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Item 1 of 40
Question Id: 12114

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The following vignette applies to the next **2** items. The items in the set must be answered in sequential order. Once you click **Proceed to Next Item**, you will not be able to add or change an answer.

A 24-year-old woman comes to the office due to a breast lump that she noticed 2 days ago. The patient's menses are regular, occurring every 26 days with 2 days of heavy bleeding and 2 days of light flow. Her last menstrual period was 3 weeks ago. She is sexually active and recently started using combined estrogen/progestin oral contraceptives. The patient is an avid jogger and wears a sports bra almost daily. Family history includes a paternal aunt diagnosed with breast cancer at age 62. Physical examination shows a 2-cm, firm, round, mobile mass in the superior outer quadrant of the right breast.

Item 1 of 2

Which of the following is the most likely diagnosis in this patient?

- A. Ductal carcinoma
- B. Fat necrosis
- C. Fibroadenoma
- D. Fibrocystic changes
- E. Galactocele
- F. Mammary duct ectasia
- G. Phyllodes tumor

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Item 1 of 40
Question Id: 12114

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Item 1 of 2

Which of the following is the most likely diagnosis in this patient?

- A. Ductal carcinoma (0%)
- B. Fat necrosis (2%)
- ✓ C. Fibroadenoma (88%)
- D. Fibrocystic changes (9%)
- E. Galactocele (0%)
- F. Mammary duct ectasia (0%)
- G. Phyllodes tumor (0%)

Omitted
Correct answer

88%
Answered correctly

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Time Spent

06/08/2020
Last Updated

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Benign breast disease	
Diagnosis	**Clinical features**
Breast cyst	• Solitary, well-circumscribed, mobile mass • ± Tenderness
Fibrocystic changes	• Multiple, diffuse nodulocystic masses • Cyclic premenstrual tenderness
Fibroadenoma	• Solitary, well-circumscribed, mobile mass • Cyclic premenstrual tenderness
Fat necrosis	• Post trauma/surgery • Firm, irregular mass • ± Ecchymosis, skin/nipple retraction

This young woman with an isolated, firm, mobile **palpable breast mass** most likely has a **fibroadenoma**, a benign breast condition common in **women age <30** and often sensitive to **estrogen**. Increased estrogen levels can cause increased fibroadenoma growth, which can make the mass more noticeable to the patient prior to menses or with initiation of combined estrogen/progestin oral contraceptives, as in this patient.

Like many benign breast masses, a fibroadenoma typically presents as a **small**, firm, **well circumscribed**, and **mobile** mass. Although fibroadenomas may present anywhere in the breast, they are usually solitary and commonly located in the **upper outer quadrant** of the breast. In contrast, a breast malignancy (eg, ductal carcinoma) is typically larger, irregularly shaped, and immobile; associated nipple discharge or lymphadenopathy may also be present **(Choice A)**.

(Choice B) Fat necrosis of the breast, which occurs due to breast injury (eg, surgery, trauma), typically presents as a unilateral, irregular, firm breast mass with possible ecchymosis of the overlying skin.

(Choice D) Fibrocystic breast changes typically cause multiple, small, cyclically tender masses and diffuse nodularity in both breasts. In contrast, this patient has a unilateral, isolated mass.

This young woman with an isolated, firm, mobile **palpable breast mass** most likely has a **fibroadenoma**, a benign breast condition common in **women age <30** and often sensitive to **estrogen**. Increased estrogen levels can cause increased fibroadenoma growth, which can make the mass more noticeable to the patient prior to menses or with initiation of combined estrogen/progestin oral contraceptives, as in this patient.

Like many benign breast masses, a fibroadenoma typically presents as a **small**, firm, **well circumscribed**, and **mobile** mass. Although fibroadenomas may present anywhere in the breast, they are usually solitary and commonly located in the **upper outer quadrant** of the breast. In contrast, a breast malignancy (eg, ductal carcinoma) is typically larger, irregularly shaped, and immobile; associated nipple discharge or lymphadenopathy may also be present **(Choice A)**.

(Choice B) Fat necrosis of the breast, which occurs due to breast injury (eg, surgery, trauma), typically presents as a unilateral, irregular, firm breast mass with possible ecchymosis of the overlying skin.

(Choice D) Fibrocystic breast changes typically cause multiple, small, cyclically tender masses and diffuse nodularity in both breasts. In contrast, this patient has a unilateral, isolated mass.

(Choice E) A galactocele is a milk retention cyst of the breast caused by an obstructed duct; it typically occurs in breastfeeding patients and is usually soft and cystic rather than firm.

(Choice F) Mammary duct ectasia can present as a unilateral, isolated breast mass; however, these benign lesions are typically subareolar (not in the upper outer quadrants) and associated with nipple discharge due to inflammation of the subareolar breast ducts.

(Choice G) Phyllodes tumors are a rare form of breast tumor that, in the early stages of growth, shares similar characteristics with fibroadenomas (ie, unilateral, isolated, firm, well circumscribed, mobile). However, phyllodes tumors typically grow much larger, resulting in changes to the shape, contour, and skin (eg, necrosis) of the affected breast.

Educational objective:
An isolated, firm, well circumscribed, and mobile breast mass in women age <30 is commonly a benign fibroadenoma.

References

- Practice bulletin no. 164: diagnosis and management of benign breast disorders.

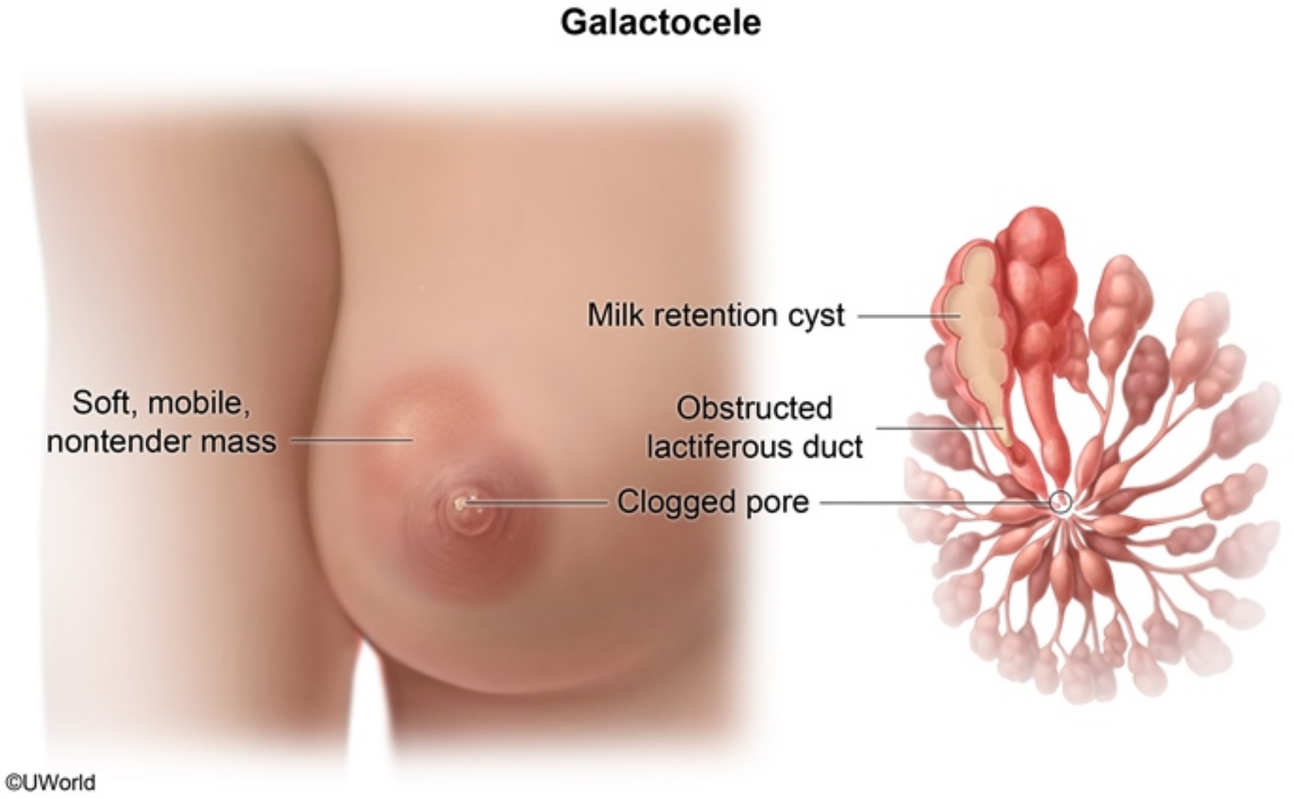
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Item 2 of 2

Which of the following is the best next step in management of this patient's breast mass?

A. Excisional biopsy
B. Mammography
C. MRI of the breast
D. No further workup indicated
E. Ultrasonography

Submit

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Item 2 of 2

Which of the following is the best next step in management of this patient's breast mass?

A. Excisional biopsy (2%)
B. Mammography (3%)
C. MRI of the breast (0%)
D. No further workup indicated (38%)
✓ E. Ultrasonography (55%)

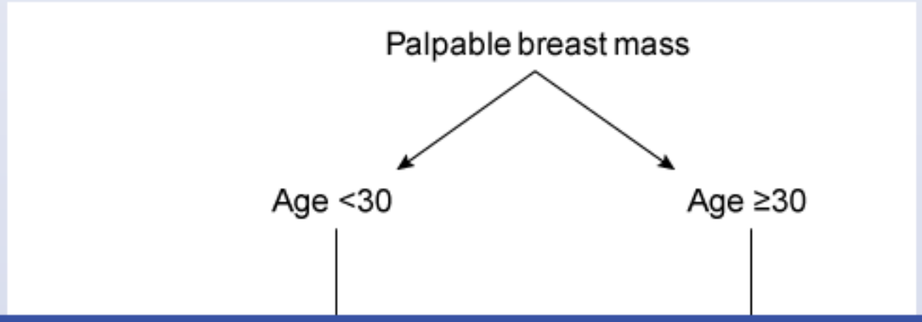
Omitted
Correct answer
E

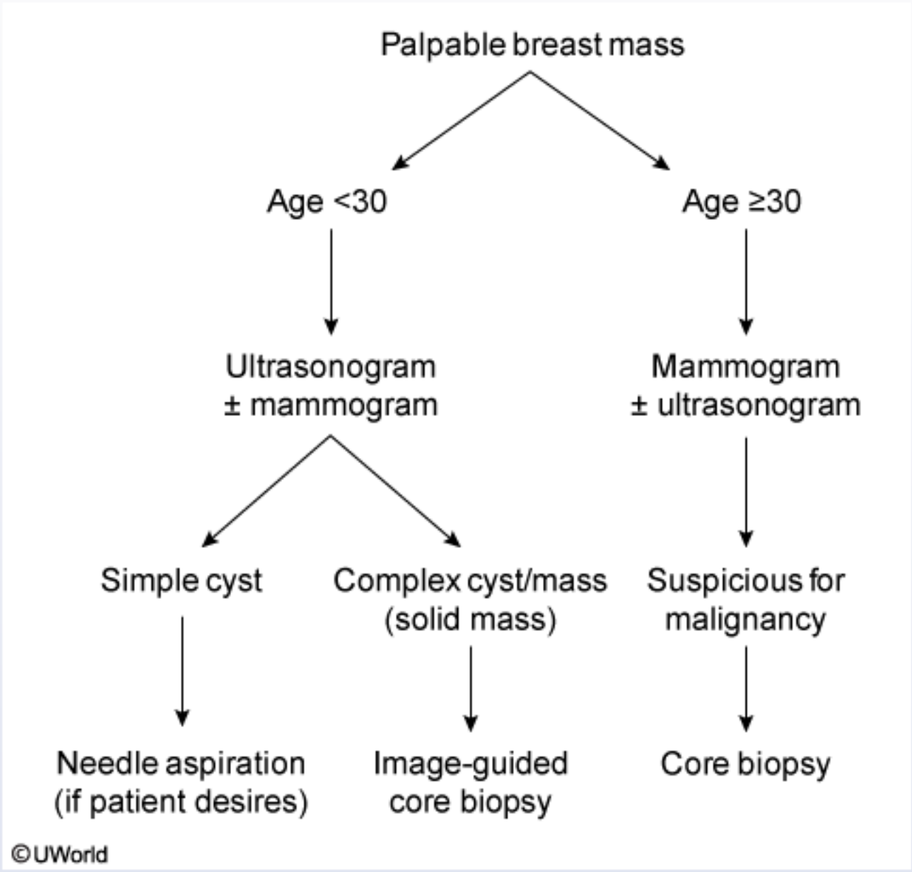
55%
Answered correctly

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06/08/2020
Last Updated

Explanation





In young women, **solitary palpable breast masses** are often benign (eg, fibroadenoma). Further evaluation depends on patient age and risk factors: In adolescents with a **suspected fibroadenoma**, reassurance and reexamination after the next menstrual cycle may be appropriate. However, adults with a palpable breast mass (such as this 24-year-old patient) require further evaluation with imaging because history and physical examination alone cannot reliably diagnose or exclude cancer in this population **(Choice D)**.

In **women age <30**, initial assessment of a palpable breast mass is with **breast ultrasound**. In this age group, ultrasound is better able to distinguish between cystic (typically benign) and solid (potentially malignant) masses. If breast ultrasound findings are concerning for malignancy

In young women, **solitary palpable breast masses** are often benign (eg, fibroadenoma). Further evaluation depends on patient age and risk factors: In adolescents with a **suspected fibroadenoma**, reassurance and reexamination after the next menstrual cycle may be appropriate. However, adults with a palpable breast mass (such as this 24-year-old patient) require further evaluation with imaging because history and physical examination alone cannot reliably diagnose or exclude cancer in this population **(Choice D)**.

In **women age <30**, initial assessment of a palpable breast mass is with **breast ultrasound**. In this age group, ultrasound is better able to distinguish between cystic (typically benign) and solid (potentially malignant) masses. If breast ultrasound findings are concerning for malignancy (eg, solid, complex-appearing), mammography may then be used as an adjunctive study.

(Choice A) Breast masses concerning for malignancy on ultrasound or mammography require biopsy, which is typically with image-guided core needle biopsy. Excisional biopsies (eg, lumpectomies) are typically reserved for patients with an abnormal core needle biopsy result or for symptomatic relief of large, growing, benign breast lesions.

(Choice B) Mammography, which is used for initial assessment in women age ≥30, is inferior in patients age <30 due to increased breast tissue density, which can cause false positives on mammography and lead to unnecessary biopsies.

(Choice C) Breast MRI is used to assess for metastatic disease in patients with diagnosed breast cancer or as breast cancer screening in high-risk patients (eg, *BRCA* carrier). It is not used to evaluate a new breast mass because MRI has high sensitivity but low specificity for breast cancer (ie, both benign and malignant masses appear enhanced).

Educational objective:
Palpable breast masses in women age <30 are initially evaluated with breast ultrasound due to increased density of breast tissue. Solid or complex-appearing masses on ultrasound may require additional imaging (eg, mammography) or biopsy to exclude malignancy.

References

- Practice bulletin no. 164: diagnosis and management of benign breast disorders.
- An evaluation of ultrasound features of breast fibroadenoma.

Surgery	Female Reproductive System & Breast	Breast mass
Subject	System	Topic

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Item 3 of 40
Question Id: 2966

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A 52-year-old man comes to the physician for a regular health check-up. He is a chronic smoker and has consumed 1 to 2 beers 2 to 3 times a week for the past 10 years. He also drinks 6 to 7 cups of coffee daily. The patient was diagnosed with type 2 diabetes mellitus 5 years ago and takes metformin. Blood pressure is 130/80 mm Hg and body mass index is 29 kg/m^2. Random blood sugar is 190 mg/dL. His older brother died of pancreatic cancer at age 58, and the patient is worried that he might also develop pancreatic cancer. Which of the following interventions would have the greatest impact on decreasing this patient's risk of pancreatic cancer?

A. Achieve better glycemic control with insulin
B. Stop alcohol intake
C. Stop coffee intake
D. Stop metformin
E. Stop smoking

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Question Id: 2966

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A 52-year-old man comes to the physician for a regular health check-up. He is a chronic smoker and has consumed 1 to 2 beers 2 to 3 times a week for the past 10 years. He also drinks 6 to 7 cups of coffee daily. The patient was diagnosed with type 2 diabetes mellitus 5 years ago and takes metformin. Blood pressure is 130/80 mm Hg and body mass index is 29 kg/m^2. Random blood sugar is 190 mg/dL. His older brother died of pancreatic cancer at age 58, and the patient is worried that he might also develop pancreatic cancer. Which of the following interventions would have the greatest impact on decreasing this patient's risk of pancreatic cancer?

A. Achieve better glycemic control with insulin (1%)
B. Stop alcohol intake (21%)
C. Stop coffee intake (0%)
D. Stop metformin (0%)
✓ E. Stop smoking (76%)

Omitted
Correct answer
E

76%
Answered correctly

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Time Spent

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Last Updated

Explanation

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Major risk factors for pancreatic cancer	
Hereditary	• First-degree relative with pancreatic cancer • Hereditary pancreatitis • Germline mutations (eg, BRCA1, BRCA2, Peutz-Jeghers syndrome)
Environmental	• Cigarette smoking (most significant) • Obesity, low physical activity • Nonhereditary chronic pancreatitis

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Pancreatic cancer is the 4th leading cause of cancer deaths in the United States. Adenocarcinoma is the most common tissue type. Pancreatic cancer usually occurs after age 45 and is more common in men and African American patients. However, it is usually diagnosed relatively late in the disease course and has a high mortality rate (98% in some studies). The major hereditary risk factors for pancreatic cancer include first-degree relatives with pancreatic cancer, hereditary pancreatitis, and germline mutations (eg, BRCA1, BRCA2, Peutz-Jeghers syndrome).

Environmental risk factors include **cigarette smoking**, nonhereditary **chronic pancreatitis**, and **obesity** with low physical activity. Cigarette smoking is the most consistent reversible risk factor for pancreatic cancer. The risk of cancer increases significantly with the number of cigarettes consumed, and heavy smokers have nearly 2-3 times higher risk than nonsmokers. Some studies estimate that smoking cessation could reduce pancreatic cancer deaths by 25%.

(Choices A and D) Long-standing diabetes is a risk factor for pancreatic cancer, and conversely, new-onset diabetes is often a sign of occult pancreatic cancer. The effect of diabetic treatment on pancreatic cancer risk is variable; insulin and insulin secretagogues (eg, sulfonylureas) are associated with an increased risk, whereas metformin is associated with a lower risk. Neither discontinuing metformin nor initiating insulin would be likely to lower this patient's cancer risk, regardless of improved glycemic control.

(Choices B and C) Studies have not shown a significantly decreased incidence of pancreatic cancer with alcohol or caffeine reduction. Heavy

Pancreatic cancer is the 4th leading cause of cancer deaths in the United States. Adenocarcinoma is the most common tissue type. Pancreatic cancer usually occurs after age 45 and is more common in men and African American patients. However, it is usually diagnosed relatively late in the disease course and has a high mortality rate (98% in some studies). The major hereditary risk factors for pancreatic cancer include first-degree relatives with pancreatic cancer, hereditary pancreatitis, and germline mutations (eg, BRCA1, BRCA2, Peutz-Jeghers syndrome).

Environmental risk factors include **cigarette smoking**, nonhereditary **chronic pancreatitis**, and **obesity** with low physical activity. Cigarette smoking is the most consistent reversible risk factor for pancreatic cancer. The risk of cancer increases significantly with the number of cigarettes consumed, and heavy smokers have nearly 2-3 times higher risk than nonsmokers. Some studies estimate that smoking cessation could reduce pancreatic cancer deaths by 25%.

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(Choices B and C) Studies have not shown a significantly decreased incidence of pancreatic cancer with alcohol or caffeine reduction. Heavy alcohol use can lead to chronic pancreatitis, which is associated with a slightly higher risk of pancreatic cancer. However, this is not as significant as the association between smoking and pancreatic cancer. In addition, this patient is not a heavy alcohol consumer.

Educational objective:
Pancreatic cancer can be due to hereditary (eg, first-degree relative with pancreatic cancer, hereditary pancreatitis) or environmental (eg, cigarette smoking, obesity) risk factors. Cigarette smoking is the most consistent reversible risk factor for pancreatic cancer.

References

- Cigarette smoking and pancreatic cancer: an analysis from the International Pancreatic Cancer Case-Control Consortium (PanC4).
- The epidemiology of pancreatitis and pancreatic cancer.
- Alcohol intake and pancreatic cancer: a pooled analysis from the Pancreatic Cancer Cohort Consortium (PanScan).

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A 50-year-old man comes to the office due to a few weeks of fatigue and back pain. The patient has a history of hypertension and major depressive disorder. He does not use alcohol or intravenous drugs. The patient emigrated from Vietnam with his family when he was a child. BMI is 21 kg/m^2. Vital signs are within normal limits. Physical examination reveals temporal wasting. Cardiopulmonary examination is normal, and no abdominal masses or tenderness is present. Spine palpation reveals significant pain over a mid-lumbar spinous process. There are no palpable testicular lesions, and digital rectal examination reveals a smooth, normal-sized prostate. Laboratory results are as follows:

Complete blood count	
Hemoglobin	10.8 g/dL
Platelets	221,000/mm^3
Leukocytes	7,100/mm^3
Serum chemistry	
Creatinine	1.6 mg/dL
Liver function studies	
Albumin	3.1 g/dL
Alkaline phosphatase	1270 U/L
Aspartate aminotransferase (SGOT)	12 U/L
Alanine aminotransferase (SGPT)	84 U/L
Blood, plasma, and serum	
Alpha-fetoprotein, serum	1735 ng/mL (normal: <10 ng/mL)

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Liver function studies

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Alanine aminotransferase (SGPT)	84 U/L

Blood, plasma, and serum

Alpha-fetoprotein, serum	1735 ng/mL (normal: <10 ng/mL)
Prostate-specific antigen, serum	1.2 ng/mL (normal: <3.5 ng/mL)

Spine imaging shows osseous blastic and lytic lesions in multiple vertebral bodies. Which of the following is the most likely diagnosis?

A. Cholangiocarcinoma
B. Hepatocellular carcinoma
C. Multiple myeloma
D. Prostate cancer
E. Renal cell carcinoma
F. Testicular cancer

Submit

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Liver function studies

Albumin	3.1 g/dL
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Prostate-specific antigen, serum	1.2 ng/mL (normal: <3.5 ng/mL)

Spine imaging shows osseous blastic and lytic lesions in multiple vertebral bodies. Which of the following is the most likely diagnosis?

- A. Cholangiocarcinoma (15%)
- ✓ B. Hepatocellular carcinoma (52%)
- C. Multiple myeloma (17%)
- D. Prostate cancer (3%)
- E. Renal cell carcinoma (3%)
- F. Testicular cancer (8%)

Omitted
Correct answer

52%
Answered correctly

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03/28/2020
Last Updated

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Explanation

This patient's back pain, cachexia, elevated alkaline phosphatase, and multiple osteoblastic/osteolytic vertebral lesions likely indicate metastatic cancer of the spine. Although a wide range of cancers metastasize to the spine, the presence of **elevated alpha-fetoprotein** (AFP), a glycoprotein produced by the fetal liver and yolk sac, raises strong suspicion for primary testicular (yolk sac) or liver (**hepatocellular carcinoma** [HCC]) cancer. This patient's normal testicular examination, older age, and emigration from Vietnam make HCC most likely.

HCC usually arises in the setting of chronic liver inflammation due to alcohol abuse, environmental toxins (eg, aflatoxin, betel nut chewing), or **viral hepatitis** (eg, hepatitis B virus [HBV], hepatitis C virus [HCV]). Incidence is greatest in Asia (eg, **Vietnam**), Africa, and the Middle East due to high rates of underlying HBV/HCV infection. In these regions, viral transmission often occurs via the **maternal-to-child** route, leading lifelong viral hepatitis in the newborn (and increased risk of cirrhosis/HCC later in life).

Patients with HCC often develop systemic (eg, weight loss, fatigue), abdominal (eg, right upper quadrant pain, early satiety), or metastatic (eg, bone pain) manifestations. Liver function tests may be normal or elevated; alkaline phosphatase is occasionally dramatically elevated due to osteoblastic bone metastases (as in this case). Significant elevation in alpha-fetoprotein raises strong suspicion for HCC but is present only in ~50% of cases.

(Choice A) Cholangiocarcinoma, a tumor of the bile duct epithelium, often causes elevated alkaline phosphatase (from biliary obstruction). However, this tumor is associated with CA 19-9 and CEA elevations, not alpha-fetoprotein elevation.

(Choices C and E) Although multiple myeloma and renal cell cancer often spread to the spine, they usually cause purely osteolytic (not mixed osteolytic/osteoblastic) lesions. Therefore, alkaline phosphatase is usually normal (serum concentrations of this enzyme elevate in the setting of osteogenesis, not osteolysis). AFP elevations are rare. This patient's elevated creatinine is most likely from chronic hypertension rather than renal cell cancer or multiple myeloma.

(Choice D) Although prostate cancer often causes elevated alkaline phosphatase (due to osteoblastic bone metastases), most cases are marked by a prostatic nodule on digital rectal examination and/or elevated prostate-specific antigen.

(Choice F) Although nonseminomatous germ cell tumors (that contain yolk sac cells) are often associated with elevated AFP and frequently spread to bone, most testicular cancers occur in males age 15-35 and are marked by unilateral testicular swelling or nodules.

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However, this tumor is associated with CA 19-9 and CEA elevations, not alpha-fetoprotein elevation.

(Choices C and E) Although multiple myeloma and renal cell cancer often spread to the spine, they usually cause purely osteolytic (not mixed osteolytic/osteoblastic) lesions. Therefore, alkaline phosphatase is usually normal (serum concentrations of this enzyme elevate in the setting of osteogenesis, not osteolysis). AFP elevations are rare. This patient's elevated creatinine is most likely from chronic hypertension rather than renal cell cancer or multiple myeloma.

(Choice D) Although prostate cancer often causes elevated alkaline phosphatase (due to osteoblastic bone metastases), most cases are marked by a prostatic nodule on digital rectal examination and/or elevated prostate-specific antigen.

(Choice F) Although nonseminomatous germ cell tumors (that contain yolk sac cells) are often associated with elevated AFP and frequently spread to bone, most testicular cancers occur in males age 15-35 and are marked by unilateral testicular swelling or nodules.

Educational objective:
Hepatocellular carcinoma usually arises due to chronic liver inflammation from viral hepatitis, alcoholism, or environmental toxins. Incidence is greatest in regions that have high rates of hepatitis B and C virus infection, such as Asia, Africa, and the Middle East. Approximately 50% of HCC cases are associated with dramatic elevations in alpha-fetoprotein.

References

- Frequency, morbidity, and mortality of bone metastases in advanced hepatocellular carcinoma.
- Estimations of worldwide prevalence of chronic hepatitis B virus infection: a systematic review of data published between 1965 and 2013.
- Performance of seruma-fetoprotein levels in the diagnosis of hepatocellular carcinoma in patients with a hepatic mass.
- Radiographic characteristics of bone metastases from hepatocellular carcinoma.

Surgery	Gastrointestinal & Nutrition	Hepatocellular cancer
Subject	System	Topic

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Question Id: 2590

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A 21-year-old African American male comes to emergency department with a six week history of progressive shortness of breath and cough. He wheezes at night and has to sit up to relieve his chest discomfort. He has no other medical problems. He does not take any medications. He denies use of tobacco, alcohol or drugs. A CT of the chest reveals a mediastinal mass compressing the trachea. Serum levels of alpha-fetoprotein and beta human chorionic gonadotropin are elevated. Which of the following is the most likely diagnosis?

A. High-grade lymphoma
B. Mixed germ cell tumor
C. Seminoma
D. Small cell neuroendocrine tumor
E. Thymoma

Submit

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Item 5 of 40
Question Id: 2590

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A 21-year-old African American male comes to emergency department with a six week history of progressive shortness of breath and cough. He wheezes at night and has to sit up to relieve his chest discomfort. He has no other medical problems. He does not take any medications. He denies use of tobacco, alcohol or drugs. A CT of the chest reveals a mediastinal mass compressing the trachea. Serum levels of alpha-fetoprotein and beta human chorionic gonadotropin are elevated. Which of the following is the most likely diagnosis?

A. High-grade lymphoma (5%)
✓ B. Mixed germ cell tumor (60%)
C. Seminoma (18%)
D. Small cell neuroendocrine tumor (5%)
E. Thymoma (9%)

Omitted
Correct answer
B

60%
Answered correctly

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04/06/2020
Last Updated

Explanation

The differential diagnosis for an anterior mediastinal mass includes the "4 T's": thymoma, teratoma, thyroid neoplasm, and terrible lymphoma. Within the category of teratoma, one must also include other germ cell tumors. Teratomas can often be distinguished from other germ cell tumors on imaging by the presence of fat or calcium, particularly if in the form of a tooth. Serum hormone levels may be helpful in differentiating seminomatous germ cell tumors from nonseminomatous variants. Serum β-HCG can be elevated in 1/3 of patients with a seminoma, although the AFP is essentially always normal. Nonseminomatous forms of germ cell tumors include yolk sac tumor, choriocarcinoma, and embryonal

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Explanation

The differential diagnosis for an anterior mediastinal mass includes the "4 T's": thymoma, teratoma, thyroid neoplasm, and terrible lymphoma. Within the category of teratoma, one must also include other germ cell tumors. Teratomas can often be distinguished from other germ cell tumors on imaging by the presence of fat or calcium, particularly if in the form of a tooth. Serum hormone levels may be helpful in differentiating seminomatous germ cell tumors from nonseminomatous variants. Serum β-HCG can be elevated in 1/3 of patients with a seminoma, although the AFP is essentially always normal. Nonseminomatous forms of germ cell tumors include yolk sac tumor, choriocarcinoma, and embryonal carcinoma. A mixture of different cell types is also possible and is referred to as a mixed germ cell tumor. Most patients with a nonseminomatous germ cell tumor have an elevated AFP, with a considerable amount also having an elevated β-HCG.

(Choice A) Lymphoma is unlikely in this case given the elevated β-HCG and AFP.

(Choice C) While seminomas often cause an elevated β-HCG, the AFP is essentially always normal.

(Choice D) Small cell neuroendocrine tumors may present as a lung mass, but an isolated anterior mediastinal mass would be unusual.

(Choice E) Thymomas may have a similar imaging appearance to germ cell tumors, but the β-HCG and AFP levels should be normal.

Educational objective:
The differential diagnosis for an anterior mediastinal mass includes the "4 T's": thymoma, teratoma (and other germ cell tumors), thyroid neoplasm, and terrible lymphoma. Seminomas may cause an elevated β-HCG, but the AFP is essentially always normal. Nonseminomatous germ cell tumors often have an elevated AFP, with a considerable number also having an elevated β-HCG.

Surgery	Hematology & Oncology	Extragonadal germ cell tumor
Subject	System	Topic

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A 25-year-old man is brought to the emergency department following a high-speed motorcycle collision. The patient is alert and in distress due to pain. Blood pressure is 84/52 mm Hg and pulse is 130/min. The airway is patent, the trachea is midline, and breath sounds are present bilaterally. Heart sounds are normal. There is bruising across the left chest wall, the lower abdomen, and the left flank. The abdomen is soft and mildly tender to palpation diffusely, without rebound tenderness. The bony pelvis is unstable to gentle downward pressure. The left lower leg is visibly deformed but distal lower extremity capillary refill is symmetric. There is blood present at the urethral meatus. Chest x-ray reveals multiple rib fractures without pneumothorax. Focused Assessment with Sonography for Trauma reveals no pericardial effusion or intraperitoneal free fluid. Portable anteroposterior pelvic x-ray is shown in the image below:



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In addition to resuscitation with IV crystalloid and/or blood products, which of the following is the best next step in management of this patient?

A. CT scan of the abdomen and pelvis
B. Placement of a pelvic binder
C. Plain radiographs of the left tibia and fibula
D. Reduction of the lower leg deformity
E. Retrograde cystourethrogram

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Item 6 of 40
Question Id: 16331

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In addition to resuscitation with IV crystalloid and/or blood products, which of the following is the best next step in management of this patient?

- A. CT scan of the abdomen and pelvis (18%)
- ✓ B. Placement of a pelvic binder (38%)
- C. Plain radiographs of the left tibia and fibula (0%)
- D. Reduction of the lower leg deformity (1%)
- E. Retrograde cystourethrogram (40%)

Omitted
Correct answer

38%
Answered correctly

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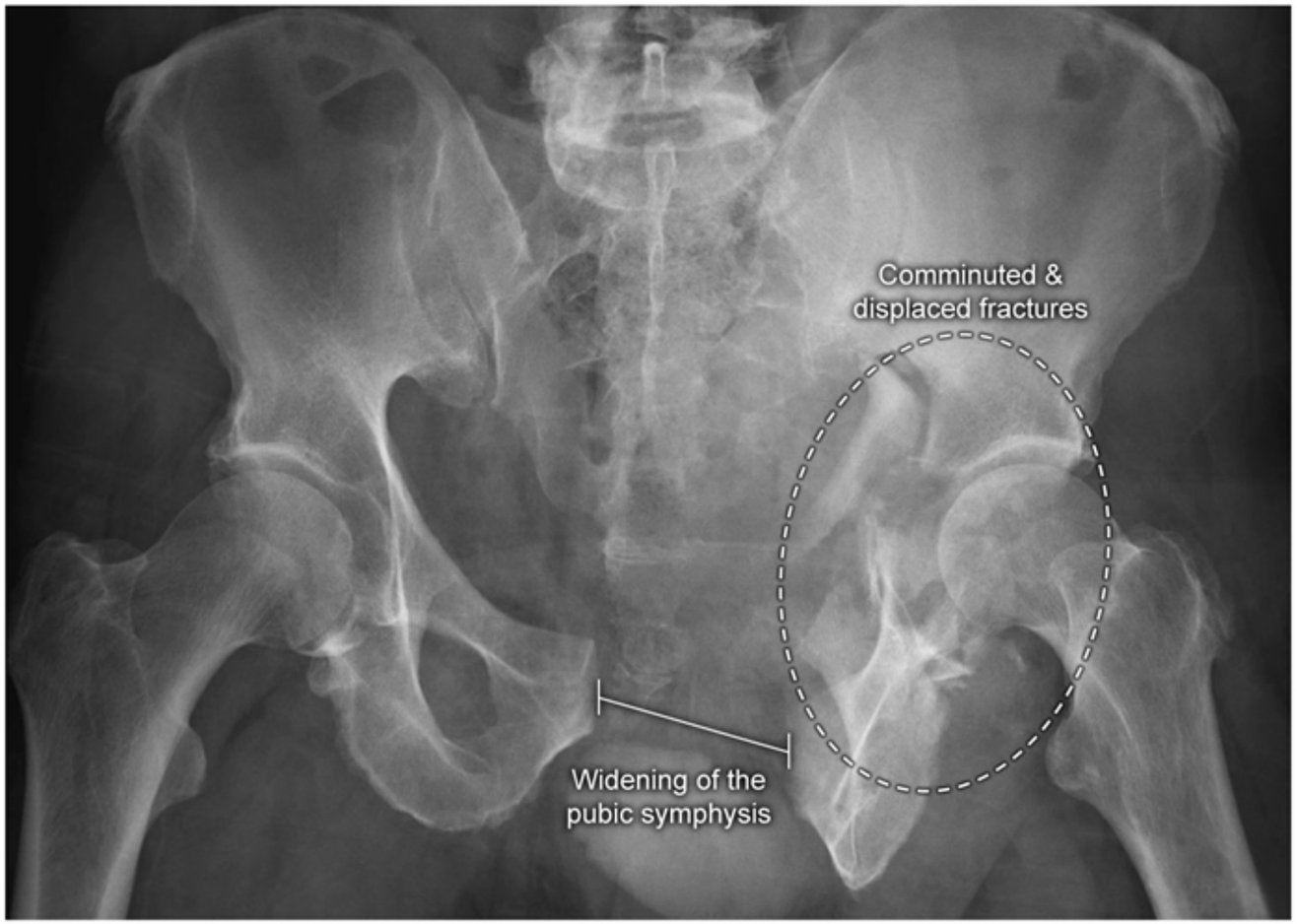
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Open book pelvic fracture



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This trauma patient has shock (eg, severe hypotension and tachycardia) in the setting of **severe pelvic fracture** (eg, unstable pelvis on palpation, pelvic ring disruption on x-ray) with accompanying signs of retroperitoneal hemorrhage (eg, flank ecchymosis). To prevent exsanguination during

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30

This trauma patient has shock (eg, severe hypotension and tachycardia) in the setting of **severe pelvic fracture** (eg, unstable pelvis on palpation, pelvic ring disruption on x-ray) with accompanying signs of retroperitoneal hemorrhage (eg, flank ecchymosis). To prevent exsanguination during ongoing resuscitation efforts and evaluation, a pelvic binder should be immediately placed.

Patients with severe pelvic fractures, such as this open-book pelvic fracture (ie, pelvic ring disruption with anterior widening), are at risk for **life-threatening hemorrhage**. Hemorrhage is typically caused by the tearing of the thin-walled **venous plexus** (presacral, lumbar) but rarely may involve the iliac vessels. Resultant bleeding can both fill the expanded pelvic volume (from widening of the pelvic ring) and extend into the retroperitoneum. Therefore, rapid, external stabilization with a **pelvic binder** should be performed as soon as possible in hemodynamically unstable (ie, systolic blood pressure <90 mm Hg) patients, such as this one; this **decreases pelvic volume** and promotes **tamponade** of venous **bleeding**.

