A 46-year-old woman comes to the clinic due to left lower extremity swelling for the past 2 years. She has had several episodes of cellulitis involving the left leg. During the most recent episode 6 months ago, she underwent treatment with intravenous antibiotics that was complicated by a catheter-related axillary vein thrombosis requiring 3 months of anticoagulation therapy. Her medical history is also significant for diet-controlled type 2 diabetes mellitus. BMI is 34 kg/m^2. Physical examination shows firm edema of the left lower extremity. There is no erythema or warmth. The examiner cannot lift the skin from the dorsum of the toes on the left foot but is able to do so with the toes on the right foot. Which of the following is the most likely cause of this patient's symptoms?

- A. Albuminuria
- B. Disruption of lymphatics
- C. Increased central venous pressure
- D. Systemic sclerosis
- E. Venous valve incompetence

Submit

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- ✗ A. Albuminuria [1%]
- ✓ B. Disruption of lymphatics [62%]
- C. Increased central venous pressure [2%]
- D. Systemic sclerosis [4%]
- E. Venous valve incompetence [28%]

Incorrect
Correct answer
B

62%
Answered correctly

28 Seconds
Time Spent

08/19/2018
Last Updated

Lymphedema	

Etiology	• Disruption of the lymphatic system
	  • Obstruction (eg, malignancy)
	  • Lymph node dissection
	  • Chronic inflammation (eg, recurrent cellulitis)
	  • Congenital (eg, Turner syndrome)
	  • Parasitic infection (eg, filariasis)

Clinical presentation	• Swelling, pain, heaviness • Early: Soft skin, pitting edema • Late: Firm & thickened skin, nonpitting edema
Treatment	• Weight loss • Limb elevation & compression • Physiotherapy

This patient most likely has chronic **lymphedema** of the left leg. **Lymphedema** most commonly results from an acquired **disruption of the lymphatic system** that leads to accumulation of lymphatic fluid in the interstitium. Common causes include malignancy and its treatment (eg, radiation, lymph node dissection), chronic inflammation (eg, **recurrent cellulitis**, connective tissue disease), and severe chronic venous insufficiency. **Obesity** is often a strong contributing factor.

Chronic lymphedema typically presents with pain, swelling, and heaviness in one or more extremities. Patients

Chronic lymphedema typically presents with pain, swelling, and heaviness in one or more extremities. Patients with early disease usually demonstrate soft skin with pitting edema. However, progressive **deposition of subcutaneous collagen and adipose tissue** occurs, leading to later development of **firm, thickened skin** and **nonpitting edema**. In advanced cases, the skin may develop a warty appearance. Inability to lift the skin on the dorsum of the second toe (positive Stemmer sign) is highly specific for lymphedema.

The diagnosis is usually based on clinical presentation, but imaging (eg, duplex ultrasound) may be useful in some cases. Treatment is challenging and may involve weight loss, limb elevation, compression bandages, and physiotherapy (eg, lymphatic drainage by massage).

(Choices A and C) Severe albuminuria (eg, diabetic nephropathy) can lead to peripheral edema due to low oncotic pressure of the blood, and increased central venous pressure (eg, heart failure) can lead to lower extremity edema due to elevated hydrostatic pressure in the deep veins of the legs. Lymphedema, evidenced by thick skin and a positive Stemmer sign, is not typical in either setting.

(Choice D) Systemic sclerosis often leads to peripheral edema due to inflammatory disruption of blood vessel walls; lymphedema due to inflammatory disruption of lymphatics can occur but is less common. If systemic sclerosis were present in this patient, other suggestive features (eg, sclerodactyly, Raynaud phenomenon) would be expected.

(Choice E) Venous valve incompetence is the major cause of lower extremity edema due to chronic venous insufficiency. When severe, lymphedema may occur due to lymphatic obstruction. However, this patient's unilateral symptoms and history of recurrent cellulitis make venous valve incompetence an unlikely underlying cause.

edema due to elevated hydrostatic pressure in the deep veins of the legs. Lymphedema, evidenced by thick skin and a positive Stemmer sign, is not typical in either setting.

(Choice D) Systemic sclerosis often leads to peripheral edema due to inflammatory disruption of blood vessel walls; lymphedema due to inflammatory disruption of lymphatics can occur but is less common. If systemic sclerosis were present in this patient, other suggestive features (eg, sclerodactyly, Raynaud phenomenon) would be expected.

(Choice E) Venous valve incompetence is the major cause of lower extremity edema due to chronic venous insufficiency. When severe, lymphedema may occur due to lymphatic obstruction. However, this patient's unilateral symptoms and history of recurrent cellulitis make venous valve incompetence an unlikely underlying cause.

Educational objective:
Chronic lymphedema is most commonly caused by an acquired disruption of the lymphatic system (eg, chronic inflammation, malignancy) and typically presents with pain and swelling in one or more extremities. Patients usually have pitting edema that later progresses to nonpitting edema accompanied by firm, thickened skin.

References

- Prevalence and characteristics of lymphoedema at a wound-care clinic.

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Etiology

- Chronic inflammation (eg, recurrent cellulitis)

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dorsum of the second toe (positive Stemmer sign) is highly specific for lymphedema.

A 34-year-old man is brought to the emergency department by paramedics after being shot in a street fight. The patient is obtunded and had an episode of vomiting en route. He receives 3 L of normal saline. His temperature is 37 C (98.8 F), blood pressure is 85/43 mm Hg, pulse is 126/min, and respirations are 21/min. The trachea is midline, and there are breath sounds bilaterally. Examination shows a gunshot entry wound in the left 6th intercostal space anteriorly lateral to the midclavicular line and an exit wound in the left seventh intercostal space posteriorly. The patient is intubated, and mechanical ventilation is initiated. Portable chest x-ray shows hazy opacities at the left lung base. Bedside ultrasound is limited due to body habitus but shows no definite pericardial or peritoneal fluid. Which of the following is the most appropriate next step in management of this patient?

- A. Chest tube placement
- B. Computed tomography scan of the abdomen
- C. Diagnostic peritoneal lavage
- D. Exploratory laparotomy
- E. Plain radiograph of the abdomen

Submit

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✗ A. Chest tube placement [17%]

B. Computed tomography scan of the abdomen [9%]

C. Diagnostic peritoneal lavage [17%]

✓ D. Exploratory laparotomy [52%]

E. Plain radiograph of the abdomen [3%]

Incorrect
Correct answer
D

52%
Answered correctly

4 Seconds
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07/31/2018
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This patient presents after a penetrating thoracic gunshot wound (GSW) with obtunded mental state and hypotension consistent with shock. The diaphragm can rise as high as the 4th thoracic dermatome on the right and 5th thoracic dermatome on the left (ie, level of the nipples) on expiration and go down to the 12th thoracic dermatome on both sides on inspiration. Any penetrating injury in the thorax below the level of the nipples has potential to also involve the abdomen through the diaphragm and is assumed to involve both compartments until proven otherwise. The described trajectory of the bullet indicates that it could have penetrated the pleura and abdominal cavity at the dome of the diaphragm on the left, at the level of the spleen and gastric fundus.

A GSW involving the abdomen can cause significant injury, most commonly to the small bowel, colon, and liver. Patients who are hemodynamically unstable (such as this patient), have evidence of peritonitis, or have evisceration of any organ need immediate exploratory laparotomy. A focused assessment with sonography for trauma (FAST) can be done in a few minutes on all patients and has high sensitivity and specificity for detecting hemoperitoneum, pericardial effusion, and intraperitoneal fluid. Because the FAST was equivocal in this hemodynamically unstable patient, he requires an immediate laparotomy.

(Choice A) A chest tube is used to manage severe hemothorax or pneumothorax. These could be complications of the GSW in this patient but are less likely given the chest x-ray findings.

(Choice B) A computed tomography scan to determine the need for a laparotomy is useful in hemodynamically stable patients with negative findings by FAST or diagnostic peritoneal lavage. However, this patient is unstable and likely would be unable to tolerate scanning.

(Choice C) This patient has **penetrating (not blunt) trauma** and is likely bleeding from the GSW. All patients

(Choice A) A chest tube is used to manage severe hemothorax or pneumothorax. These could be complications of the GSW in this patient but are less likely given the chest x-ray findings.

(Choice B) A computed tomography scan to determine the need for a laparotomy is useful in hemodynamically stable patients with negative findings by FAST or diagnostic peritoneal lavage. However, this patient is unstable and likely would be unable to tolerate scanning.