(Choices A and E) The eventual workup of this patient will likely include CT scan of the abdomen and pelvis to assess for intraabdominal injury and provide three-dimensional visualization of the pelvic fractures. Retrograde cystourethrogram will also be indicated to assess for urethral injury, especially given the finding of blood at the urethral meatus. However, because this patient is currently hemodynamically unstable, hemorrhage control (eg, pelvic binder) and resuscitation should be performed first to stabilize the patient prior to any diagnostic testing that requires transport away from the trauma bay.

(Choices C and D) This patient with a left lower leg deformity will likely undergo plain radiographs of the left tibia and fibula and reduction of the lower leg deformity (eg, temporary splinting) following stabilization. However, hemorrhage control (eg, pelvic binder) and resuscitation should be performed first. Patients are more likely to lose large amounts of blood into the pelvis (eg, up to the entire blood volume) or thigh (eg, up to 1-2 L) compared to the lower leg.

Educational objective:
Pelvic fractures, especially those with pelvic ring disruption, can cause life-threatening hemorrhage from vascular (eg, venous plexus) injury. Pelvic binder application can decrease pelvic volume and promote tamponade of bleeding.

References

- Pelvic trauma: WSES classification and guidelines.
- Western Trauma Association Critical Decisions in Trauma: management of pelvic fracture with hemodynamic instability – 2016 updates

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Question Id: 4640

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A 25-year-old man comes to the office with pain over the intergluteal region. The pain has been present for several weeks and makes him uncomfortable when he sits at his desk at work. He has also noticed intermittent swelling with mucoid discharge, which recently became blood-tinged. The patient has no fever or chills. Bowel movements are regular and he has no urinary symptoms. His medical history is significant for an appendectomy 2 years ago. He works as a computer programmer. The patient is sexually active with a female partner. Temperature is 37 C (98.6 F), blood pressure is 123/79 mm Hg, and pulse is 78/min. BMI is 34 kg/m^2. Examination shows a tender mass near the tip of the coccyx that drains mucoid fluid with pressure. The remainder of the examination shows no abnormalities. Which of the following is the most likely diagnosis?

- A. Folliculitis
- B. Hidradenitis suppurativa
- C. Perianal abscess
- D. Perianal Crohn disease
- E. Pilonidal disease
- F. Squamous cell carcinoma

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A 25-year-old man comes to the office with pain over the intergluteal region. The pain has been present for several weeks and makes him uncomfortable when he sits at his desk at work. He has also noticed intermittent swelling with mucoid discharge, which recently became blood-tinged. The patient has no fever or chills. Bowel movements are regular and he has no urinary symptoms. His medical history is significant for an appendectomy 2 years ago. He works as a computer programmer. The patient is sexually active with a female partner. Temperature is 37 C (98.6 F), blood pressure is 123/79 mm Hg, and pulse is 78/min. BMI is 34 kg/m^2. Examination shows a tender mass near the tip of the coccyx that drains mucoid fluid with pressure. The remainder of the examination shows no abnormalities. Which of the following is the most likely diagnosis?

A. Folliculitis (4%)
B. Hidradenitis suppurativa (7%)
C. Perianal abscess (16%)
D. Perianal Crohn disease (1%)
✓ E. Pilonidal disease (69%)
F. Squamous cell carcinoma (0%)

Omitted
Correct answer
E

69%
Answered correctly

02 secs
Time Spent

03/23/2020
Last Updated

Explanation

This patient with subacute pain over the midline sacrococcygeal with mucoid and bloody drainage most likely has **pilonidal disease** (PD). PD

This patient with subacute pain over the midline sacrococcygeal with mucoid and bloody drainage most likely has **pilonidal disease** (PD). PD most frequently affects individuals age 15-30, particularly **young males**, **obese** individuals, those with **sedentary lifestyles** or occupations, and those with deep gluteal clefts. The most common presenting manifestations include a painful, **fluctuant mass** 4-5 cm cephalad to the anus in the **intergluteal region** with associated mucoid, purulent, or bloody drainage. Pain is frequently worsened by activities that stretch the overlying skin (eg, bending down).

PD develops when an edematous, infected hair follicle in the intergluteal region becomes occluded. The infection spreads subcutaneously and forms an abscess, which can rupture and create a pilonidal sinus tract. As the patient sits or stands, hair and debris are forced into the sinus tract, resulting in recurrent infections and foreign-body reactions. Treatment is drainage of abscesses and collected debris followed by excision of sinus tracts. Despite longer healing times, open closure is preferred due to decreased recurrence rates.

(Choice A) Although folliculitis is part of the initial pathophysiology of PD, it most frequently presents with multiple small, pruritic pustules, not a fluctuant, tender mass.

(Choice B) Hidradenitis suppurativa (HS), PD, dissecting folliculitis of the scalp, and acne conglobata are members of the follicular occlusion tetrad. Patients with HS typically have multiple, recurrent, painful nodules in the axillae, inguinal folds, and perineal areas as opposed to a single, fluctuant mass. Moreover, the lesions of PD are usually midline in the gluteal clefts, whereas HS can occur at any location in intertriginous areas.

(Choice C) A perianal abscess presents with fever, malaise, anal pain, and a tender, erythematous bulge at the anal verge. This patient is afebrile, and his pain and swelling are located superior to the anus over the coccyx (4-5 cm cephalad to the anus).

(Choice D) Perianal Crohn disease commonly presents with fistulas, fissures, or abscesses. However, fistulas, which are the result of abscesses spreading into the soft tissues, are typically located closer to the anus and present as single or multiple openings draining purulent material. Fissures usually manifest as painful ulcers, which are exacerbated by defecation.

(Choice F) Squamous cell carcinoma may present as a thin, erythematous plaque with well-defined irregular borders and an overlying scale or as firm, indurated nodules. Drainage of purulent or bloody material is not common.

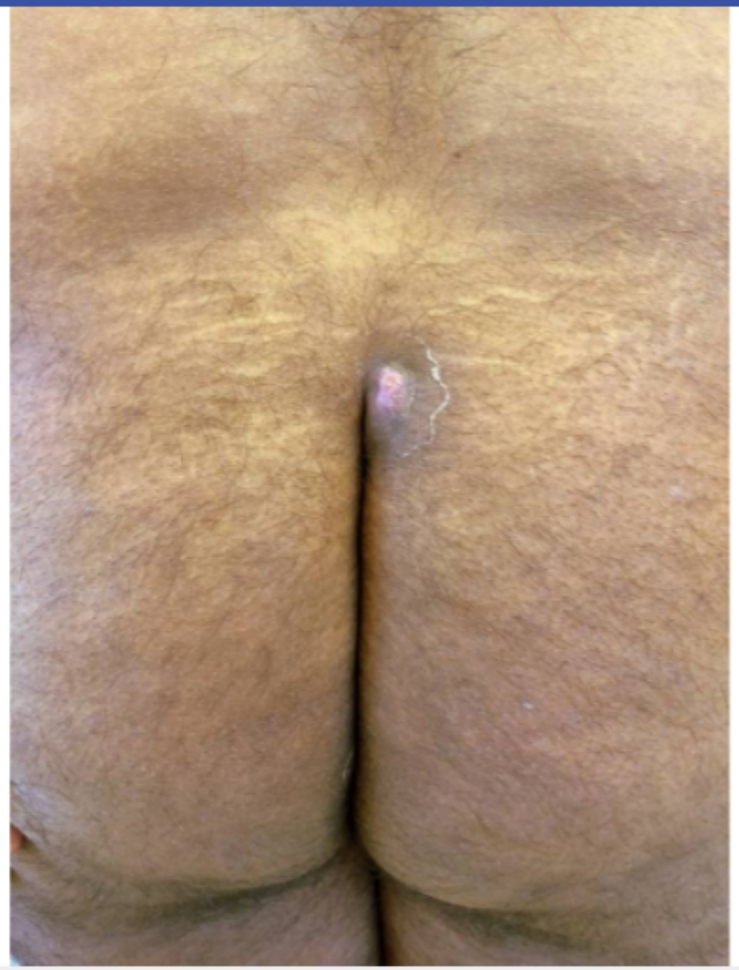
Educational objective:
Pilonidal disease most frequently affects males age 15-30, particularly obese individuals, those with sedentary lifestyles or occupations, and those with deep gluteal clefts. The most common presenting symptoms include a painful, fluctuant mass 4-5 cm cephalad to the anus in the intergluteal

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This patient with subacute pain over the midline sacrococcygeal with mucoid and bloody drainage most likely has **pilonidal disease** (PD). PD

Exhibit Display



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with deep gluteal clefts. The most common presenting symptoms include a painful, fluctuant mass 4-5 cm cephalad to the anus in the intergluteal

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This patient with subacute pain over the midline sacrococcygeal with mucoid and bloody drainage most likely has **pilonidal disease** (PD). PD

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with deep gluteal clefts. The most common presenting symptoms include a painful, fluctuant mass 4-5 cm cephalad to the anus in the intergluteal

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This patient with subacute pain over the midline sacrococcygeal with mucoid and bloody drainage most likely has **pilonidal disease** (PD). PD

Exhibit Display



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fluctuant, tender mass.

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(Choice F) Squamous cell carcinoma may present as a thin, erythematous plaque with well-defined irregular borders and an overlying scale or as firm, indurated nodules. Drainage of purulent or bloody material is not common.

Educational objective:
Pilonidal disease most frequently affects males age 15-30, particularly obese individuals, those with sedentary lifestyles or occupations, and those with deep gluteal clefts. The most common presenting symptoms include a painful, fluctuant mass 4-5 cm cephalad to the anus in the intergluteal region with associated mucoid, purulent, or bloody drainage.

References

- Pilonidal disease.
- Pilonidal sinus: a comparative study of treatment methods.

Surgery	Gastrointestinal & Nutrition	Pilonidal disease
Subject	System	Topic

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Question Id: 16215

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A 66-year-old man comes to the office due to a sore throat over the last 3 months. The pain in the throat is worsening and is particularly noticeable when the patient swallows. He thought the pain was related to tonsil stones and tried picking them out with toothpicks and gargling with salt water after meals, but this did not relieve the pain. The patient has noticed an ulcer on the right tonsil that bleeds when he touches it. Medical history is significant for chronic obstructive pulmonary disease, for which he uses multiple inhalers. The patient has smoked 2 packs of cigarettes daily for the past 50 years. Vital signs are within normal limits. Ear examination is normal. The nasal mucosa is dry, and examination of the oral cavity shows poor dentition with no lesions. Oropharyngeal examination shows an enlarged, firm right tonsil with a 1-cm ulceration with surrounding fibrinous debris. The left tonsil has several small tonsil stones without surrounding inflammation. There is no cervical adenopathy. Biopsy of this lesion would most likely reveal which of the following?

- A. Adenocarcinoma
- B. Aphthous ulcer
- C. Non-Hodgkin lymphoma
- D. Pemphigus vulgaris
- E. Small cell carcinoma
- F. Squamous cell carcinoma

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- A. Adenocarcinoma (6%)
- B. Aphthous ulcer (5%)
- C. Non-Hodgkin lymphoma (1%)
- D. Pemphigus vulgaris (0%)
- E. Small cell carcinoma (0%)
- ✓ F. Squamous cell carcinoma (85%)

Omitted
Correct answer
F

85%
Answered correctly

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Last Updated

Explanation

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An **ulcerated tonsillar** lesion in a patient with a long smoking history is highly suspicious for oropharyngeal **squamous cell carcinoma** (SCC). Oropharyngeal SCC may present with **sore throat** and odynophagia due to tumor invasion or local irritation. Lesions often ulcerate and can be friable (eg, bleeding to light touch). Other manifestations include referred otalgia or an isolated neck mass (representing regional nodal spread of disease).

Traditional risk factors for oropharyngeal SCC include age >40, **tobacco use**, alcohol use, and immunocompromised status. There has also been a dramatic increase in oropharyngeal cancer due to human papillomavirus (HPV), which may be seen in younger, nonsmoking patients. This patient should undergo biopsy of the tonsil lesion with evaluation of HPV status as well as neck imaging (eg, CT scan) to characterize the lesion and any associated nodal metastasis.

Tonsil stones (tonsilloliths)—commonly occurring concretions of food, cellular, and bacterial debris—are not known to be risk factors for oropharyngeal SCC and can be managed with gentle removal (eg, gargling with salt water). However, frequent patient manipulation (eg, with toothpicks) can cause mucosal trauma, which may be mistaken as an ulcerated neoplasm.

(Choice A) A tonsil malignancy is unlikely to be adenocarcinoma. Lung adenocarcinoma shares some risk factors (eg, smoking, age) and possible presenting symptoms (eg, cough, hemoptysis) with oropharyngeal SCC, but it does not metastasize to the tonsil.

(Choice B) Aphthous ulcers are common, painful ulcers that typically present with an erythematous border and a white membrane covering the ulcer. However, they typically resolve in 1-2 weeks and are usually seen in the oral cavity (eg, tongue, buccal mucosa) rather than the oropharynx (tonsil).

(Choice C) Although non-Hodgkin lymphoma rarely can present in a tonsil, it is much less common than head and neck SCC. It would also cause tonsillar enlargement rather than ulceration and is usually seen in patients with immunosuppression or autoimmune diseases.

(Choice D) Pemphigus vulgaris is an autoimmune disease characterized by painful blisters of the skin and mucous membranes. Although it is seen in middle-aged and older adults and can present with mucosal ulcerations, the pain would likely be more severe, there would be multiple ulcerations, and skin blistering would be evident as well.

(Choice E) Small cell carcinoma is a neuroendocrine lung tumor that occurs almost exclusively in smokers. However, it is not seen in the tonsil.

Educational objective:

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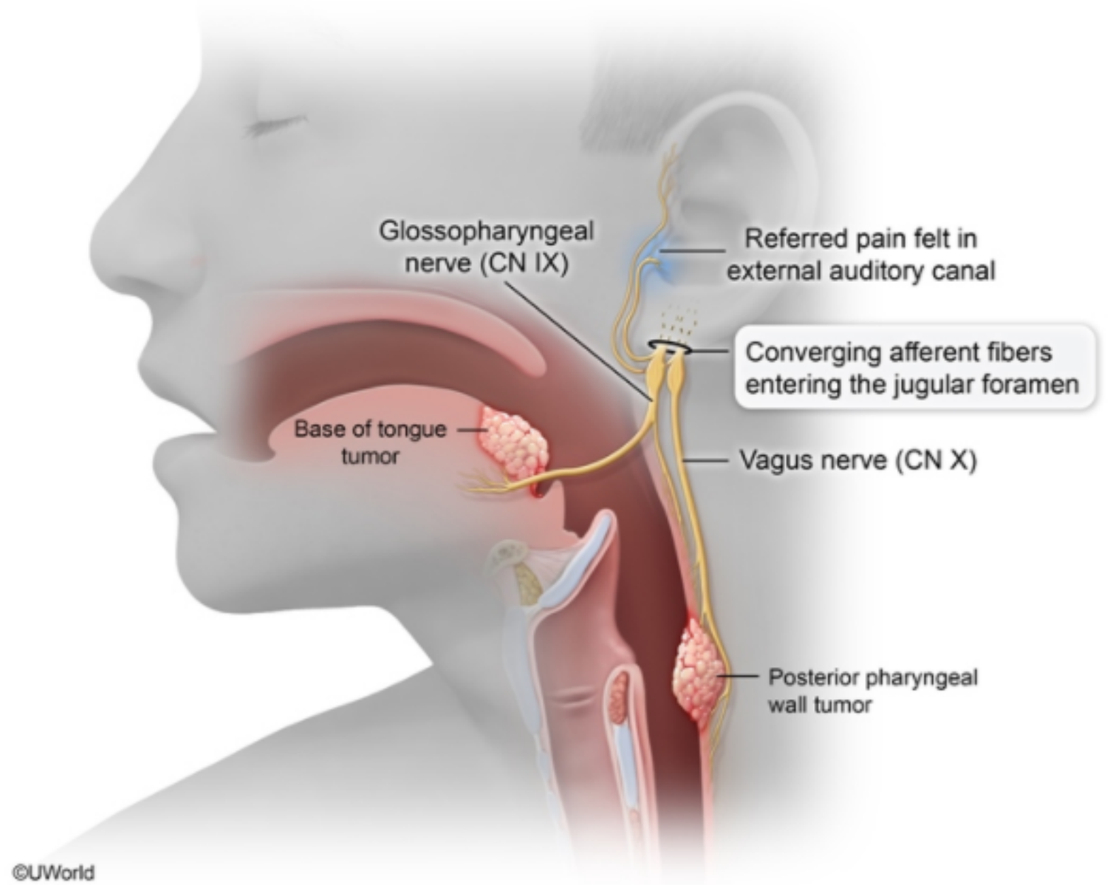
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Referred otalgia



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Educational objective:

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Traditional risk factors for oropharyngeal SCC include age >40, **tobacco use**, alcohol use, and immunocompromised status. There has also been a dramatic increase in oropharyngeal cancer due to human papillomavirus (HPV), which may be seen in younger, nonsmoking patients. This patient should undergo biopsy of the tonsil lesion with evaluation of HPV status as well as neck imaging (eg, CT scan) to characterize the lesion and any associated nodal metastasis.

Tonsil stones (tonsilloliths)—commonly occurring concretions of food, cellular, and bacterial debris—are not known to be risk factors for oropharyngeal SCC and can be managed with gentle removal (eg, gargling with salt water). However, frequent patient manipulation (eg, with toothpicks) can cause mucosal trauma, which may be mistaken as an ulcerated neoplasm.

(Choice A) A tonsil malignancy is unlikely to be adenocarcinoma. Lung adenocarcinoma shares some risk factors (eg, smoking, age) and possible presenting symptoms (eg, cough, hemoptysis) with oropharyngeal SCC, but it does not metastasize to the tonsil.

(Choice B) Aphthous ulcers are common, painful ulcers that typically present with an erythematous border and a white membrane covering the ulcer. However, they typically resolve in 1-2 weeks and are usually seen in the oral cavity (eg, tongue, buccal mucosa) rather than the oropharynx (tonsil).

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(Choice E) Small cell carcinoma is a neuroendocrine lung tumor that occurs almost exclusively in smokers. However, it is not seen in the tonsil.

Educational objective:
A tonsil ulcer in a smoker is likely due to squamous cell carcinoma.

References

- HPV-associated head and neck cancer.
- Distinct risk factor profiles for human papillomavirus type 16-positive and human papillomavirus type 16-negative head and neck cancers.

(Choice A) A tonsil malignancy is unlikely to be adenocarcinoma. Lung adenocarcinoma shares some risk factors (eg, smoking, age) and possible presenting symptoms (eg, cough, hemoptysis) with oropharyngeal SCC, but it does not metastasize to the tonsil.

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(Choice E) Small cell carcinoma is a neuroendocrine lung tumor that occurs almost exclusively in smokers. However, it is not seen in the tonsil.

Educational objective:
A tonsil ulcer in a smoker is likely due to squamous cell carcinoma.

References

- HPV-associated head and neck cancer.
- Distinct risk factor profiles for human papillomavirus type 16-positive and human papillomavirus type 16-negative head and neck cancers.
- Multidetector computed tomography imaging characteristics of asymptomatic palatine tonsilloliths: a retrospective study on 3886 examinations.

Surgery	Ear, Nose & Throat (ENT)	Head and neck cancers
Subject	System	Topic

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A 48-year-old man comes to the emergency department due to pain in his right foot and leg. Yesterday, the patient sailed a friend's boat on the ocean and sustained a small cut to his right foot while jumping onto the dock. He stopped the bleeding using direct pressure and washed the wound with antiseptic. Last night, he awoke with throbbing pain in the right foot. The patient took ibuprofen, but the pain progressively worsened. A few hours later, he developed fever with rigors. The patient was recently diagnosed with hereditary hemochromatosis after laboratory studies showed abnormal liver aminotransferases and elevated transferrin saturation. He has not received treatment and has no other medical problems. He does not use tobacco, alcohol, or illicit drugs. Temperature is 39.4 C (103 F), blood pressure is 100/60 mm Hg, and pulse is 120/min. The patient is in moderate distress. Physical examination shows a 1.5-cm laceration on the dorsum of the right foot with extensive surrounding edema, erythema, and several dark-colored bullae. There is streaking erythema extending up the proximal right thigh. Leukocyte count is 21,000/mm^3. Which of the following is the most likely causative organism of this patient's current condition?

A. *Pasteurella multocida*
B. *Pseudomonas aeruginosa*
C. *Staphylococcus aureus*
D. *Streptococcus pyogenes*
E. *Vibrio vulnificus*

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A. *Pasteurella multocida* (2%)
B. *Pseudomonas aeruginosa* (21%)
C. *Staphylococcus aureus* (15%)
D. *Streptococcus pyogenes* (10%)
✓ E. *Vibrio vulnificus* (50%)

Omitted
Correct answer
E

50%
Answered correctly

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Last Updated

Explanation

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Vibrio vulnificus	
Epidemiology	• Gram-negative, free-living in **marine** environments • Ingestion (oysters) or wound infection • ↑ Risk in those with **liver** disease* (cirrhosis, hepatitis)
Manifestations	• **Rapidly progressive** (often <12 hours) • **Septicemia** - septic shock, bullous lesions • **Cellulitis** - hemorrhagic bullae, necrotizing fasciitis
Diagnosis	• Blood & wound cultures
Treatment	• Empiric in those with likely illness as **highly fatal** • Intravenous ceftriaxone + doxycycline

*Hereditary hemochromatosis is particularly high risk as iron acts as a growth catalyst.

Vibrio vulnificus is a free-living, gram-negative bacterium that grows in brackish coastal water and **marine** environments. Levels are greatest in the summer months, reaching as high as 8% of total bacteria in some areas. Infections are primarily acquired through the consumption of **raw oysters** (which concentrate the bacteria) or through **wound contamination** during recreational activities (eg, sailing) or raw seafood handling. Most patients who become ill have **liver disease** (eg, alcoholic cirrhosis, viral hepatitis); those with **hemochromatosis** are at particularly great risk as free iron acts as an exponential growth catalyst.

Patients with wound contamination typically develop a mild cellulitis, but those with liver disease or certain comorbidities (eg, diabetes mellitus) are at risk for **necrotizing fasciitis** with hemorrhagic bullous lesions and septic shock. Diagnosis is made by blood and wound cultures, but treatment (intravenous antibiotics) should not be delayed due to the high risk of death. Surgical debridement may be required, particularly in high-risk patients with serious infections.

(Choice A) *Pasteurella* infections are typically associated with dog or cat bites/scratches and may cause rapid-onset cellulitis and necrotizing fasciitis. This patient developed a wound infection shortly after sustaining an injury while sailing, making *V vulnificus* more likely.

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(Choice B) *Pseudomonas aeruginosa* skin infections commonly occur due to hot tub (not ocean) water, nail puncture wounds, and ear piercings. Folliculitis and cellulitis are more common than necrotizing fasciitis.

(Choices C and D) *Staphylococcus aureus* and *Streptococcus pyogenes* are leading causes of cellulitis and erysipelas. Although these organisms may occasionally cause necrotizing fasciitis (particularly *S pyogenes*), lesions typically develop over a few days (not hours). In addition, exposure to ocean water in a patient with hereditary hemochromatosis makes *V vulnificus* more likely.

Educational objective:
Vibrio vulnificus is a free-living marine bacterium that causes food-borne illness (through oysters) and wound infections. Wound infections may be mild, but some patients develop rapid-onset, severe, necrotizing fasciitis with hemorrhagic bullous lesions and septic shock. Patients with liver disease such as cirrhosis, viral hepatitis, and hereditary hemochromatosis are at particularly high risk.

Surgery	Infectious Diseases	Vibrio vulnificus
Subject	System	Topic

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"Hereditary hemochromatosis is particularly high risk as iron acts as a growth catalyst."

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Vibrio vulnificus is a free-living marine bacterium that causes food-borne illness (through oysters) and wound infections. Wound infections may be mild, but some patients develop rapid-onset, severe, necrotizing fasciitis with hemorrhagic bullous lesions and septic shock. Patients with liver disease such as cirrhosis, viral hepatitis, and hereditary hemochromatosis are at particularly high risk.

Surgery	Infectious Diseases	Vibrio vulnificus
Subject	System	Topic

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A 68-year-old woman comes to the office due to a groin bulge. She first noticed it 2 months ago and says that it gets larger with prolonged standing and shrinks with lying down, but it is not painful. There has been no trauma to the area. The patient has had no fever, nausea, anorexia, weight loss, abdominal pain, or urinary symptoms. She has a history of obstructive pulmonary disease with occasional exacerbations and hypertension. The patient has smoked a pack of cigarettes daily for 45 years. Temperature is 36.9 C (98.4 F), blood pressure is 140/80 mm Hg, pulse is 78/min, and respirations are 16/min. BMI is 34 kg/m^2. Oxygen saturation is 95% on room air. Cardiopulmonary examination shows mildly decreased breath sounds bilaterally. The abdomen is soft and nontender; bowel sounds are normal. There is a 2-cm groin mass below the right inguinal ligament, which is medial to the right femoral artery; no tenderness, pulsations, or overlying erythema is present. The mass is tympanitic to percussion. Which of the following is the best next step in management of this patient?

- A. CT angiogram of the lower extremities (1%)
- ✓ B. Elective surgical repair (82%)
- C. Needle aspiration of the mass (0%)
- D. Oral antibiotics and reevaluation in 2 weeks (0%)
- E. Reassurance and observation (15%)

Omitted
Correct answer
B

82%
Answered correctly

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Last Updated

Explanation

Groin hernias

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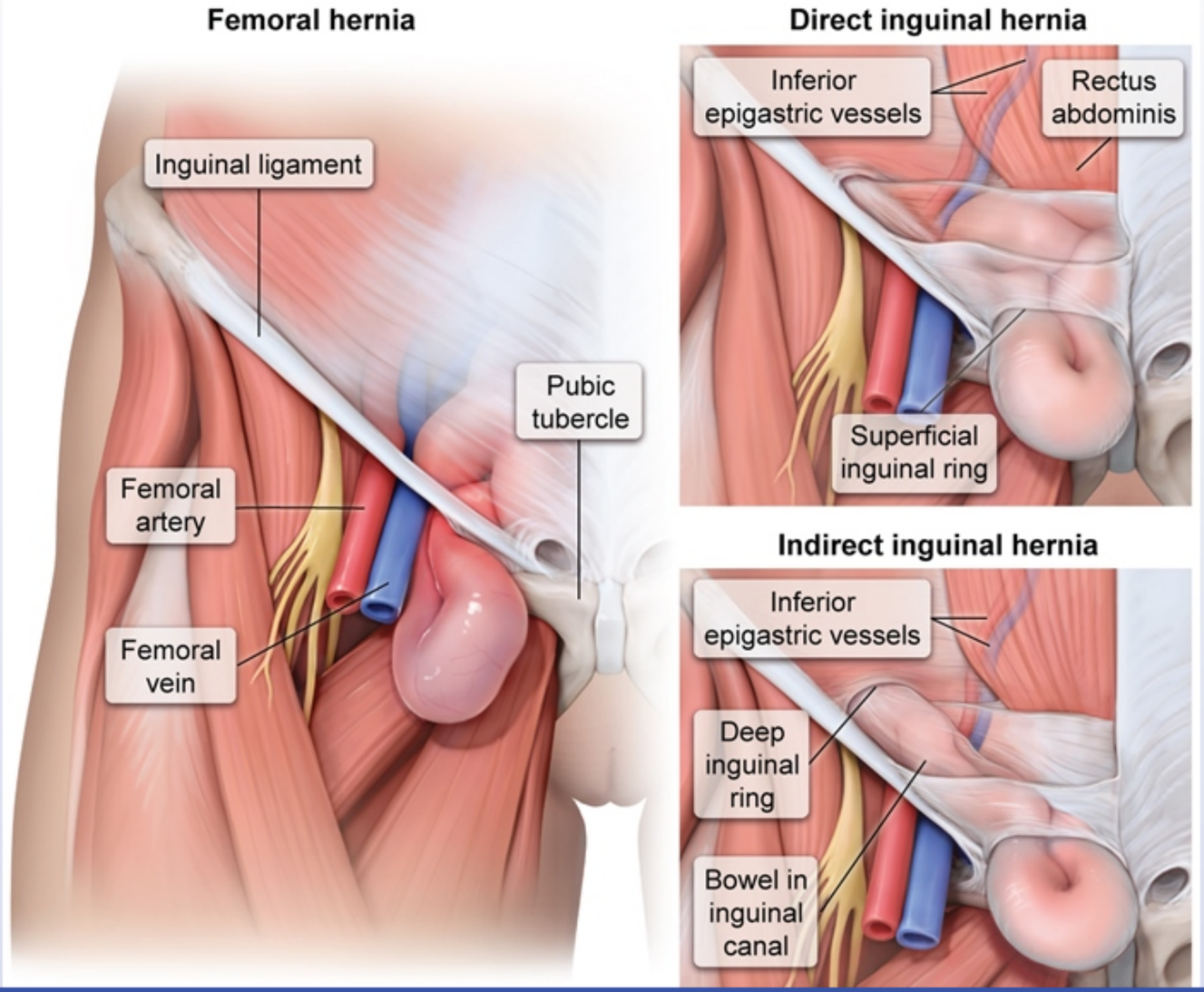
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Groin hernias



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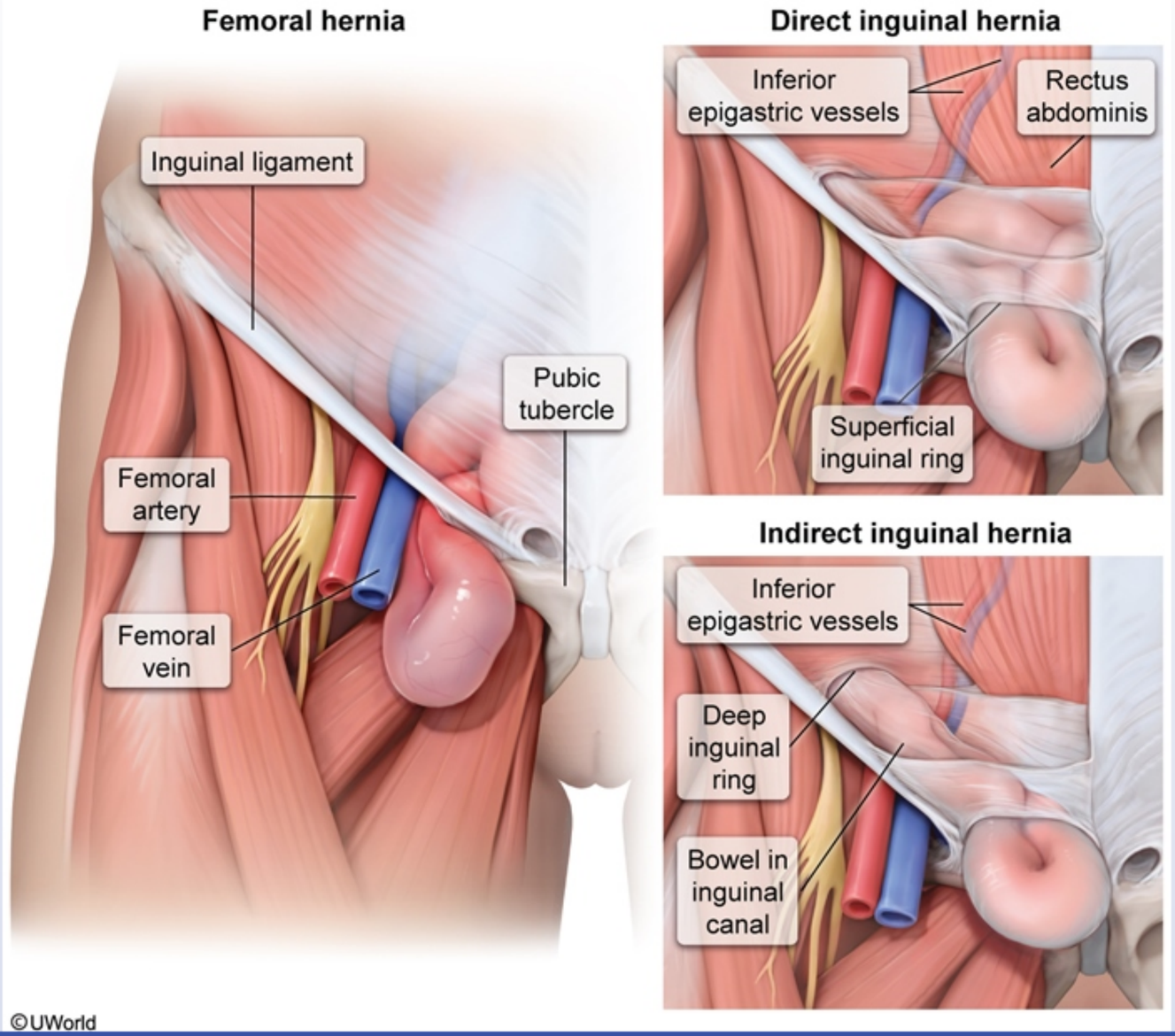
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This patient's nontender groin bulge is located below the inguinal ligament, raising strong suspicion for **femoral hernia**, a displacement of abdominal or pelvic contents through a widened or laxed femoral ring (medial to the femoral artery and lateral to the inguinal ligament). Risk factors include chronic cough (eg, chronic obstructive pulmonary disease), constipation, and smoking. Most cases arise in **older** women and present as a **nonpulsatile mass** in the groin. The mass generally worsens with increased abdominal pressure (eg, standing, Valsalva maneuver, coughing) and improves with decreased abdominal pressure (eg, lying down). When a bowel loop is present within the hernia, it is often **tympanitic** to percussion.

Because femoral hernias pass through a narrow orifice, they are associated with a substantial risk of **incarceration** (trapping of abdominal/pelvic contents within the hernia) and **strangulation** (constriction of blood flow with subsequent ischemia/necrosis). Therefore, asymptomatic femoral hernias are generally referred for **elective surgical repair** to prevent potentially life-threatening complications and subsequent high-risk emergency surgery, which is associated with an increased risk of morbidity (eg, bowel resection) and mortality.

In contrast, inguinal hernias (hernia above the inguinal ligament) are associated with a lower risk for incarceration and strangulation because hernia contents pass through a wider orifice. Therefore, most asymptomatic inguinal hernias can be managed with reassurance and watchful waiting. Observation can also be considered for patients with chronic (>3 months), stable femoral hernias, but is not recommended for most patients with femoral hernias due to the risk of incarceration **(Choice E)**.

(Choice A) CT angiography can be used to diagnose femoral artery aneurysm, which is associated with a pulsatile groin bulge that does not change with alterations in abdominal pressure.

(Choices C and D) Diverticulitis usually presents with lower abdominal pain and, occasionally, a tender lower abdominal mass. Treatment of uncomplicated diverticulitis generally includes oral antibiotics; percutaneous drainage is sometimes required when diverticular abscess is present. Other infections that can develop in the groin include cutaneous abscesses or lymphangitis. This patient's mass is nontender and not associated with erythema or fever, making infection less likely.

Educational objective:
Femoral hernias (hernia located below inguinal ligament) protrude through the femoral ring and usually present with a nontender, nonpulsatile bulge in the groin that grows in size with increased abdominal pressure. Because the risk of incarceration with femoral hernias is high (due to

tympanitic to percussion.

Because femoral hernias pass through a narrow orifice, they are associated with a substantial risk of **incarceration** (trapping of abdominal/pelvic contents within the hernia) and **strangulation** (constriction of blood flow with subsequent ischemia/necrosis). Therefore, asymptomatic femoral hernias are generally referred for **elective surgical repair** to prevent potentially life-threatening complications and subsequent high-risk emergency surgery, which is associated with an increased risk of morbidity (eg, bowel resection) and mortality.

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Educational objective:
Femoral hernias (hernia located below inguinal ligament) protrude through the femoral ring and usually present with a nontender, nonpulsatile bulge in the groin that grows in size with increased abdominal pressure. Because the risk of incarceration with femoral hernias is high (due to narrow hernia orifice), patients with asymptomatic femoral hernias are referred for early elective hernia repair. In contrast, asymptomatic inguinal hernias (hernia located above inguinal ligament) can usually be managed with watchful waiting because hernia contents pass through a wider orifice.

Surgery	Gastrointestinal & Nutrition	Groin hernias
Subject	System	Topic

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Question Id: 2767

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A 62-year-old woman comes to the office for evaluation of a pigmented lesion on her left forearm. She first noticed the lesion 4 months ago and says it occasionally itches but is otherwise asymptomatic. The patient also has numerous "freckles" that she attributes to playing golf during the summer. Medical history includes psoriasis, hypertension, and mild chronic obstructive pulmonary disease. She quit smoking 5 years ago and drinks 2 or 3 glasses of wine a week after golfing. On examination, there is a 5-mm, dark brown lesion at the dorsal surface of her distal left forearm; it has a smooth border and a small, eccentric nodule. In addition, multiple scattered, flat, light brown lesions are present on the nose, cheeks, and dorsal surface of the hands. Which of the following is the most appropriate next step in management of this patient's forearm lesion?

A. Cryotherapy with liquid nitrogen
B. Excisional biopsy
C. Re-examination in 3-6 months
D. Shave biopsy
E. Topical fluorouracil

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A. Cryotherapy with liquid nitrogen (3%)
✓ B. Excisional biopsy (55%)
C. Re-examination in 3-6 months (30%)
D. Shave biopsy (9%)
E. Topical fluorouracil (1%)

Omitted
Correct answer
B

55%
Answered correctly

02 secs
Time Spent

02/15/2020
Last Updated

Explanation

Visual assessment of melanoma	
	• Asymmetry

Visual assessment of melanoma	
ABCDE criteria (≥1-2 is suspicious)	• **A**symmetry • **B**order irregularity • **C**olor variation (within lesion or compared to other lesions) • **D**iameter ≥6 mm • **E**volving appearance over time
7-point checklist (≥1 major or ≥3 minor is suspicious)	• **Major criteria:** change in size, shape, or color • **Minor criteria:** size ≥7 mm, local inflammation, crusting/bleeding, sensory symptoms
Ugly duckling sign	• One lesion is significantly different from others on the patient

The ABCDE criteria (Table) are useful in visual inspection of pigmented skin lesions to identify which may represent **malignant melanoma**. However, although the ABCDE criteria can assist in evaluation of superficial spreading melanoma, they are less effective in identifying nodular or atypical melanomas. Nodular melanomas account for up to 30% of all melanomas but may not meet any of the ABCDE criteria until they are relatively advanced. To address this shortcoming, additional visual criteria should be considered in assessing risk of melanoma:

- In a patient with multiple pigmented lesions, a lesion that is substantially different from the others (eg, shape, color) may represent melanoma **("ugly duckling sign")**. The "ugly duckling sign" has a sensitivity of up to 90% for melanoma.
- **Palpable nodularity** often corresponds with vertical growth of a melanoma and increases metastatic risk. The Breslow depth (distance from the epidermal granular cell layer to the deepest visible melanoma cells) is the most important prognostic indicator in malignant melanoma.
- Benign pigmented lesions are usually asymptomatic; biopsy should be considered for moles that **itch, bleed**, or are associated with local **sensory symptoms** (eg, tingling).

Although this patient's lesion does not have any of the ABCDE characteristics, she has a pruritic, nodular lesion that is significantly different from her other pigmented lesions. She should therefore undergo a full-thickness **excisional biopsy** with initial margins of 1-3 mm of normal tissue.

(Choices A and E) Actinic keratoses are roughened papules that usually occur in sun-exposed areas (eg, face, hands). They can be treated by destruction in situ with cryotherapy or topical fluorouracil. Actinic keratoses are rarely pigmented, and nodularity is more consistent with

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(Choice C) Periodic surveillance is recommended for patients with numerous or atypical nevi, but suspected melanomas warrant tissue confirmation without delay.

(Choice D) Shave biopsy is not recommended for most cases of suspected melanoma because partial removal may not provide adequate tissue for diagnosis and does not allow for accurate depth measurement.

Educational objective:
A mole may represent melanoma if it appears substantially different from others ("ugly duckling sign"), itches or bleeds, or develops nodularity. If melanoma is suspected, an excisional biopsy should be obtained.

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melanoma.

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References

- Revised U.K. guidelines for the management of cutaneous melanoma 2010.
- The ABCDEF rule: Combining the "ABCDE rule" and the "ugly duckling sign" in an effort to improve patient self-screening examinations.

Surgery	Dermatology	Melanoma
Subject	System	Topic

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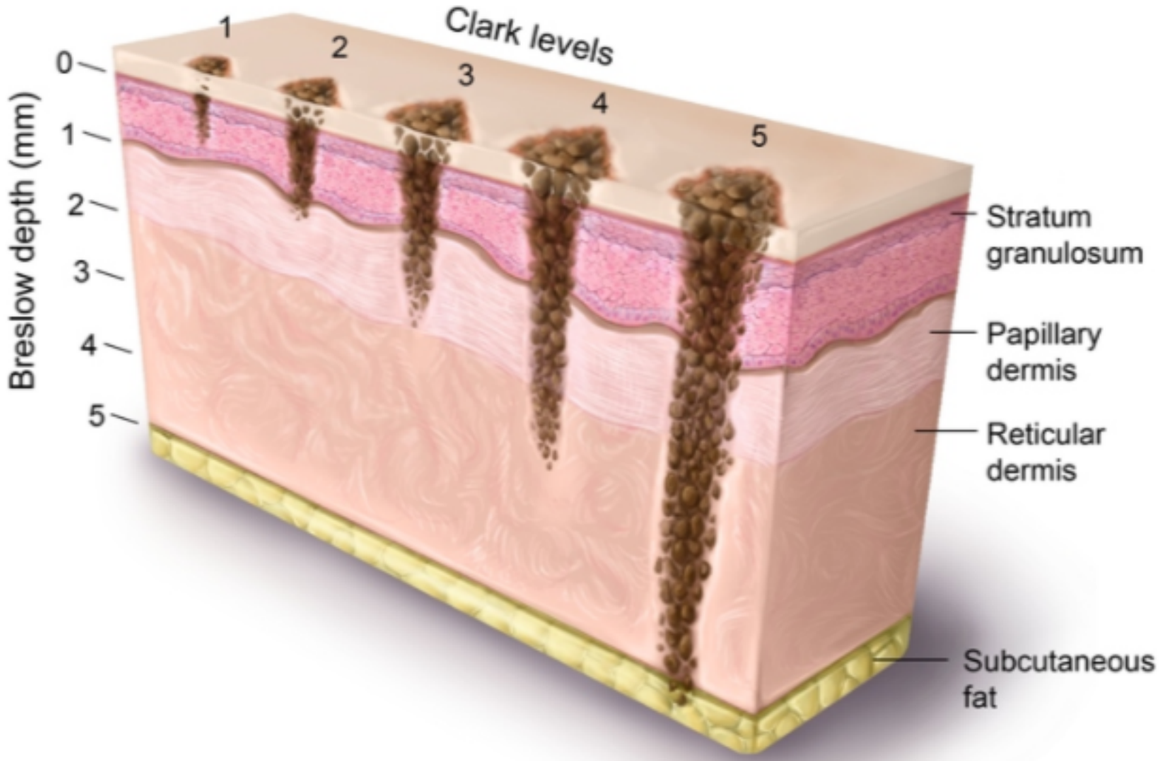
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7-point checklist	• **Major criteria:** change in size, shape, or color

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Melanoma depth of invasion



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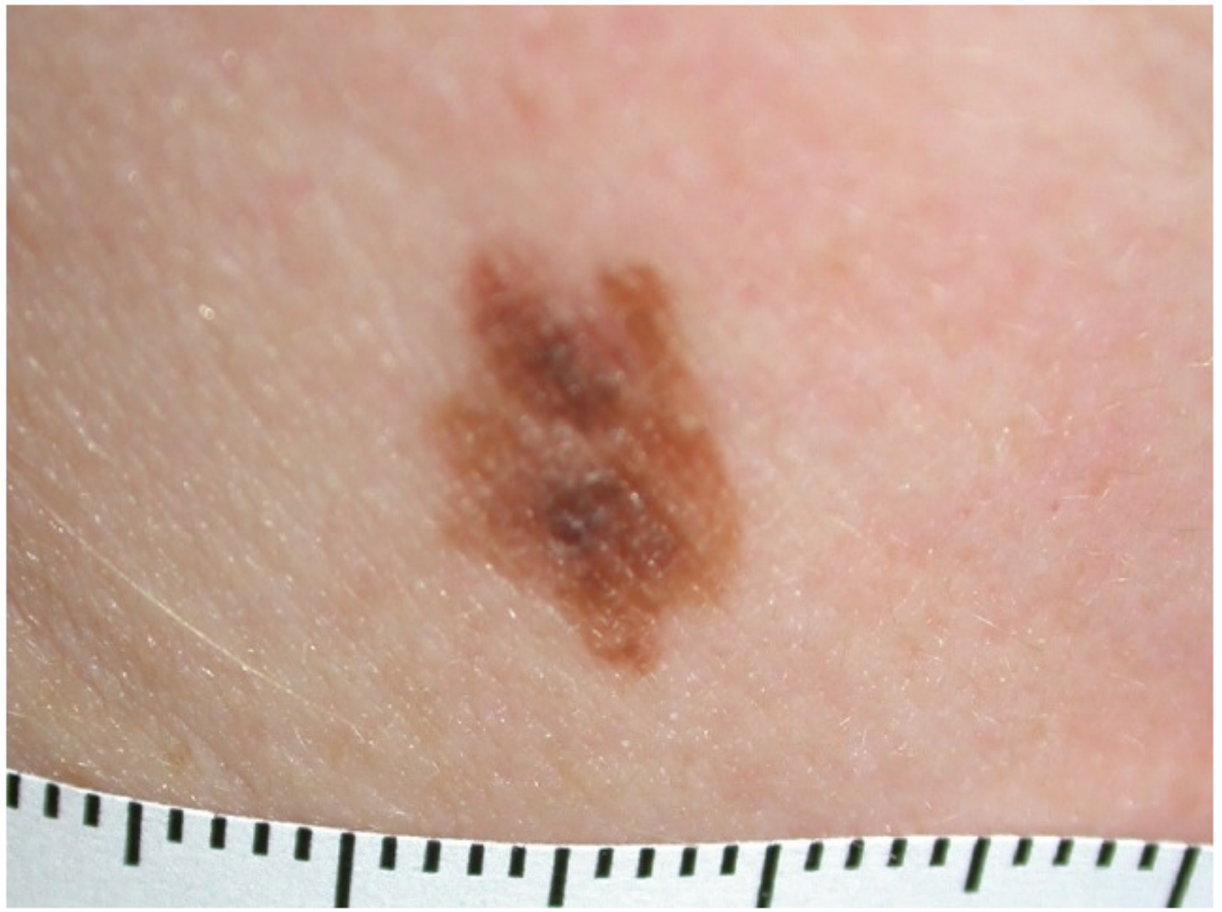
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Question Id: 4486

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A 45-year-old male immigrant from Guatemala comes to the office due to of persistent nausea and vomiting of partially digested food. He has had these symptoms for the past 1 month. He has also lost 2.3 kg (5 lb) during this period of time. His appetite is good, but he mentions early satiety. He denies hematemesis, black stools, difficulty swallowing, and chest pain. Other medical problems include type 2 diabetes for the past 1 year and a suicide attempt 3 months ago in which he ingested acid. He has a history of peptic ulcer disease and often takes antacids for heartburn. He drinks alcohol and smokes one pack of cigarettes daily. His temperature is 36.8 C (98.2 F), blood pressure is 110/65 mm Hg, pulse is 110/min, and respirations are 16/min. Mucous membranes are dry. Abdominal examination shows succussion splash on the epigastrium. Which of the following is the most likely diagnosis?

A. Achalasia
B. Chronic pancreatitis
C. Diabetic gastroparesis
D. Esophageal stricture
E. Portal hypertension
F. Pyloric stricture

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Question Id: 4486

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A. Achalasia (4%)
B. Chronic pancreatitis (2%)
C. Diabetic gastroparesis (11%)
D. Esophageal stricture (23%)
E. Portal hypertension (0%)
✓ F. Pyloric stricture (57%)

Omitted
Correct answer
F

57%
Answered correctly

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Last Updated

Explanation

This patient presents with signs/symptoms consistent with **gastric outlet obstruction** caused by mechanical obstruction, leading to postprandial

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This patient presents with signs/symptoms consistent with **gastric outlet obstruction** caused by mechanical obstruction, leading to postprandial pain and vomiting with early satiety. Common causes of gastric outlet obstruction include gastric malignancy, peptic ulcer disease, Crohn disease, strictures (with pyloric stenosis) secondary to ingestion of caustic agents, and gastric bezoars.

Physical examination can show an abdominal **succussion splash**, which is elicited by placing the stethoscope over the upper abdomen and rocking the patient back and forth at the hips: **Retained gastric material** >3 hours after a meal will generate a splash sound and indicates the presence of a hollow viscus filled with both fluid and gas.

This patient **ingested acid** 3 months ago, which is a risk factor for the development of a **pyloric stricture**. Acid ingestion causes fibrosis 6-12 weeks after the resolution of the acute injury. Upper endoscopy is usually required to confirm the diagnosis, and treatment is primarily surgical.

(Choices A and D) Esophageal stricture and dysmotility (egman, achalasia) tend to present with dysphagia, which is not this patient's presenting symptom. In addition, abdominal succussion splash is not a typical finding in esophageal stricture or achalasia.

(Choice B) Chronic pancreatitis can lead to inflammation and fibrosis in adjacent structures (e.g., duodenum, jejunum, and transverse colon) that can rarely lead to obstruction. However, gastric obstruction is not usually caused by pancreatitis.

(Choice C) Diabetic gastroparesis tends to occur in patients who have had diabetes for longer than a decade. This patient was diagnosed with diabetes only 1 year ago and is less likely to have gastroparesis.

(Choice E) Portal hypertension typically does not lead to gastric obstruction or an abdominal succussion splash on physical examination.

Educational objective:
Gastric outlet obstruction can be caused by many disease processes and is characterized by early satiety, nausea, nonbilious vomiting, and weight loss. In a patient with a history of acid ingestion, pyloric stricture is the most likely cause.

References

- Pyloric and antral strictures following corrosive acid ingestion: A report of four cases.
- Caustic injury of the upper gastrointestinal tract in adults: a clinical and endoscopic study.

Surgery Gastrointestinal & Nutrition Gastric outlet obstruction

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Question Id: 4813

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A 44-year-old man who has had an extensive small bowel resection for Crohn disease has been on total parenteral nutrition for two years. He presented to the hospital with epigastric and right upper quadrant pain. His vital signs are within normal limits. Physical examination shows mild right upper quadrant tenderness. An ultrasonogram shows several gallstones; an ultrasonogram performed two years ago did not demonstrate gall stones. Which of the following is the most likely cause of his gallstones?

A. Estrogen-induced increase in cholesterol secretion
B. Gallbladder stasis
C. Hypertriglyceridemia
D. Increased enterohepatic recycling of bile acids
E. Increased red blood cell destruction

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A 44-year-old man who has had an extensive small bowel resection for Crohn disease has been on total parenteral nutrition for two years. He presented to the hospital with epigastric and right upper quadrant pain. His vital signs are within normal limits. Physical examination shows mild right upper quadrant tenderness. An ultrasonogram shows several gallstones; an ultrasonogram performed two years ago did not demonstrate gall stones. Which of the following is the most likely cause of his gallstones?

A. Estrogen-induced increase in cholesterol secretion (0%)
✓ B. Gallbladder stasis (77%)
C. Hypertriglyceridemia (5%)
D. Increased enterohepatic recycling of bile acids (16%)
E. Increased red blood cell destruction (0%)

Omitted
Correct answer
B

77%
Answered correctly

01 sec
Time Spent

02/09/2020
Last Updated

Explanation

Gallbladder stasis is the most likely cause of gallstone formation in this patient. The presence of proteins and fatty acids in the duodenum acts as a stimulus for release of cholecystokinin (CCK), which in turn stimulates the contraction of the gallbladder. In patients on total parenteral nutrition or prolonged fasting, the normal stimulus for CCK release and gallbladder contraction is absent. This leads to biliary stasis and promotes the formation of bile sludge and gallstones. Small-bowel (ileal) resection also contributed to the formation of gallstones in this patient. Decreased enterohepatic circulation of bile acids results in altered hepatic bile composition, which becomes supersaturated with cholesterol and promotes gallstone formation.

Gallbladder stasis is the most likely cause of gallstone formation in this patient. The presence of proteins and fatty acids in the duodenum acts as a stimulus for release of cholecystokinin (CCK), which in turn stimulates the contraction of the gallbladder. In patients on total parenteral nutrition or prolonged fasting, the normal stimulus for CCK release and gallbladder contraction is absent. This leads to biliary stasis and promotes the formation of bile sludge and gallstones. Small-bowel (ileal) resection also contributed to the formation of gallstones in this patient. Decreased enterohepatic circulation of bile acids results in altered hepatic bile composition, which becomes supersaturated with cholesterol and promotes gallstone formation.

(Choice A) Estrogen-induced increase in cholesterol secretion is the underlying mechanism for the development of cholesterol gallstones during pregnancy and in women taking oral contraceptives. During pregnancy, estrogen causes an increase in cholesterol secretion and progesterone causes a reduction in bile acid secretion, causing increased cholesterol saturation of bile. Progesterone also slows gallbladder emptying and thus facilitates the formation of cholesterol gallstones during pregnancy.

(Choice C) Hypertriglyceridemia can predispose to gallstones in some patients. However, it is unlikely in this patient.

(Choice D) Increased enterohepatic recycling of bile acids would not predispose to gallstone formation. Decreased enterohepatic recycling of bile acids, as seen in patients with ileal Crohn disease or ileal resection, can predispose to cholesterol gallstones due to increased concentration of bilirubin conjugates and total calcium in the gallbladder.

(Choice E) Increased red blood cell destruction (hemolytic anemia) increases the risk of pigmented gallstones by increasing the amount of heme requiring degradation to bilirubin.

Educational objective:
Total parenteral nutrition causes gallbladder stasis and predisposes to gallstone formation and bile sludging, both of which may lead to cholecystitis.

Surgery	Gastrointestinal & Nutrition	Gallstone disease
Subject	System	Topic

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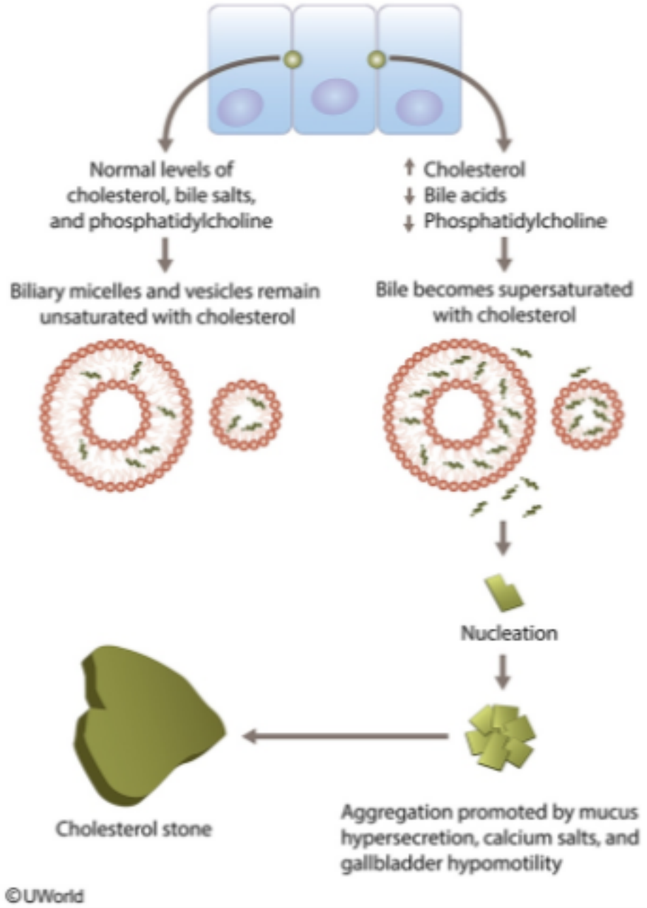
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Question Id: 4813

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Exhibit Display

Pathogenesis of cholesterol gallstones



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A 46-year-old woman comes to the office for evaluation of an abdominal mass. The patient first noticed a small abdominal mass 2 months ago that was not painful and did not cause any issues. However, over the past month, the mass has slowly grown and sometimes causes mild abdominal discomfort. The patient has had no weight loss, nausea, vomiting, or changes in bowel patterns. She underwent a total abdominal hysterectomy and bilateral salpingo-oophorectomy for uterine sarcoma 6 years ago. Vital signs are normal. BMI is 32 kg/m^2. The patient has a large, vertical midline abdominal scar consistent with her prior surgery. There is a small, nontender mass at the midline that is palpable while the patient is supine and increases in size with Valsalva. Bowel sounds are normal; there is no rebound or guarding. Which of the following is the most likely diagnosis in this patient?

A. Incisional hernia
B. Metastatic uterine sarcoma
C. Rectus abdominis diastasis
D. Rectus sheath hematoma
E. Subcutaneous lipoma

Submit

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Item 14 of 40
Question Id: 15718

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A 46-year-old woman comes to the office for evaluation of an abdominal mass. The patient first noticed a small abdominal mass 2 months ago that was not painful and did not cause any issues. However, over the past month, the mass has slowly grown and sometimes causes mild abdominal discomfort. The patient has had no weight loss, nausea, vomiting, or changes in bowel patterns. She underwent a total abdominal hysterectomy and bilateral salpingo-oophorectomy for uterine sarcoma 6 years ago. Vital signs are normal. BMI is 32 kg/m^2. The patient has a large, vertical midline abdominal scar consistent with her prior surgery. There is a small, nontender mass at the midline that is palpable while the patient is supine and increases in size with Valsalva. Bowel sounds are normal; there is no rebound or guarding. Which of the following is the most likely diagnosis in this patient?

- ✓ A. Incisional hernia (80%)
- B. Metastatic uterine sarcoma (0%)
- C. Rectus abdominis diastasis (18%)
- D. Rectus sheath hematoma (0%)
- E. Subcutaneous lipoma (0%)

Omitted
Correct answer
A

80%
Answered correctly

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Time Spent

06/06/2020
Last Updated

Explanation

Incisional hernia

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Incisional hernia	
Pathogenesis	• Breakdown of prior fascial closure
Risk factors	• Obesity • Tobacco smoking • Poor wound healing (eg, immunosuppression, malnutrition) • Vertical or midline incision • Surgical site infection
Clinical features	• Abdominal mass that enlarges with Valsalva • Palpable fascial edges in nonobese patients • Possible delayed presentation (months-years)
Diagnosis	• Clinical • CT scan of abdomen

This patient has a slowly enlarging abdominal mass at her prior surgical incision site, consistent with an **incisional hernia**. Incisional hernias occur due to **fascial closure breakdown**. They are common in patients with obesity (elevated intraabdominal pressure) and a prior vertical or midline incision (increased tissue tension). These 2 factors lead to gradual fascial breakdown; presentation may be delayed for months to years, as in this patient.

Incisional hernias can be associated with acute gastrointestinal symptoms if the hernias become very large (mass effect) or bowel incarceration occurs (higher risk with smaller hernia size). However, most patients have an **asymptomatic abdominal mass** (ie, protruding abdominal contents) that slowly enlarges as the fascial defect expands. The mass may be present when patients lie supine, and discrete fascial edges may be palpable in nonobese patients. In addition, abdominal **mass size increases with Valsalva** because greater intraabdominal pressure causes more protrusion through the defect.

Diagnosis is typically clinical. Abdominal CT scan may be used to identify unclear anatomy (eg, surgical repair planning) or if there is concern for

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Diagnosis is typically clinical. Abdominal CT scan may be used to identify unclear anatomy (eg, surgical repair planning) or if there is concern for an acute complication (eg, bowel incarceration).

(Choice B) Metastatic uterine sarcoma may cause an abdominal mass, but tumor size is not affected by the Valsalva maneuver. In addition, this diagnosis typically has associated systemic symptoms (eg, weight loss).

(Choice C) Rectus abdominis diastasis is a bulge between the rectus muscles due to linea alba weakening. However, unlike a true hernia, it has no associated fascial defect; therefore, the abnormality is not palpable while supine.

(Choice D) A rectus sheath hematoma may present as an abdominal mass. However, it is usually associated with acute trauma and pain rather than with a slowly enlarging, uncomfortable bulge, as in this patient. In addition, hematoma size does not change with Valsalva.

(Choice E) A subcutaneous lipoma is a soft tissue tumor that can appear as an abdominal mass; however, lipomas are not typically located in the midline and do not enlarge with Valsalva.

Educational objective:
Incisional hernias develop due to fascial closure breakdown and may have a delayed presentation (months-years). Patients typically have a slowly enlarging abdominal mass (ie, protruding abdominal contents) that is palpable while supine and enlarges with the Valsalva maneuver.

References

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Educational objective:
Incisional hernias develop due to fascial closure breakdown and may have a delayed presentation (months-years). Patients typically have a slowly enlarging abdominal mass (ie, protruding abdominal contents) that is palpable while supine and enlarges with the Valsalva maneuver.

References

- Up and down or side to side? A systematic review and meta-analysis examining the impact of incision on outcomes after abdominal surgery.
- Systematic review and meta-regression of factors affecting midline incisional hernia rates: analysis of 14,618 patients.
- Incidence of and risk factors for incisional hernia after abdominal surgery.

Surgery	Miscellaneous (Multisystem)	Incisional hernia
Subject	System	Topic

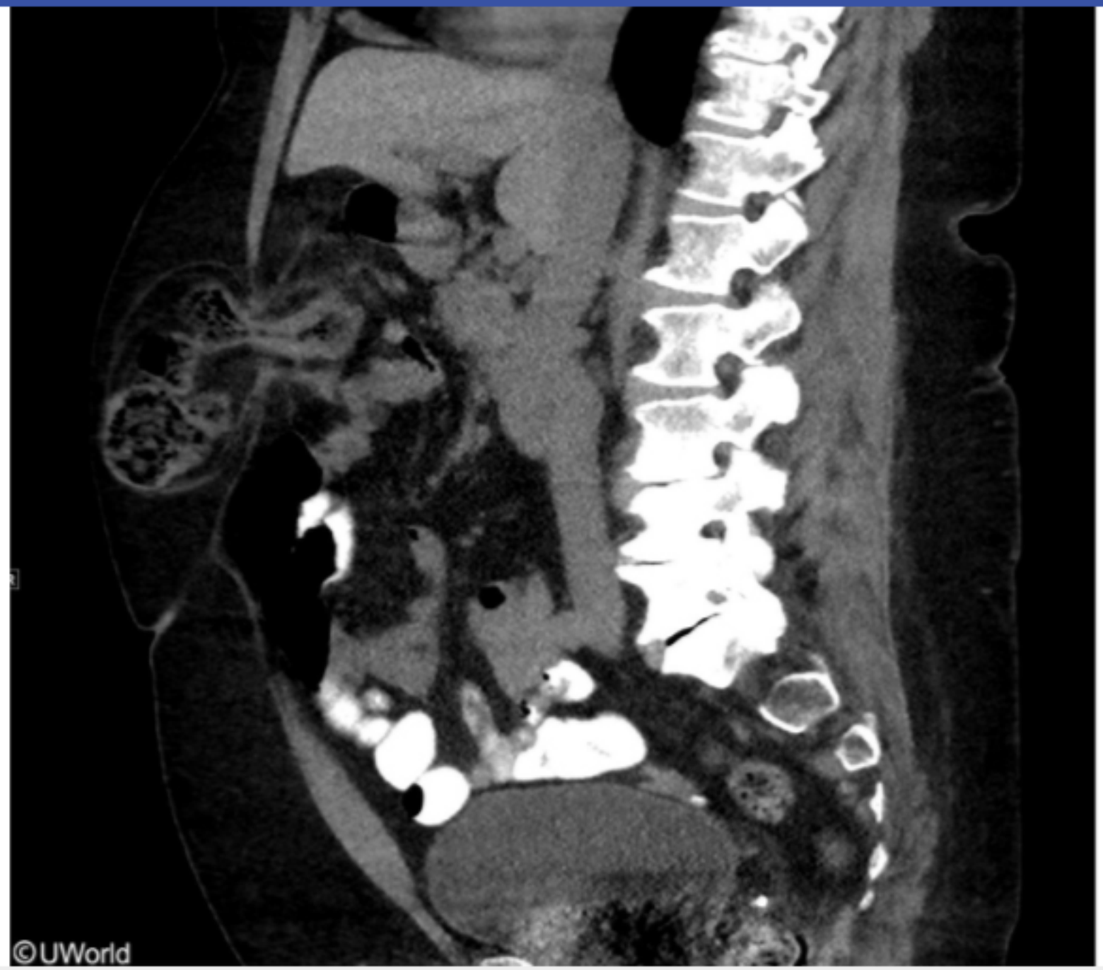
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more protrusion through the defect.

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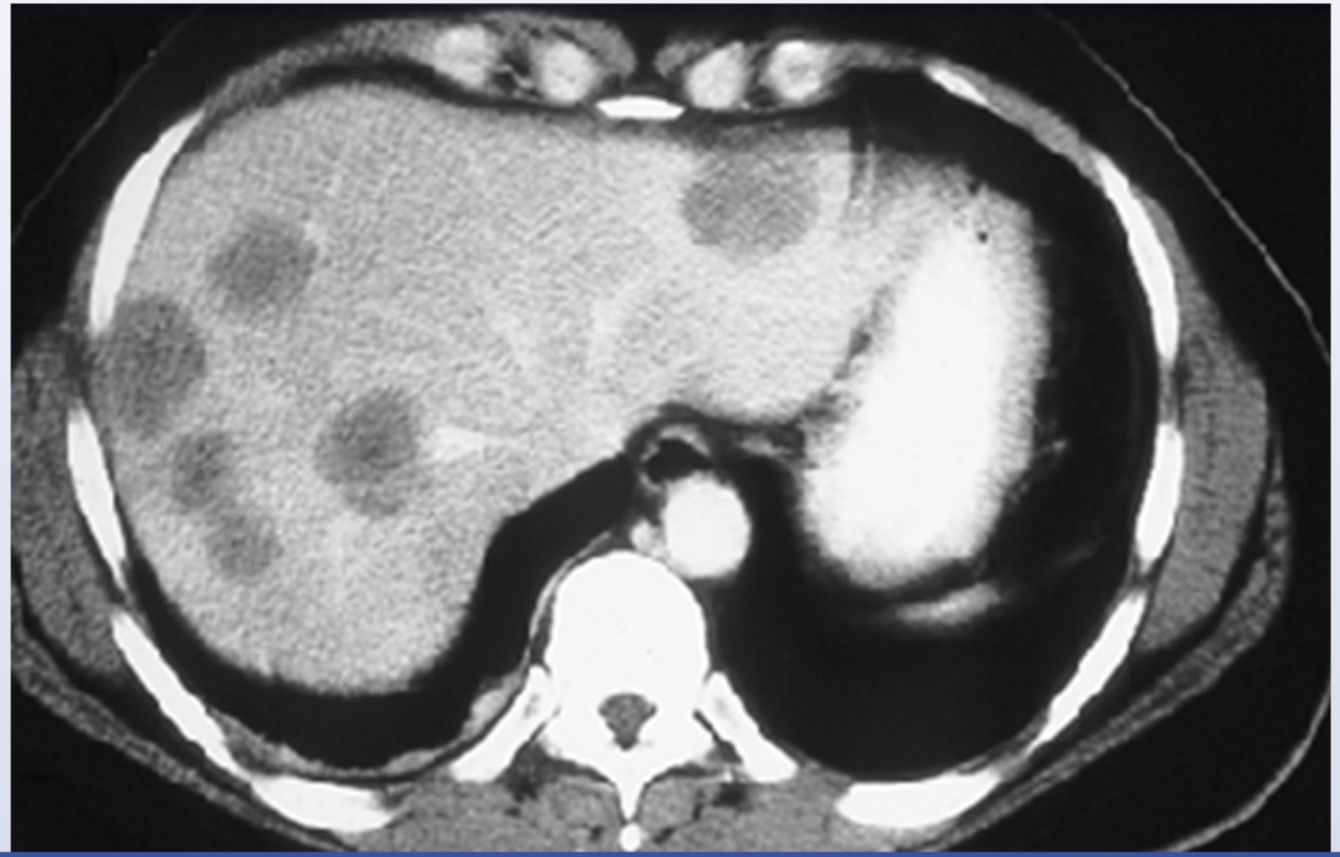
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A 62-year-old man comes to the office due to fatigue and weight loss. Over the last 6 months, he has lost 9 kg (20 lb) and can no longer walk long distances without sitting down to rest. The patient has not seen a physician in 15 years. He has smoked a pack daily for the last 35 years but does not use alcohol or illicit drugs. He has not recently traveled. Temperature is 36.9 C (98.4 F), blood pressure is 130/80 mm Hg, pulse is 88/min, and respirations are 12/min. Lungs are clear to auscultation, and abdominal examination shows a liver span of 14 cm with no tenderness. Rectal examination reveals normal sphincter tone but a slightly enlarged prostate that is nontender to palpation. Chest x-ray is unremarkable. CT scan of the abdomen is shown in the image below.



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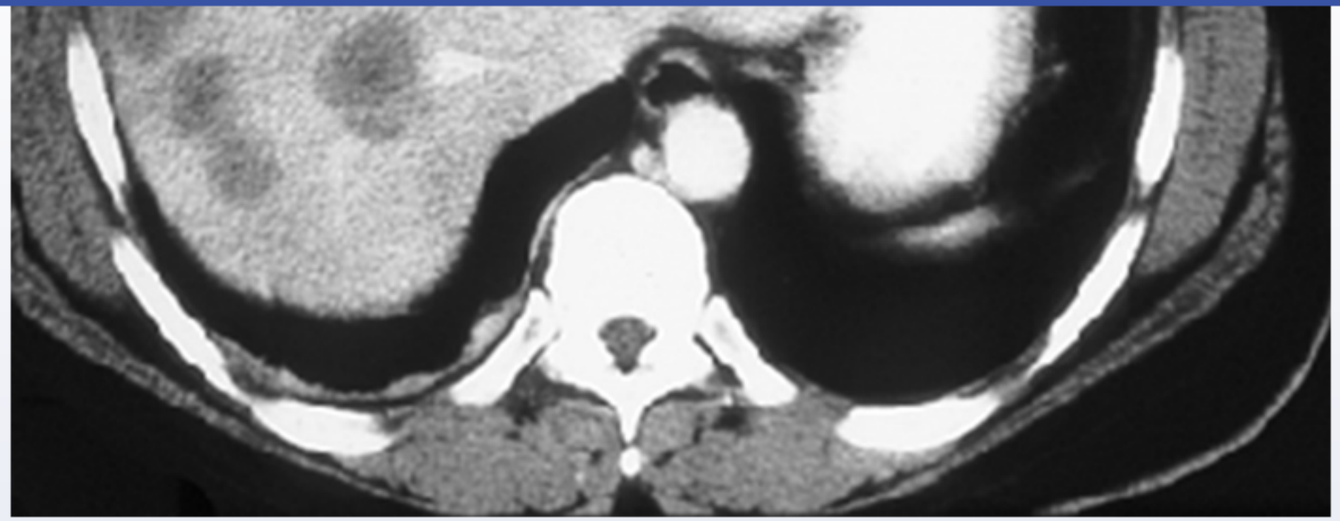
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Which of the following is most likely to establish the diagnosis in this patient?

A. Alpha-fetoprotein measurement
B. Aspiration and culture of the liver lesions
C. Bone marrow biopsy
D. Colonoscopy
E. Prostate-specific antigen measurement
F. Stool test for ova and parasites

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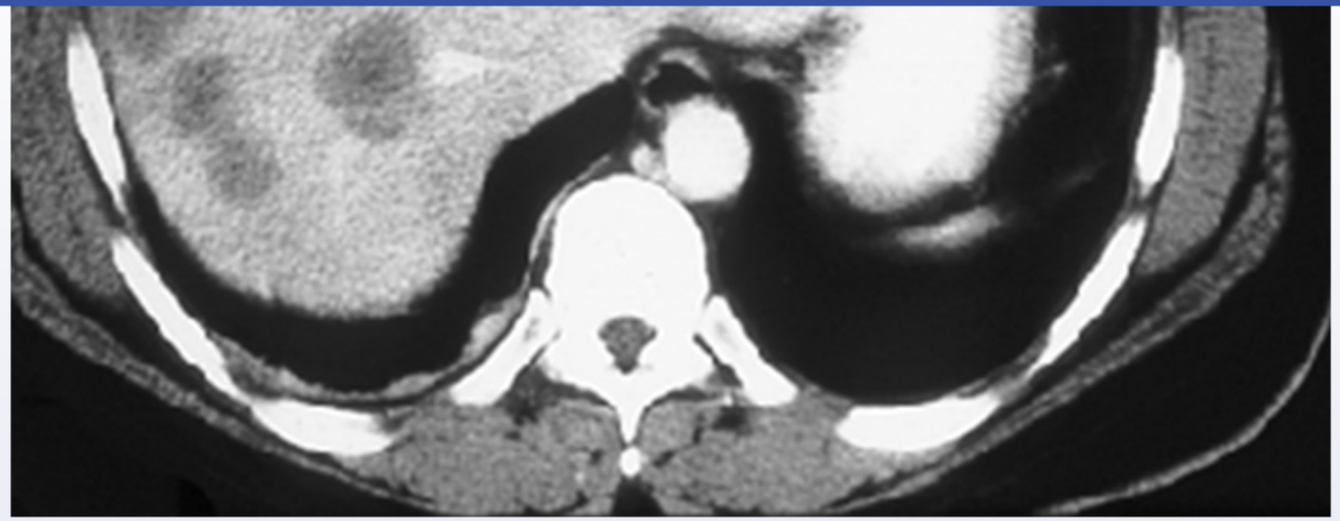
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Which of the following is most likely to establish the diagnosis in this patient?

A. Alpha-fetoprotein measurement (17%)
B. Aspiration and culture of the liver lesions (7%)
C. Bone marrow biopsy (0%)
✓ D. Colonoscopy (62%)
E. Prostate-specific antigen measurement (11%)
F. Stool test for ova and parasites (1%)

Omitted
Correct answer

62%
Answered correctly

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Time Spent

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Last Updated

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Explanation

This patient with weight loss and fatigue has **multiple liver lesions** on CT scan, suggesting **metastatic** disease to the liver rather than primary liver cancer. **Colorectal cancer** is the most common source of liver metastases (as blood from the colon moves through the portal circulation directly to the liver) and should be excluded in this patient, even in the absence of specific symptoms (eg, alteration in bowel habits, gastrointestinal bleeding). Abdominal CT is a useful screening test but can often miss primary intraluminal tumors. **Colonoscopy** is the most appropriate next diagnostic step as it both localizes the tumor and provides a tissue diagnosis.

Lung and breast cancers also metastasize to the liver, although less commonly than gastrointestinal malignancies. This patient is a smoker; however, he has a normal chest x-ray and no respiratory symptoms, making metastatic lung cancer unlikely.

(Choice A) Alpha-fetoprotein measurement is used along with imaging studies in the diagnosis of hepatocellular carcinoma, which most commonly occurs in the setting of chronic liver disease and presents as a solitary mass.

(Choice B) With pyogenic liver abscesses, aspiration and culture can guide antibiotic therapy. However, abscesses typically present acutely with fever, right upper quadrant pain, anorexia, and weight loss. Serologic studies can distinguish between pyogenic and amebic liver abscesses.