(Choice C) This patient has **penetrating (not blunt) trauma** and is likely bleeding from the GSW. All patients with penetrating injury and evidence of peritonitis or unstable hemodynamics need immediate laparotomy. **Diagnostic peritoneal lavage** is done in hemodynamically unstable patients with **blunt** abdominal trauma and inconclusive FAST examination.

(Choice E) Abdominal plain film can show the bullet if there is no exit wound but is reserved for stable patients as a possible initial test.

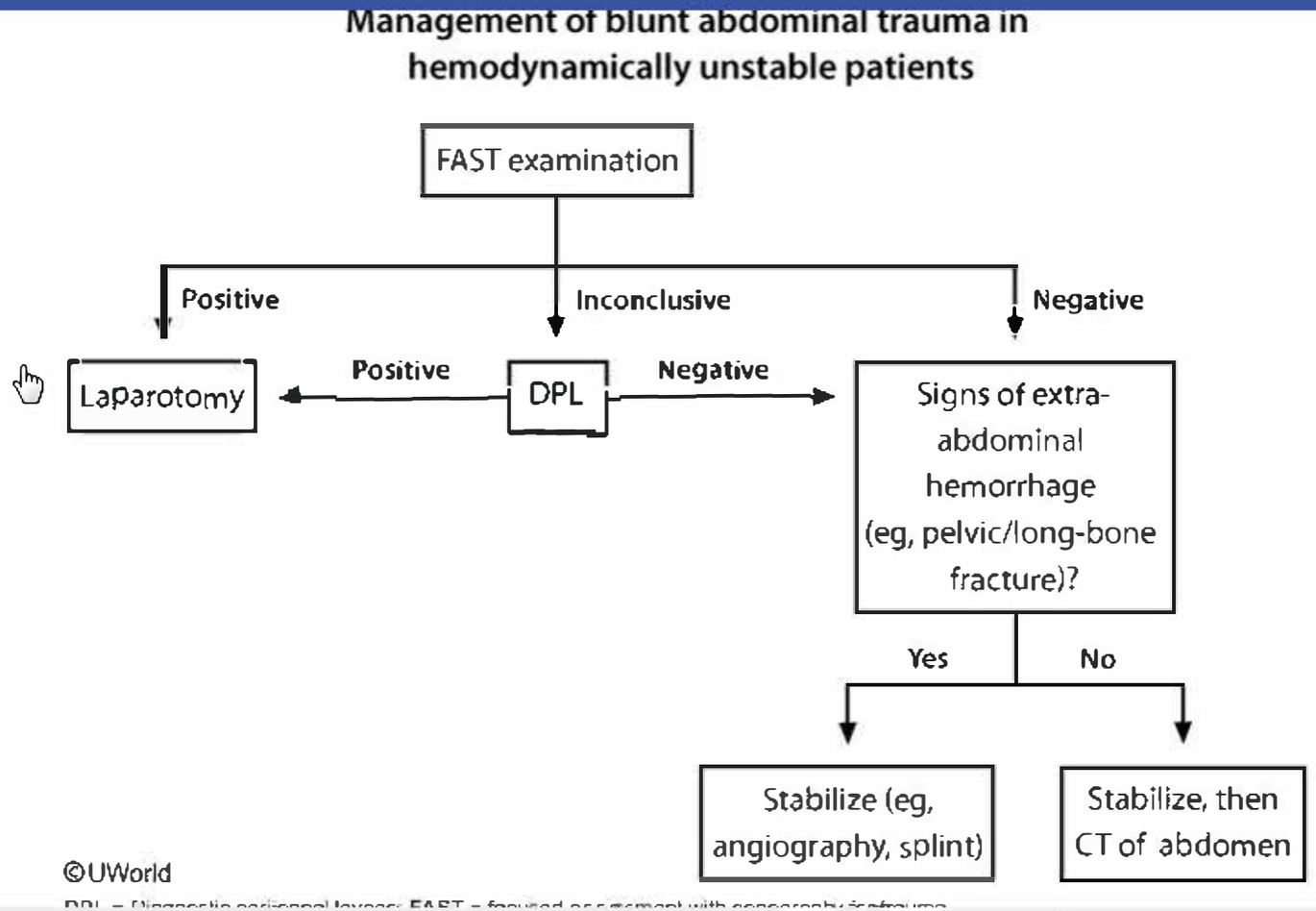
Educational objective:
Any penetrating wound below the 4th intercostal space (ie, level of the nipples) is considered to involve the abdomen and requires an exploratory laparotomy in unstable patients.

References

- Penetrating left thoracoabdominal trauma: the incidence and clinical presentation of diaphragm injuries

(Choice A) A chest tube is used to manage severe hemothorax or pneumothorax. These could be complications

Exhibit Display



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A 29-year-old woman comes to the office in the fall for a health maintenance examination. She has been feeling well and her medical history is unremarkable. She received her last vaccinations at age 17. Her last Pap smear, performed at age 25, showed no abnormalities. The patient works as an administrative assistant and does not use alcohol, tobacco, or illicit drugs. She started a new sexual relationship 3 months ago. There is no family history of cancer. Which of the following screening tests and vaccinations are recommended for this patient?

Abbreviations:

HPV - Human papillomavirus

Tdap - Tetanus toxoid, reduced diphtheria toxoid, and acellular pertussis

Td - Tetanus and diphtheria toxoids

- A. HPV vaccine, influenza vaccine, and Pap smear
- B. HPV vaccine, influenza vaccine, Pap smear, and Tdap/Td vaccine
- C. HPV vaccine, Pap smear, and Tdap/Td vaccine
- D. Influenza vaccine, Pap smear, and Tdap/Td vaccine
- E. Pap smear and Tdap/Td vaccine

Submit

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Abbreviations:

HPV - Human papillomavirus

Tdap - Tetanus toxoid, reduced diphtheria toxoid, and acellular pertussis

Td - Tetanus and diphtheria toxoids

- A. HPV vaccine, influenza vaccine, and Pap smear [4%]
- ✗ B. HPV vaccine, influenza vaccine, Pap smear, and Tdap/Td vaccine [13%]
- C. HPV vaccine, Pap smear, and Tdap/Td vaccine [2%]
- ✓ D. Influenza vaccine, Pap smear, and Tdap/Td vaccine [77%]
- E. Pap smear and Tdap/Td vaccine [3%]

Incorrect
Correct answer

77%
Answered correctly

5 Seconds
Time Spent

11/01/2018
Last Updated

The United States Advisory Committee on Immunization Practices recommends a single dose of **Tdap vaccine** at age 11-18 (preferably age 11-12). Tdap is also recommended for those age ≥19 who did not receive it earlier. Subsequent vaccination with Td should be continued every 10 years thereafter to maintain immunity. A dose of Tdap is also recommended during each pregnancy regardless of the number of years since a woman's prior Td or Tdap vaccination.

Current guidelines recommend cervical cancer screening with cytology (**Pap smear**) every 3 years starting at age 21 in women age 21-29. For women age 30-65, screening is recommended with either continued Pap smears every 3 years or with a combination of Pap smear and human papillomavirus (HPV) testing every 5 years. In immunocompromised patients, Pap screening is recommended annually beginning at age 21, and patients with HIV should also be screened twice in the first year after HIV diagnosis and annually thereafter.

(Choices A, B, and C) HPV vaccination is recommended for both male and female patients at age 11-12 and may be considered as early as age 9. For patients who did not receive the initial vaccine series, it is recommended through age 26 for women and through age 21 for men. It is not currently recommended for older patients.

(Choice E) Influenza vaccination is recommended annually for all patients age >6 months and should be given as soon as it is available in the fall.

Educational objective:
Women should be screened for cervical cancer with a Pap smear every 3 years at age 21-65 (or with Pap smear and HPV testing every 5 years at age 30-65). A single dose of Tdap (tetanus toxoid, reduced diphtheria toxoid, and acellular pertussis) is recommended beginning at age 11, with Td (tetanus and diphtheria toxoids) every 10

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19

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Women should be screened for cervical cancer with a Pap smear every 3 years at age 21-65 (or with Pap smear and HPV testing every 5 years at age 30-65). A single dose of Tdap (tetanus toxoid, reduced diphtheria toxoid, and acellular pertussis) is recommended beginning at age 11, with Td (tetanus and diphtheria toxoids) every 10 years thereafter.

A 35-year-old woman is brought to the emergency department after being caught in a house fire. She has no chronic medical conditions and no known allergies. Temperature is 35 C (95 F), blood pressure is 80/58 mm Hg, pulse is 156/min, and respirations are 35/min. Oxygen saturation is 67% on room air. The patient is disoriented. Black soot is seen in the nose and mouth. At least 50% of the body has burns, and there are full-thickness burns on the arms and legs. Intravenous access is obtained, and the patient is intubated and sedated due to signs of smoke inhalation and severe injuries. The wounds are cleaned, and topical antibiotics are placed over the burns. Which of the following is the most appropriate fluid management for this patient during the next 24 hours?