(Choice C) Bone marrow biopsy is useful in establishing a diagnosis of myeloproliferative or lymphoproliferative disorders. It would be uncommon for these disorders to cause multiple liver masses.

(Choice E) Prostate-specific antigen measurement is a useful marker for prostate cancer. However, prostate cancer tends to be an indolent malignancy that commonly metastasizes to the pelvic lymph nodes and bones rather than the liver.

(Choice F) Liver flukes can be diagnosed with ova and parasite stool tests. However, they tend to invade the biliary tree rather than the liver parenchyma, and the patient has no history of recent travel abroad, making this diagnosis unlikely.

Educational objective:
Multiple liver masses are much more likely to be the result of metastatic disease than infectious causes or primary liver malignancy. Primary tumors of the gastrointestinal tract, lung, and breast are the most common diseases causing liver metastases.

Surgery Gastrointestinal & Nutrition Metastatic liver disease

directly to the liver) and should be excluded in this patient, even in the absence of specific symptoms (eg, alteration in bowel habits, gastrointestinal bleeding). Abdominal CT is a useful screening test but can often miss primary intraluminal tumors. **Colonoscopy** is the most appropriate next diagnostic step as it both localizes the tumor and provides a tissue diagnosis.

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Educational objective:
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Surgery	Gastrointestinal & Nutrition	Metastatic liver disease
Subject	System	Topic

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Item 16 of 40
Question Id: 7522

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A 56-year-old man comes to the office due to a right foot ulcer that is not healing. He first noticed a small wound on the right sole 2 weeks ago but does not remember any trauma. The patient applied over-the-counter antibiotic cream, but the wound gradually enlarged and began draining foul-smelling material. He has had no fever or significant pain. The patient has a history of hypertension and type 2 diabetes mellitus. Temperature is 37.2 C (99 F), blood pressure is 140/80 mm Hg, and pulse is 86/min. Right foot examination shows a 2×3 cm plantar ulcer under the first metatarsal head. There is purulent exudate and the bone can be palpated with a sterile metal probe. Distal pulses are present, but lower-extremity sensation to light touch and pain is decreased. A recent hemoglobin A1c level is 8.9%. Which of the following is the best next step in management of this patient's foot ulcer?

A. Amputation of the foot
B. Erythrocyte sedimentation rate
C. Fungal blood cultures
D. Metatarsal bone biopsy
E. Swab and culture from the wound base

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- A. Amputation of the foot (10%)
- B. Erythrocyte sedimentation rate (1%)
- C. Fungal blood cultures (0%)
- ✓ D. Metatarsal bone biopsy (33%)
- E. Swab and culture from the wound base (54%)

Omitted
Correct answer
D

33%
Answered correctly

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Explanation

Patients with **diabetes** have multiple risk factors for the development of **infected foot ulcers**, including:

- peripheral neuropathy (eg, decreased lower extremity sensation, as in this patient): leading to impaired recognition of minor damage

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Explanation

Patients with **diabetes** have multiple risk factors for the development of **infected foot ulcers**, including:

- peripheral neuropathy (eg, decreased lower extremity sensation, as in this patient): leading to impaired recognition of minor damage
- hyperglycemia (eg, elevated hemoglobin A1c, as in this patient): leading to impaired immunity
- peripheral arterial disease: further contributing to impaired healing once a wound is present

Contiguous (nonhematogenous) extension of infection from the ulcer to underlying bone causes **osteomyelitis**. Because this complication may be asymptomatic, patients with diabetic foot ulcers should be assessed for extent of infection. As seen in this patient, the presence of a positive **probe-to-bone test** (palpating bone with a sterile, blunt wooden or metal tool), a large ulcer (eg, >2 cm^2), or an ulcer lasting ≥1 week increase the likelihood of osteomyelitis. Fever, pain, an elevated erythrocyte sedimentation rate (ESR), and **sinus tract drainage** (eg, purulent drainage) may be present.

The most specific diagnostic test for osteomyelitis is **bone biopsy and culture**. Bone biopsy, preferably performed before antibiotic initiation, allows for **identification of the causative pathogens** and tailoring of antibiotic therapy. Positive superficial wound cultures do not reliably predict the culprit organisms; even among patients with diabetes and foot ulcers who do not have osteomyelitis, wound base culture should be performed following debridement and curettage (ie, aseptically scraping the wound base with a blade or curette) rather than following a simple swab (which can be contaminated) **(Choice E)**.

(Choice A) Management of a foot ulcer complicated by osteomyelitis includes surgical debridement of necrotic material and prolonged (ie, multiple weeks) antimicrobial therapy. Amputation is the option of last resort and is used in instances of significant complications (eg, ischemia, necrosis) or when medical management fails.

(Choice B) Although an elevated ESR (eg, >70 mm/hr) is suggestive of osteomyelitis in the appropriate clinical setting, it can be increased by any significant inflammatory process and therefore is nonspecific. In osteomyelitis, an ESR is helpful in following the response to antibiotic treatment; however, the diagnosis should ideally be established via tissue biopsy and the culprit organism identified via microbiologic examination.

(Choice C) Although patients with diabetes are at increased risk for superficial fungal infections, invasive fungal infections are an uncommon cause of osteomyelitis, so fungal cultures are not a part of the standard evaluation. Routine blood cultures can be helpful in patients with osteomyelitis due to hematogenous spread (eg, infective endocarditis) but are less helpful in disease due to direct extension of local infection

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Educational objective:
Bacterial infection of a chronic diabetic foot ulcer may be minimally symptomatic and requires specific assessment. When the bone can be palpated with a probe, the risk of underlying osteomyelitis is greatly increased. Biopsy and culture of affected bone is critical to confirming the diagnosis and guiding management.

References

- Osteomyelitis in diabetic foot: a comprehensive overview.

Surgery	Infectious Diseases	Osteomyelitis
Subject	System	Topic

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A 34-year-old man comes to the emergency department due to acute-onset central chest and epigastric pain radiating to the mid-lower back. The pain started an hour ago while at rest. The patient also reports mild shortness of breath and diaphoresis. He has not seen a physician in 10 years. The patient drinks 3 or 4 beers most days and occasionally uses cocaine. His last use of cocaine was a day ago. On examination, the patient is in severe distress due to pain. Skin is cool and clammy. Blood pressure is 210/120 mm Hg and equal in both arms. Pulse is 110/min and regular, and respirations are 22/min. Pulse oximetry shows 95% on room air. BMI is 34 kg/m^2. There is no pulse asymmetry. Jugular venous pressure is normal. Breath sounds are decreased at the left lower base, and percussion is dull in the same area. Heart sounds are normal with no murmurs or extra sounds. Abdominal and neurologic examinations show no abnormalities. Extremities have no cyanosis, clubbing, or edema. ECG reveals sinus tachycardia with nonspecific T-wave changes. Laboratory studies show a hemoglobin of 11 g/dL. Troponin is normal. D-dimer is elevated. Serum lipase is normal. Chest x-ray shows a left pleural effusion. Which of the following is the most likely cause of the patient's current condition?

A. Coronary artery vasospasm
B. Longitudinal tear in the esophagus
C. Necrotizing pancreatitis
D. Pulmonary embolism
E. Ruptured atherosclerotic plaque
F. Tear in the aortic intima

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Item 17 of 40
Question Id: 15888

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A 34-year-old man comes to the emergency department due to acute-onset central chest and epigastric pain radiating to the mid-lower back. The pain started an hour ago while at rest. The patient also reports mild shortness of breath and diaphoresis. He has not seen a physician in 10 years. The patient drinks 3 or 4 beers most days and occasionally uses cocaine. His last use of cocaine was a day ago. On examination, the patient is in severe distress due to pain. Skin is cool and clammy. Blood pressure is 210/120 mm Hg and equal in both arms. Pulse is 110/min and regular, and respirations are 22/min. Pulse oximetry shows 95% on room air. BMI is 34 kg/m^2. There is no pulse asymmetry. Jugular venous pressure is normal. Breath sounds are decreased at the left lower base, and percussion is dull in the same area. Heart sounds are normal with no murmurs or extra sounds. Abdominal and neurologic examinations show no abnormalities. Extremities have no cyanosis, clubbing, or edema. ECG reveals sinus tachycardia with nonspecific T-wave changes. Laboratory studies show a hemoglobin of 11 g/dL. Troponin is normal. D-dimer is elevated. Serum lipase is normal. Chest x-ray shows a left pleural effusion. Which of the following is the most likely cause of the patient's current condition?

- A. Coronary artery vasospasm (9%)
- B. Longitudinal tear in the esophagus (4%)
- C. Necrotizing pancreatitis (5%)
- D. Pulmonary embolism (16%)
- E. Ruptured atherosclerotic plaque (1%)
- ✓ F. Tear in the aortic intima (62%)

Omitted
Correct answer
F

62%
Answered correctly

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03/17/2020
Last Updated

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Acute aortic dissection	
Clinical features	• History of HTN*, Marfan syndrome, cocaine use • Severe, sharp, tearing chest or back pain • ± >20 mm Hg variation in SBP between arms
Complications due to extension (involved structure)	• Stroke (carotid artery) • Acute aortic regurgitation (aortic root/valve) • Horner syndrome (carotid sympathetic plexus) • Myocardial ischemia/infarction (coronary artery ostia) • Pericardial effusion/tamponade (pericardium) • Hemothorax (pleural cavity) • Renal injury (renal arteries) • Abdominal pain (mesenteric arteries) • Lower extremity paraplegia (spinal arteries)

HTN = hypertension; **SBP** = systolic blood pressure.

*Strongest overall risk factor.

This patient likely has **acute aortic dissection** complicated by pleural effusion. Risk factors for aortic dissection include hypertension, connective tissue disorders (eg, Marfan syndrome), and preexisting aneurysm. **Cocaine**, which can cause rapid and transient hypertension, is frequently associated with dissections in young patients.

Patients typically have sudden-onset, severe **chest** or **back pain** that is described as sharp or tearing. Depending on the vessels and structures involved (eg, carotid arteries, aortic root, celiac artery), complications can include stroke, acute aortic regurgitation with heart failure, or mesenteric ischemia. Involvement of the subclavian or iliac arteries can result in asymmetry of pulses or blood pressure. **Pleural effusion** may occur due to either direct extension causing hemothorax or from an inflammatory reaction to blood irritating the pleural lining.

D-dimer elevation is common (sensitive but not specific) due to the presence of fibrin degradation products, and acute **anemia** can result from extravasation of blood into the chest or abdomen. ECG findings can be variable depending on the patient's underlying illnesses (eg, hypertension)

*Strongest overall risk factor.

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D-dimer elevation is common (sensitive but not specific) due to the presence of fibrin degradation products, and acute **anemia** can result from extravasation of blood into the chest or abdomen. ECG findings can be variable depending on the patient's underlying illnesses (eg, hypertension) or the presence of coronary ostia compromise or shock. Plain x-ray may demonstrate a widened cardiac silhouette, and CT scan typically shows an intimal flap or double aortic lumen.

(Choices A and E) Myocardial infarction (MI) due to ruptured atherosclerotic plaque is uncommon in young patients (<35), and cocaine-induced MI is usually due to increased myocardial oxygen demand and coronary artery vasospasm. MI due to either mechanism is less likely than aortic dissection in this patient given the normal troponin, pleural effusion, and likely acute anemia.

(Choice B) Longitudinal esophageal tear (Mallory-Weiss syndrome) typically presents with hematemesis and epigastric pain in the setting of recent vomiting with retching.

(Choice C) Acute necrotizing pancreatitis commonly presents with epigastric pain radiating to the back, often with an associated pleural effusion. However, normal serum lipase makes this diagnosis much less likely.

(Choice D) Presentation with chest pain, dyspnea, sinus tachycardia on ECG, elevated D-dimer (again nonspecific), and pleural effusion can be typical of pulmonary embolism. However, the chest pain is usually pleuritic; epigastric pain, significant hypertension, and anemia are not common and make cocaine-induced aortic dissection a more likely diagnosis.

Educational objective:

D-dimer elevation is common (sensitive but not specific) due to the presence of fibrin degradation products, and acute **anemia** can result from extravasation of blood into the chest or abdomen. ECG findings can be variable depending on the patient's underlying illnesses (eg, hypertension) or the presence of coronary ostia compromise or shock. Plain x-ray may demonstrate a widened cardiac silhouette, and CT scan typically shows an intimal flap or double aortic lumen.

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Educational objective:
Cocaine can cause rapid and transient hypertension and is associated with aortic dissection in young patients. There is typically sudden-onset, severe chest or back pain that is sharp or tearing, and pleural effusion may occur due to hemothorax.

References

- Acute aortic dissection and intramural hematoma: a systematic review.

Surgery	Cardiovascular System	Aortic dissection
Subject	System	Topic

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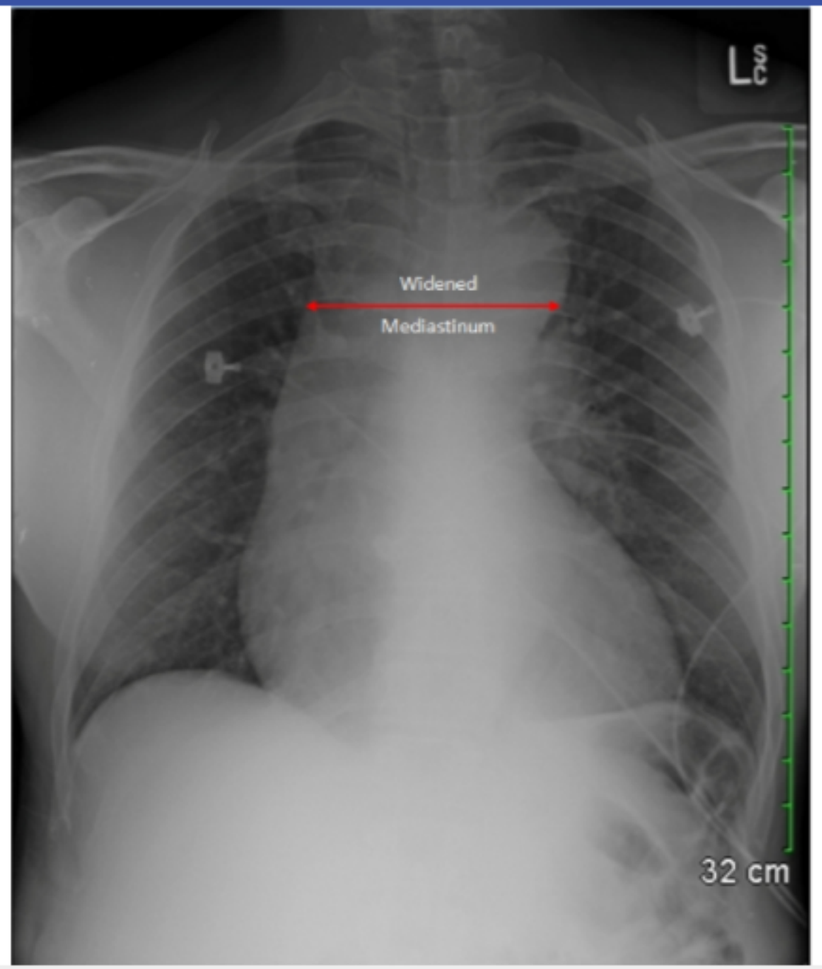
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- Lower extremity paraplegia (spinal arteries)

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typical of pulmonary embolism. However, the chest pain is usually pleuritic, epigastric pain, significant hypertension, and anemia are not common

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Item 17 of 40
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- Lower extremity paraplegia (spinal arteries)

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Item 18 of 40
Question Id: 2195

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A 30-year-old school teacher presents with a three-day history of fever, chills, and sore throat. He also complains of difficulty swallowing that started yesterday. He denies any cough, chest pain, or difficulty breathing. He is married and denies any new sexual encounters. His temperature is 39.8° C (102.2° F), blood pressure is 118/76 mmHg, pulse is 102/min, and respirations are 19/min. On examination, his voice is muffled. Enlarged, tender cervical lymph nodes are palpated on the left, and his uvula is deviated to the right. What is the most appropriate treatment for this patient?

A. Throat swabs and oral antibiotics
B. Monospot test and oral antibiotics
C. Emergency laryngoscopy
D. Cricothyroidotomy
E. Needle peritonsillar aspiration

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Item 18 of 40
Question Id: 2195

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A. Throat swabs and oral antibiotics (23%)
B. Monospot test and oral antibiotics (8%)
C. Emergency laryngoscopy (13%)
D. Cricothyroidotomy (1%)
✓ E. Needle peritonsillar aspiration (52%)

Omitted
Correct answer
E

52%
Answered correctly

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Last Updated

Explanation

This patient's symptoms are most likely secondary to a peritonsillar abscess. Although the three-day history of fever, chills, and sore throat were most likely secondary to tonsillitis, his muffled or "hot potato voice" and deviation of the uvula suggest that a peritonsillar abscess has developed as a complication of his tonsillitis. Patients with a peritonsillar abscess typically have prominent unilateral lymphadenopathy, as seen in this patient. This condition can be fatal secondary to either airway obstruction or spread of the infection into the parapharyngeal space, which may lead to involvement of the carotid sheath. Initial treatment consists of aspiration of the peritonsillar abscess and initiation of intravenous

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(Choice A) Throat swabs and oral antibiotics are the usual treatment of tonsillopharyngitis, but this patient's muffled voice and deviation of his uvula suggest that a more complicated infection is present.

(Choice B) This patient's unilateral lymphadenopathy, deviation of his uvula, and muffled voice are not consistent with mononucleosis.

(Choice C) Emergency laryngoscopy is typically required in patients with epiglottitis to ensure adequate protection of the airway. Epiglottitis can present with difficulty swallowing and a muffled voice similar to that seen in this patient, but the unilateral lymphadenopathy and deviation of the uvula are more suggestive of a peritonsillar abscess. In addition, the epiglottis is located more distal in the airway and is not adjacent to the uvula.

(Choice D) Cricothyroidotomy is used as a last resort in patients who are unable to protect their airway. This patient, however, is not complaining of any difficulty breathing at this time.

Educational objective:
A muffled voice should make one consider a diagnosis other than uncomplicated pharyngitis or tonsillitis. A peritonsillar abscess is a potential complication of tonsillitis and requires both intravenous antibiotic therapy and urgent drainage of the abscess. Deviation of the uvula and unilateral lymphadenopathy can be helpful in distinguishing a peritonsillar abscess from epiglottitis.

Surgery	Ear, Nose & Throat (ENT)	Peritonsillar abscess
Subject	System	Topic

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A 38-year-old woman comes to the hospital due to right upper quadrant pain associated with nausea and vomiting for the past 12 hours. She has had similar pain previously, usually after the ingestion of fatty foods, but past episodes have always resolved within 1-2 hours. Past medical history includes hypertriglyceridemia, for which she takes fenofibrate. The patient's temperature is 38.3 C (101 F), blood pressure is 130/70 mm Hg, pulse is 98/min, and respirations are 20/min. Her BMI is 34 kg/m^2. Examination shows right upper quadrant tenderness. Laboratory results are as follows:

Total bilirubin	0.8 mg/dL
Alkaline phosphatase	80 U/L
Aspartate aminotransferase (SGOT)	22 U/L
Alanine aminotransferase (SGPT)	24 U/L
Amylase	81 U/L

Abdominal ultrasound reveals gallstones, a thickened gallbladder wall with edema, and a normal common bile duct. In addition to the supportive care, which of the following is the most appropriate next step in management of this patient?

A. Cholecystectomy within 72 hours
B. CT scan of the abdomen
C. Delayed cholecystectomy after 7 days
D. Discontinue fenofibrate and reevaluate in 3 months
E. Endoscopic retrograde cholangiopancreatography
F. Hepatobiliary iminodiacetic acid (HIDA) scan

history includes hypertriglyceridemia, for which she takes fenofibrate. The patient's temperature is 38.3 C (101 F), blood pressure is 130/70 mm Hg, pulse is 98/min, and respirations are 20/min. Her BMI is 34 kg/m^2. Examination shows right upper quadrant tenderness. Laboratory results are as follows:

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Amylase	81 U/L

Abdominal ultrasound reveals gallstones, a thickened gallbladder wall with edema, and a normal common bile duct. In addition to the supportive care, which of the following is the most appropriate next step in management of this patient?

- A. Cholecystectomy within 72 hours (74%)
- B. CT scan of the abdomen (1%)
- C. Delayed cholecystectomy after 7 days (11%)
- D. Discontinue fenofibrate and reevaluate in 3 months (4%)
- E. Endoscopic retrograde cholangiopancreatography (4%)
- F. Hepatobiliary iminodiacetic acid (HIDA) scan (3%)

Omitted
Correct answer

74%
Answered correctly

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Time Spent

02/18/2020
Last Updated

Management of gallstones	
Gallstones without symptoms	• **No treatment** required in most patients
Gallstones with typical biliary colic symptoms	• Elective laparoscopic cholecystectomy • Possible ursodeoxycholic acid in poor surgical candidates
Complicated gallstone disease*	• Cholecystectomy within 72 hr

*Acute cholecystitis, choledocholithiasis, gallstone pancreatitis.

Acute cholecystitis is characterized by inflammation and distension of the gallbladder due to **obstruction of the cystic duct** by a gallstone. Typical features include acute right upper quadrant pain and tenderness, fever, and leukocytosis. Palpation (or an ultrasound probe) under the costal margin at the midclavicular line may elicit acute tenderness, especially during inspiration (Murphy sign).

Symptoms often subside within a few days with volume resuscitation, antibiotics, and pain medications. However, early **cholecystectomy** (within 72 hours) reduces disease duration, duration of hospitalization, and mortality when compared to delayed cholecystectomy (>7 days after hospitalization) **(Choice C)**. Laparoscopic cholecystectomy is the surgical procedure of choice in patients without contraindications. Early cholecystectomy is also advised for patients with other complications of gallstones, such as gallstone pancreatitis.

(Choices B and F) The hepatobiliary iminodiacetic acid (HIDA) scan uses a nuclear tracer that is excreted in the bile. Failure to visualize the tracer in the gallbladder suggests obstruction; therefore, this test can be used in the evaluation of cholecystitis when ultrasound findings are indeterminate. CT can also be used to evaluate the biliary tree but is less sensitive than ultrasound. This patient has evidence of acute cholecystitis on ultrasound, and additional imaging is not necessary.

(Choice D) Delayed, elective cholecystectomy is appropriate for patients with uncomplicated biliary colic. However, even though fenofibrate can contribute to gallstone formation, this patient has acute cholecystitis, which requires timely removal of her gallbladder.

(Choice E) Endoscopic retrograde cholangiopancreatography (ERCP) uses fluoroscopy to visualize the biliary tree for diagnostic and therapeutic purposes. ERCP is indicated for a gallstone in the common biliary duct (CBD) causing CBD dilation. In such cases, sphincterotomy can facilitate passage of stones. This patient's normal alkaline phosphatase makes CBD obstruction unlikely (acute cholecystitis is usually due to cystic duct

Management of gallstones	
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Gallstones with typical biliary colic symptoms	• Elective laparoscopic cholecystectomy • Possible ursodeoxycholic acid in poor surgical candidates
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Educational objective:
Acute cholecystitis presents with right upper quadrant pain, fever, and leukocytosis. Patients with acute cholecystitis should be treated with laparoscopic cholecystectomy within 72 hours.

References

- Surgical and nonsurgical management of gallstones.

Surgery Gastrointestinal & Nutrition Cholecystitis

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A 34-year-old man comes to the office due to intermittent dizziness over the past 3 months. The patient has had episodes of a sudden spinning sensation, accompanied by nausea, that resolve spontaneously after approximately a minute. Symptoms occur when he is lifting heavy weights, riding on an elevator, or after sneezing. He has had no headache or ear pain but has trouble hearing out of the right ear. The patient had a concussion after a bicycle collision 4 months ago but has no other medical conditions and has had no recent upper respiratory illness. Vital signs are within normal limits. Physical examination shows normal ears, including tympanic membranes. There is no extremity weakness or sensory loss. No nystagmus is present at rest but performing a Valsalva maneuver provokes nystagmus and the other reported symptoms. Which of the following is the most likely diagnosis?

A. Benign paroxysmal positional vertigo
B. Eustachian tube dysfunction
C. Ménière disease
D. Orthostatic hypotension
E. Perilymphatic fistula
F. Postconcussive syndrome

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A. Benign paroxysmal positional vertigo (20%)
B. Eustachian tube dysfunction (20%)
C. Ménière disease (19%)
D. Orthostatic hypotension (2%)
✓ E. Perilymphatic fistula (25%)
F. Postconcussive syndrome (11%)

Omitted
Correct answer
E

25%
Answered correctly

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Time Spent

06/08/2020
Last Updated

Explanation

The **inner ear** contains the endolymphatic fluid-filled semicircular canals (which convey movement and position of the head) and the cochlea

Explanation

The **inner ear** contains the endolymphatic fluid-filled semicircular canals (which convey movement and position of the head) and the cochlea (which is the sensory organ of hearing). Conditions that cause disruption of endolymph flow can present with vertigo (semicircular canals) and/or sensorineural hearing loss (cochlea).

Perilymphatic fistulas are a rare, but debilitating, complication of head injury or barotrauma. They cause leakage of endolymph from the semicircular canals and cochlea into surrounding tissues, resulting in characteristic clinical features:

- **Progressive sensorineural hearing loss** caused by damage to cochlear hair cells from loss of endolymph.
- **Episodic vertigo with nystagmus** triggered by pressure changes in the inner ear (eg, **Valsalva** maneuver, elevation changes [eg, riding in elevator]) due to acutely increased endolymph leakage. This can be demonstrated clinically by performing a loud clap (ie, pressure change due to sound conduction through the ossicles) near the patient's ear and observing for nystagmus (Tullio phenomenon).

Patients are advised to limit activities that increase inner ear pressure; they also require ENT referral for further management.

(Choice A) Benign paroxysmal positional vertigo is caused by debris (otoliths) that temporarily alters endolymph flow through the semicircular canals. Therefore, patients typically have sudden, brief (<1-min) episodes of vertigo triggered by head movement.

(Choice B) Eustachian tube dysfunction can result in fluid in the middle ear space (not the inner ear vestibular system) and can cause ear popping, cracking, and hearing loss in response to changes in pressure. However, it also causes a sense of ear fullness or pain, not episodic vertigo with nystagmus.

(Choice C) Ménière disease is caused by increased endolymphatic fluid volume or pressure in the vestibular system. It also causes episodic vertigo with hearing loss, but episodes are accompanied by aural fullness or tinnitus, last 20 minutes to 24 hours, and often lack specific, identifiable triggers.

(Choice D) Orthostatic hypotension causes lightheadedness, presyncope, or syncope when the patient assumes a standing position due to cerebral hypoperfusion. It does not involve the vestibular system and therefore does not cause true vertigo or nystagmus.

(Choice F) This patient's traumatic brain injury puts him at risk for postconcussive syndrome, which is characterized by headache, confusion, difficulty concentrating, mood alterations, and sleep disturbances. It does not cause spinning vertigo with nystagmus triggered by Valsalva

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(Choice F) This patient's traumatic brain injury puts him at risk for postconcussive syndrome, which is characterized by headache, confusion, difficulty concentrating, mood alterations, and sleep disturbances. It does not cause spinning vertigo with nystagmus triggered by Valsalva maneuvers.

Educational objective:
A perilymphatic fistula can occur after head trauma and result in episodic vertigo triggered by sudden pressure changes (eg, Valsalva maneuvers) or loud noises (Tullio phenomenon).

References

- Diagnosis and treatment of perilymphatic fistula.

Surgery	Ear, Nose & Throat (ENT)	Vertigo
Subject	System	Topic

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Settings

Item 21 of 40
Question Id: 3349

Mark | Previous | Next | Full Screen | Tutorial | Lab Values | Notes | Calculator | Reverse Color | Text Zoom | Settings

A 45-year-old man is brought to the emergency department following a motor vehicle collision. He has pain in his lower abdomen and right groin. The patient is unable to move his right lower extremity due to pain. Temperature is 37 C (98.6 F), blood pressure is 130/82 mm Hg, pulse is 100/min, and respirations are 16/min. There is fullness in the suprapubic region. The right lower extremity is adducted, flexed, and internally rotated. Bruising is present around the scrotum and perineum, and blood is seen at the urethral meatus. The testes are nontender on palpation. Digital rectal examination reveals a high-riding prostate. Which of the following is the best next step in management of this patient?

- A. Foley catheterization
- B. Immediate surgical repair of the urethra
- C. Retrograde cystography
- D. Retrograde urethrography
- E. Testicular and scrotal ultrasound

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Item 21 of 40
Question Id: 3349

Mark | Previous | Next | Full Screen | Tutorial | Lab Values | Notes | Calculator | Reverse Color | Text Zoom | Settings

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- A. Foley catheterization (4%)
- B. Immediate surgical repair of the urethra (19%)
- C. Retrograde cystography (10%)
- ✓ D. Retrograde urethrography (61%)
- E. Testicular and scrotal ultrasound (3%)

Omitted
Correct answer
D

61%
Answered correctly

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Time Spent

03/23/2020
Last Updated

Explanation

Male urogenital anatomy

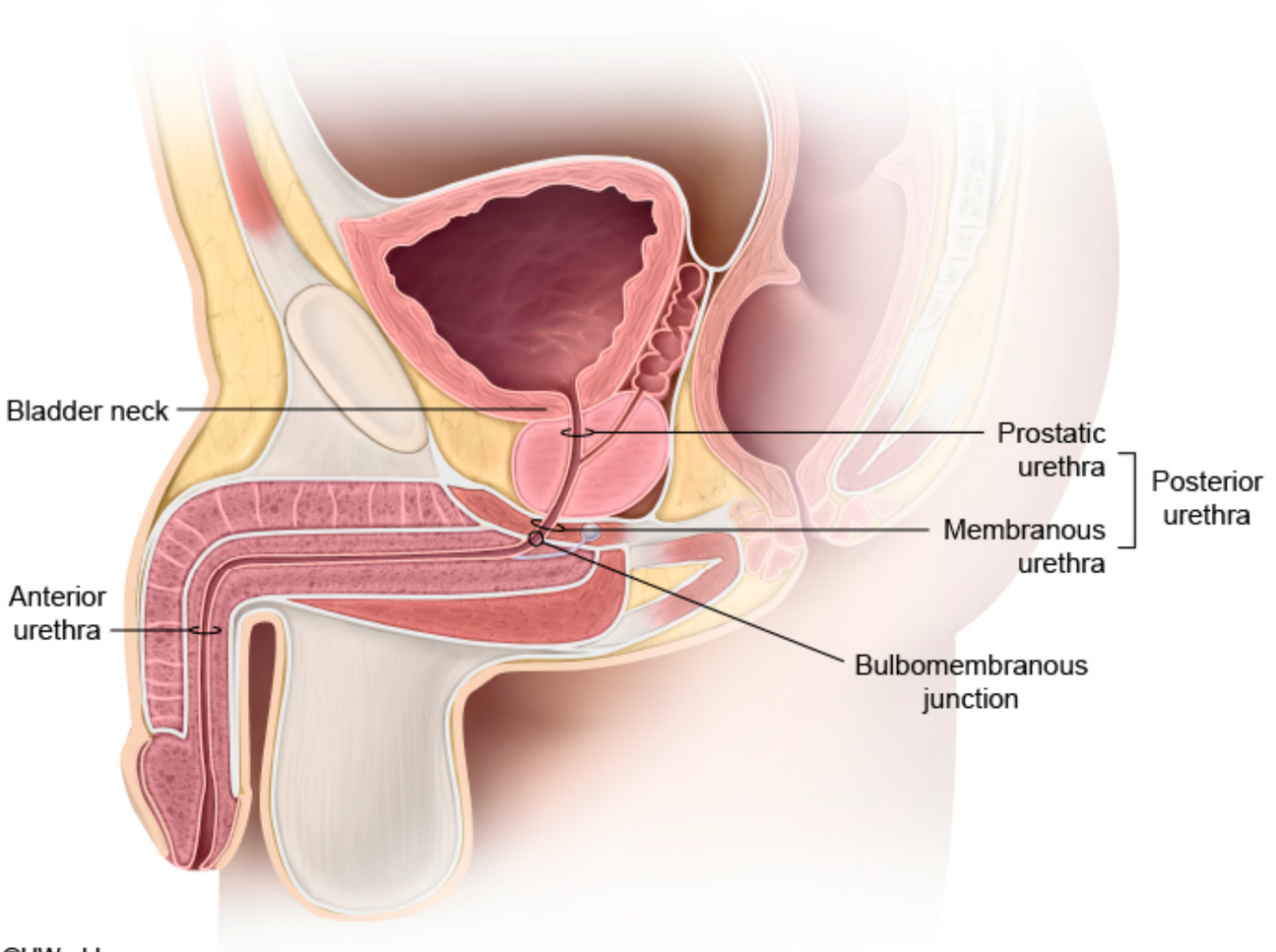
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Male urogenital anatomy



This patient has evidence of a **pelvic fracture** (eg, adducted and internally rotated right lower extremity, perineal bruising), accompanied by blood

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This patient has evidence of a **pelvic fracture** (eg, adducted and internally rotated right lower extremity, perineal bruising), accompanied by blood at the urethral meatus and a high-riding prostate on digital rectal examination. This presentation is most concerning for **posterior urethral injury (PUI)** and should prompt retrograde urethrography.

Because of the length and positioning of the male urethra, men with pelvic fractures are at significant risk for PUI. Abrupt upward shifting of the bladder and prostate can lead to urethral tearing, most commonly at the **bulbomembranous junction** (transition point between the anterior and posterior urethra). Findings consistent with PUI include **blood** at the **urethral meatus**, inability to void (due to urethral discontinuity), perineal bruising, and a **high-riding prostate** on digital rectal examination.

In patients with suspected urethral injury, **retrograde urethrography** should be performed. This diagnostic test involves x-ray of the urethral tract following injection of radiopaque contrast through the urethral meatus. **Extravasation of contrast** from the urethra is diagnostic of urethral injury. Urethrography should precede any attempts at urethral (eg, Foley) catheterization because it can worsen the injury, potentially converting a partial urethral tear into a complete urethral laceration **(Choice A)**.

(Choice B) In all cases of urethral injury, urethrography or urethroscopy is recommended prior to surgery to both confirm the diagnosis and aid operative planning. After imaging, anterior urethral injuries (eg, penile fracture, straddle injury) are typically repaired urgently (eg, within 24 hours), whereas most PUIs are treated with temporary urinary diversion via suprapubic catheter, followed by delayed repair.

(Choice C) Retrograde cystography images (eg, via CT or fluoroscopy) the bladder after it has been passively filled with radiopaque contrast via Foley catheter. Bladder rupture, as in PUI, is commonly associated with pelvic fracture and could also be present in this patient. However, urethral injury should be ruled out prior to any attempts at urethral catheterization for cystography in this patient with signs of likely urethral injury.

(Choice E) Ultrasound is appropriate for evaluating for testicular pathology (eg, torsion, rupture). Although this patient has scrotal ecchymosis, which may be seen in testicular injury, the lack of testicular tenderness suggests that the ecchymosis is more likely due to a nontesticular (eg, urethral) injury.

Educational objective:
Pelvic fractures in men may be complicated by posterior urethral injury. Patients with suspected urethral injury (eg, blood at the urethral meatus, high-riding prostate) should undergo retrograde urethrography.

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A 22-year-old woman comes to the office for evaluation of new-onset foot pain. The pain is located at the heel and is most pronounced when she gets up from sitting after a long period of time. The patient is a collegiate soccer player who plays both indoor and outdoor soccer. In addition, she enjoys trail running and occasionally runs barefoot along the beach. Physical examination of the foot shows a moderately high arch with no discoloration or deformity. Direct pressure to the bottom of the heel elicits sharp pain, but mediolateral squeezing of the heel causes no discomfort. Which of the following is the most likely etiology of the patient's foot pain?

A. Entrapment of the posterior tibial nerve
B. Increased foot compartment pressures
C. Inflammation of the Achilles tendon
D. Inflammation of the plantar aponeurosis
E. Overuse injury to the bone

Submit

Settings

Item 22 of 40
Question Id: 15967

Mark | Previous | Next | Full Screen | Tutorial | Lab Values | Notes | Calculator | Reverse Color | Text Zoom | Settings

A 22-year-old woman comes to the office for evaluation of new-onset foot pain. The pain is located at the heel and is most pronounced when she gets up from sitting after a long period of time. The patient is a collegiate soccer player who plays both indoor and outdoor soccer. In addition, she enjoys trail running and occasionally runs barefoot along the beach. Physical examination of the foot shows a moderately high arch with no discoloration or deformity. Direct pressure to the bottom of the heel elicits sharp pain, but mediolateral squeezing of the heel causes no discomfort. Which of the following is the most likely etiology of the patient's foot pain?

- A. Entrapment of the posterior tibial nerve (1%)
- B. Increased foot compartment pressures (1%)
- C. Inflammation of the Achilles tendon (7%)
- ✓ D. Inflammation of the plantar aponeurosis (71%)
- E. Overuse injury to the bone (18%)

Omitted
Correct answer
D

71%
Answered correctly

01 sec
Time Spent

02/24/2020
Last Updated

Explanation

Plantar fasciitis	
Risk factors	• Pes planus • Obesity

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Plantar fasciitis	
Risk factors	• Pes planus • Obesity • Working or exercising on hard surfaces
Symptoms	• Pain at plantar aspect of heel & hindfoot • Worse with weight bearing (especially after prolonged rest)
Diagnosis	• Tenderness at insertion of plantar fascia • Pain with dorsiflexion of toes • Presence of heel spurs on x-ray has low sensitivity & specificity
Treatment	• Activity modification • Stretching exercises • Heel pads/orthotics

This patient with heel pain that is worse with weight bearing has **plantar fasciitis**. Plantar fasciitis is most common in obese, middle-aged adults, but it may also be seen in younger, well-conditioned individuals who participate in **high-impact exercise** or spend extended periods in **bare feet**. Plantar fasciitis is characterized by inflammation and degeneration of the **plantar aponeurosis** (deep plantar fascia), a thick, fibrous band that extends from the calcaneus to the toes and supports the longitudinal arch of the foot. It is thought to be due to chronic overuse and **repetitive microtrauma** to the aponeurosis and its insertion point at the calcaneus.

The diagnosis of plantar fasciitis is based on clinical factors. The pain is often worst when first standing from rest; it may lessen with activity but may again worsen after long periods of standing or walking. Physical examination typically shows tenderness at the insertion of the plantar fascia at the calcaneus, especially with the toes passively dorsiflexed. Patients frequently have preexisting abnormalities of the arch (eg, pes planus, high arch).

X-ray may show **calcifications** in the proximal plantar fascia ("**heel spurs**"), but this finding is neither sensitive nor specific, and imaging is done primarily to rule out other causes of pain. Initial management includes activity modification (eg, avoiding walking barefoot, reducing high-impact

- Heel pads/orthotics

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X-ray may show **calcifications** in the proximal plantar fascia ("**heel spurs**"), but this finding is neither sensitive nor specific, and imaging is done primarily to rule out other causes of pain. Initial management includes activity modification (eg, avoiding walking barefoot, reducing high-impact exercise), stretching exercises, and padded heel inserts. However, the plantar aponeurosis recovers slowly; the long-term outcome is generally good, but symptoms may require months or even years for complete resolution.

(Choice A) Tarsal tunnel syndrome is caused by entrapment and compression of the tibial nerve where it passes under the flexor retinaculum at the medial aspect of the ankle. It presents with numbness and paresthesias at the toes and distal sole. The pain is provoked by percussion at the tarsal tunnel (not palpation of the heel, as in this patient).

(Choice B) Chronic exertion compartment syndrome is related to transient relative ischemia due to muscle expansion within a fixed fascial compartment. It is typically seen in distance runners and presents with episodic muscle pain and paresthesias during strenuous exercise. However, it does not cause pain when standing up from rest or tenderness to palpation of the heel.

(Choice C) Achilles tendinopathy is a common cause of exercise-induced heel pain. However, the pain and tenderness are most prominent at the posterior heel, often with palpable thickening of the tendon. Also, the pain is typically reproduced by passive dorsiflexion of the ankle rather than palpation of the heel.

(Choice E) Calcaneal stress fractures are typically seen in inexperienced athletes after initiation of a high-impact exercise program. Like plantar

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(Choice E) Calcaneal stress fractures are typically seen in inexperienced athletes after initiation of a high-impact exercise program. Like plantar fasciitis, they cause pain at the heel that is worse with weight bearing. However, the pain can often be elicited by firm palpation at the sides of the heel (squeeze test).

Educational objective:
Plantar fasciitis is characterized by inflammation and degeneration of the plantar aponeurosis (deep plantar fascia), a thick, fibrous band that extends from the calcaneus to the toes and supports the longitudinal arch of the foot. It presents with chronic pain at the sole of the foot that is worse with weight bearing.

References

- Diagnosis and treatment of plantar fasciitis.

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A 23-year-old man is brought to the emergency department by his family due to a severe sore throat, persistent elevated fevers, pain and difficulty with swallowing, and shortness of breath. His symptoms worsened over the past day. Three days ago, he was seen at an urgent care center for pharyngitis and was prescribed azithromycin. The patient's past medical history is otherwise insignificant. He does not use tobacco, alcohol, or illicit drugs. His temperature is 40 C (104 F), blood pressure is 90/58 mm Hg, pulse is 115/min, and respirations are 24/min. Pulse oximetry shows 94% on room air. Physical examination is notable for a well-built man in moderate distress due to pain. There is mild swelling and erythema of the oropharynx and tonsils without exudate. Dentition is intact and shows good hygiene. The neck is swollen and tender along the left sternocleidomastoid muscle. Lung examination reveals basilar crackles. There are no heart murmurs. Leukocyte count is 17,400/mm^3 with 93% neutrophils. A duplex ultrasound shows left internal jugular vein thrombosis. Chest x-ray reveals multiple peripheral lung nodules, some with cavitation. Which of the following is the most likely causative organism?

A. *Clostridium perfringens*
B. *Fusobacterium necrophorum*
C. *Haemophilus influenzae* serotype b
D. *Klebsiella pneumoniae*
E. *Streptococcus pyogenes*

Submit

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A. *Clostridium perfringens* (5%)
✓ B. *Fusobacterium necrophorum* (51%)
C. *Haemophilus influenzae* serotype b (11%)
D. *Klebsiella pneumoniae* (15%)
E. *Streptococcus pyogenes* (16%)

Omitted
Correct answer
B

51%
Answered correctly

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Time Spent

05/19/2020
Last Updated

Explanation

Lemierre syndrome (LS) is a severe life-threatening infection that affects young immunocompetent patients and is usually caused by the gram

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Lemierre syndrome (LS) is a severe life-threatening infection that affects young immunocompetent patients and is usually caused by the gram-negative anaerobic bacillus ***Fusobacterium*** *necrophorum*. *F necrophorum* is part of the normal oral flora. LS usually begins with an oropharyngeal infection, usually **tonsillitis**, but can also arise as a complication from dental work or mastoiditis. The bacterium invades the lateral pharyngeal space through the lymphatic system and affects the neurovascular structures, causing **internal jugular vein thrombosis** and infection.

The classic presentation is a prolonged (eg, weeklong) duration of sore throat with high fever, rigors, dysphagia, and neck pain and swelling along the sternocleidomastoid muscle. Once the internal jugular vein is infected, septic thromboemboli can seed other organs, particularly the lungs, causing respiratory symptoms and leading to nodules on chest x-ray. LS should be considered in any **toxic**-appearing patient with respiratory difficulties and significant **neck swelling or tenderness** in the week following an oropharyngeal infection.

Microbiologic diagnosis requires culture from blood or pus. In addition to supportive (eg, airway) management, treatment is with intravenous antibiotics and, possibly, surgery (eg, incision and drainage, vein excision) in patients with no response to antibiotics.

(Choice A) *Clostridium perfringens* is a gram-positive bacillus that commonly causes food poisoning and gas gangrene.

(Choice C) Prior to the use of the conjugate vaccine against *Haemophilus influenzae* serotype b (Hib), the organism was an important cause of epiglottitis, which can present with febrile pharyngitis and progress to respiratory compromise. Hib infection can also lead to bacteremia. However, jugular vein thrombosis and septic pulmonary emboli are much more suggestive of LS due to *Fusobacterium*.

(Choice D) *Klebsiella pneumoniae* is a gram-negative rod that is a rare cause of community-acquired pneumonia. A classic presentation is pneumonia with thick "currant jelly" sputum in alcoholics or patients with diabetes.

(Choice E) Group A *Streptococcus pyogenes* causes many cases of bacterial pharyngitis. However, tonsillar exudates are classically present and patients are not typically severely toxic-appearing.

Educational objective:
Lemierre syndrome (LS) is caused by an oropharyngeal infection, usually pharyngitis or tonsillitis, that leads to local invasion of the lateral pharyngeal wall and infection of the neurovascular bundle, especially the internal jugular vein. Thrombosis of this vein allows dissemination of septic emboli to distal sites. *Fusobacterium necrophorum* is the most frequent bacterial cause of LS.

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Lemierre syndrome (LS) is caused by an oropharyngeal infection, usually pharyngitis or tonsillitis, that leads to local invasion of the lateral pharyngeal wall and infection of the neurovascular bundle, especially the internal jugular vein. Thrombosis of this vein allows dissemination of septic emboli to distal sites. *Fusobacterium necrophorum* is the most frequent bacterial cause of LS.

Surgery	Infectious Diseases	Thrombophlebitis
Subject	System	Topic

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Settings

Item 24 of 40
Question Id: 15479

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A 13-year-old boy is seen in the office for persistent right knee pain. He first noticed a dull pain along the anterior knee 2 months ago. Initially, the pain was noticeable only after basketball practice. Two days ago, the pain worsened after the patient landed during a rebound attempt at a basketball game. The knee pain is now constant and not relieved with ibuprofen or ice. The patient has no chronic medical conditions. Temperature is 37.4 C (99.3 F). Height is at the 75th percentile, and weight is at the 95th percentile. The patient walks with a limp with the right foot pointed laterally. There is no tenderness, erythema, or swelling around the right knee. The anterior and posterior drawer tests are normal. No abnormal findings during knee flexion and extension are present with either internal or external rotation of the tibia. Range of motion of the right hip is limited, and the knee points laterally upon passive hip flexion. Which of the following is the most likely diagnosis in this patient?

A. Anterior cruciate ligament tear
B. Medial meniscus tear
C. Osgood-Schlatter disease
D. Osteoarthritis of the hip
E. Osteoid osteoma of the proximal femur
F. Slipped capital femoral epiphysis
G. Transient synovitis of the hip

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- A. Anterior cruciate ligament tear (0%)
- B. Medial meniscus tear (1%)
- C. Osgood-Schlatter disease (11%)
- D. Osteoarthritis of the hip (0%)
- E. Osteoid osteoma of the proximal femur (1%)
- ✓ F. Slipped capital femoral epiphysis (83%)
- G. Transient synovitis of the hip (2%)

Omitted
Correct answer
F

83%
Answered correctly

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Time Spent

06/08/2020
Last Updated

Explanation

Slipped capital femoral epiphysis	
Risk factors	• Obesity • Adolescence
Clinical presentation	• Dull hip pain • Referred knee pain • Altered gait • Limited internal rotation of hip
Diagnosis	• Posteriorly displaced femoral head on x-ray
Treatment	• Non–weight bearing • Surgical pinning
Complications	• Avascular necrosis • Osteoarthritis

Slipped capital femoral epiphysis (SCFE) is characterized by anterolateral and superior displacement of the proximal femur along the physis (growth plate). It most commonly presents in **obese adolescents** with chronic hip pain. However, 15% of patients with SCFE have only **referred** thigh or **knee pain**, as seen here. Due to the referred nature of the pain, knee examination is normal. Characteristic findings on hip examination, however, include **limited internal rotation**, which causes the foot to point laterally, and thigh abduction and external rotation with passive hip flexion.

Bilateral hip x-rays are diagnostic for SCFE and show a posteriorly displaced femoral head. The patient should be non–weight bearing to avoid further slip and referred for immediate surgical screw fixation of the physis.

(Choice A) Following a knee injury, anterior cruciate ligament tear presents with pain, swelling, and a popping sensation in the knee. Anterior translation of the proximal tibia upon pulling the tibia forward (or a positive anterior drawer test) is typical (not seen in this case).

(Choice B) Medial meniscus tear usually occurs after a twisting injury and presents with knee pain and swelling. Findings typically include a

- Osteoarthritis

Slipped capital femoral epiphysis (SCFE) is characterized by anterolateral and superior displacement of the proximal femur along the physis (growth plate). It most commonly presents in **obese adolescents** with chronic hip pain. However, 15% of patients with SCFE have only **referred** thigh or **knee pain**, as seen here. Due to the referred nature of the pain, knee examination is normal. Characteristic findings on hip examination, however, include **limited internal rotation**, which causes the foot to point laterally, and thigh abduction and external rotation with passive hip flexion.

Bilateral hip x-rays are diagnostic for SCFE and show a posteriorly displaced femoral head. The patient should be non–weight bearing to avoid further slip and referred for immediate surgical screw fixation of the physis.

(Choice A) Following a knee injury, anterior cruciate ligament tear presents with pain, swelling, and a popping sensation in the knee. Anterior translation of the proximal tibia upon pulling the tibia forward (or a positive anterior drawer test) is typical (not seen in this case).

(Choice B) Medial meniscus tear usually occurs after a twisting injury and presents with knee pain and swelling. Findings typically include a palpable click during knee extension with internal or external tibial rotation (positive McMurray test), not seen in this patient.

(Choice C) Osgood-Schlatter disease, or osteochondritis of the tibial tubercle, is a common cause of chronic knee pain that is worse with running and jumping in active adolescents. However, tenderness over the tibial tubercle would be present on examination (not seen in this case).

(Choice D) Osteoarthritis of the hip presents with chronic hip pain and stiffness. It is more common in obese patients but typically does not occur until age >50.

(Choice E) Osteoid osteoma is a benign bone tumor that typically occurs at the proximal femur and causes nighttime leg pain in adolescents. In contrast to this patient's presentation, pain associated with osteoid osteoma is unrelated to activity and relieved with ibuprofen.

(Choice G) Transient synovitis of the hip typically presents in children age 3-8 with acute hip pain, often after a viral illness. This patient's age and chronic symptoms make SCFE more likely.

Educational objective:
Slipped capital femoral epiphysis is most common in obese adolescents and occurs when the proximal femur is displaced relative to the epiphysis along the growth plate. Knee pain may be the only presenting symptom. Supportive examination findings include limited hip flexion and internal

Settings

Item 24 of 40
Question Id: 15479

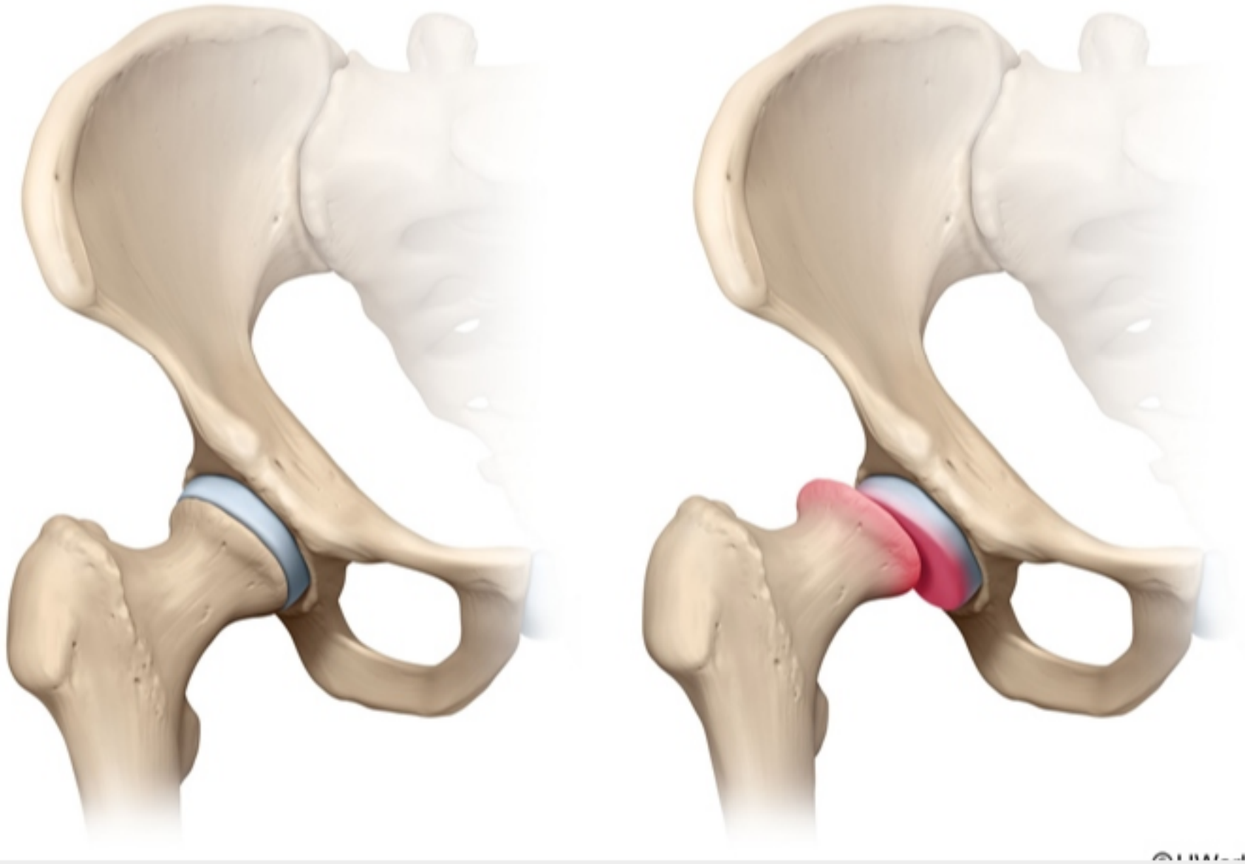
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- Osteoarthritis

Exhibit Display

Normal | **Slipped capital femoral epiphysis**



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along the growth plate. Knee pain may be the only presenting symptom. Supportive examination findings include limited hip flexion and internal

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Item 24 of 40
Question Id: 15479

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- Osteoarthritis

Exhibit Display



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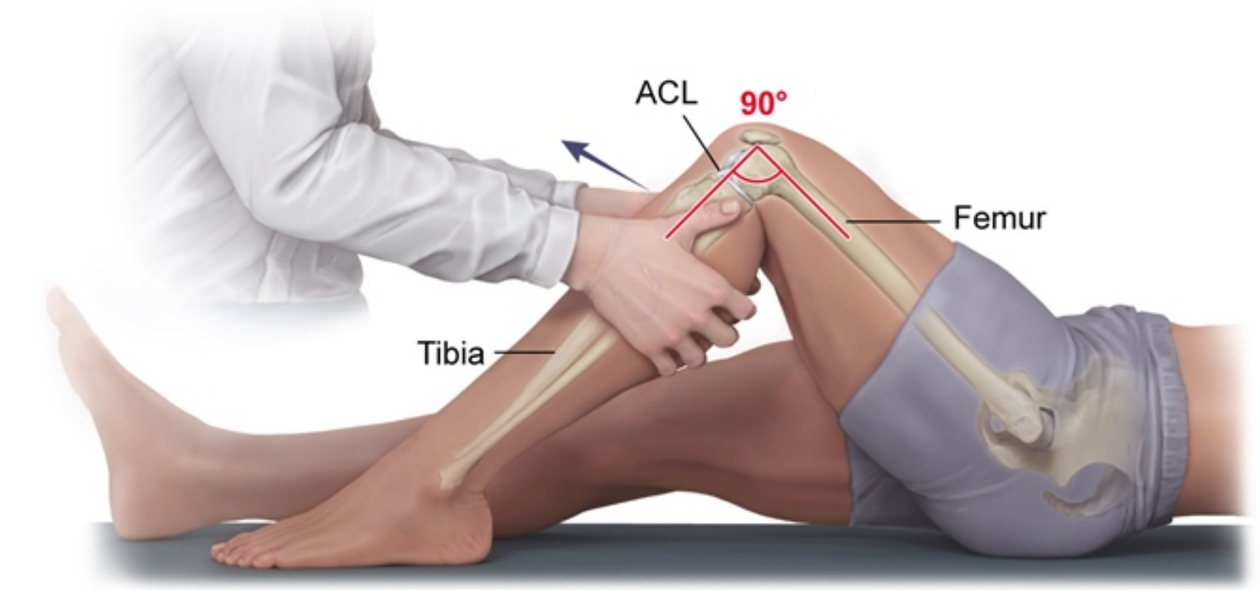
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- Osteoarthritis

Exhibit Display

Anterior drawer test



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along the growth plate. Knee pain may be the only presenting symptom. Supportive examination findings include limited hip flexion and internal

Settings

Item 24 of 40
Question Id: 15479

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- Osteoarthritis

Exhibit Display

McMurray test



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Educational objective:
Slipped capital femoral epiphysis is most common in obese adolescents and occurs when the proximal femur is displaced relative to the epiphysis along the growth plate. Knee pain may be the only presenting symptom. Supportive examination findings include limited hip flexion and internal rotation.

References

- Patterns of pain in adolescents with slipped capital femoral epiphysis.
- Slipped capital femoral epiphysis in atypical patients.

Surgery	Rheumatology/Orthopedics & Sports	Slipped Capital Femoral Epiphysis
Subject	System	Topic

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Settings

Item 25 of 40
Question Id: 3352

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A 34-year-old man comes to the emergency department due to severe, sudden-onset pain in his penis. During sexual intercourse 2 hours ago, he heard a cracking sound followed by pain and rapid loss of erection. When attempting to urinate, the pain is aggravated, and the patient is unable to pass urine. Physical examination shows a swollen and ecchymotic penis. Following adequate analgesia, which of the following is the best next step in management of this patient?

A. Cold compresses, pressure dressings, and penile splinting
B. Color Doppler ultrasonography
C. CT scan of the abdomen and pelvis
D. Placement of a suprapubic catheter
E. Retrograde urethrography

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Settings

Item 25 of 40
Question Id: 3352

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A. Cold compresses, pressure dressings, and penile splinting (17%)
B. Color Doppler ultrasonography (18%)
C. CT scan of the abdomen and pelvis (2%)
D. Placement of a suprapubic catheter (22%)
✓ E. Retrograde urethrography (39%)

Omitted
Correct answer
E

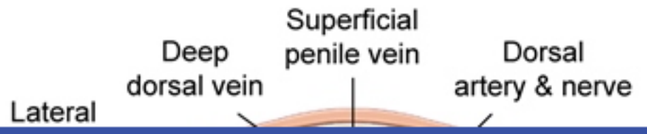
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Explanation

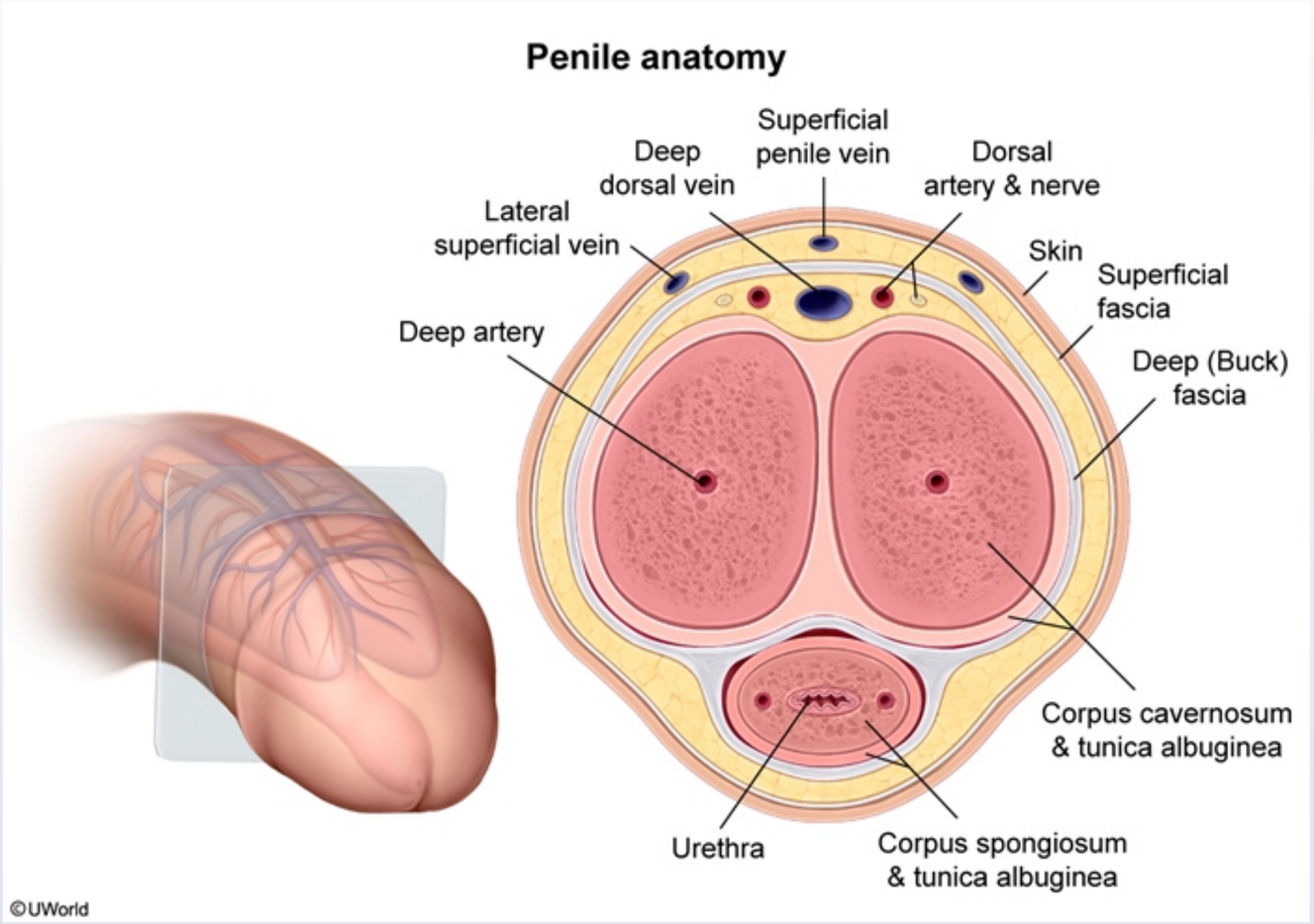
Penile anatomy



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This patient has a classic presentation of **penile fracture** (PF), a urologic emergency most commonly caused by **blunt trauma** (eg, sexual intercourse) to the **erect penis**. PF results from rupture of the fibrous tunica albuginea that envelopes the corpus cavernosum. At the moment of rupture, patients often hear a snapping sound and experience sudden-onset pain. Afterward, as blood exits the engorged corpus cavernosum, patients experience rapid penile detumescence and formation of a penile shaft hematoma (eg, swelling, ecchymosis).

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Diagnosis of PF is usually clinical, and urgent surgical repair of the tunica albuginea is the mainstay of treatment. However, because concomitant **urethral injury** occurs in approximately 20% of PF cases (due to the close proximity of the corpus spongiosum), the following findings warrant investigation with **retrograde urethrography** (or urethroscopy) prior to surgery:

- **Blood at the meatus**
- Hematuria
- **Dysuria**
- **Urinary retention**

If urethral injury is confirmed by urethrography, then the urethra should also undergo repair at the time of surgery.

(Choice A) Medical management of PF (eg, cold compresses, pressure dressings, penile splinting) was previously routine, but it has overwhelmingly been replaced by surgery due to the much higher rate of long-term complications (eg, erectile dysfunction, painful erections) with nonoperative management.

(Choice B) Color Doppler ultrasonography is sometimes used in the evaluation of testicular torsion, which would present with sudden-onset testicular pain and a high-riding testis on examination (due to fixation of the testis to the tunica vaginalis).

(Choice C) CT scan is recommended in the evaluation of patients with blunt genitourinary trauma who have suspected renal injury, which would be unlikely with PF.

(Choice D) In some cases of urethral injury (typically posterior urethral injuries associated with pelvic fracture), a suprapubic catheter is required to decompress the bladder until the urethra can be repaired. However, PF causes isolated anterior urethral injury that is more commonly managed with urgent urethral repair and intraoperative urethral catheter placement (for bladder drainage as well as postoperative protection of the repair).

- Dysuria
- **Urinary retention**

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Educational objective:
Penile fracture is most commonly caused by blunt trauma (eg, sexual intercourse) to an erect penis. Although penile fracture is a urologic emergency that requires urgent operative repair, patients with evidence of urethral injury (eg, blood at the meatus, dysuria, urinary retention) should undergo retrograde urethrography prior to surgery.

References

- Fracture with urethral injury: evaluation by retrograde urethrogram.
- Penile fracture: a meta-analysis.
- Management of penile fracture.

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A 54-year-old man comes to the office after a year of progressive fatigue and frequent loose stools. He describes voluminous, foul-smelling stools that float and are difficult to flush. The patient has lost about 9 kg (20 lbs) in the past 6 months. He was hospitalized on multiple occasions several years ago for epigastric pain radiating to the back, nausea, and vomiting. Lately, the patient has had intermittent episodes of similar pain lasting for 15-30 minutes after meals. He has had no hematemesis, hematochezia, or melena. The patient stopped drinking alcohol several years ago and does not use tobacco or recreational drugs. Temperature is 37 C (98.6 F), blood pressure is 118/80 mm Hg, and pulse is 78/min. BMI is 19.5 kg/m^2. Abdominal examination shows epigastric tenderness on deep palpation. Bowel sounds are normal. Which of the following is most likely to improve this patient's symptoms?

A. Antimicrobial therapy
B. Cholecystectomy and stone removal
C. Gluten-free diet
D. *Helicobacter pylori* eradication
E. Mesenteric angioplasty
F. Pancreatic enzyme supplementation
G. Restriction of dairy products

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- A. Antimicrobial therapy (1%)
- B. Cholecystectomy and stone removal (6%)
- C. Gluten-free diet (2%)
- D. *Helicobacter pylori* eradication (1%)
- E. Mesenteric angioplasty (0%)
- ✓ F. Pancreatic enzyme supplementation (87%)
- G. Restriction of dairy products (0%)

Omitted
Correct answer
F

87%
Answered correctly

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01/30/2020
Last Updated

Explanation

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Common causes of steatorrhea	
Pancreatic insufficiency	• Chronic pancreatitis due to alcohol abuse, cystic fibrosis, or autoimmune/hereditary pancreatitis • Pancreatic cancer
Bile salt-related	• Small-bowel Crohn disease • Bacterial overgrowth • Primary biliary cirrhosis • Primary sclerosing cholangitis • Surgical resection of ileum (at least 60-100 cm)
Impaired intestinal surface epithelium	• Celiac disease • AIDS enteropathy • Giardiasis
Other rare causes	• Whipple disease • Zollinger-Ellison syndrome • Medication-induced

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This patient's presentation of weight loss and **loose, greasy, malodorous stools** that float in the toilet and are **difficult to flush** is consistent with fat malabsorption (**steatorrhea**), which can be caused by various conditions.

This patient's steatorrhea is most likely due to **chronic pancreatitis** related to long-standing **alcohol abuse**. His previous hospitalizations for

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This patient's steatorrhea is most likely due to **chronic pancreatitis** related to long-standing **alcohol abuse**. His previous hospitalizations for vomiting and epigastric pain that radiates to the back raise suspicion for recurrent episodes of acute alcoholic pancreatitis. Repeated pancreatic injury causes progressive inflammation and fibrosis and results in impaired endocrine and exocrine (loss of digestive enzymes) functions. Patients with chronic pancreatitis may initially be asymptomatic, but disease progression ultimately leads to malabsorption, steatorrhea, and postprandial epigastric pain that can become continuous. Symptomatic improvement can be achieved with alcohol cessation and **pancreatic enzyme supplementation**.

(Choice A) Antimicrobial therapy (eg, rifaximin) should be considered in patients with small intestinal bacterial overgrowth syndrome, which can present with abdominal pain/bloating and symptoms of malabsorption. However, this condition is typically associated with anatomical abnormalities (eg, surgical blind loop) or motility disorders (eg, scleroderma) of the gastrointestinal tract.

(Choice B) Cholecystectomy and stone removal should be considered in patients with biliary colic, which typically presents with postprandial right upper quadrant/epigastric pain associated with nausea/vomiting. Steatorrhea and malabsorption are not characteristic.

(Choice C) A gluten-free diet is appropriate for individuals with celiac disease, which can present with diarrhea, malabsorption, and nutritional deficiencies. However, this patient's history of alcohol use and epigastric abdominal pain that radiates to the back is more consistent with chronic pancreatitis.

(Choice D) *Helicobacter pylori* infection is a common cause of peptic ulcer disease, which can present with postprandial epigastric pain, nausea/vomiting, and weight loss due to food aversion. However, peptic ulcer disease does not usually cause steatorrhea.

(Choice E) Mesenteric angioplasty should be considered in patients with chronic mesenteric ischemia, which can present with postprandial abdominal pain (intestinal angina) and weight loss due to food aversion. However, steatorrhea is not characteristic.

(Choice G) Restriction of dairy products may be considered in patients with lactose intolerance, which typically presents with abdominal pain/cramping, bloating, flatulence, and frothy/watery diarrhea after dairy product consumption. However, steatorrhea and malabsorption are not characteristic.

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Educational objective:
Steatorrhea occurs due to fat malabsorption and generally presents with voluminous, greasy, and foul-smelling stools that are difficult to flush. It is commonly caused by pancreatic exocrine insufficiency (loss of digestive enzymes) in patients with chronic alcoholic pancreatitis. Alcohol cessation and pancreatic enzyme supplementation can improve symptoms in such patients.

References

- Chronic pancreatitis.

A 38-year-old woman comes to the office due to intermittent abdominal bloating and diarrhea for the past 2 months. The patient has 5 or 6 loose, large-volume, greasy stools a day. These episodes are often severe after a meal, but there are no specific foods that trigger the symptoms. She has a history of morbid obesity and lost 30 kg (66 lb) after undergoing Roux-en-Y gastric bypass surgery 2 years ago. Other medical conditions include hyperlipidemia and hypertension, both of which improved after the bypass surgery. The patient used to drink alcohol occasionally but has been abstinent for the past 5 years and does not use tobacco or illicit drugs. She takes multivitamins daily and has taken no antibiotics recently. The patient has no history of recent travel or exposure to anyone with diarrheal illness. Temperature is 37 C (98.6 F), blood pressure is 130/84 mm Hg, and pulse is 78/min. BMI is 34.2 kg/m^2. Abdominal examination shows mild, diffuse tenderness to palpation without rebound tenderness. Bowel sounds are increased. Stool testing demonstrates increased fecal fat but is negative for occult blood. Laboratory results are as follows:

Complete blood count	
Leukocytes	9,000/mm^3
Hemoglobin	11.0 g/dL
Mean corpuscular volume	106 µm^3
Platelets	275,000/mm^3
Serum chemistry	
Potassium	3.5 mEq/L
Bicarbonate	22 mEq/L
Creatinine	0.6 mg/dL
Calcium	7.8 mg/dL
Glucose	110 mg/dL

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Glucose	110 mg/dL

Albumin	4.0 g/dL
Erythrocyte sedimentation rate	11 mm/h

Which of the following is the most likely cause of this patient's symptoms?

A. Dumping syndrome
B. *Giardia lamblia* infection
C. Inflammatory bowel disease

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Which of the following is the most likely cause of this patient's symptoms?

A. Dumping syndrome
B. *Giardia lamblia* infection
C. Inflammatory bowel disease
D. Irritable bowel syndrome
E. Lactose intolerance
F. Small intestinal bacterial overgrowth

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Calcium	7.8 mg/dL
Glucose	110 mg/dL
Albumin	4.0 g/dL
Erythrocyte sedimentation rate	11 mm/h

Which of the following is the most likely cause of this patient's symptoms?

A. Dumping syndrome (60%)
B. *Giardia lamblia* infection (1%)
C. Inflammatory bowel disease (2%)
D. Irritable bowel syndrome (3%)
E. Lactose intolerance (1%)
✓ F. Small intestinal bacterial overgrowth (30%)

Omitted
Correct answer

30%
Answered correctly

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Small intestinal bacterial overgrowth	
Etiology	• Anatomical abnormalities (eg, strictures, surgery) • Motility disorders (eg, diabetes mellitus, scleroderma)
Signs/symptoms	• Abdominal pain, diarrhea, bloating, flatulence • Malabsorption, weight loss, anemia, vitamin deficiency
Diagnosis	• Jejunal aspirate & culture showing >10^5 organisms/mL • Carbohydrate breath testing (eg, lactulose, glucose)
Organisms	• Streptococci, *Bacteroides*, *Escherichia*, *Lactobacillus*
Treatment	• Antibiotics (eg, rifaximin, amoxicillin-clavulanate) • Avoid antimotility agents (eg, narcotics) • Dietary changes (eg, high-fat, low-carbohydrate) • Promotility agents (eg, metoclopramide)

This patient has abdominal bloating, steatorrhea (elevated fecal fat), and macrocytic anemia. In the setting of a **Roux-en-Y gastric bypass**, this presentation suggests **small intestinal bacterial overgrowth (SIBO)**. The proximal small intestine normally contains minimal bacterial colonization due to gastric acidity and peristalsis; however, gastric bypass procedures result in a blind loop of intestine that allows for excessive bacterial growth. Conditions that alter intestinal motility (eg, systemic sclerosis, diabetes mellitus), anatomy (eg, strictures), or gastric/pancreatic secretions (eg, atrophic gastritis, chronic pancreatitis) also predispose to SIBO.

Patients with SIBO typically develop bloating, flatulence, abdominal discomfort, and watery diarrhea; in severe cases, malabsorption (eg, **steatorrhea**) and weight loss are seen. Laboratory studies are frequently normal but may demonstrate **nutritional deficiencies** (eg, vitamin B_{12}, fat-soluble vitamins) and associated **macrocytic anemia**.

Diagnostic tests include carbohydrate breath tests (eg, lactulose, glucose) that measure the production of hydrogen by intestinal flora. Endoscopy with jejunal aspirate and culture showing increased bacterial burden are also used. Management involves correction of the underlying

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Diagnostic tests include carbohydrate breath tests (eg, lactulose, glucose) that measure the production of hydrogen by intestinal flora. Endoscopy with jejunal aspirate and culture showing increased bacterial burden are also used. Management involves correction of the underlying abnormality, dietary modification, and a short course of empiric antibiotics (eg, rifaximin).

(Choice A) Dumping syndrome (DS) is a complication of gastric bypass and occurs when high-carbohydrate foods are rapidly emptied into the small bowel, leading to osmotically driven fluid shifts from the plasma to the intestine. Although patients have abdominal pain and diarrhea soon (<30 min) after meals, the fluid shifts result in sympathetic activation, leading to tachycardia, diaphoresis, and flushing. Hypoglycemia may also occur. DS is not associated with steatorrhea or vitamin B_{12} deficiency (ie, macrocytic anemia).

(Choice B) Patients with *Giardia lamblia* infections commonly have steatorrhea and diarrhea, flatulence, fatigue, and significant weight loss. Affected patients frequently have a history of immunosuppression or recent travel.