- A. Dextrose 5% in water
- B. Fresh frozen plasma
- C. Half-normal saline
- D. Lactated Ringer solution
- E. Normal saline

Submit

A 35-year-old woman is brought to the emergency department after being caught in a house fire. She has no chronic medical conditions and no known allergies. Temperature is 35 C (95 F), blood pressure is 80/58 mm Hg, pulse is 156/min, and respirations are 35/min. Oxygen saturation is 67% on room air. The patient is disoriented. Black soot is seen in the nose and mouth. At least 50% of the body has burns, and there are full-thickness burns on the arms and legs. Intravenous access is obtained, and the patient is intubated and sedated due to signs of smoke inhalation and severe injuries. The wounds are cleaned, and topical antibiotics are placed over the burns. Which of the following is the most appropriate fluid management for this patient during the next 24 hours?

A. Dextrose 5% in water [3%]

B. Fresh frozen plasma [1%]

✗ C. Half-normal saline [2%]

✓ D. Lactated Ringer solution [53%]

E. Normal saline [38%]

Incorrect
Correct answer
D

53%
Answered correctly

5 Seconds
Time Spent

10/30/2018
Last Updated

Intravenous fluids		
Tonicity	**Fluid type**	**Clinical use**
Isotonic	0.9% (normal) saline	Volume resuscitation (eg, hypovolemia, shock)
	Lactated Ringer solution	
	Albumin (5% or 25%)*	Volume replacement, treatment of SBP or HRS
Hypotonic	Dextrose 5% in water	Free-water deficit
	0.45% (half-normal) saline	
	Dextrose 5% in 0.45% (half-normal) saline**	Maintenance hydration
Hypertonic	3% (hypertonic) saline	Severe, symptomatic hyponatremia

HRS = hepatorenal syndrome; **SBP** = spontaneous bacterial peritonitis.

*Colloid solution; all other listed fluid types are crystalloid solutions.

**Dextrose 5% in 0.45% saline is hypertonic initially but becomes hypotonic following infusion due to rapid metabolism of dextrose.

Severe **burn injuries** often result in rapid development of intravascular volume depletion and shock due to both insensible fluid loss (due to decreased skin integrity) and massive fluid shift into the extravascular space (due to

Severe **burn injuries** often result in rapid development of intravascular volume depletion and shock due to both insensible fluid loss (due to decreased skin integrity) and massive fluid shift into the extravascular space (due to increased vascular permeability). Patients with extensive burns require **aggressive fluid resuscitation** to maintain tissue perfusion and reduce mortality. This is accomplished with the infusion of an **isotonic crystalloid** solution (eg, normal saline, **lactated Ringer solution** [LR]), which have similar osmolality to the blood (~288 mOsm/kg H_2O).

Although these agents are equally effective at plasma volume expansion, LR, a **balanced fluid**, is preferred for resuscitation in burn victims. It contains near-physiologic levels of chloride, potassium, and calcium and includes sodium lactate, a buffer that is hepatically metabolized to bicarbonate, which helps correct acidosis and **maintain normal blood pH**. Normal saline is considered an **unbalanced** fluid because its chloride concentration is supraphysiologic (154 vs 103 mmol/L) and can cause a **hyperchloremic metabolic acidosis**. It has also been associated with hypocoagulability **(Choice E)**.

(Choices A and C) Dextrose 5% in water is a mildly hypotonic crystalloid solution that quickly becomes markedly hypotonic with the metabolism of dextrose; it is administered to patients with a free-water deficit (ie, hypernatremia). Half-normal saline is a hypotonic crystalloid that is also useful in treating hypernatremia. It is also used as a maintenance fluid in those unable to maintain adequate oral hydration and may be used after this patient has been adequately resuscitated. However, these solutions must be infused slowly because the low osmolality causes much of the fluid volume to shift into the intracellular space following infusion, which can result in cerebral edema.

(Choice B) Fresh frozen plasma is a colloid solution that is indicated for replacement of coagulation factors (eg,

normal blood pH. Normal saline is considered an **unbalanced** fluid because its chloride concentration is supraphysiologic (154 vs 103 mmol/L) and can cause a **hyperchloremic metabolic acidosis**. It has also been associated with hypocoagulability **(Choice E)**.

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(Choice B) Fresh frozen plasma is a colloid solution that is indicated for replacement of coagulation factors (eg, diffuse intravascular coagulation, major bleeding on warfarin, massive transfusions). Colloids are less effective and more expensive than crystalloid solutions and not indicated for resuscitation for severe burns.

Educational objective:
Burn victims frequently develop intravascular volume depletion and require aggressive resuscitation with crystalloid solutions. Lactated Ringer solution, a balanced fluid, is preferred because it contains near-physiologic levels of electrolytes and includes a buffer that helps correct acidosis and maintain normal blood pH. Normal saline is associated with the development of hyperchloremic metabolic acidosis.

While working on-site at a factory doing physical examinations for workers, a physician is suddenly called to help a worker who amputated his finger. Which of the following is the most appropriate next step in management in this situation?

A. Place the amputated finger in a plastic bag with water and bring it along with the patient to the emergency department

B. Place the amputated finger in a plastic bag with alcohol; place the bag on a bed of ice and bring it along with the patient to the emergency department

C. Place the amputated finger in saline moistened gauze in a plastic bag; place the bag on a bed of ice and bring it along with the patient to the emergency department

D. Place the amputated finger in antiseptic solution and bring it along with the patient to the emergency department

E. Place the amputated finger on a bed of ice and bring it along with the patient to the emergency department

Submit

While working on-site at a factory doing physical examinations for workers, a physician is suddenly called to help a worker who amputated his finger. Which of the following is the most appropriate next step in management in this situation?

A. Place the amputated finger in a plastic bag with water and bring it along with the patient to the emergency department [1%]

B. Place the amputated finger in a plastic bag with alcohol; place the bag on a bed of ice and bring it along with the patient to the emergency department [1%]

✔ C. Place the amputated finger in saline moistened gauze in a plastic bag; place the bag on a bed of ice and bring it along with the patient to the emergency department [81%]

D. Place the amputated finger in antiseptic solution and bring it along with the patient to the emergency department [1%]

E. Place the amputated finger on a bed of ice and bring it along with the patient to the emergency department [14%]

Correct

81%
Answered correctly

6 Seconds
Time Spent

10/12/2018
Last Updated

All patients suffering traumatic amputations should be treated as candidates for reimplantation while in the field. As such, their amputated limb or digit should be wrapped in sterile gauze, moistened with sterile saline and placed in a plastic bag. The bag should be then placed on ice and transported with the patient to the nearest emergency department. The amputated part should not be allowed to freeze. Packaging of the amputated part in this manner prolongs the viability of the part for up to 24 hours. Younger patients suffering sharp amputations with no crush injury or avulsion are the best candidates for amputation reimplantation.

(Choice A) The amputated part should not be immersed in water as this may make digital vessel repair more difficult.

(Choices B and D) The amputated part should not be placed in antiseptic solution or alcohol as chemical injury may occur. The patient will be appropriately treated with antibiotics and the amputated part irrigated and cleansed before reimplantation is attempted.

(Choice E) The amputated part should not be placed directly on ice because this could result in frostbite injury to the amputated tissue and loss of viability.

Educational objective:
In case of amputation injury, amputated parts should be wrapped in saline-moistened gauze, sealed in a plastic bag, placed on ice and brought to the emergency department with the patient.

A 70-year-old woman comes to the physician for a routine preventive visit. She has no specific complaints and feels well. The patient is a retired school teacher, lives alone, and does not smoke. She drinks alcohol occasionally. Other than an emergency appendectomy 40 years ago, she has no significant past medical history. The patient takes no medications and has no personal or family history of cancer or heart disease. She had a normal mammogram, Pap smear, and lipid panel at her examination 2 years ago. A colonoscopy 7 years ago showed no lesions. Which of the following studies is most appropriate at this visit?

- A. Chest x-ray
- B. Colonoscopy
- C. Electrocardiogram
- D. Lipid profile
- E. Mammography
- F. Pap smear

Submit

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A 70-year-old woman comes to the physician for a routine preventive visit. She has no specific complaints and feels well. The patient is a retired school teacher, lives alone, and does not smoke. She drinks alcohol occasionally. Other than an emergency appendectomy 40 years ago, she has no significant past medical history. The patient takes no medications and has no personal or family history of cancer or heart disease. She had a normal mammogram, Pap smear, and lipid panel at her examination 2 years ago. A colonoscopy 7 years ago showed no lesions. Which of the following studies is most appropriate at this visit?

- A. Chest x-ray [1%]
- B. Colonoscopy [6%]
- ✗ C. Electrocardiogram [7%]
- D. Lipid profile [32%]
- ✓ E. Mammography [50%]
- F. Pap smear [1%]

Incorrect
Correct answer
E

50%
Answered correctly

4 Seconds
Time Spent

08/12/2018
Last Updated

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Disease | Age | Test & interval

Exhibit Display

Screening tests for patients at average risk*

Disease	Age	Test & interval
Breast cancer	Women 50-75	Mammogram every 2 years
Cervical cancer	Women 21-65	Pap smear every 3 years
Colon cancer	50-75	Fecal occult blood test yearly or colonoscopy every 10 years
HIV	15-65	HIV antibody screen 1 time
Hyperlipidemia	Men 35+	Lipid panel every 5 years
Hypertension	18+	Blood pressure measurement every 2 years
Osteoporosis	Women 65+	DEXA (interval uncertain)

*Optimum screening tests & intervals may vary for patients at increased risk or for those with abnormal or near-abnormal results.

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The US Preventive Services Task Force recommends **biennial (every 2 years) screening mammography for women age 50-74 years**. Routine mammography is not necessary beyond age 75, although screening for those age 75-85 may be individualized. Other recommended screening procedures are summarized in the table.

(Choice A) Chest radiography is not recommended for lung cancer screening in asymptomatic individuals as it has low sensitivity and specificity for detecting early-stage cancers that are amenable to treatment. For patients with a significant smoking history, screening with low-dose computed tomography has been advocated, but protocols are not widely standardized.

(Choice B) Patients should be offered screening for colon cancer at age 50-75 with either annual fecal occult blood testing or colonoscopy every 10 years. More frequent colonoscopy is not recommended as the benefit has not been proven to outweigh the potential risk.

(Choice C) Although some experts advise screening high-risk patients for asymptomatic coronary artery disease with resting electrocardiography, there is no evidence to support its routine use in patients at average risk.

(Choice D) The Task Force recommends routine cholesterol screening in men at average risk for coronary artery disease beginning at age 35 and in women at increased risk beginning at age 45. The ideal age to discontinue screening is not known, but the yield likely decreases in elderly patients with consistently normal lipid results. A 5-year interval is most commonly recommended, and there is likely little benefit from more frequent testing in patients with normal risk for coronary artery disease and normal lipids in the past.

(Choice F) The incidence of cervical cancer in the United States peaks before age 50 and declines thereafter. Pap smears can therefore be discontinued at age 65 if the patient has had adequate screening until then with no

blood testing or colonoscopy every 10 years. More frequent colonoscopy is not recommended as the benefit has not been proven to outweigh the potential risk.

(Choice C) Although some experts advise screening high-risk patients for asymptomatic coronary artery disease with resting electrocardiography, there is no evidence to support its routine use in patients at average risk.

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(Choice F) The incidence of cervical cancer in the United States peaks before age 50 and declines thereafter. Pap smears can therefore be discontinued at age 65 if the patient has had adequate screening until then with no evidence of malignant or premalignant findings.

Educational objective:
Mammograms should be performed every 2 years starting at age 50 in women at average risk for breast cancer. Routine mammography is not necessary beyond age 75.

References

- Updated recommendations for breast cancer screening.

A 9-month-old child is brought to the office for a routine visit. The patient has had several episodes of otitis media since birth, but no major illnesses or hospitalizations. She was previously happy and sociable around other people but now cries when her mother is not in the room and screams when going to day care. Developmentally, the child pulls herself up to stand and can stand on her own briefly. She can hold a spoon with 3 fingers and throw objects. The patient does not yet respond to her name, babble, or use words. When the physician hides a toy with his hand, the child lifts the hand to look for it. She waves goodbye when the physician waves first. Which of the following is the best next step in management of this patient?

- A. Audiology evaluation
- B. Physical therapy evaluation
- C. Psychological evaluation
- D. Reassurance that the child's development is normal
- E. Social services referral

Submit

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19

A 9-month-old child is brought to the office for a routine visit. The patient has had several episodes of otitis media since birth, but no major illnesses or hospitalizations. She was previously happy and sociable around other people but now cries when her mother is not in the room and screams when going to day care. Developmentally, the child pulls herself up to stand and can stand on her own briefly. She can hold a spoon with 3 fingers and throw objects. The patient does not yet respond to her name, babble, or use words. When the physician hides a toy with his hand, the child lifts the hand to look for it. She waves goodbye when the physician waves first. Which of the following is the best next step in management of this patient?

- ✔ A. Audiology evaluation [73%]
- B. Physical therapy evaluation [0%]
- ✘ C. Psychological evaluation [0%]
- D. Reassurance that the child's development is normal [25%]
- E. Social services referral [0%]

Incorrect
Correct answer
A

73%
Answered correctly

4 Seconds
Time Spent

10/10/2018
Last Updated

Explanation

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19

Developmental milestones during first year of life

Age (months)	Gross Motor	Fine Motor	Language	Social/cognitive
2	• Lifts head/chest in prone position	• Hands unfisted 50% of the time • Tracks past midline	• Alerts to voice/sound • Coos	• Social smile • Recognizes parents
4	• Sits with trunk support • Begins rolling	• Hands mostly open • Reaches midline	• Laughs • Turns to voice	• Enjoys looking around
6	• Sits momentarily propped on hands (unsupported by 7 months)	• Transfers objects hand to hand • Raking grasp	• Responds to name • Babbles	• Stranger anxiety
9	• Pulls to stand • Cruises	• 3-finger pincer grasp • Holds bottle or	• Says "dada," "mama"	• Waves "bye" • Plays "pat-a-

9	• Pulls to stand • Cruises	• 3-finger pincer grasp • Holds bottle or cup	• Says "dada," "mama"	• Waves "bye" • Plays "pat-a-cake"
12	• Stands well • Walks first steps independently • Throws ball	• 2-finger pincer grasp	• Says first words other than "dada," "mama"	• Separation anxiety • Comes when called

Evaluation for developmental delay includes assessment of motor, cognitive, social/emotional, and verbal milestones. This child is meeting gross and fine motor milestones (stands unassisted for a short time, throws objects, holds utensils). Physical therapy is not indicated **(Choice B)**. Cognitively, infants develop object permanence at age 6-12 months and realize when specific people or objects are not present. This is demonstrated by the girl's ability to find a toy covered by a hand as well as by her **separation anxiety**, which usually manifests at age **9-18 months** when parents leave the room or at bedtime. The physician should reassure the mother that separation anxiety is **normal** at 9 months and should improve over time.

The concerning feature is the child's **delay** in **verbal milestones**. At age 9 months, she should be babbling; using small, nonspecific words (eg, "mama," "dada"); and responding to her own name. Her presentation and history of recurrent otitis media raise concern for a hearing problem and the need for an **audiology evaluation**.

(Choice C) Normal childhood separation anxiety should be distinguished from separation anxiety disorder. In the

The concerning feature is the child's **delay** in **verbal milestones**. At age 9 months, she should be babbling; using small, nonspecific words (eg, "mama," "dada"); and responding to her own name. Her presentation and history of recurrent otitis media raise concern for a hearing problem and the need for an **audiology evaluation**.

(Choice C) Normal childhood separation anxiety should be distinguished from separation anxiety disorder. In the latter, children have an unreasonable fear of being separated from a loved one and can present with severe symptoms, such as panic attacks and vomiting. Children with these symptoms should undergo a psychological evaluation.

(Choice D) The mother can be reassured that her child's motor and social development are normal, but her verbal development requires further evaluation.

(Choice E) This child interacts with the physician, with no concerning findings on history or physical examination aside from her verbal delay. A social services consult is not required.

Educational objective:
Children age 9 months should be able to grasp objects, pull to stand, babble, say some words, and respond to their name. Some separation anxiety is developmentally normal at age 9-18 months. Delayed verbal milestones should be assessed with an audiological evaluation.

References

- Identifying infants and young children with developmental disorders in the medical home: An algorithm for developmental surveillance and screening.