(Choice C) Inflammatory bowel disease is associated with diarrhea, weight loss, and anemia. Stools typically demonstrate gross or occult blood, and patients may also have extraintestinal symptoms (eg, fever) and elevated inflammatory markers.

(Choice D) Irritable bowel syndrome is characterized by chronic abdominal pain, altered bowel habits, and symptom relief after a bowel movement. Steatorrhea and macrocytic anemia are not typical, and this patient's history of bariatric surgery makes SIBO more likely.

(Choice E) Patients with lactose intolerance usually have symptoms (eg, diarrhea, bloating, cramps) after consuming lactose-containing products. In this patient, signs of malabsorption and the lack of a clear food trigger make this diagnosis less likely.

Educational objective:

(<30 min) after meals, the fluid shifts result in sympathetic activation, leading to tachycardia, diaphoresis, and flushing. Hypoglycemia may also occur. DS is not associated with steatorrhea or vitamin B_{12} deficiency (ie, macrocytic anemia).

(Choice B) Patients with *Giardia lamblia* infections commonly have steatorrhea and diarrhea, flatulence, fatigue, and significant weight loss. Affected patients frequently have a history of immunosuppression or recent travel.

(Choice C) Inflammatory bowel disease is associated with diarrhea, weight loss, and anemia. Stools typically demonstrate gross or occult blood, and patients may also have extraintestinal symptoms (eg, fever) and elevated inflammatory markers.

(Choice D) Irritable bowel syndrome is characterized by chronic abdominal pain, altered bowel habits, and symptom relief after a bowel movement. Steatorrhea and macrocytic anemia are not typical, and this patient's history of bariatric surgery makes SIBO more likely.

(Choice E) Patients with lactose intolerance usually have symptoms (eg, diarrhea, bloating, cramps) after consuming lactose-containing products. In this patient, signs of malabsorption and the lack of a clear food trigger make this diagnosis less likely.

Educational objective:
Small intestinal bacterial overgrowth (SIBO) is characterized by bloating, flatulence, and watery diarrhea; malabsorption and nutritional deficiencies may also occur. SIBO is a common complication of gastric bypass procedures. Conditions that alter intestinal motility (eg, systemic sclerosis, diabetes mellitus), anatomy (eg, strictures), or gastric/pancreatic secretions (eg, atrophic gastritis, chronic pancreatitis) also predispose to SIBO.

References

- Review article: small intestinal bacterial overgrowth—prevalence, clinical features, current and developing diagnostic tests, and treatment.
- Small intestinal bacterial overgrowth syndrome.

Surgery	Gastrointestinal & Nutrition	Small intestinal bacterial overgrowth
Subject	System	Topic

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A 62-year-old man comes to the office due to anorexia, fatigue, and a 9 kg (20 lb) weight loss over the past 6 months. He rarely drinks alcohol and does not use illicit drugs, although he has smoked one pack of cigarettes daily for the past 40 years. The patient has previously been diagnosed with hypertension, diverticulosis, external hemorrhoids, and osteoarthritis. Current medications are atenolol and aspirin, and he has no known drug allergies. Temperature is 37 C (98.6 F), blood pressure is 132/88 mm Hg, pulse is 70/min, and respirations are 12/min. Physical examination reveals a soft abdomen that is mildly tender to deep palpation in the midepigastric region. The sclerae are icteric, and the skin is jaundiced. Laboratory results show:

Complete blood count	
Hemoglobin	13.5 g/L
Platelets	220,000/mm^3
Leukocytes	5,100/mm^3
Liver function studies	
Albumin	3.9 g/dL
Total bilirubin	6.7 mg/dL
Alkaline phosphatase	647 U/L
Aspartate aminotransferase (SGOT)	110 U/L
Alanine aminotransferase (SGPT)	102 U/L

Antimitochondrial antibodies are negative. Abdominal ultrasound demonstrates mild dilation of the common bile duct; there are no stones present in the gallbladder and no evidence of gallbladder wall thickening. Which of the following is the best next step in the management of this patient's condition?

Leukocytes	5,100/mm^3

Liver function studies

Albumin	3.9 g/dL
Total bilirubin	6.7 mg/dL
Alkaline phosphatase	647 U/L
Aspartate aminotransferase (SGOT)	110 U/L
Alanine aminotransferase (SGPT)	102 U/L

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A. Abdominal CT scan
B. Endoscopic retrograde pancreatography (ERCP)
C. Percutaneous transhepatic cholangiogram (PTC)
D. Serum amylase and lipase
E. Serum CA 19-9

Submit

Leukocytes	5,100/mm^3

Liver function studies

Albumin	3.9 g/dL
Total bilirubin	6.7 mg/dL
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Alanine aminotransferase (SGPT)	102 U/L

Antimitochondrial antibodies are negative. Abdominal ultrasound demonstrates mild dilation of the common bile duct; there are no stones present in the gallbladder and no evidence of gallbladder wall thickening. Which of the following is the best next step in the management of this patient's condition?

- ✓ A. Abdominal CT scan (70%)
- B. Endoscopic retrograde pancreatography (ERCP) (16%)
- C. Percutaneous transhepatic cholangiogram (PTC) (1%)
- D. Serum amylase and lipase (7%)
- E. Serum CA 19-9 (4%)

Omitted
Correct answer

70%
Answered correctly

05 secs
Time Spent

03/29/2020
Last Updated

Pancreatic adenocarcinoma	
Risk factors	• Smoking • Hereditary pancreatitis • Nonhereditary chronic pancreatitis • Obesity & lack of physical activity
Clinical presentation	• Systemic symptoms (eg, weight loss, anorexia) (>85%) • Abdominal pain/back pain (80%) • Jaundice (56%) • Recent-onset atypical diabetes mellitus • Unexplained migratory superficial thrombophlebitis • Hepatomegaly & ascites with metastasis
Laboratory studies	• Cholestasis (↑ alkaline phosphatase & direct bilirubin) • ↑ Cancer-associated antigen 19-9 (not as a screening test) • Abdominal ultrasound (if jaundiced) or CT scan (if no jaundice)

This patient with a history of tobacco use now has **weight loss**, fatigue, anorexia, and **painless jaundice** with dilation of the common bile duct on ultrasound. This presentation is concerning for **pancreatic cancer**, the 4th leading cause of cancer death in the United States.

The presentation of pancreatic cancer varies with tumor location. Tumors in the pancreatic head often cause compression of the pancreatic duct and common bile duct, resulting in painless obstructive jaundice with elevations in serum **bilirubin** and **alkaline phosphatase**. Tumors in the pancreatic body or tail often result in progressive abdominal pain without jaundice.

Abdominal ultrasound is usually the initial imaging performed on patients with jaundice. When the ultrasound is nondiagnostic (as in this case) or when there is clinical suspicion for pancreatic cancer in a nonjaundiced patient, an **abdominal CT scan** should be obtained. This imaging modality has a sensitivity of up to 97% in the detection of pancreatic cancer and can be used for staging purposes and preoperative planning.

(Choice B) Endoscopic retrograde pancreatography is used to visualize the biliary tree and pancreatic ducts and allows for tissue sampling.

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This patient with a history of tobacco use now has **weight loss**, fatigue, anorexia, and **painless jaundice** with dilation of the common bile duct on ultrasound. This presentation is concerning for **pancreatic cancer**, the 4th leading cause of cancer death in the United States.

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(Choice B) Endoscopic retrograde pancreatography is used to visualize the biliary tree and pancreatic ducts and allows for tissue sampling. However, it is invasive and has a lower sensitivity than CT scan for tumors located in the uncinate process or tail of the pancreas. It is typically recommended for patients in which other modalities were inconclusive and can sometimes be used to relieve obstruction (eg, via biliary stent placement).

(Choice C) Percutaneous transhepatic cholangiogram is an invasive procedure used to evaluate the biliary tree of patients who have had a less invasive imaging fail. It can be used for stent placement across malignant obstructions but is not a first-line diagnostic technique.

(Choice D) Serum amylase and lipase are elevated in pancreatitis, which typically presents with severe abdominal pain radiating into the back with nausea and vomiting, not painless jaundice. They are not helpful in diagnosing pancreatic malignancy.

(Choice E) Serum CA 19-9 is a tumor marker that is often elevated in pancreatic cancer, but sensitivity is related to tumor size and is limited in small cancers. In addition, it has low specificity and may be elevated in multiple conditions (eg, hepatocellular cancer, cholangitis). It can be used to monitor disease progression but is less useful for diagnosis than CT scan.

Educational objective:
The presentation of pancreatic cancer is dependent on tumor location; tumors in the pancreatic head often present with painless obstructive jaundice, whereas those in the body or tail often cause abdominal pain without jaundice. Although ultrasound is the imaging test of choice to evaluate a jaundiced patient, a CT scan of the abdomen is indicated for those with a nondiagnostic ultrasound or to evaluate for suspected

modality has a sensitivity of up to 97% in the detection of pancreatic cancer and can be used for staging purposes and preoperative planning.

(Choice B) Endoscopic retrograde pancreatography is used to visualize the biliary tree and pancreatic ducts and allows for tissue sampling. However, it is invasive and has a lower sensitivity than CT scan for tumors located in the uncinate process or tail of the pancreas. It is typically recommended for patients in which other modalities were inconclusive and can sometimes be used to relieve obstruction (eg, via biliary stent placement).

(Choice C) Percutaneous transhepatic cholangiogram is an invasive procedure used to evaluate the biliary tree of patients who have had a less invasive imaging fail. It can be used for stent placement across malignant obstructions but is not a first-line diagnostic technique.

(Choice D) Serum amylase and lipase are elevated in pancreatitis, which typically presents with severe abdominal pain radiating into the back with nausea and vomiting, not painless jaundice. They are not helpful in diagnosing pancreatic malignancy.

(Choice E) Serum CA 19-9 is a tumor marker that is often elevated in pancreatic cancer, but sensitivity is related to tumor size and is limited in small cancers. In addition, it has low specificity and may be elevated in multiple conditions (eg, hepatocellular cancer, cholangitis). It can be used to monitor disease progression but is less useful for diagnosis than CT scan.

Educational objective:
The presentation of pancreatic cancer is dependent on tumor location; tumors in the pancreatic head often present with painless obstructive jaundice, whereas those in the body or tail often cause abdominal pain without jaundice. Although ultrasound is the imaging test of choice to evaluate a jaundiced patient, a CT scan of the abdomen is indicated for those with a nondiagnostic ultrasound or to evaluate for suspected malignancy in a nonjaundiced patient.

References

- Diagnosis and detection of pancreatic cancer.

Surgery	Gastrointestinal & Nutrition	Pancreatic cancer
Subject	System	Topic

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Settings

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Item 29 of 40
Question Id: 16537

Mark | Previous | Next | Full Screen | Tutorial | Lab Values | Notes | Calculator | Reverse Color | Text Zoom | Settings

A 35-year-old woman undergoes core needle biopsy for a suspicious, asymptomatic thyroid nodule that was discovered during a routine physical examination. TSH is normal. After the procedure, the patient develops an expanding hematoma at the biopsy site. She has no personal or family history of bleeding or easy bruising. Which of the following is the most likely diagnosis?

- A. Dysfunctional platelets
- B. Factor VIII deficiency
- C. Insufficient hemostasis
- D. Thrombocytopenia
- E. Vitamin C deficiency
- F. Vitamin K deficiency

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A 35-year-old woman undergoes core needle biopsy for a suspicious, asymptomatic thyroid nodule that was discovered during a routine physical examination. TSH is normal. After the procedure, the patient develops an expanding hematoma at the biopsy site. She has no personal or family history of bleeding or easy bruising. Which of the following is the most likely diagnosis?

A. Dysfunctional platelets (15%)
B. Factor VIII deficiency (4%)
✓ C. Insufficient hemostasis (64%)
D. Thrombocytopenia (7%)
E. Vitamin C deficiency (1%)
F. Vitamin K deficiency (7%)

Omitted
Correct answer
C

64%
Answered correctly

01 sec
Time Spent

06/24/2020
Last Updated

Explanation

This patient developed a hematoma after core needle biopsy for an asymptomatic thyroid nodule. She has no personal or family history of easy bleeding or bruising, making vitamin deficiency and most hereditary bleeding disorders unlikely. Therefore, despite a core needle biopsy being a fairly low-risk procedure, the most likely explanation for the hematoma is **insufficient hemostasis** following tissue injury from the biopsy.

(Choice A) Platelet dysfunction can be seen in patients who take antiplatelet agents (eg, aspirin) or have certain comorbid conditions (eg, liver disease, uremia). Von Willebrand disease can affect platelet function. This otherwise healthy individual (with no family history of bleeding) is

This patient developed a hematoma after core needle biopsy for an asymptomatic thyroid nodule. She has no personal or family history of easy bleeding or bruising, making vitamin deficiency and most hereditary bleeding disorders unlikely. Therefore, despite a core needle biopsy being a fairly low-risk procedure, the most likely explanation for the hematoma is **insufficient hemostasis** following tissue injury from the biopsy.

(Choice A) Platelet dysfunction can be seen in patients who take antiplatelet agents (eg, aspirin) or have certain comorbid conditions (eg, liver disease, uremia). Von Willebrand disease can affect platelet function. This otherwise healthy individual (with no family history of bleeding) is unlikely to have platelet dysfunction. Furthermore, most cases would manifest immediately with oozing at the biopsy site.

(Choice B) Factor VIII deficiency is seen in hemophilia A, which usually presents in childhood with bruising and mucocutaneus or joint bleeding. Because it is transmitted in an X-linked recessive fashion, male patients are affected; a female patient with no history of bleeding is unlikely to have factor VIII deficiency.

(Choice D) Clinically significant thrombocytopenia (eg, primary immune thrombocytopenia) usually manifests with a history of bruising and mucocutaneous bleeding.

(Choices E and F) Although vitamin C deficiency (scurvy) can increase the risk of bleeding due to blood vessel fragility, and vitamin K deficiency can increase the risk of bleeding due to coagulation factor (eg, factor II, VII, IX, X) deficiency, this patient's lack of mucocutaneous bruising or bleeding makes these conditions unlikely. In addition, healthy individuals who consume a relatively normal diet are at very low risk for vitamin deficiency.

Educational objective:
Insufficient hemostasis is the most common cause of postoperative hematoma in patients with no personal or family history of easy bleeding or bruising.

Surgery	Hematology & Oncology	Von willebrand disease
Subject	System	Topic

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A previously healthy 35-year-old man comes to the emergency department due to severe abdominal pain for the last 4 hours. The pain started in the periumbilical area but has now shifted to the right lower quadrant. The patient has also had nausea and 2 episodes of vomiting. He has no history of other medical conditions and takes no medications. Temperature is 38.3 C (100.9 F), blood pressure is 126/80 mm Hg, pulse is 100/min, and respirations are 20/min. Abdominal examination shows tenderness in the right lower quadrant that does not worsen with inspiration. Palpation of the left lower quadrant produces pain in the right lower quadrant. Urinalysis is normal. Laboratory results are as follows:

Complete blood count

Hemoglobin	14.2 g/dL
Platelets	220,000/mm^3
Leukocytes	16,000/mm^3
Neutrophils	86%
Eosinophils	2%
Lymphocytes	8%
Monocytes	4%

Which of the following diagnostic imaging studies is most appropriate prior to definitive treatment of this patient?

A. CT scan of the abdomen and pelvis
B. MRI of the abdomen and pelvis
C. No additional imaging
D. Supine and lateral decubitus abdominal x-rays
E. Ultrasound of the abdomen

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Palpation of the left lower quadrant produces pain in the right lower quadrant. Urinalysis is normal. Laboratory results are as follows:

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Submit

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Neutrophils	86%
Eosinophils	2%
Lymphocytes	8%
Monocytes	4%

Which of the following diagnostic imaging studies is most appropriate prior to definitive treatment of this patient?

- ✓ A. CT scan of the abdomen and pelvis (38%)
- B. MRI of the abdomen and pelvis (0%)
- C. No additional imaging (44%)
- D. Supine and lateral decubitus abdominal x-rays (0%)
- E. Ultrasound of the abdomen (16%)

Omitted
Correct answer

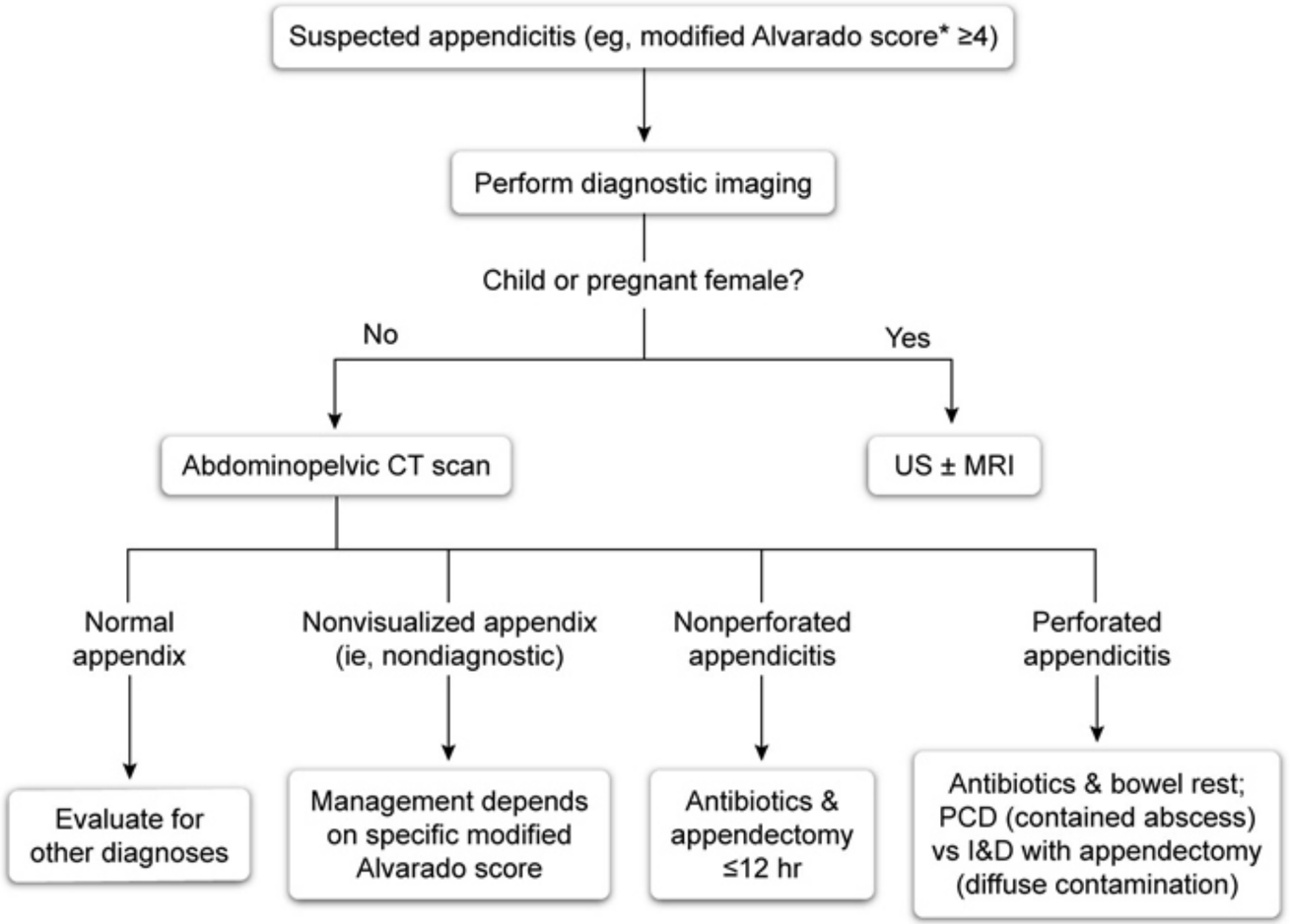
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02/28/2020
Last Updated

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Management of suspected appendicitis



***Modified Alvarado score**
1 point each: migratory RLQ pain, anorexia, nausea or vomiting, RLQ rebound tenderness, fever >37.5 C (99.5 F).
2 points each: RLQ tenderness, leukocytes >10,000/mm^3.

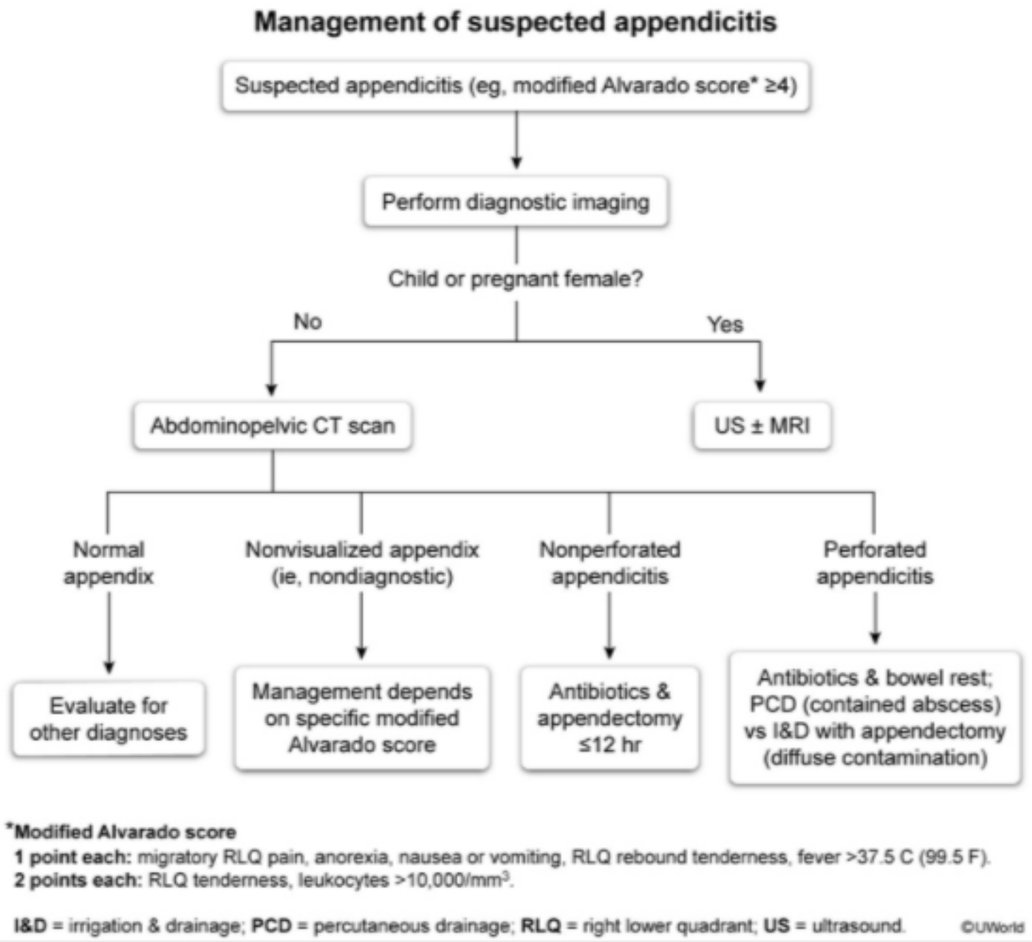
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Item 30 of 40
Question Id: 3064

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2 points each: RLQ tenderness, leukocytes >10,000/mm3.

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I&D = irrigation & drainage; **PCD** = percutaneous drainage; **RLQ** = right lower quadrant; **US** = ultrasound. ©UWorld

This patient's migratory right lower quadrant (RLQ) pain, nausea, vomiting, fever, and leukocytosis are most concerning for **acute appendicitis**. A high clinical suspicion of appendicitis was historically considered sufficient to proceed to appendectomy, and a negative appendectomy (ie, removed appendix was noninflamed on pathology) rate (NAR) of approximately 10% was deemed acceptable. However, given its widespread availability and rapidity, diagnostic imaging is now typically performed when appendicitis is suspected (eg, modified Alvarado score ≥4). Imaging decreases the NAR and directs definitive management **(Choice C)**.

For avoiding ionizing radiation exposure, abdominal ultrasound is the initial imaging modality used in children and pregnant women, and MRI may be necessary if ultrasound is nondiagnostic. However, **CT scan of the abdomen and pelvis** (with contrast) is the preferred study for evaluation of suspected appendicitis in **nonpregnant adults**, such as this man. CT has high diagnostic accuracy and is less likely to yield an indeterminate result (ie, nonvisualized appendix). In addition, CT is less operator dependent than ultrasound and is quicker, cheaper, and better tolerated by patients than MRI **(Choices B and E)**.

Management can be directed by CT findings:

- Normal appendix: Evaluate for other diagnoses (avoids unnecessary appendectomy).
- Nonperforated appendicitis: Treat with antibiotics and appendectomy within 12 hours.
- Perforated appendicitis: Treat with antibiotics and either percutaneous drainage (for stable patients with a contained RLQ abscess [ie, contained perforation]) or emergency appendectomy (for patients with diffuse intraabdominal contamination [ie, free perforation]).

Several trials have studied antibiotic-based nonoperative management of patients with nonperforated appendicitis. Although most patients avoided appendectomy when treated with antibiotics only, there was no reliable way to predict which patients would fail treatment and which would require rescue appendectomy. At present, appendectomy remains the treatment of choice for nonperforated appendicitis.

(Choice D) Plain abdominal (eg, supine, lateral decubitus) x-rays can be helpful in diagnosing some intraabdominal conditions (eg, air-fluid levels on lateral decubitus view in bowel obstruction). However, plain films do not visualize the appendix and cannot detect appendiceal inflammation.

Educational objective:
The evaluation of patients with suspected appendicitis (eg, modified Alvarado score ≥4) now includes imaging, which can visualize the appendix (eg, normal vs nonperforated or perforated appendicitis) and direct management. CT scan of the abdomen and pelvis is the recommended

high clinical suspicion of appendicitis was historically considered sufficient to proceed to appendectomy, and a negative appendectomy (ie, removed appendix was no
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Management can be direc

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(Choice D) Plain abdomi
on lateral decubitus view i

Educational objective:
The evaluation of patients
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References

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Modified Alvarado score	
Points (each)	**Clinical feature**
1	• Migratory RLQ pain • Anorexia • Nausea or vomiting • Fever >37.5 C (>99.5 F) • RLQ rebound tenderness
2	• RLQ tenderness • Leukocytes >10,000/mm^3
9	**Total possible score**
0-3: Appendicitis unlikely. **≥4:** Evaluate for appendicitis.	

RLQ = right lower quadrant.

Add To New Card | Existing Card

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- Normal appendix: Evaluate for other diagnoses (avoids unnecessary appendectomy).
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Educational objective:
The evaluation of patients with suspected appendicitis (eg, modified Alvarado score ≥4) now includes imaging, which can visualize the appendix (eg, normal vs nonperforated or perforated appendicitis) and direct management. CT scan of the abdomen and pelvis is the recommended imaging study in nonpregnant adults.

References

- ACR Appropriateness Criteria® right lower quadrant pain-suspected appendicitis.
- Computed tomography for diagnosis of acute appendicitis in adults.
- Evolution and current trends in the management of acute appendicitis.

Surgery	Gastrointestinal & Nutrition	Appendicitis
Subject	System	Topic

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Settings

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Item 31 of 40
Question Id: 16043

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A 48-year-old woman comes to the hospital for elective cholecystectomy to treat symptomatic cholelithiasis. She has had increasingly severe, intermittent biliary colic pain, and ultrasonography revealed several gallstones. The patient has a history of hypertension and obesity. Preoperative medical evaluation and laboratory testing were unremarkable. The patient receives cefazolin for surgical site infection prophylaxis, and surgery is performed under general anesthesia. A Foley catheter is placed preoperatively. The planned laparoscopic procedure is converted to open approach due to difficult anatomy; otherwise, the surgery is uneventful with minimal blood loss. Two hours later, the patient is noted to have a temperature of 38.9 C (102 F). Her blood pressure is 140/85 mm Hg, pulse is 104/min, and respirations are 18/min. The patient is awake and alert but reports mild pain at the surgical site. A right-sided internal jugular central venous catheter, which was placed in the operating room, is in a good position with no redness at the insertion site. The lungs are clear on auscultation, and heart sounds are normal. The surgical site is clean with minimal serosanguinous discharge. There is no lower extremity edema. Current laboratory results are as follows:

Complete blood count	
Hemoglobin	10.4 g/dL
Platelets	240,000/mm^3
Leukocytes	14,000/mm^3
Neutrophils	80%
Serum chemistry	
Sodium	136 mEq/L
Potassium	4.4 mEq/L
Bicarbonate	26 mEq/L
Creatinine	0.8 mg/dL
Liver function studies	

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Serum chemistry

Sodium	136 mEq/L
Potassium	4.4 mEq/L
Bicarbonate	26 mEq/L
Creatinine	0.8 mg/dL

Liver function studies

Total bilirubin	1.3 mg/dL
Alkaline phosphatase	70 U/L
Aspartate aminotransferase (SGOT)	37 U/L
Alanine aminotransferase (SGPT)	49 U/L

Arterial blood gases

pH	7.4
PaO_2	86 mm Hg
$PaCO_2$	34 mm Hg

Chest x-ray reveals decreased lung volumes and small areas of subsegmental thickening bilaterally. Which of the following is the most appropriate next step in management of this patient's fever?

A. Abdominal CT scan to evaluate for loculated fluid collection

B. Continuous positive airway pressure and chest physiotherapy

Alkaline phosphatase	70 U/L
Aspartate aminotransferase (SGOT)	37 U/L
Alanine aminotransferase (SGPT)	49 U/L

Arterial blood gases

pH	7.4
PaO_2	86 mm Hg
$PaCO_2$	34 mm Hg

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A. Abdominal CT scan to evaluate for loculated fluid collection
B. Continuous positive airway pressure and chest physiotherapy
C. Culture from surgical incision site and empiric antibiotics
D. Culture of the urine and Foley catheter removal
E. Intravenous dantrolene and active cooling measures
F. Symptomatic treatment only and close observation

Submit

Alkaline phosphatase	70 U/L
Aspartate aminotransferase (SGOT)	37 U/L
Alanine aminotransferase (SGPT)	49 U/L

Arterial blood gases

pH	7.4
PaO_2	86 mm Hg
$PaCO_2$	34 mm Hg

Chest x-ray reveals decreased lung volumes and small areas of subsegmental thickening bilaterally. Which of the following is the most appropriate next step in management of this patient's fever?

A. Abdominal CT scan to evaluate for loculated fluid collection (8%)
B. Continuous positive airway pressure and chest physiotherapy (36%)
C. Culture from surgical incision site and empiric antibiotics (6%)
D. Culture of the urine and Foley catheter removal (6%)
E. Intravenous dantrolene and active cooling measures (10%)
✓ F. Symptomatic treatment only and close observation (33%)

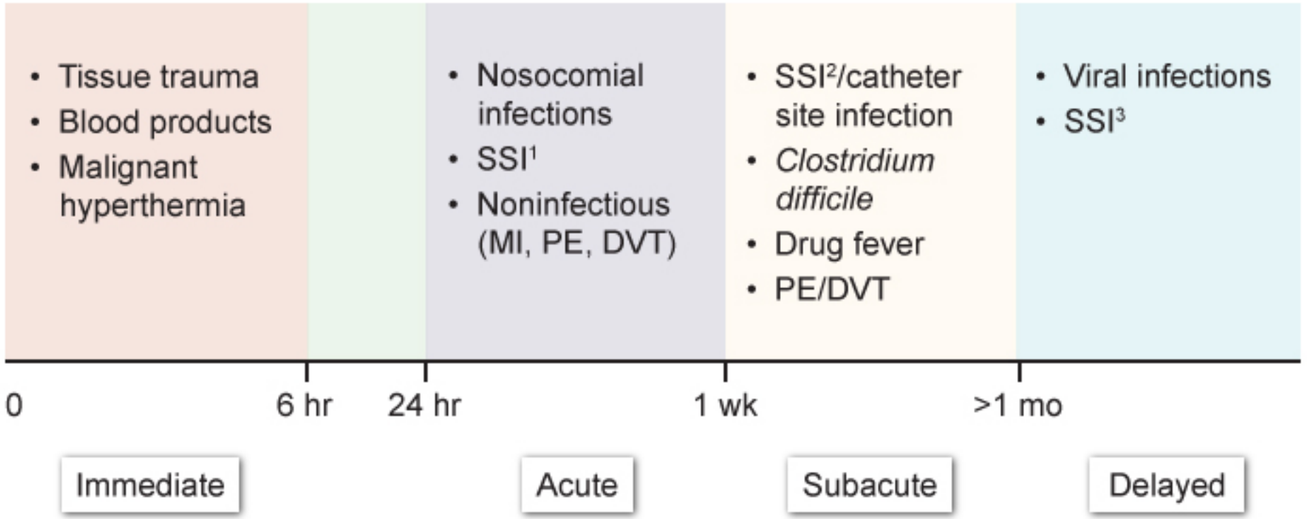
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Correct answer

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Last Updated

Timeline of cause of postoperative fever



SSI¹ = Due to group A *Streptococcus* (GAS) or *Clostridium perfringens*
SSI² = Due to other organisms (not GAS or *C perfringens*)
SSI³ = Due to indolent organisms

DVT = deep venous thrombosis; **MI** = myocardial infarction; **PE** = pulmonary embolism; **SSI** = surgical site infection.

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Postoperative fever, defined as temperature >38 C (100.4 F), is common following major surgery and is generally mediated by the release of **pyretic cytokines** (eg, IL-1, **IL-6**, TNF-α, IFN-γ) in response to tissue trauma, blood cell lysis, or bacterial endotoxins/exotoxins. The underlying etiology can often be differentiated based on how much time has elapsed since surgery.

Immediate postoperative fever occurs **within hours** of the operation. Most cases are caused by **tissue damage** incurred during a major procedure (eg, open cholecystectomy); fever and leukocytosis generally last <3 days and are **managed symptomatically** (eg, acetaminophen) and observed. Other causes of immediate fever include blood transfusion and drug reactions; these are often associated with hypotension (due to vasodilation) and rash.

Postoperative fever, defined as temperature >38 C (100.4 F), is common following major surgery and is generally mediated by the release of **pyretic cytokines** (eg, IL-1, **IL-6**, TNF-α, IFN-γ) in response to tissue trauma, blood cell lysis, or bacterial endotoxins/exotoxins. The underlying etiology can often be differentiated based on how much time has elapsed since surgery.

Immediate postoperative fever occurs **within hours** of the operation. Most cases are caused by **tissue damage** incurred during a major procedure (eg, open cholecystectomy); fever and leukocytosis generally last <3 days and are **managed symptomatically** (eg, acetaminophen) and observed. Other causes of immediate fever include blood transfusion and drug reactions; these are often associated with hypotension (due to vasodilation) and rash.

Acute (1-7 days postoperatively) and subacute (7-28 days postoperatively) fever is usually caused by bacterial infection. Fever is delayed with infection because several days of bacterial replication are generally necessary to produce enough endotoxin/exotoxin to generate fever. Most acute postoperative fevers are caused by nosocomial infections such as urinary tract infection and pneumonia **(Choice D)**, whereas subacute postoperative fevers are often due to abscess or infection of a central line or surgical site **(Choices A and C)**.

(Choice B) Postoperative atelectasis is not generally considered an independent cause of fever but can predispose patients to developing pneumonia. Atelectasis is usually managed/prevented with incentive spirometry, not positive airway pressure and chest physiotherapy (these measures are primarily reserved for those with excessive secretions that lead to respiratory plugging).

(Choice E) Malignant hyperthermia is a rare cause of immediate postoperative fever. It is triggered by exposure to volatile anesthetics/succinylcholine and generally presents intraoperatively with severe muscle rigidity, hypercarbia, tachypnea, and tachycardia. Urgent treatment with dantrolene (a skeletal muscle relaxant) and cooling measures is required to prevent death.

Educational objective:
Postoperative fever is generally mediated by cytokine release in response to tissue trauma, blood cell lysis, or infection. Immediate postsurgical fever occurs within hours of the operation and is usually due to tissue trauma, mismatched blood products, or drug reactions. Acute (1-7 days postoperatively) and subacute (7-28 days postoperatively) fever is generally driven by infections.

Surgery	Infectious Diseases	Postoperative fever
Subject	System	Topic

Settings

Item 32 of 40
Question Id: 17087

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A 62-year-old man is hospitalized for elective coronary artery bypass graft surgery. The patient had been having worsening exertional angina and was found to have 3-vessel coronary artery disease. His other medical conditions include hypertension, type 2 diabetes mellitus, and hyperlipidemia. He has had no infections and has not used antibiotics recently. The patient has a history of severe penicillin allergy causing anaphylactic shock. Blood pressure is 128/72 mm Hg and pulse is 78/min. The lungs are clear on auscultation and heart sounds are normal. Preoperative blood cell counts, serum chemistry, and coagulation studies are within normal limits. Which of the following is the most appropriate preoperative prophylactic antibiotic for this patient?

- A. Azithromycin
- B. Ciprofloxacin
- C. Metronidazole
- D. Piperacillin-tazobactam
- E. Vancomycin

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Item 32 of 40
Question Id: 17087

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- A. Azithromycin (26%)
- B. Ciprofloxacin (22%)
- C. Metronidazole (3%)
- D. Piperacillin-tazobactam (8%)
- ✓ E. Vancomycin (38%)

Omitted
Correct answer
E

38%
Answered correctly

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Time Spent

02/27/2020
Last Updated

Explanation

Antibiotics for SSI prevention			
Wound	Procedure	Typical	Antibiotic prophylaxis

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Antibiotics for SSI prevention			
Wound classification	**Procedure examples**	**Typical contaminants**	**Antibiotic prophylaxis**
Clean*	Cardiac, neurological, orthopedic, vascular	Skin flora: *Streptococcus*, *Staphylococcus aureus* & coagulase-negative staphylococci	1st-line: cefazolin Alternatives: vancomycin, clindamycin
Clean-contaminated**	Gastrointestinal, genitourinary, gynecologic/obstetric, head & neck, thoracic	Skin flora, gram-negative bacilli, enterococci & endogenous flora of the viscus	Based on surgical site, broader coverage often indicated

*Uninfected, uninflamed, the viscus is not entered.