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A 5-day-old girl is brought to the physician for her first checkup. She was born full term to a primigravid mother by uncomplicated vaginal delivery. She was discharged from the well-baby nursery 3 days ago. Since then, she has been breastfeeding exclusively every 1-3 hours for 15 minutes per breast. She has had 5-6 wet diapers and 3-4 "yellow, seedy" stools daily. Birth weight was 3402 g (7 lb 8 oz). Current weight is 3260 grams (7 lb 3 oz). On examination, the girl is awake and alert. The anterior fontanelle is open, soft, and flat. Her mucous membranes are moist and capillary refill is <2 seconds. Peeling of the hands and feet is seen, as is acrocyanosis. Her diaper is shown below.

Which of the following is the most appropriate next step in management of this patient?

- A. Continue current feeding regimen
- B. Fortification of breast milk with powdered formula
- C. Intravenous fluids
- D. Serum electrolytes
- E. Supplementation with infant formula in addition to breastfeeding
- F. Supplementation with water in addition to breastfeeding
- G. Urinalysis

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A 5-day-old girl is brought to the physician for her first checkup. She was born full term to a primigravid mother by

Exhibit Display

Zoom In | Zoom Out | Reset | Add To Flash Card

A 5-day-old girl is brought to the physician for her first checkup. She was born full term to a primigravid mother by

Exhibit Display

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Which of the following is the most appropriate next step in management of this patient?

- A. Continue current feeding regimen [65%] ✔
- B. Fortification of breast milk with powdered formula [2%]
- C. Intravenous fluids [2%]
- D. Serum electrolytes [3%]
- E. Supplementation with infant formula in addition to breastfeeding [9%]
- F. Supplementation with water in addition to breastfeeding [1%]
- G. Urinalysis [14%]

Correct

65% Answered correctly

43 Seconds Time Spent

09/05/2018 Last Updated

Evaluation of neonatal hydration		
Signs of dehydration	• Decreased wet diapers • Absence of tears • Sunken fontanelle • Dry mucous membranes • Decreased skin turgor • Delayed capillary refill	
Management of weight loss	<7%	• Continue exclusive breastfeeding • Follow-up at age 10-14 days to check that infant has regained birth weight
	≥7%	• Assess for oromotor dysfunction • Assess for lactation failure • Daily weights • Consider formula supplementation

This full-term newborn has a normal physical examination. Dry, flaky, peeling skin of the hands and feet is expected as the skin adjusts to the dry extrauterine environment. The appearance of "pink stains" or "brick dust" in neonatal diapers represent **uric acid crystals**. Uric acid excretion is especially high at birth and decreases until adolescence, when adult levels are observed. Uric acid crystals are commonly seen during the first week as the mother's milk is coming in, or in later months with the morning void after the infant begins to sleep through the

neonatal diapers represent **uric acid crystals**. Uric acid excretion is especially high at birth and decreases until adolescence, when adult levels are observed. Uric acid crystals are commonly seen during the first week as the mother's milk is coming in, or in later months with the morning void after the infant begins to sleep through the night.

Although this patient's weight is ~4% decreased from birth, healthy neonates normally lose **up to 7% of their birth weight** in the **first 5 days** of life due to excretion of excess fluid acquired in utero and during labor. The weight loss is more pronounced in exclusively breastfed infants as the mother's milk supply gradually increases to meet infant demands. Frequent breastfeeding should be encouraged, and education about dehydration should be provided.

Signs of dehydration include dry mucous membranes, a sunken fontanelle, and decreased urine output. As a general rule, the number of wet diapers should equal age in days for the first week of life. For example, a 4-day-old neonate should have ≥4 wet diapers per day. After the first week, infants should have ≥6 wet diapers per day. **Birth weight should be regained by age 10-14 days**.

(Choice B) Breast milk fortified with powdered infant formula may be used for infants with failure to thrive or for preterm infants but is not recommended for physiologic neonatal weight loss.

(Choice C) Intravenous fluids should be reserved for dehydrated infants who cannot ingest adequate oral nutrition. This infant appears well hydrated, making intravenous fluids unnecessary.

(Choice D) Serum electrolytes, particularly serum sodium, can be used as a measure of dehydration. Infants who lose >7% of birth weight or appear dehydrated on examination are at risk for life-threatening hypernatremic

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(Choice C) Intravenous fluids should be reserved for dehydrated infants who cannot ingest adequate oral nutrition. This infant appears well hydrated, making intravenous fluids unnecessary.

(Choice D) Serum electrolytes, particularly serum sodium, can be used as a measure of dehydration. Infants who lose >7% of birth weight or appear dehydrated on examination are at risk for life-threatening hypernatremic dehydration. Laboratory testing is unnecessary for this well-hydrated neonate.

(Choice E) Formula supplementation can be considered in infants who have lost >7% of birth weight despite optimization of breastfeeding.

(Choice F) Infants have immature kidneys that cannot reabsorb sodium effectively. Plain water should never be given to infants age <6 months as it can dilute the blood, resulting in dangerous hyponatremia and seizures.

(Choice G) Parents should be reassured that urinary uric acid crystals rarely represent a disorder of purine metabolism (eg, Lesch-Nyhan syndrome). No workup is necessary if the infant is feeding, growing, and urinating normally.

Educational objective:
Healthy infants normally lose up to 7% of birth weight in the first 5 days of life. No treatment is required, and exclusive breastfeeding should be continued. Birth weight should be regained by age 10-14 days.

References

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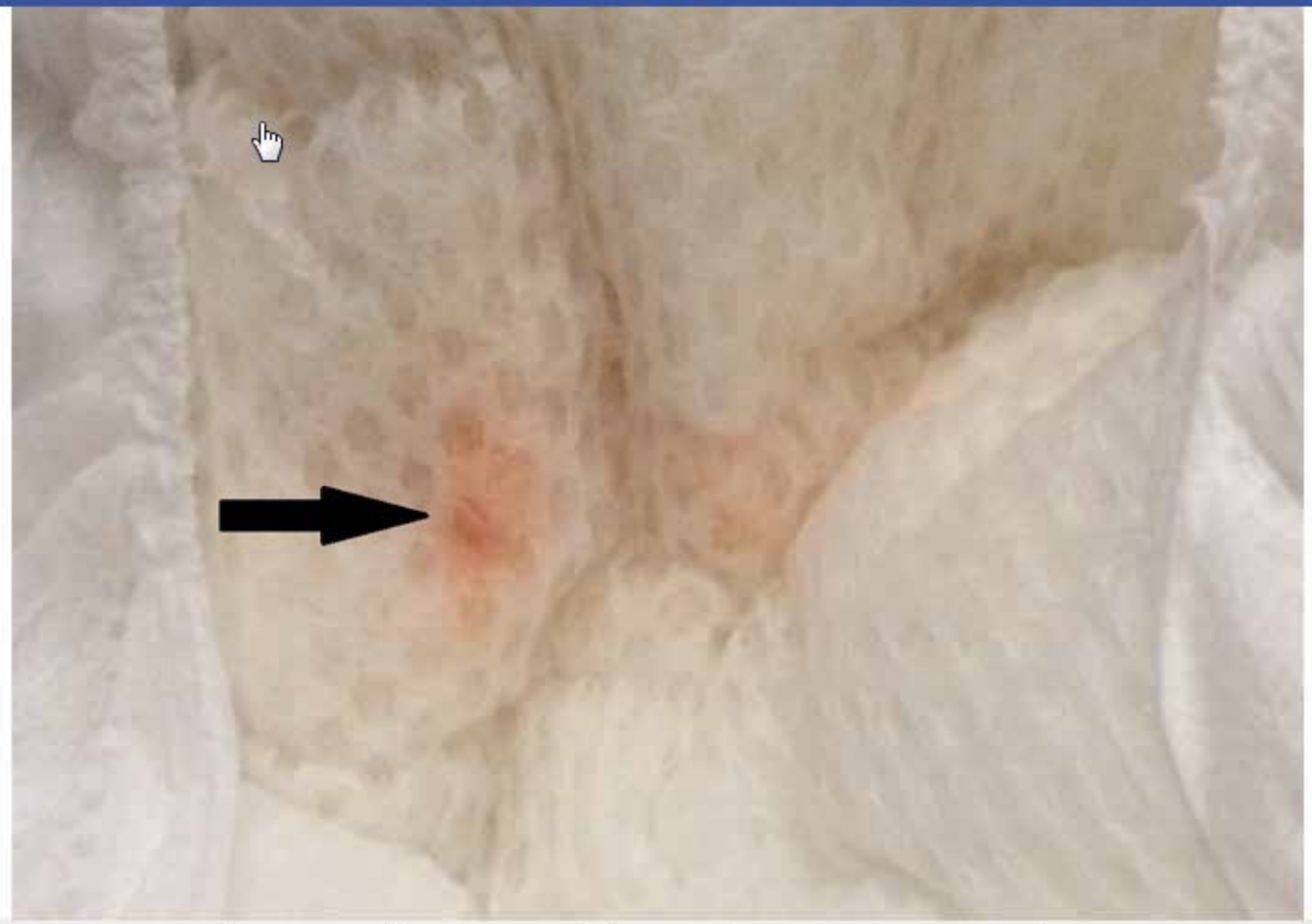

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A 6-month-old girl is brought to the office for a routine well-child visit. The patient has been breastfeeding well and has recently started eating pureed solid foods. She babbles but does not say "mama" or "dada." Her 2-year-old brother has a speech delay requiring therapy twice a week. The patient is at the 40th percentile for length, 50th percentile for weight, and 60th percentile for head circumference. She cries when the physician picks her up but is easily consoled by her mother. The patient transfers a toy from her left hand to her right and sits unsupported, but she falls forward after a few seconds. When her father calls her name, she turns to him and smiles. She is unable to pull to a stand and does not crawl. Moro and grasp reflexes are absent. Firm stroking of the soles of her feet causes the big toes to turn up. Which of the following is the most appropriate assessment of this child's development?