**Viscus (eg, alimentary, genitourinary, respiratory systems) is entered under controlled conditions.

SSI = surgical site infection.

In addition to preoperative antiseptic skin preparation and sterile surgical technique, **prophylactic antibiotics** can help reduce surgical site infections (SSIs). Administered prior to incision, prophylactic antibiotics reduce the microorganism burden at the surgical site and are indicated when there is a **high risk of infection** (eg, traumatic wounds) or when infection would **cause significant morbidity**/mortality (eg, mediastinitis after cardiac surgery).

The specific antibiotic is chosen based on several factors, including the type of surgical wound and its expected degree of microbial contamination:

- Clean – without infection or viscus entry
- Clean-contaminated – with controlled viscus entry
- Contaminated – inflamed, acutely traumatic, or with viscus spillage
- Dirty – infected, necrotic, or fecally contaminated

Cardiac procedures are typically considered clean, and most associated SSIs are due to skin flora. Therefore, only **gram-positive skin flora** (eg

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- Contaminated – inflamed, acutely traumatic, or with viscus spillage
- Dirty – infected, necrotic, or fecally contaminated

Cardiac procedures are typically considered clean, and most associated SSIs are due to skin flora. Therefore, only **gram-positive skin flora** (eg, *Streptococcus*, *Staphylococcus aureus*, coagulase-negative *Staphylococcus*) coverage is required. **First- and second-generation cephalosporins** (eg, cefazolin) typically provide good prophylactic coverage. However, this patient has a history of a severe IgE-mediated allergic reaction (ie, anaphylactic shock) to penicillin, with which first- and second-generation cephalosporins have structural similarities (ie, shared allergenic epitopes). Therefore, an alternative antibiotic (eg, **vancomycin**, **clindamycin**) with good gram-positive coverage should be selected.

(Choice A) Azithromycin has a broad spectrum of activity against many gram-positive and some gram-negative bacteria including atypical bacteria (eg, *Mycoplasma*, *Legionella*); it is commonly used for treatment of community-acquired pneumonia. It has inferior coverage against *Staphylococcus* and is not typically used for SSI prophylaxis.

(Choices B and C) Ciprofloxacin has antimicrobial activity against aerobic, enteric, gram-negative bacilli and is used for prophylaxis in some genitourinary procedures. Metronidazole has antimicrobial activity against anaerobes (eg, *Bacteroides*, *Clostridium*) and protozoa (eg, *Trichomonas vaginalis)* and is used as part of a prophylaxis regimen in some gastrointestinal, gynecologic, and genitourinary procedures. However, neither antibiotic provides adequate coverage against typical gram-positive skin flora for this cardiac procedure.

(Choice D) Piperacillin-tazobactam has antimicrobial activity against gram-positive, gram-negative, and anaerobic bacteria including *Pseudomonas aeruginosa*; it is commonly used in broad-spectrum, empiric coverage for severe infections. However, such broad coverage is unnecessary (following principles of antimicrobial stewardship) for prophylaxis against a narrower spectrum of gram-positive skin flora. In addition,

Cardiac procedures are typically considered clean, and most associated SSIs are due to skin flora. Therefore, only **gram-positive skin flora** (eg, *Streptococcus*, *Staphylococcus aureus*, coagulase-negative *Staphylococcus*) coverage is required. **First- and second-generation cephalosporins** (eg, cefazolin) typically provide good prophylactic coverage. However, this patient has a history of a severe IgE-mediated allergic reaction (ie, anaphylactic shock) to penicillin, with which first- and second-generation cephalosporins have structural similarities (ie, shared allergenic epitopes). Therefore, an alternative antibiotic (eg, **vancomycin**, **clindamycin**) with good gram-positive coverage should be selected.

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(Choice D) Piperacillin-tazobactam has antimicrobial activity against gram-positive, gram-negative, and anaerobic bacteria including *Pseudomonas aeruginosa*; it is commonly used in broad-spectrum, empiric coverage for severe infections. However, such broad coverage is unnecessary (following principles of antimicrobial stewardship) for prophylaxis against a narrower spectrum of gram-positive skin flora. In addition, piperacillin-tazobactam should be avoided given this patient's severe penicillin allergy.

Educational objective:
Prophylactic antibiotics reduce surgical site infections and are indicated when there is a high risk of infection or when infection would lead to significant morbidity/mortality. Patients undergoing clean procedures (ie, without infection or viscus entry) should receive coverage against gram-positive skin flora, ideally with a first- or second-generation cephalosporin (eg, cefazolin) or, alternatively, with vancomycin or clindamycin.

References

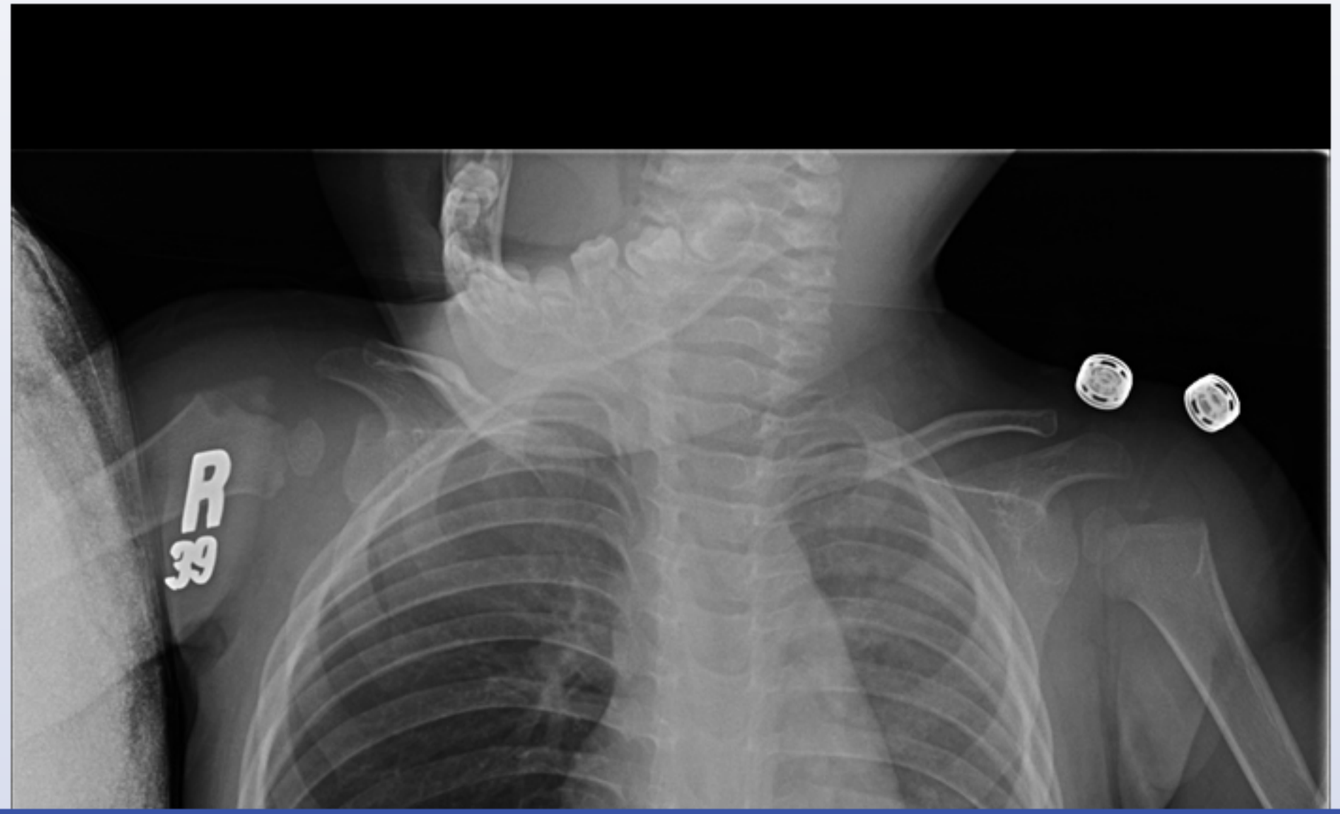
- Centers for Disease Control and Prevention guideline for the prevention of surgical site infection, 2017.
- Clinical practice guidelines for antimicrobial prophylaxis in surgery.

Settings

Item 33 of 40
Question Id: 16267

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An 18-month-old boy is brought to the emergency department due to respiratory distress. Severe cough and wheezing began an hour ago while the patient was playing at his cousin's house. Temperature, blood pressure, and pulse are normal. Respirations are 46/min, and pulse oximetry is 90% on room air. Oropharynx is unremarkable. There are suprasternal and intercostal retractions. Auscultation reveals a prolonged expiratory phase as well as wheezing without crackles over the right lung. There is hyperresonance to percussion on the right chest. The left lung is clear without crackles or wheezes. Cardiac examination shows normal S1 and S2. The abdomen is soft and nontender. Skin examination shows no rashes. The patient receives a dose of nebulized albuterol and supplemental oxygen with no improvement. Chest radiograph is shown in the image below:



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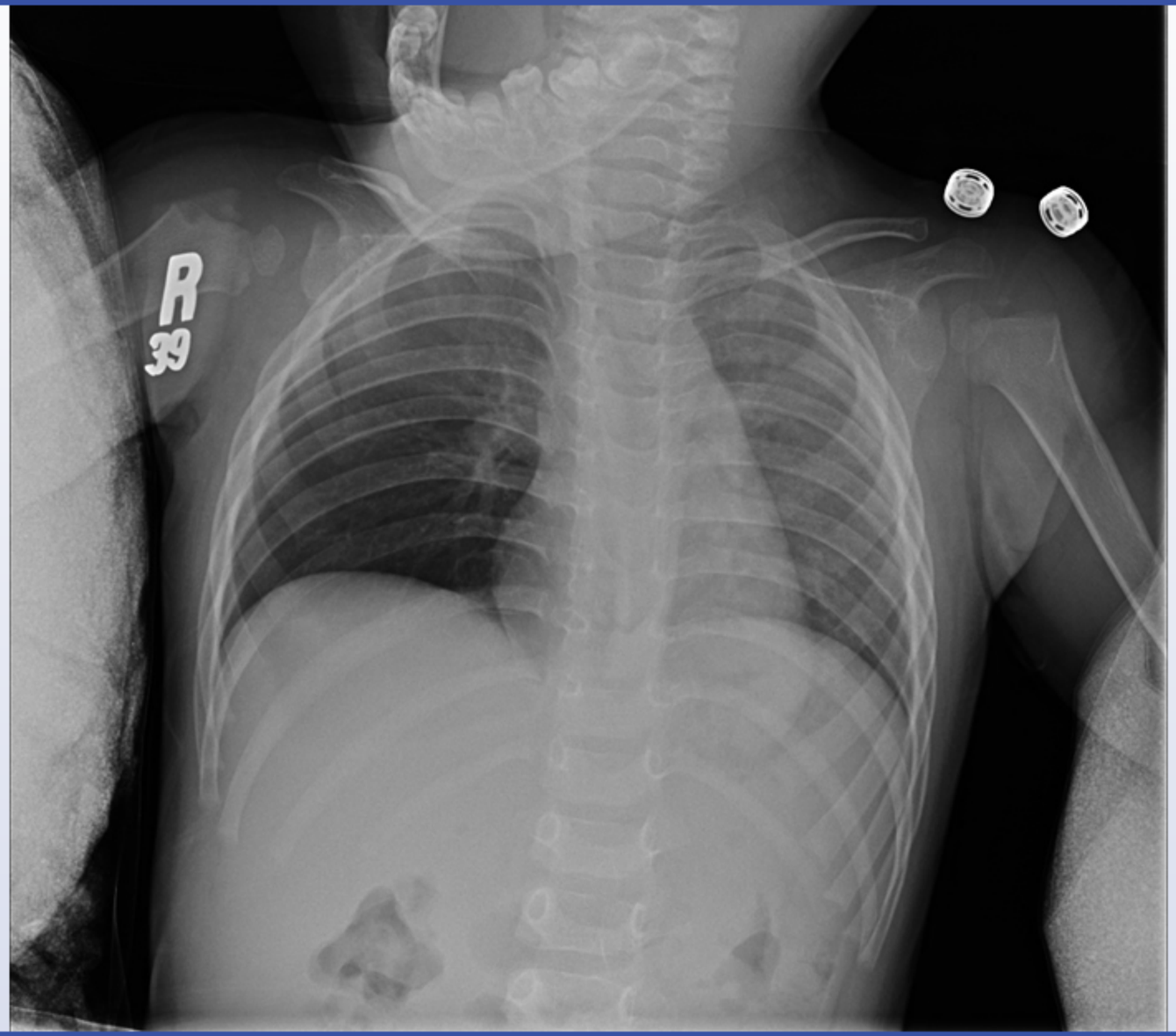
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Item 33 of 40
Question Id: 16267

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Item 33 of 40
Question Id: 16267

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Which of the following is the most likely cause of this patient's symptoms?

A. Anaphylaxis
B. Asthma
C. Bronchiolitis
D. Foreign body aspiration
E. Pneumonia
F. Pneumothorax

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Item 33 of 40
Question Id: 16267

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Which of the following is the most likely cause of this patient's symptoms?

- A. Anaphylaxis (0%)
- B. Asthma (1%)
- C. Bronchiolitis (2%)
- ✓ D. Foreign body aspiration (74%)
- E. Pneumonia (0%)
- F. Pneumothorax (21%)

Omitted
Correct answer

74%
Answered correctly

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Time Spent

06/11/2020
Last Updated

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Foreign body aspiration	
Clinical features	• Sudden-onset cough, dyspnea • Cyanosis • ± History of choking episode
Examination findings	• Wheezing &/or stridor • Focal area of diminished breath sounds
X-ray findings	• Hyperinflation of affected side • Mediastinal shift toward unaffected side • Atelectasis if obstruction is complete • ± Foreign body
Management	• Rigid bronchoscopy

Wheezing, a common chief complaint in children, is primarily due to asthma or a viral illness. However, sudden-onset, **unilateral wheezing** that is **unresponsive to albuterol** raises suspicion for **foreign body (FB) aspiration**.

FB aspiration most commonly occurs in children age 1-3 due to oral exploratory behavior and a relatively narrow airway diameter. Following aspiration, patients classically develop **abrupt-onset respiratory distress** (eg, cough, dyspnea, hypoxia). The aspiration event may be unwitnessed, and a history of choking is not always present. In most cases, the object partially obstructs one of the bronchi, resulting in a **prolonged expiratory phase** due to air trapped distal to the obstruction. Wheezing and **decreased breath sounds** on the **affected side** are characteristic, and **hyperresonance** to percussion can occur over the hyperexpanded lung.

Although x-ray may be normal, findings suggestive of FB aspiration include **unilateral lung hyperinflation** with **mediastinal shift** toward the unaffected side, as seen in this patient. Atelectasis may be present in cases of complete bronchial obstruction. Most aspirated objects are radiolucent and therefore not identified on x-ray.

Management includes immediate rigid bronchoscopy to confirm the diagnosis and remove the object.

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Management includes immediate rigid bronchoscopy to confirm the diagnosis and remove the object.

(Choice A) Anaphylaxis presents with acute-onset respiratory distress, angioedema/urticaria, and hypotension. This patient has no rash, and blood pressure is normal for age. In addition, wheezing in anaphylaxis would be diffuse (ie, nonfocal).

(Choice B) Patients with asthma have diffuse wheezing, prolonged expiratory phase, and bilateral hyperinflation on x-ray. In contrast, this patient has localized wheezing unresponsive to albuterol and unilateral lung hyperinflation.

(Choice C) Bronchiolitis is a lower respiratory tract infection that presents in children age <2 with fever, cough, rhinorrhea, and diffuse wheezing. X-ray may show bilateral hyperinflation as well as peribronchial thickening. This patient lacks infectious symptoms (eg, fever, rhinorrhea) and has asymmetric lung findings.

(Choice E) Pneumonia can present with cough and respiratory distress but also typically causes fever, crackles, and a lobar consolidation on x-ray (not seen in this patient).

(Choice F) Pneumothorax can present abruptly with cough and hypoxia but does not typically cause wheezing. In addition, x-ray shows air without lung markings outside the pleural line with ipsilateral lung collapse (not hyperinflation).

Educational objective:

Management includes immediate rigid bronchoscopy to confirm the diagnosis and remove the object.

(Choice A) Anaphylaxis presents with acute-onset respiratory distress, angioedema/urticaria, and hypotension. This patient has no rash, and blood pressure is normal for age. In addition, wheezing in anaphylaxis would be diffuse (ie, nonfocal).

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(Choice F) Pneumothorax can present abruptly with cough and hypoxia but does not typically cause wheezing. In addition, x-ray shows air without lung markings outside the pleural line with ipsilateral lung collapse (not hyperinflation).

Educational objective:
Foreign body aspiration should be suspected in a child with abrupt-onset cough and wheeze (with or without a choking episode) that is unresponsive to albuterol. Supportive findings include a focal lung examination (eg, wheeze, decreased breath sounds, hyperresonance) and/or unilateral lung hyperinflation with mediastinal shift on x-ray.

References

- Factors predicting early diagnosis of pediatric laryngotracheobronchial foreign bodies.

Surgery	Pulmonary & Critical Care	Foreign body aspiration
Subject	System	Topic

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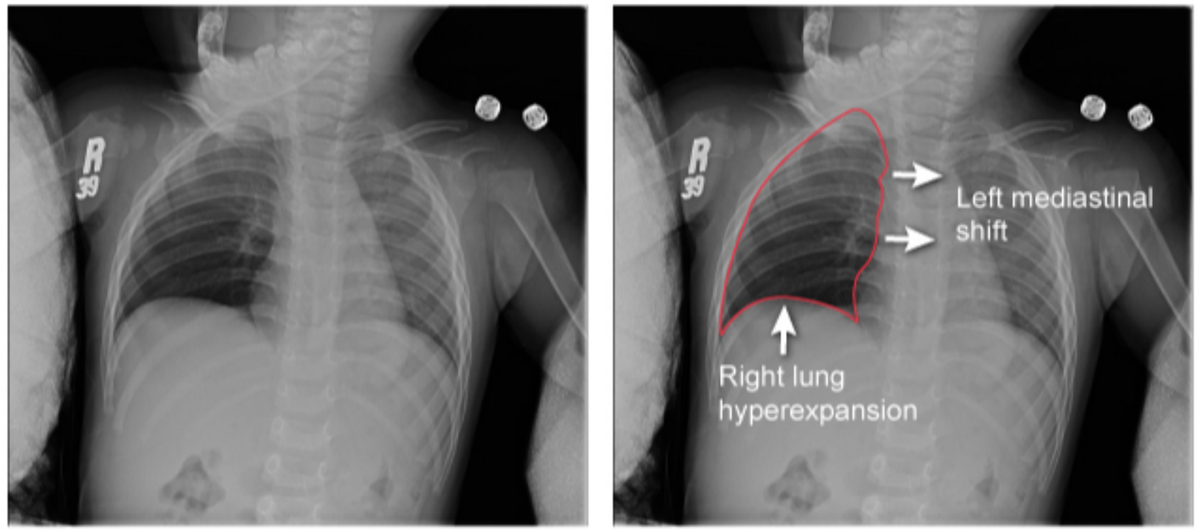
Item 33 of 40
Question Id: 16267

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Foreign body aspiration

Exhibit Display

Plastic foreign body aspiration



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(Choice A) Anaphylaxis presents with acute-onset respiratory distress, angioedema/urticaria, and hypotension. This patient has no rash, and

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Item 34 of 40
Question Id: 15760

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A 58-year-old computer engineer is evaluated for a murmur heard during a routine physical. He has no symptoms and no significant medical history. Specifically, he has no dyspnea, chest pain, syncope, or lower extremity swelling. The patient smokes a cigar and drinks a glass of brandy every Friday night. His lifestyle is mostly sedentary, but he walks for several miles on weekends. Blood pressure is 122/69 mm Hg and pulse is 72/min. There is no jugular venous distension. Vesicular breath sounds are auscultated bilaterally. There is a 3/6 holosystolic murmur best heard at the apex. Echocardiogram shows the mitral valve cusps bulging into the left atrium during systole, and there is severe mitral regurgitation. The left ventricle is dilated with ejection fraction of 52%. Which of the following is the most appropriate next step in management of this patient?

- A. Angiotensin receptor blocker
- B. Beta adrenergic blocker
- C. Referral for mitral valve repair
- D. Referral to an exercise program
- E. Repeat echocardiogram in 6 months

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- A. Angiotensin receptor blocker (12%)
- B. Beta adrenergic blocker (16%)
- ✓ C. Referral for mitral valve repair (45%)
- D. Referral to an exercise program (2%)
- E. Repeat echocardiogram in 6 months (22%)

Omitted
Correct answer
C

45%
Answered correctly

02 secs
Time Spent

02/05/2020
Last Updated

Explanation

Surgical indications for severe chronic mitral valve regurgitation

Surgical indications for severe chronic mitral valve regurgitation	
Primary MR	• Surgery if LVEF 30%-60% (regardless of symptoms) • Consider surgery if successful valve repair is highly likely: ◦ Symptomatic & LVEF <30% ◦ Asymptomatic & LVEF >60%
Secondary MR	• Medical management, valve surgery rarely indicated

LVEF = left ventricular ejection fraction; **MR** = mitral regurgitation.

Primary mitral regurgitation (MR) is defined as that caused by an intrinsic defect of the mitral valve apparatus (eg, leaflets, chordae tendineae) and is differentiated from secondary MR, which results from other cardiac disease (eg, myocardial ischemia, dilated cardiomyopathy). This patient's echocardiogram reveals **severe MR** due to mitral valve prolapse, a primary defect resulting from myxomatous degeneration of the mitral valve (manifesting on echocardiography as mitral valve cusps bulging into the left atrium during systole).

Chronic severe MR of primary etiology is best treated with **surgical repair**, and the timing of surgery should precede the development of significant left ventricular (LV) dysfunction. An important consideration is that measured **LV ejection fraction (LVEF) overestimates LV function** in severe MR because regurgitant flow accounts for a large amount of the stroke volume. Therefore, **LVEF 30%-60%** (as in this patient) is generally an indication for surgical repair or replacement in patients with primary chronic severe MR, regardless of symptoms. Patients with LVEF <30% likely have life-limiting, permanent systolic dysfunction, and surgery should be considered only when there is a high likelihood of successful valve repair (rather than replacement). Preemptive surgery can also be considered in asymptomatic patients with LVEF >60% who are excellent candidates for successful valve repair.

(Choices A and B) Treatment with angiotensin receptor blockers (eg, losartan) and/or beta blockers (eg, metoprolol) can be beneficial for chronic severe MR that is secondary to dilated cardiomyopathy (ie, the MR is due to LV dilation and the mitral valve itself is normal). However, pharmacologic therapy is of limited benefit in patients with chronic severe MR of primary etiology; timely surgical repair is most effective.

(Choices D and E) Referral to an exercise program or repeat echocardiography in 6 months can be appropriate for patients with primary chronic severe MR and LVEF >60%. However, even patients with LVEF >60% may be considered for surgery if they have a high likelihood of successful

LVEF = left ventricular ejection fraction; MR = mitral regurgitation.

Primary mitral regurgitation (MR) is defined as that caused by an intrinsic defect of the mitral valve apparatus (eg, leaflets, chordae tendineae) and is differentiated from secondary MR, which results from other cardiac disease (eg, myocardial ischemia, dilated cardiomyopathy). This patient's echocardiogram reveals **severe MR** due to mitral valve prolapse, a primary defect resulting from myxomatous degeneration of the mitral valve (manifesting on echocardiography as mitral valve cusps bulging into the left atrium during systole).

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(Choices D and E) Referral to an exercise program or repeat echocardiography in 6 months can be appropriate for patients with primary chronic severe MR and LVEF >60%. However, even patients with LVEF >60% may be considered for surgery if they have a high likelihood of successful and durable mitral valve repair.

Educational objective:
Timely surgical repair is the best treatment for chronic severe mitral regurgitation (MR) of primary etiology. The measured left ventricular ejection fraction (LVEF) significantly overestimates the effective LVEF in patients with severe MR; therefore, surgery is indicated for both symptomatic and asymptomatic patients with LVEF ≤60%.

References

- 2017 ACC Expert Consensus Decision Pathway for Mitral Regurgitation: a report of the American College of Cardiology Task Force on Expert Consensus Decision Pathways

Chronic severe MR of primary etiology is best treated with **surgical repair**, and the timing of surgery should precede the development of significant left ventricular (LV) dysfunction. An important consideration is that measured **LV ejection fraction (LVEF) overestimates LV function** in severe MR because regurgitant flow accounts for a large amount of the stroke volume. Therefore, **LVEF 30%-60%** (as in this patient) is generally an indication for surgical repair or replacement in patients with primary chronic severe MR, regardless of symptoms. Patients with LVEF <30% likely have life-limiting, permanent systolic dysfunction, and surgery should be considered only when there is a high likelihood of successful valve repair (rather than replacement). Preemptive surgery can also be considered in asymptomatic patients with LVEF >60% who are excellent candidates for successful valve repair.

(Choices A and B) Treatment with angiotensin receptor blockers (eg, losartan) and/or beta blockers (eg, metoprolol) can be beneficial for chronic severe MR that is secondary to dilated cardiomyopathy (ie, the MR is due to LV dilation and the mitral valve itself is normal). However, pharmacologic therapy is of limited benefit in patients with chronic severe MR of primary etiology; timely surgical repair is most effective.

(Choices D and E) Referral to an exercise program or repeat echocardiography in 6 months can be appropriate for patients with primary chronic severe MR and LVEF >60%. However, even patients with LVEF >60% may be considered for surgery if they have a high likelihood of successful and durable mitral valve repair.

Educational objective:
Timely surgical repair is the best treatment for chronic severe mitral regurgitation (MR) of primary etiology. The measured left ventricular ejection fraction (LVEF) significantly overestimates the effective LVEF in patients with severe MR; therefore, surgery is indicated for both symptomatic and asymptomatic patients with LVEF ≤60%.

References

- 2017 ACC Expert Consensus Decision Pathway for Mitral Regurgitation: a report of the American College of Cardiology Task Force on Expert Consensus Decision Pathways.

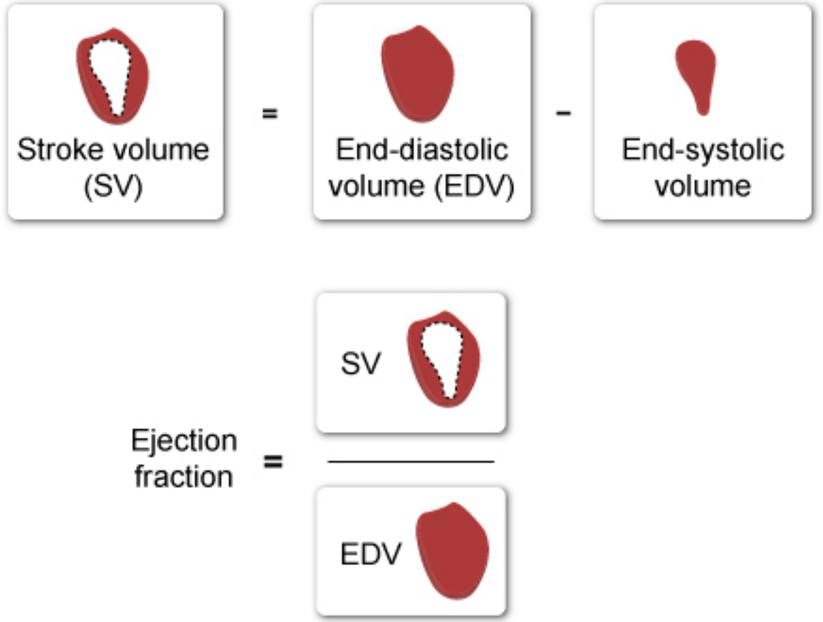
Surgery	Cardiovascular System	Mitral regurgitation
Subject	System	Topic

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- Consider surgery if successful valve repair is highly likely:

Exhibit Display

Stroke volume & ejection fraction



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Timely surgical repair is the best treatment for chronic severe mitral regurgitation (MR) of primary etiology. The measured left ventricular ejection

A 42-year-old obese woman with a history of chronic alcoholism presents with right upper quadrant abdominal pain that began shortly after she had dinner at a local steakhouse. The pain is sharp, rated 7/10 in severity, and radiates to her right scapula. She also complains of nausea and vomiting. Her medical records indicate she has a history of asymptomatic gallstones. She drinks approximately 6 beers a day for the past 20 years but denies tobacco or illicit drug use. Her temperature is 38.5 C (101.3 F), blood pressure is 110/60 mm Hg, pulse is 96/min, and respirations are 16/min. On physical examination, there is right upper quadrant tenderness with deep inspiration. The rest of her examination is within normal limits. Laboratory studies are shown below.

Total bilirubin	1.2 mg/dL
Direct bilirubin	0.8 mg/dL
Alkaline phosphatase	110 U/L
Aspartate aminotransferase (SGOT)	48 U/L
Alanine aminotransferase (SGPT)	65 U/L
Amylase	125 U/L

Complete blood count shows leukocytosis with mild left shift. Which of the following is the most likely initial event leading to this patient's symptoms?

A. Impaction of gallstone in cystic duct
B. Infection of gallbladder
C. Common bile duct obstruction with stone
D. Carcinoma of pancreatic head
E. Alcohol toxicity

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D. Carcinoma of pancreatic head
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Submit

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30

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Alanine aminotransferase (SGPT)	65 U/L
Amylase	125 U/L

Complete blood count shows leukocytosis with mild left shift. Which of the following is the most likely initial event leading to this patient's symptoms?

- ✓ A. Impaction of gallstone in cystic duct (62%)
- B. Infection of gallbladder (9%)
- C. Common bile duct obstruction with stone (25%)
- D. Carcinoma of pancreatic head (0%)
- E. Alcohol toxicity (1%)

Omitted
Correct answer

62%
Answered correctly

04 secs
Time Spent

06/24/2020
Last Updated

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30

Explanation

This patient presents with findings consistent with acute cholecystitis, which usually presents with sudden onset of steady epigastric or right upper quadrant pain after a large or fatty meal. The pain may radiate to the right scapula or be accompanied by Murphy's sign, described as worsening of right upper quadrant pain with inspiration that sometimes causes the patient to suddenly hold their breath. Other classical findings include fever, vomiting, and leukocytosis. Uncomplicated cholecystitis can cause mild elevations in transaminases, total serum bilirubin from 1-4 mg/dL, and serum amylase without obvious common bile duct or pancreatic disease. In these cases, the laboratory elevations are usually due to passage of sludge or pus in the common bile duct. However, alkaline phosphatase is usually not elevated without associated cholangitis or choledocholithiasis.

Acute cholecystitis is secondary to gallstone formation in over 90% of cases, most commonly arising when a gallstone impacts in the cystic duct. Ingestion of fatty foods then stimulates the contraction of the gallbladder against the obstructed cystic duct, and leads to severe colicky pain. The tissue behind the duct obstruction becomes inflamed, from stasis leading to bacterial overgrowth. The subsequent ischemic changes most commonly lead to gangrene and perforation, generalized peritonitis, or a well-circumscribed abscess. Other potential complications include cholangitis and chronic cholecystitis.

Treatment for acute cholecystitis includes supportive care (nothing by mouth, intravenous antibiotics, and analgesics). Laparoscopic cholecystectomy is recommended shortly after hospitalization and should be performed immediately in cases of perforation or gangrene.

(Choice B) Although infection of the gallbladder is present in 50-70% of acute cholecystitis cases, the original inciting event is gallstone impaction in the cystic duct. Therefore, infection would not be the primary mechanism for this patient's symptoms.

(Choices C and D) Common bile duct obstruction with stone or carcinoma would normally cause obstructive jaundice characterized by severe icterus and very high alkaline phosphatase levels.

(Choice E) Alcohol toxicity can cause acute pancreatitis but is not usually associated with acute cholecystitis.

Educational objective:
Acute cholecystitis usually presents with sudden onset of right upper quadrant abdominal pain, fever, vomiting, and leukocytosis. The primary inciting event is a gallstone obstructing the cystic duct with subsequent inflammation and infection

choledocholithiasis.

Acute cholecystitis is secondary to gallstone formation in over 90% of cases, most commonly arising when a gallstone impacts in the cystic duct. Ingestion of fatty foods then stimulates the contraction of the gallbladder against the obstructed cystic duct, and leads to severe colicky pain. The tissue behind the duct obstruction becomes inflamed, from stasis leading to bacterial overgrowth. The subsequent ischemic changes most commonly lead to gangrene and perforation, generalized peritonitis, or a well-circumscribed abscess. Other potential complications include cholangitis and chronic cholecystitis.

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Educational objective:
Acute cholecystitis usually presents with sudden onset of right upper quadrant abdominal pain, fever, vomiting, and leukocytosis. The primary inciting event is a gallstone obstructing the cystic duct with subsequent inflammation and infection

References

- Hyperbilirubinemia without common bile duct abnormalities and hyperamylasemia without pancreatitis in patients with gallbladder disease.

Surgery	Gastrointestinal & Nutrition	Cholecystitis
Subject	System	Topic

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1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30

A 70-year-old man comes to the office due to early satiety, nausea, and abdominal distension for the past 3 months. These symptoms have increased in frequency and limited the patient's ability to eat a full meal. For the past week, he has been unable to consume any solid food without vomiting afterward. The patient has also experienced a 13.5-kg (29.8-lb) weight loss during this period. He does not have dysphagia, hematochezia, melena, or hematemesis. Current medication is omeprazole, which he takes daily for heartburn. Temperature is 37.5 C (99.5 F), blood pressure is 132/78 mm Hg, pulse is 85/min, and respiratory rate is 12/min. Physical examination is significant for bilateral temporal wasting. Heart and lung sounds are unremarkable, and there is no appreciable lymphadenopathy. The abdomen is distended and tender to palpation in the epigastrium. A succussion splash is elicited during abdominal auscultation. Laboratory results are as follows:

Complete blood count

Hemoglobin	13.8 g/dL
Platelets	345,000/mm^3
Leukocytes	6,500/mm^3

Serum chemistry

Sodium	142 mEq/L
Potassium	2.7 mEq/L
Chloride	89 mEq/L
Bicarbonate	32 mEq/L
Creatinine	0.6 mg/dL
Glucose	220 mg/dL

Which of the following most likely explains this patient's presentation?

Platelets	345,000/mm^3
Leukocytes	6,500/mm^3

Serum chemistry

Sodium	142 mEq/L
Potassium	2.7 mEq/L
Chloride	89 mEq/L
Bicarbonate	32 mEq/L
Creatinine	0.6 mg/dL
Glucose	220 mg/dL

Which of the following most likely explains this patient's presentation?

A. Annular pancreas
B. Gastric bezoar
C. Gastric volvulus
D. Pancreatic adenocarcinoma
E. Peptic ulcer disease

Submit

Platelets	345,000/mm^3
Leukocytes	6,500/mm^3

Serum chemistry

Sodium	142 mEq/L
Potassium	2.7 mEq/L
Chloride	89 mEq/L
Bicarbonate	32 mEq/L
Creatinine	0.6 mg/dL
Glucose	220 mg/dL

Which of the following most likely explains this patient's presentation?

A. Annular pancreas (3%)
B. Gastric bezoar (18%)
C. Gastric volvulus (13%)
✓ D. Pancreatic adenocarcinoma (59%)
E. Peptic ulcer disease (5%)

Omitted
Correct answer

59%
Answered correctly

05 secs
Time Spent

01/26/2020
Last Updated

This patient with early satiety, **intractable nausea and vomiting**, and weight loss most likely has a **gastric outlet obstruction** (GOO), which results from a mechanical obstruction of the stomach or duodenum. Physical examination findings include abdominal tenderness; abdominal distension; and a **succussion splash** ("splash" heard on abdominal auscultation when rocking the patient back and forth at the hips), suggestive of retained food in the stomach. **Hypochloremic metabolic alkalosis** and **hypokalemia** commonly result from excessive vomiting and volume contraction. CT findings suggestive of GOO include gastric distension and air-fluid levels; however, an upper endoscopy is often needed to confirm the diagnosis.

Although the etiology of GOO is broad (eg, peptic ulcer disease, bezoar, gastric polyps), up to 80% of cases occur due to **malignancy**, most commonly from **pancreatic adenocarcinoma** with gastric or duodenal invasion. The presence of **unexplained hyperglycemia** (ie, new-onset diabetes mellitus), particularly in a malnourished, elderly patient with bitemporal wasting, is highly suggestive of pancreatic adenocarcinoma and occurs due to islet cell destruction with tumor invasion. Pancreatic malignancy associated with GOO has a poor prognosis because the tumor is usually too advanced for surgical resection. Palliative measures include gastro-jejunal bypass and endoscopic stent placement, which allow patients to tolerate food again.

(Choice A) Annular pancreas occurs when the embryonic ventral pancreatic bud fails to rotate properly around the duodenum, leading to duodenal encirclement. Most patients are asymptomatic or present early in life with GOO; in addition, it would not explain the hyperglycemia in this malnourished patient.

(Choice B) A gastric bezoar results from the accumulation of undigestible materials (eg, hair, foreign objects) in the stomach. Bezoars can cause GOO but are very rare and most patients have an underlying motility disorder (eg, gastroparesis) or prior gastric surgery.

(Choice C) Acute gastric volvulus can cause GOO but typically presents acutely with severe abdominal pain and hematemesis. Chronic volvulus may cause mild abdominal discomfort and nausea, but intractable nausea, vomiting, and hyperglycemia would be unexpected.