	Gross Motor	Fine Motor	Cognitive
A.	Delayed	Delayed	Delayed
B.	Delayed	Delayed	Normal
C.	Delayed	Normal	Delayed
D.	Delayed	Normal	Normal
E.	Normal	Delayed	Delayed
F.	Normal	Delayed	Normal
G.	Normal	Normal	Delayed

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B.	Delayed	Delayed	Normal
C.	Delayed	Normal	Delayed
D.	Delayed	Normal	Normal
E.	Normal	Delayed	Delayed
F.	Normal	Delayed	Normal
G.	Normal	Normal	Delayed
H.	Normal	Normal	Normal

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B. [2%]	Delayed	Delayed	Normal
C. [1%]	Delayed	Normal	Delayed
D. [22%]	Delayed	Normal	Normal
E. [0%]	Normal	Delayed	Delayed
F. [2%]	Normal	Delayed	Normal
G. [1%]	Normal	Normal	Delayed
✔ H. [69%]	Normal	Normal	Normal

Correct

69% Answered correctly

12 Seconds TimeSpent

07/24/2018 Last Updated

Developmental milestones during first year of life				
Age (months)	Gross Motor	Fine Motor	Language	Social/cognitive
2	• Lifts head/chest in prone position	• Hands unfisted 50% of the time • Tracks past midline	• Alerts to voice/sound • Coos	• Social smile • Recognizes parents
4	• Sits with trunk support • Begins rolling	• Hands mostly open • Reaches midline	• Laughs • Turns to voice	• Enjoys looking around
6	• Sits momentarily propped on hands (unsupported by 7 months)	• Transfers objects hand to hand • Raking grasp	• Responds to name • Babbles	• Stranger anxiety
9	• Pulls to stand	• 3-finger pincer grasp	• Says "dada,"	• Waves "bye" • Plays "pat-a-

9	• Pulls to stand • Cruises	• 3-finger pincer grasp • Holds bottle or cup	• Says "dada," "mama"	• Waves "bye" • Plays "pat-a-cake"
12	• Stands well • Walks first steps independently • Throws ball	• 2-finger pincer grasp	• Says first words other than "dada," "mama"	• Separation anxiety • Comes when called

Every well-child examination should include an assessment of developmental milestones, as prompt recognition allows for early intervention with therapies to optimize both skill acquisition and overall long-term health.

This infant demonstrates appropriate motor and cognitive developmental skills for a 6-month-old. By **6 months**, a child should be able to **sit momentarily** on propped hands and begin to sit unsupported, as seen in this child. **Transferring objects** from one hand to another is also a 6-month motor milestone; however, crawling and pulling to a stand is not expected for another few months. This child recognizes her parents and **responds** appropriately to her **name**, yet she cries when picked up by the physician. **Stranger anxiety** is a normal phase of cognitive and social development that can begin as early as age 6 months and last until age 18-24 months.

By age 6 months, **primitive reflexes** (eg, Moro, grasp) have typically already **disappeared** as the infant initiates purposeful movement of the extremities. The tongue protrusion reflex also disappears by age 4-6 months, allowing for coordination to ingest solid foods at this age. The **Babinski** reflex is the only primitive reflex that may **persist** in

This infant demonstrates appropriate motor and cognitive developmental skills for a 6-month-old. By **6 months**, a child should be able to **sit momentarily** on propped hands and begin to sit unsupported, as seen in this child. **Transferring objects** from one hand to another is also a 6-month motor milestone; however, crawling and pulling to a stand is not expected for another few months. This child recognizes her parents and **responds** appropriately to her **name**, yet she cries when picked up by the physician. **Stranger anxiety** is a normal phase of cognitive and social development that can begin as early as age 6 months and last until age 18-24 months.

By age 6 months, **primitive reflexes** (eg, Moro, grasp) have typically already **disappeared** as the infant initiates purposeful movement of the extremities. The tongue protrusion reflex also disappears by age 4-6 months, allowing for coordination to ingest solid foods at this age. The **Babinski** reflex is the only primitive reflex that may **persist** in healthy children up to age 2 years but can disappear as early as age 12 months.

Educational objective:
A healthy 6-month-old infant should be able to sit momentarily on propped hands, transfer objects between hands, and respond to name. Stranger anxiety also develops around this age. Primitive Moro and grasp reflexes disappear before 6 months, but Babinski is typically still present.

References

- Developmental milestones.

A 62-year-old man comes to the emergency department because of severe abdominal pain. He states that he suddenly felt weak, diaphoretic, and had no energy. He is a smoker and has hypertension. His blood pressure on initial examination was 110/70 mm Hg. Physical examination shows a diffusely tender abdomen. During CT scan he becomes pale and drowsy. CT scan is shown below.

Repeat examination shows a man with anxiety and a blood pressure of 80/50 mm Hg and pulse of 110/min. Which of the following is the most appropriate next step in management?

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Repeat examination shows a man with anxiety and a blood pressure of 80/50 mm Hg and pulse of 110/min. Which of the following is the most appropriate next step in management?

- A. Exploratory abdominal surgery
- B. Obtain ultrasound
- C. Check amylase and lipase
- D. Laparoscopy
- E. Drain fluid from the abdomen

Submit

Repeat examination shows a man with anxiety and a blood pressure of 80/50 mm Hg and pulse of 110/min. Which of the following is the most appropriate next step in management?

- ✔ A. Exploratory abdominal surgery [89%]
- B. Obtain ultrasound [1%]
- C. Check amylase and lipase [1%]
- D. Laparoscopy [3%]
- E. Drain fluid from the abdomen [2%]

The above patient is admitted with hypotension and abdominal pain. The CT scan shows a ruptured aorta with blood collection in the adventitial layer. This is a classic presentation of a ruptured abdominal aortic aneurysm. An abdominal aortic aneurysm can rupture freely into the peritoneal cavity or into the retroperitoneum. These ruptures are associated with significant abdominal pain and hypotension. Patients with a ruptured aortic aneurysm require urgent surgery. If the patient is unstable and rupture has been diagnosed, no further evaluation is required and the patient is transferred straight to the operating room. CT scanning is only done in stable patients. In patients not stable enough to undergo CT scan, the presence of an aneurysm can be confirmed at the bedside by ultrasound. Surgical repair of a ruptured aortic aneurysm carries a very high morbidity and mortality rate **(Choice A)**.

(Choice B) In the above patient, the CT scan shows a ruptured abdominal aortic aneurysm. The role of ultrasound in the presence of a ruptured aortic aneurysm is limited. If a patient has hypotension and there is a possibility of probable abdominal aneurysm, confirmation of the aneurysm can be obtained by ultrasound. All patients who are hypotensive and have a pulsatile mass should be evaluated in the operating room. Ultrasound is portable, sensitive, and readily available.

(Choice C) Amylase and lipase are markers for acute pancreatitis. Additional support for the diagnosis includes an elevated WBC, mild azotemia, and hypocalcemia. CT scan can be used to confirm the diagnosis of pancreatitis.

(Choice D) Laparoscopy is not indicated in this acute condition.

(Choice E) The above CT scan shows no evidence of ascites. When there is excessive fluid in the abdomen, it can be drained by a percutaneous technique.

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(Choice D) Laparoscopy is not indicated in this acute condition.

(Choice E) The above CT scan shows no evidence of ascites. When there is excessive fluid in the abdomen, it can be drained by a percutaneous technique.