(Choice E) GOO can result from large gastric or duodenal ulcers; however, proton pump inhibitors are preventative, making peptic ulcer disease unlikely. In addition, patients typically have symptoms of chronic peptic ulcer disease (eg, epigastric pain associated with eating).

Educational objective:
Gastric outlet obstruction presents with intractable nausea and vomiting, early satiety, and weight loss. Most cases are caused by malignancy, most commonly from pancreatic adenocarcinoma with gastric or duodenal invasion. Pancreatic adenocarcinoma can also cause unexplained hyperglycemia resulting from islet cell destruction.

patients to tolerate food again.

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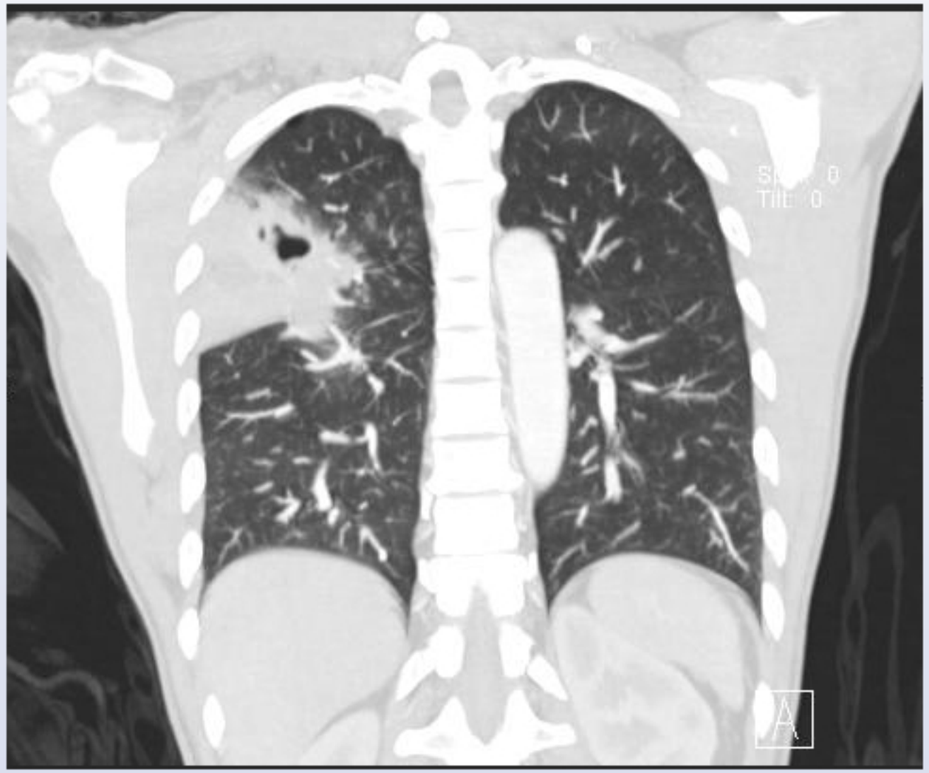
References

- Stent placement versus surgical palliation for adults with malignant gastric outlet obstruction.
- Laparoscopic gastrojejunostomy for gastric outlet obstruction in patients with unresectable hepatopancreatobiliary cancers: a personal series and systematic review of the literature.

Surgery	Gastrointestinal & Nutrition	Pancreatic cancer
Subject	System	Topic

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A 38-year-old man comes to the emergency department due to a week of fever, chills, and cough productive of foul-smelling sputum. He has also had night sweats, anorexia, and fatigue. The patient was hospitalized for acute alcohol intoxication 3 weeks ago after he was found unconscious on a sidewalk. He was given supportive care and vitamin supplementation and was discharged. The patient has no other medical conditions and takes no medications. He has unstable housing and often sleeps in doorways or at shelters. The patient smokes cigarettes and drinks alcohol but does not use injection drugs. Temperature is 39.5 C (103.1 F), blood pressure is 110/70 mm Hg, and pulse is 120/min. The patient appears ill and disheveled with poor dentition. Lung auscultation reveals right-sided crackles. Leukocyte count is 18,000/mm^3 and serum sodium is 128 mEq/L. Chest imaging findings are shown below.

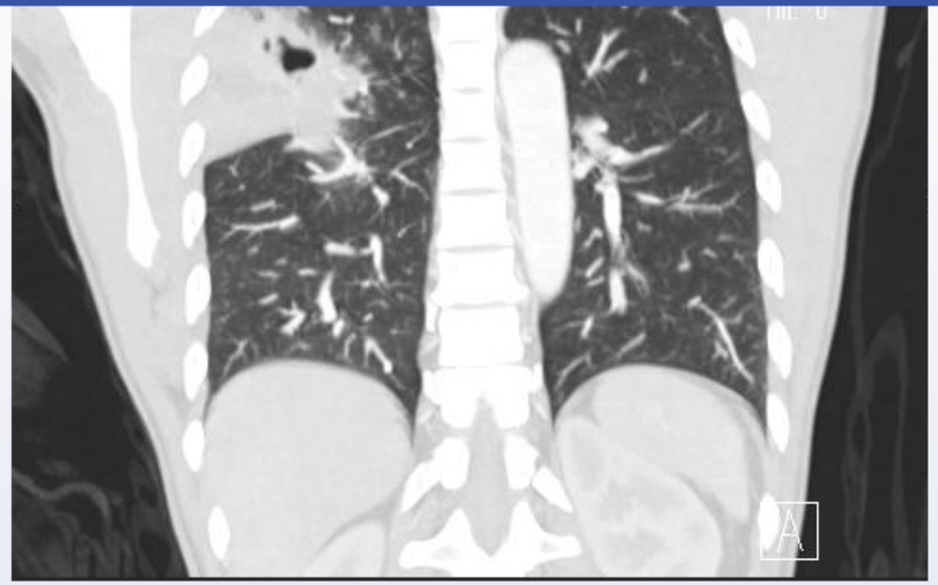


Which of the following is the most likely cause of this patient's current condition?

Settings

Item 37 of 40
Question Id: 3901

Mark | Previous | Next | Full Screen | Tutorial | Lab Values | Notes | Calculator | Reverse Color | Text Zoom | Settings



Which of the following is the most likely cause of this patient's current condition?

A. Anaerobic bacterial infection
B. *Aspergillus* colonization
C. Cavitary lung neoplasm
D. Gastric acid–induced lung injury
E. Mycobacterial infection

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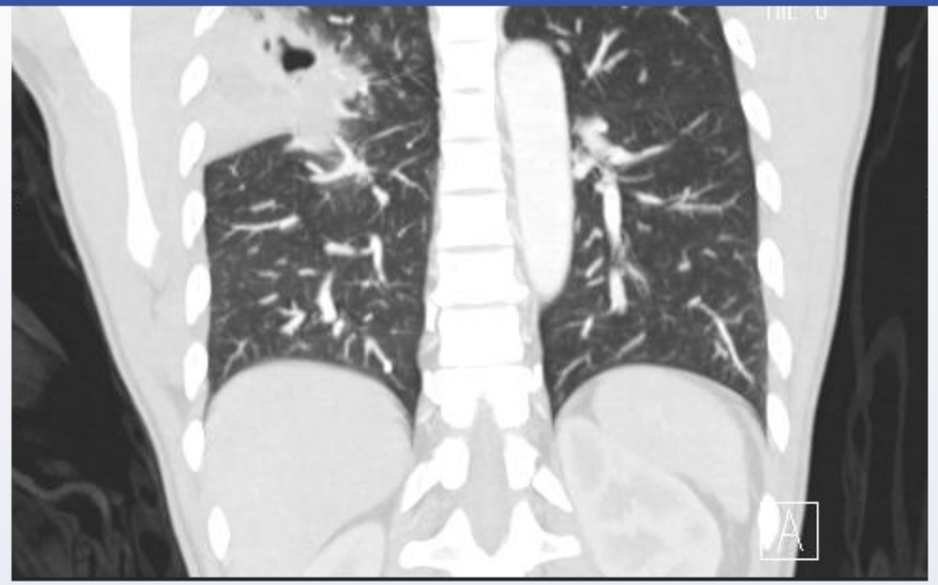
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Item 37 of 40
Question Id: 3901

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1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30



Which of the following is the most likely cause of this patient's current condition?

- ✓ A. Anaerobic bacterial infection (68%)
- B. *Aspergillus* colonization (5%)
- C. Cavitary lung neoplasm (5%)
- D. Gastric acid–induced lung injury (3%)
- E. Mycobacterial infection (16%)

Omitted
Correct answer

68%
Answered correctly

04 secs
Time Spent

03/23/2020
Last Updated

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Lung abscess	
Pathophysiology	• Aspiration of oropharyngeal/gingival anaerobes • Risk factors: dysphagia, substance abuse, seizures • Pneumonitis → pneumonia → abscess/empyema
Manifestations	• Subacute fever, night sweats, weight loss • Cough with putrid sputum
Diagnosis	• Cavitary infiltrates with air-fluid levels • Cultures rarely useful
Treatment	• Ampicillin-sulbactam, imipenem, meropenem • Alternate: clindamycin

This patient with a history of alcohol abuse has cough productive of foul-smelling sputum, fever, leukocytosis, and a cavitary lung infiltrate, raising strong suspicion for **aspiration pneumonia** with **lung abscess**. Most cases are caused by the aspiration of oropharyngeal **anaerobic bacteria** (eg, *Peptostreptococcus*, *Fusobacterium*) in the setting of dysphagia or impaired consciousness (eg, due to **alcohol abuse** or seizures). Those with **poor dentition** or gingival disease are at greatest risk.

Because anaerobic bacteria grow slowly, manifestations generally arise over **days or weeks**. Common symptoms include fever, night sweats, weight loss, and cough with **foul-smelling sputum**. Hyponatremia may be present due to infection-induced antidiuretic hormone secretion. Chest x-ray and CT scan typically reveal cavitary infiltrates, often with **air-fluid levels** in the superior lower lobe or posterior upper lobe (sections that are dependent with recumbency).

Anaerobic bacteria are difficult to isolate on culture. Therefore, patients with suspicious symptoms generally receive empiric antibiotics with an agent that has good pulmonary penetration and efficacy against anaerobes. **Ampicillin-sulbactam** is considered first-line therapy. Clindamycin is used less often than in the past due to the risk of *Clostridioides* (formerly *Clostridium*) *difficile* infection and increasing resistance. A prolonged course is indicated; surgical intervention (eg, pneumonectomy, lobectomy) may be required in the rare cases that do not improve with antibiotic therapy.

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(Choice B) Pulmonary aspergillosis is seen primarily in immunocompromised patients and presents with fever, pleuritic pain, and hemoptysis. Imaging typically reveals nodules with surrounding ground-glass infiltrates (ie, halo sign), not consolidation with cavitation.

(Choice C) Squamous cell carcinoma of the lung may present with a cavitary lung lesion, weight loss, and hyponatremia; however, fever, leukocytosis, and a short duration of symptoms would be uncommon.

(Choice D) Aspiration of gastric contents can result in chemical pneumonitis. Symptoms typically arise within hours (not a week) and include significant dyspnea but minimal fever.

(Choice E) Homeless individuals are at increased risk for reactivation tuberculosis, which can cause fever and cavitary lung lesions, but symptoms are usually more chronic. Nontuberculous mycobacteria (eg, *Mycobacterium avium* complex) can also cause cavitary lung disease, but this is more common in older patients with underlying chronic obstructive pulmonary disease or immune suppression. Foul-smelling sputum is more suggestive of lung abscess than mycobacterial infection.

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Educational objective:
Lung abscess is usually due to the aspiration of oropharyngeal anaerobic bacteria. Patients with dysphagia or episodes of impaired consciousness (eg, drug or alcohol abuse) are at high risk. Symptoms include subacute fever, night sweats, weight loss, and cough with putrid sputum. X-ray reveals cavitary infiltrates, often with air-fluid levels.

References

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References

- Lung abscess: update on microbiology and management.

Surgery Pulmonary & Critical Care Lung abscess

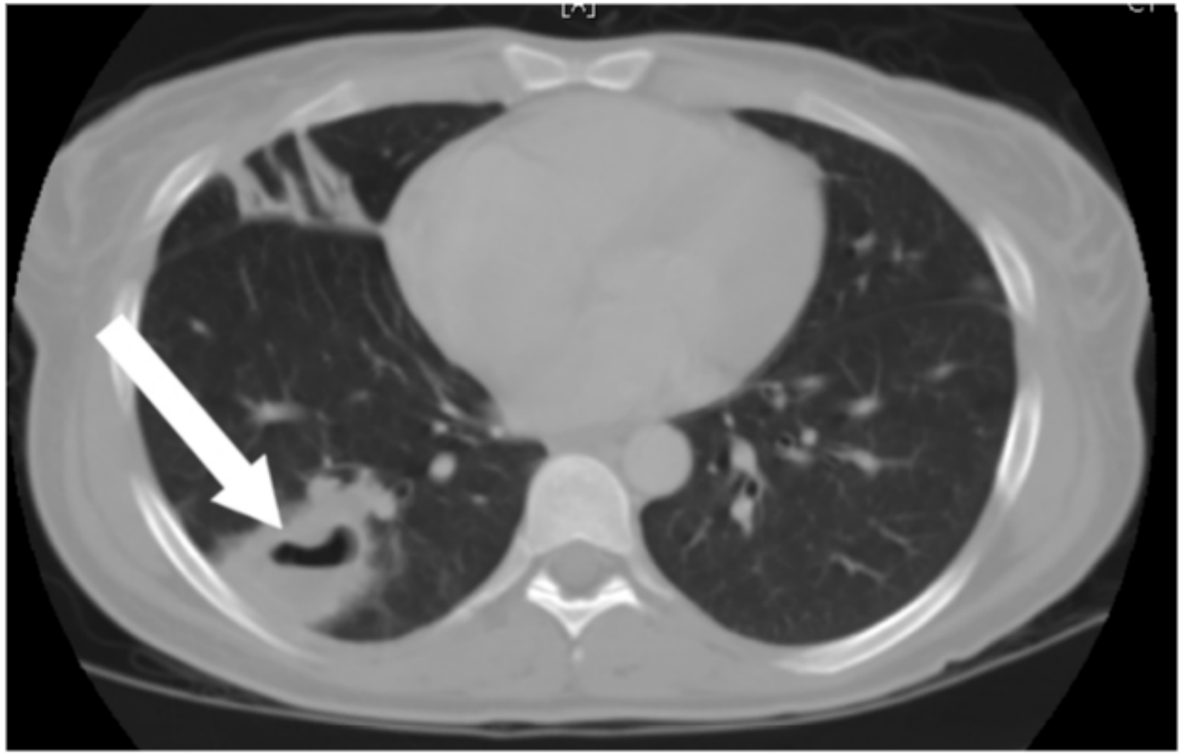
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Item 37 of 40
Question Id: 3901

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Exhibit Display



Zoom In | Zoom Out | Reset | Add To New Card | Existing Card

antibiotic therapy.

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(Choice C) Squamous cell carcinoma of the lung may present with a cavitary lung lesion, weight loss, and hyponatremia; however, fever, leukocytosis, and a short duration of symptoms would be uncommon.

(Choice D) Aspiration of gastric contents can result in chemical pneumonitis. Symptoms typically arise within hours (not a week) and include significant dyspnea but minimal fever.

(Choice E) Homeless individuals are at increased risk for reactivation tuberculosis, which can cause fever and cavitary lung lesions, but symptoms are usually more chronic. Nontuberculous mycobacteria (eg, *Mycobacterium avium* complex) can also cause cavitary lung disease, but this is more common in older patients with underlying chronic obstructive pulmonary disease or immune suppression. Foul-smelling sputum is more suggestive of lung abscess than mycobacterial infection.

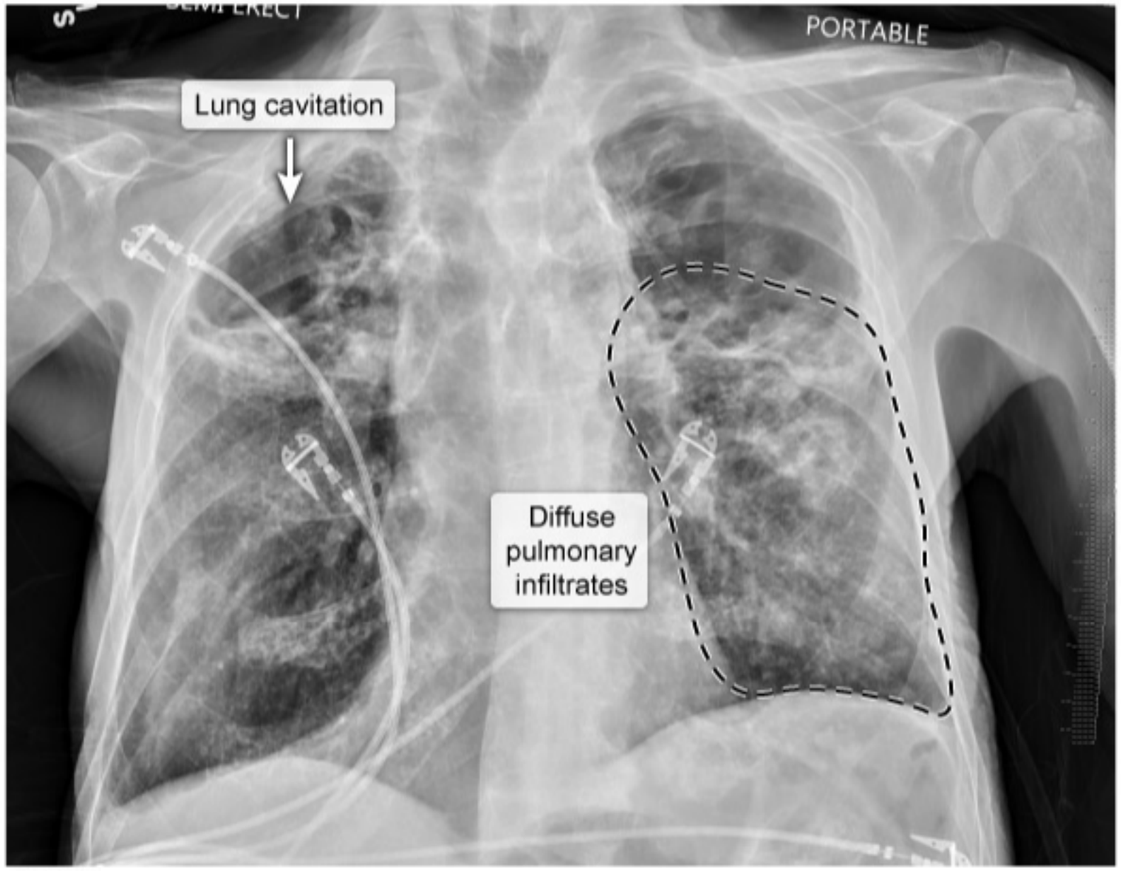
Educational objective:
Lung abscess is usually due to the aspiration of oropharyngeal anaerobic bacteria. Patients with dysphagia or episodes of impaired consciousness (eg, drug or alcohol abuse) are at high risk. Symptoms include subacute fever, night sweats, weight loss, and cough with putrid sputum. X-ray reveals cavitary infiltrates, often with air-fluid levels.

References

is used less often than in the past due to the risk of *Clostridioides* (formerly *Clostridium*) *difficile* infection and increasing resistance. A

Exhibit Display

Chronic pulmonary *Mycobacterium avium*



Zoom In | Zoom Out | Reset | Add To New Card | Existing Card

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Item 38 of 40
Question Id: 16622

Mark | Previous | Next | Full Screen | Tutorial | Lab Values | Notes | Calculator | Reverse Color | Text Zoom | Settings

A 66-year-old man comes to the emergency department due to worsening abdominal pain. Over the past week, he has had vague lower abdominal discomfort, nausea, anorexia, and constipation. This morning, the patient had sudden, severe lower abdominal pain accompanied by lightheadedness and an episode of vomiting. The pain initially improved but then gradually intensified to involve the entire abdomen. Medical history is significant for coronary artery disease and remote appendectomy. Temperature is 38.3 C (100.9 F), blood pressure is 110/54 mm Hg, pulse is 108/min, and respirations are 20/min. On physical examination, the patient is alert and cooperative but appears uncomfortable. Heart and lung sounds are normal. Bowel sounds are diminished. The abdomen is diffusely tender with guarding and rebound tenderness. Abdominal imaging is most likely to reveal which of the following findings in this patient?

A. Colonic dilatation with loss of haustral markings
B. Dilated small bowel with a transition point
C. Embolic occlusion of a mesenteric artery
D. Free air in the peritoneal cavity
E. Hematoma surrounding the abdominal aorta

Submit

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TUTOR

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A. Colonic dilatation with loss of haustral markings (6%)
B. Dilated small bowel with a transition point (14%)
C. Embolic occlusion of a mesenteric artery (21%)
✓ D. Free air in the peritoneal cavity (55%)
E. Hematoma surrounding the abdominal aorta (2%)

Omitted
Correct answer
D

55%
Answered correctly

02 secs
Time Spent

01/26/2020
Last Updated

Explanation

This elderly patient with weeklong symptoms of likely **diverticulitis** (eg, vague lower abdominal discomfort, anorexia, constipation) experienced **sudden, severe** abdominal **pain** that temporarily improved and then spread to his entire abdomen. This presentation, now accompanied by fever and **peritonitis** (eg, guarding, rebound tenderness), is most consistent with **diverticular perforation**. Because free (ie, noncontained) perforation

This elderly patient with weeklong symptoms of likely **diverticulitis** (eg, vague lower abdominal discomfort, anorexia, constipation) experienced **sudden, severe** abdominal **pain** that temporarily improved and then spread to his entire abdomen. This presentation, now accompanied by fever and **peritonitis** (eg, guarding, rebound tenderness), is most consistent with **diverticular perforation**. Because free (ie, noncontained) perforation causes colonic contents to spill into the **peritoneal** cavity, **free air** is typically visible on abdominal imaging (eg, upright x-ray, CT scan).

Patients with free perforation of the gastrointestinal tract in the setting of ongoing inflammation (eg, diverticulitis) often have a **classic pain sequence**:

- Moment of perforation: sudden, severe pain (± vomiting, lightheadedness or syncope)
- After perforation to 2 hours: temporary relief or decreased pain as the inflamed organ decompresses
- >2 hours after perforation: generalized, constant pain due to peritonitis (± sepsis/septic shock)

Unlike diverticular microperforation (ie, contained perforation), which usually responds to medical management (eg, antibiotics, bowel rest), free perforation is a surgical emergency that requires abdominal washout and resection of the ruptured bowel segment.

(Choice A) Colonic dilatation with loss of haustral markings may be seen in toxic megacolon. Toxic megacolon can cause fever, abdominal pain, and peritonitis. However, bloody diarrhea is typically present, as is a history of inflammatory bowel disease or recent antibiotic therapy (leading to *Clostridioides* [formerly *Clostridium*] *difficile*).

(Choice B) Dilated small bowel with a transition point is seen in small bowel obstruction. This condition more commonly causes crampy (vs sudden and severe) pain of the midabdomen and increased, high-pitched (vs diminished) bowel sounds without peritonitis, unless perforation has occurred (causing free air on imaging).

(Choice C) Embolic occlusion of a mesenteric artery causes acute-onset, severe abdominal pain (acute mesenteric ischemia). Such pain is typically out of proportion to a relatively benign abdominal examination, whereas this patient has guarding and rebound tenderness proportionate to his severe pain. In addition, a predisposing risk factor for embolism (eg, atrial fibrillation) is usually present.

(Choice E) A hematoma surrounding the abdominal aorta may been seen with contained abdominal aortic aneurysm rupture. Such rupture may cause acute-onset, severe abdominal pain; however, contained rupture does not typically cause fever and peritonitis.

Educational objective:

Unlike diverticular microperforation (ie, contained perforation), which usually responds to medical management (eg, antibiotics, bowel rest), free perforation is a surgical emergency that requires abdominal washout and resection of the ruptured bowel segment.

(Choice A) Colonic dilatation with loss of haustral markings may be seen in toxic megacolon. Toxic megacolon can cause fever, abdominal pain, and peritonitis. However, bloody diarrhea is typically present, as is a history of inflammatory bowel disease or recent antibiotic therapy (leading to *Clostridioides* [formerly *Clostridium*] *difficile*).

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(Choice E) A hematoma surrounding the abdominal aorta may been seen with contained abdominal aortic aneurysm rupture. Such rupture may cause acute-onset, severe abdominal pain; however, contained rupture does not typically cause fever and peritonitis.

Educational objective:
Free perforation of the gastrointestinal tract in the setting of ongoing inflammation (eg, diverticulitis) often causes a classic pain sequence: sudden, severe pain (perforation) followed by temporary relief (decompression) and then generalized, constant pain (peritonitis). Abdominal imaging typically shows intraperitoneal free air.

References

- Colorectal emergencies: perforated diverticulitis (operative and nonoperative management).
- Diverticulitis: a comprehensive review with usual and unusual complications.

Surgery	Gastrointestinal & Nutrition	Perforated viscus
Subject	System	Topic

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30

A 72-year-old man is brought to the office due to 4 weeks of worsening productive cough. The patient has also had malaise and night sweats and has lost 3 kg (6.6 lb) during this period. His wife states that he has had occasional nonproductive cough in the past, particularly while eating, but it is now persistent and productive of abundant yellow sputum. The patient has a history of hypertension and Parkinson disease. He has a remote 5-pack-year history of smoking and does not drink alcohol. He is a retired schoolteacher, lives in Ohio, and has not traveled or been exposed to sick contacts recently. Temperature is 37.8 C (100 F), blood pressure is 126/68 mm Hg, pulse is 88/min, and respirations are 14/min. Pulse oximetry is 96% on room air. On examination, the patient appears frail with resting tremor of both hands. Lung auscultation reveals scattered rhonchi but no wheezing. Heart sounds are normal. Laboratory results are as follows:

Complete blood count	
Hemoglobin	11.4 g/dL
Mean corpuscular volume	92 μm^3
Platelets	420,000/mm^3
Leukocytes	13,100/mm^3

Chest x-ray reveals a density with cavitation in the right lower lobe. Which of the following is the most likely cause of this patient's current condition?

A. *Histoplasma* infection
B. Necrotizing vasculitis
C. Neoplastic proliferation
D. Oropharyngeal aspiration
E. Tuberculosis reactivation
F. Venous thromboembolism

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30

sick contacts recently. Temperature is 37.8 C (100 F), blood pressure is 126/68 mm Hg, pulse is 88/min, and respirations are 14/min. Pulse oximetry is 96% on room air. On examination, the patient appears frail with resting tremor of both hands. Lung auscultation reveals scattered rhonchi but no wheezing. Heart sounds are normal. Laboratory results are as follows:

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Submit

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Leukocytes	13,100/mm^3

Chest x-ray reveals a density with cavitation in the right lower lobe. Which of the following is the most likely cause of this patient's current condition?

- A. *Histoplasma* infection (29%)
- B. Necrotizing vasculitis (0%)
- C. Neoplastic proliferation (7%)
- ✓ D. Oropharyngeal aspiration (52%)
- E. Tuberculosis reactivation (9%)
- F. Venous thromboembolism (0%)

Omitted
Correct answer

52%
Answered correctly

05 secs
Time Spent

03/04/2020
Last Updated

Lung abscess	
Pathophysiology	• Aspiration of oropharyngeal/gingival anaerobes • Risk factors: dysphagia, substance abuse, seizures • Pneumonitis → pneumonia → abscess/empyema
Manifestations	• Subacute fever, night sweats, weight loss • Cough with putrid sputum
Diagnosis	• Cavitary infiltrates with air-fluid levels • Cultures rarely useful
Treatment	• Ampicillin-sulbactam, imipenem, meropenem • Alternate: clindamycin

This patient's long-standing cough productive of yellow sputum, systemic symptoms (eg, weight loss, malaise, night sweats), leukocytosis, and a cavitary lesion in the right lower lobe raises strong suspicion for **lung abscess**. Most cases are caused by the **aspiration of oropharyngeal anaerobic bacteria** into dependent portions of the lung during periods of impaired consciousness (eg, alcohol/drug abuse, seizure disorder) or **swallowing dysfunction**.

Parkinson disease is frequently associated with significant swallowing dysfunction due to loss of dopaminergic neurons that control the striated muscles in the oral cavity, pharynx, and esophagus. **Coughing during eating** (due to microaspiration of food particles) is often an important clue; as dysphagia worsens, patients are at very high risk for aspiration pneumonia with or without lung abscess.

Lung abscess usually causes **indolent fever** and **cough productive of foul-smelling sputum**. Systemic manifestations such as night sweats, weight loss, and malaise are often present, and laboratory evaluation frequently reveals leukocytosis and signs of chronic inflammation (eg, anemia of chronic disease, thrombocytosis). The diagnosis is generally confirmed when chest imaging shows a cavitary infiltrate in a dependent portion of the lung (eg, superior segment of a lower lobe, posterior segment of an upper lobe).

Management generally requires a prolonged course of antibiotics; in rare cases where there is limited improvement with antibiotics (or if cancer is

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Management generally requires a prolonged course of antibiotics; in rare cases where there is limited improvement with antibiotics (or if cancer is suspected), surgical intervention may be required.

(Choice A) *Histoplasma capsulatum* is endemic to the Ohio and Mississippi River valleys. It is a common cause of community-acquired pneumonia in these regions and frequently presents with productive cough and subacute systemic symptoms. However, chest x-ray usually reveals a lobar pulmonary infiltrate and hilar/mediastinal lymphadenopathy; cavitation very rarely occurs.

(Choice B) Granulomatosis with polyangiitis is a necrotizing vasculitis that frequently presents in older adults with subacute systemic manifestations and dyspnea from trachea or lung involvement. However, productive cough is atypical, and chest x-ray usually reveals nodular infiltrates, not cavitary disease.

(Choice C) Lung cancer can cause weight loss, malaise, cough, anemia, thrombocytosis, and a cavitary infiltrate. However, the presence of fever, leukocytosis, and malaise in the setting of swallowing dysfunction make a lung abscess far more likely.

(Choice E) Tuberculosis reactivation can lead to a cavitary lung lesion, subacute systemic symptoms, and leukocytosis. However, this patient with a cavitary lesion in the lower lobe in the setting of swallowing dysfunction is far more likely to have aspiration pneumonia with subsequent

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(Choice F) Venous thromboembolism often presents with pleuritic chest pain, tachycardia, and dyspnea. Although lobar infiltrates can be seen when pulmonary infarction occurs, cavitary infiltrates and chronic productive cough are atypical.

Educational objective:

Settings

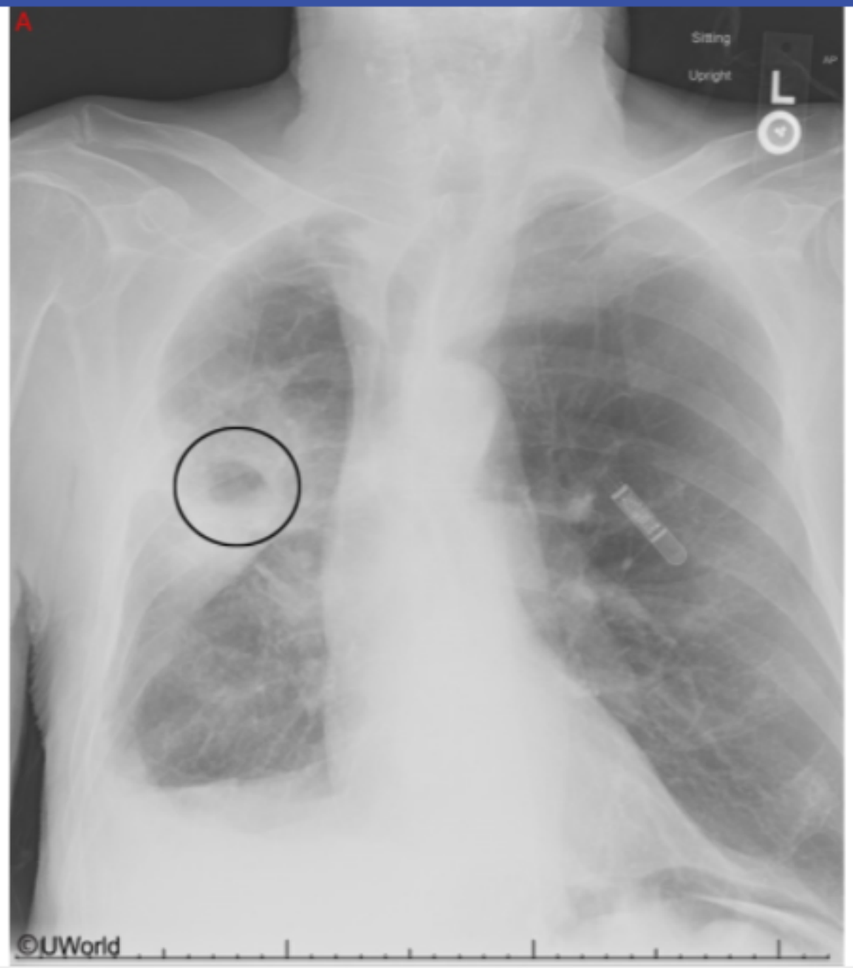
Item 39 of 40
Question Id: 14378

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Exhibit Display



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Educational objective:

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(Choice F) Venous thromboembolism often presents with pleuritic chest pain, tachycardia, and dyspnea. Although lobar infiltrates can be seen when pulmonary infarction occurs, cavitary infiltrates and chronic productive cough are atypical.

Educational objective:
Lung abscess is common in patients with periods of impaired consciousness (eg, alcohol/drug abuse, seizure disorder) or swallowing dysfunction (eg, Parkinson disease). It usually presents with indolent systemic symptoms and cough productive of foul-smelling sputum. Chest x-ray usually reveals a cavitary infiltrate in a dependent portion of the lung.

Surgery	Pulmonary & Critical Care	Lung abscess
Subject	System	Topic

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Settings

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Item 40 of 40
Question Id: 3976

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A 46-year-old man undergoes an elective inguinal hernia repair. After induction of general anesthesia, he is noted to be pale and tachycardic. The patient's medical history is significant for frequent headaches, hypertension, and an anxiety disorder. His outpatient medications include lisinopril, alprazolam, and as-needed naproxen. The patient regularly drinks a 6-pack of beer on weekends but does not use tobacco or illicit drugs. Family history is unremarkable. His temperature is 36.9 C (98.4 F), blood pressure is now 250/140 mm Hg (it was 144/90 mm Hg before induction), and pulse is 125/min. ECG shows sinus tachycardia with no ischemic changes. Which of the following is the most likely diagnosis?

A. Alcohol withdrawal
B. Anaphylaxis
C. Panic disorder
D. Pheochromocytoma
E. Serotonin syndrome
F. Thyroid storm

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Item 40 of 40
Question Id: 3976

Mark | Previous | Next | Full Screen | Tutorial | Lab Values | Notes | Calculator | Reverse Color | Text Zoom | Settings

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A. Alcohol withdrawal (6%)
B. Anaphylaxis (5%)
C. Panic disorder (2%)
✓ D. Pheochromocytoma (52%)
E. Serotonin syndrome (11%)
F. Thyroid storm (22%)

Omitted
Correct answer
D

52%
Answered correctly

04 secs
Time Spent

05/28/2020
Last Updated

Explanation

In light of this patient's history of hypertension and frequent headaches, his presentation with severe hypertension, pallor, and sinus tachycardia is concerning for an occult **pheochromocytoma** with a **catecholamine surge** due to anesthesia. Pheochromocytomas and paraganglionomas are catecholamine-producing tumors arising from chromaffin cells of the adrenal medulla or extra-adrenal paraganglia, respectively.

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Hypertension in pheochromocytoma can be intermittent or sustained. **Paroxysms** of severe **hypertension** can be precipitated by increases in intra-abdominal pressure (eg, tumor palpation, positional changes), surgical procedures, and a number of medications, particularly **anesthetic** agents. In addition, nonselective **beta blockers** can cause a state of unopposed alpha adrenergic stimulation leading to vasoconstriction and paradoxical hypertension. For this reason, alpha adrenergic blockers (eg, phenoxybenzamine) should be administered prior to beta blockers in patients with pheochromocytoma.

(Choices A, C, and F) Alcohol withdrawal and panic disorder can mimic pheochromocytoma paroxysms but are unlikely to manifest when the patient is under anesthesia. Thyroid storm can be precipitated by surgery in patients with preexisting thyrotoxicosis, but the presentation is usually less acute, and almost all patients will have pyrexia. Severely elevated blood pressure and pallor (from catecholamine-induced vasoconstriction) are more likely due to catecholamine surge from pheochromocytoma.

(Choice B) Anaphylaxis is a severe type 1 hypersensitivity reaction to a drug, environmental agent, or food. Anaphylaxis typically causes hives, angioedema, respiratory compromise, and acute hypotension rather than hypertension.

(Choice E) Serotonin syndrome is characterized by abnormal mental status, autonomic hyperactivity, and muscular rigidity with hyperreflexia. It is typically triggered by initiation or titration of selective serotonin reuptake inhibitors.

Educational objective:
Pheochromocytomas are catecholamine-producing tumors arising from chromaffin cells of the adrenal medulla. Paroxysms of severe hypertension in patients with pheochromocytoma can be precipitated by surgical procedures, induction of anesthesia, and a number of medications.

References

- Pheochromocytoma and paraganglioma: an endocrine society clinical practice guideline.

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Pheochromocytomas are catecholamine-producing tumors arising from chromaffin cells of the adrenal medulla. Paroxysms of severe hypertension in patients with pheochromocytoma can be precipitated by surgical procedures, induction of anesthesia, and a number of medications.

References

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Surgery	Endocrine, Diabetes & Metabolism	Pheochromocytoma
Subject	System	Topic

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