Educational Objective:

A patient, who is hypotensive with abdominal pain and has a CT scan showing an enlarged aortic silhouette, has a diagnosis of a ruptured abdominal aortic aneurysm. This patient needs immediate surgery.

A 25-year-old previously healthy man is brought to the emergency department after falling from a tree. He was building a treehouse when he lost his balance, fell about 3 m (10 ft), and landed on his left side. The patient did not lose consciousness but started experiencing left-sided chest and abdominal pain. He also has left shoulder pain. Blood pressure is 113/71 mm Hg and pulse is 116/min. Physical examination shows bruising on the left chest wall. Heart sounds are normal without murmur. The patient reports sharp left chest pain with deep inspiration but has equal breath sound on both sides. There is tenderness of the left costal margin and left upper quadrant of the abdomen with guarding. Bowel sounds are normal. Range of motion of the left shoulder is normal. His hemoglobin is 11.8 g/dL and a single-view chest x-ray is normal. Focused assessment with sonography shows no significant free intraperitoneal fluid. Which of the following is the most appropriate next step in management of this patient?

- A. Monitor with serial physical examinations
- B. Obtain CT scan of the abdomen with contrast
- C. Obtain dedicated rib radiographs
- D. Obtain MRI of the left shoulder
- E. Perform diagnostic peritoneal lavage
- F. Perform urgent exploratory laparotomy

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building a treehouse when he lost his balance, fell about 3 m (10 ft), and landed on his left side. The patient did not lose consciousness but started experiencing left-sided chest and abdominal pain. He also has left shoulder pain. Blood pressure is 113/71 mm Hg and pulse is 116/min. Physical examination shows bruising on the left chest wall. Heart sounds are normal without murmur. The patient reports sharp left chest pain with deep inspiration but has equal breath sound on both sides. There is tenderness of the left costal margin and left upper quadrant of the abdomen with guarding. Bowel sounds are normal. Range of motion of the left shoulder is normal. His hemoglobin is 11.8 g/dL and a single-view chest x-ray is normal. Focused assessment with sonography shows no significant free intraperitoneal fluid. Which of the following is the most appropriate next step in management of this patient?

- ✗ A. Monitor with serial physical examinations [14%]
- ✓ B. Obtain CT scan of the abdomen with contrast [51%]
- C. Obtain dedicated rib radiographs [18%]
- D. Obtain MRI of the left shoulder [0%]
- E. Perform diagnostic peritoneal lavage [10%]
- F. Perform urgent exploratory laparotomy [4%]

Incorrect
Correct answer

51%
Answered correctly

7 Seconds
Time Spent

08/10/2018
Last Updated

This patient with **blunt abdominal trauma** (BAT), left-sided abdominal pain, and anemia most likely has a **splenic injury** (SI). SI is one of the most common intra-abdominal complications of BAT and should be suspected in any patient with BAT and evidence of hemorrhage. Manifestations include hypotension, pleuritic chest pain, left abdominal wall bruising, left upper quadrant abdominal tenderness, and abdominal guarding. Patients may report referred pain to the left shoulder due to phrenic nerve irritation from the splenic hemorrhage.

The evaluation and management of SI due to BAT depend on the patient's hemodynamic status and response to intravenous fluids:

- Patients who are **hemodynamically stable** (eg, systolic blood pressure >90 mm Hg) and alert should undergo **Focused Assessment with Sonography for Trauma** (FAST). Those with a **normal** (negative) FAST (eg, no intraperitoneal fluid) but high-risk features such as anemia or guarding (as seen in this patient) should undergo **subsequent CT scan** of the abdomen.
- Stable patients with altered mental status often proceed directly to CT imaging.

If operative intervention is required, every effort is made to repair the spleen rather than remove it, especially in children. If removal is unavoidable, postoperative immunization against encapsulated bacteria is mandatory.

(Choice A) Hemodynamically stable patients with minimal SI on CT imaging may undergo serial examinations and observation.

(Choices C and D) Although this patient's costal margin tenderness may be due to an underlying fracture, dedicated evaluation of the ribs is a lower priority in a patient with BAT and evidence of hemorrhage (anemia) until the source of bleeding has been identified. Similarly, shoulder MRI for evaluation is low priority, particularly as the

observation.

(Choices C and D) Although this patient's costal margin tenderness may be due to an underlying fracture, dedicated evaluation of the ribs is a lower priority in a patient with BAT and evidence of hemorrhage (anemia) until the source of bleeding has been identified. Similarly, shoulder MRI for evaluation is low priority, particularly as the shoulder pain is likely referred pain due to phrenic nerve irritation from splenic hemorrhage.

(Choice E) In the past, diagnostic peritoneal lavage was used more frequently. However, given improvements in ultrasound and CT imaging, its role has largely been reduced to hemodynamically unstable patients with equivocal FAST results or to settings in which emergency ultrasound or CT scanning is unavailable.

(Choice F) Urgent exploratory laparotomy is most appropriate for hemodynamically unstable patients with a positive FAST or for stable patients with significant areas of injury documented on CT scan.

Educational objective:

Splenic injury is one of the most common intra-abdominal complications of blunt abdominal trauma (BAT) and should be suspected in any patient with BAT and evidence of hemorrhage. Hemodynamically stable patients with a negative ultrasound evaluation but high-risk features should undergo subsequent CT imaging.

References

- Investigation of blunt abdominal trauma.
- An experience with blunt abdominal trauma: evaluation, management and outcome.

A 48-year-old man is brought to the emergency department after being stabbed during a robbery on the street. The patient says his attacker pulled out a knife and stabbed him once in the abdomen. He sustained no other injuries. Blood pressure is 104/68 mm Hg and pulse is 114/min. Bilateral breath sounds are clear and equal. Heart sounds are normal without murmur. Abdominal examination shows a puncture wound on the left upper quadrant measuring approximately 2.5×1 cm that has stopped bleeding. The patient has diffuse abdominal tenderness with guarding and rebound tenderness. Bowel sounds are decreased. Rectal examination reveals no blood. Focused bedside abdominal ultrasonography reveals no free intraperitoneal fluid. Intravenous resuscitation is started. Which of the following is the best next step in management of this patient?

- A. CT scan of the abdomen with intravenous contrast
- B. Diagnostic peritoneal lavage
- C. Exploratory laparotomy
- D. Observation with serial physical examinations
- E. Upper gastrointestinal endoscopy

Submit

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- A. CT scan of the abdomen with intravenous contrast [36%]
- ✗ B. Diagnostic peritoneal lavage [8%]
- ✓ C. Exploratory laparotomy [47%]
- D. Observation with serial physical examinations [6%]
- E. Upper gastrointestinal endoscopy [0%]

Incorrect
Correct answer
C

47%
Answered correctly

4 Seconds
Time Spent

11/05/2018
Last Updated

This patient has **penetrating abdominal trauma** (PAT) in the left upper quadrant, where the spleen, splenic flexure of the colon, or even the left hemidiaphragm may be injured. Following completion of the primary survey, the evaluation of patients with PAT should focus on identifying potentially life-threatening indications for urgent exploratory laparotomy to prevent sepsis or exsanguinating hemorrhage.

Although this patient has no evidence of intraperitoneal fluid on abdominal ultrasound, he has **rebound tenderness**, which is associated with a greatly increased likelihood of intraabdominal organ injury (eg, **intestines**, great vessels, spleen, diaphragm). The presence of any of the following suggests significant injury and is an indication for **urgent exploratory laparotomy**:

- Hemodynamic instability
- **Peritonitis** (rebound tenderness, guarding)
- Evisceration (ie, externally exposed intestines)
- Blood from a nasogastric tube or on rectal examination

Patients without indications for urgent laparotomy should undergo further evaluation, including local exploration of the wound and an extended ultrasound examination (eg, extended Focused Assessment with Sonography for Trauma [eFAST], which evaluates for pneumothorax and hemothorax in addition to intraperitoneal injuries).

(Choice A) CT imaging should be considered to assess intraabdominal injury in some PAT patients without indication for urgent laparotomy as they are at low risk for clinical deterioration while in the CT scanner. However, given the presence of peritoneal signs in this patient, surgical management should not be delayed for further imaging (including CT scan, despite the fact that it can be obtained relatively quickly).

the wound and an extended ultrasound examination (eg, extended Focused Assessment with Sonography for Trauma [eFAST], which evaluates for pneumothorax and hemothorax in addition to intraperitoneal injuries).

(Choice A) CT imaging should be considered to assess intraabdominal injury in some PAT patients without indication for urgent laparotomy as they are at low risk for clinical deterioration while in the CT scanner. However, given the presence of peritoneal signs in this patient, surgical management should not be delayed for further imaging (including CT scan, despite the fact that it can be obtained relatively quickly).

(Choice B) Diagnostic peritoneal lavage is sometimes used when emergency ultrasound or CT scan is unavailable for the evaluation of trauma patients (particularly those with blunt abdominal trauma) who are hemodynamically unstable.

(Choice D) This patient has signs of peritonitis and consequently warrants urgent exploratory laparotomy.

(Choice E) Upper gastrointestinal endoscopy has no role in the rapid evaluation of patients with PAT, although it may occasionally be used in those with penetrating chest trauma to evaluate for esophageal injuries.

Educational objective:
Patients with penetrating trauma who have evidence of significant injury to abdominal organs, such as hemodynamic instability, peritonitis, evisceration, or blood from a nasogastric tube or rectal examination, should undergo urgent exploratory laparotomy.

References

A 34-year-old man is brought to the emergency department after a head-on motor vehicle collision. The patient was the restrained driver. At the scene of the collision, paramedics found him conscious with a blood pressure of 72/38 mm Hg and a pulse of 134/min. His cervical spine was immobilized, and an intravenous fluid infusion was started. Physical examination in the emergency department shows an awake and alert patient with diaphoresis and breath smelling of alcohol. He has several facial abrasions and lacerations that have stopped bleeding. Pupils are equal and reactive to light. Ecchymosis in the distribution of a seat belt is present over the chest and abdominal wall. The patient has chest wall tenderness and equal breath sounds bilaterally. The abdomen is distended and diffusely tender. Bowel sounds are decreased. Portable chest x-ray reveals multiple rib fractures without pneumothorax. Pelvic and cervical spine radiographs are negative for fractures or dislocations. Focused assessment with sonography for trauma reveals free intraperitoneal fluid but no pericardial fluid. After rapid infusion of 3 L of intravenous crystalloid, blood pressure is 82/51 mm Hg and pulse is 113/min. A blood transfusion is planned. Which of the following is the most appropriate next step in management of this patient?

- A. Contrast angiography
- B. CT scan of the abdomen
- C. Diagnostic peritoneal lavage
- D. Monitoring with serial examination
- E. Urgent laparotomy

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- ✗ A. Contrast angiography [0%]
- B. CT scan of the abdomen [8%]
- C. Diagnostic peritoneal lavage [3%]
- D. Monitoring with serial examination [0%]
- ✓ E. Urgent laparotomy [86%]

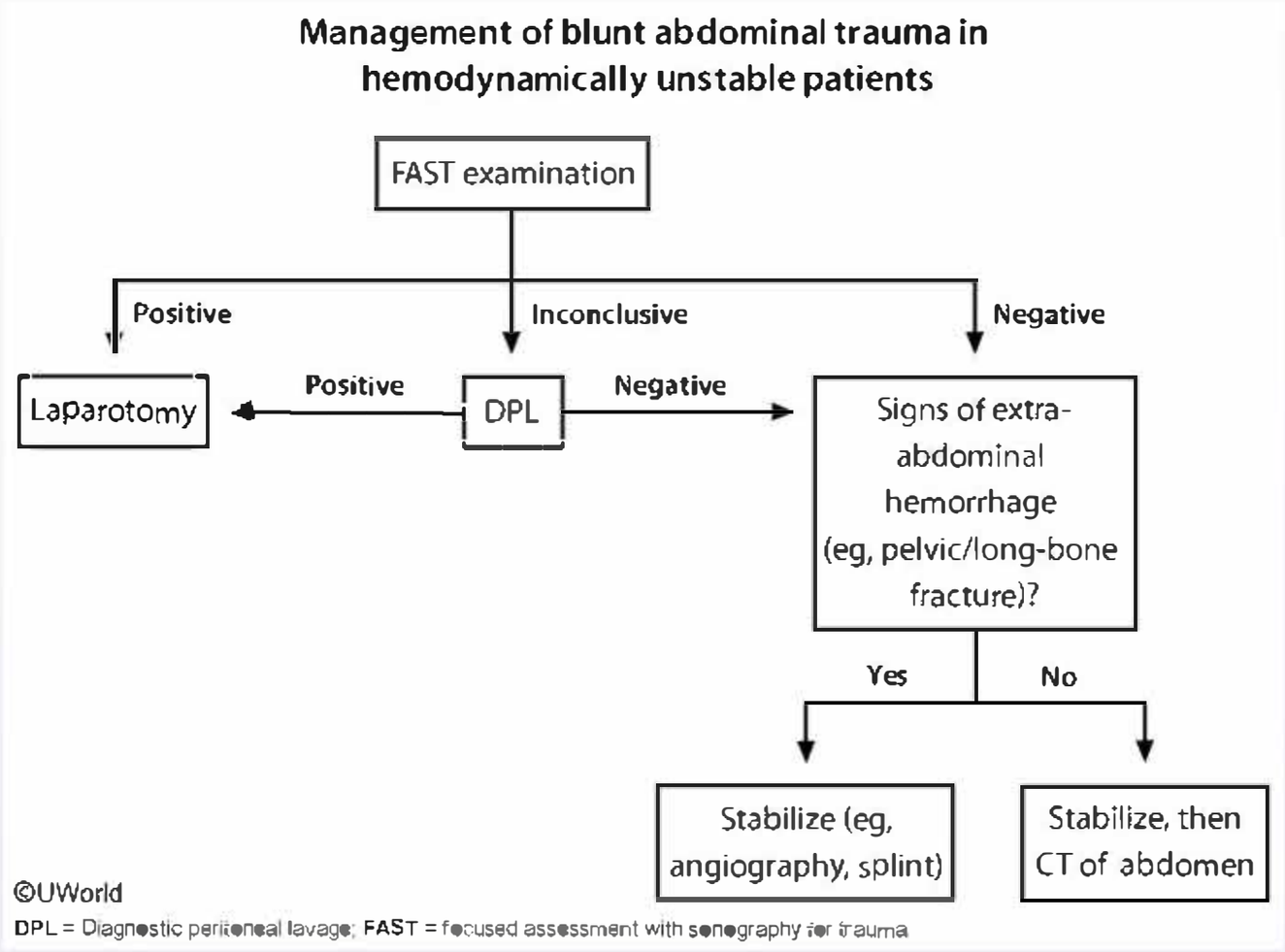
Incorrect
Correct answer

86%
Answered correctly

8 Seconds
Time Spent

10/18/2018
Last Updated

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19



This patient's history of motor vehicle collision, abdominal wall ecchymosis, distended abdomen, and decreased

This patient's history of motor vehicle collision, abdominal wall ecchymosis, distended abdomen, and decreased bowel sounds is concerning for **blunt abdominal trauma** with associated intraabdominal injury. In a **hemodynamically unstable** patient with suspected intraabdominal trauma after a motor vehicle collision, appropriate management involves resuscitation with intravenous fluids and focused assessment with sonography for trauma (FAST). If **FAST** reveals **free intraperitoneal fluid** in the abdomen of a hemodynamically unstable patient, **urgent laparotomy** is indicated. The spleen and liver are the 2 most commonly injured organs and can often lead to intraabdominal hemorrhage.

(Choice A) Contrast angiography is sometimes used for unstable trauma patients who have pelvic fractures with associated disruption of the pelvic vessels and for patients who have hemorrhage due to splenic or hepatic lacerations. However, due to both the challenge of coordinating its provision and the length of time required to successfully stop hemorrhage in most scenarios, it is less preferred than laparotomy.

(Choice B) Hemodynamically stable patients with intraperitoneal fluid identified on FAST should have a CT scan of the abdomen. A CT scan can help distinguish blood from urine or ascites and can help quantify the amount of intraperitoneal blood. In addition, a CT scan can often identify the site and severity of injury.

(Choice C) Historically, diagnostic peritoneal lavage was used more frequently; given improvements in ultrasound and CT imaging, however, its role has largely been reduced to hemodynamically unstable patients with indeterminate FAST results or settings where emergency ultrasound or CT scan is unavailable.

(Choice D) Observation is not appropriate in a hemodynamically unstable patient with evidence of internal hemorrhage. Surgeons sometimes select this course of management over laparotomy in hemodynamically stable patients when the CT scan of the abdomen demonstrates limited and controlled bleeding/injury

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(Choice D) Observation is not appropriate in a hemodynamically unstable patient with evidence of internal hemorrhage. Surgeons sometimes select this course of management over laparotomy in hemodynamically stable patients when the CT scan of the abdomen demonstrates limited and controlled bleeding/injury.

Educational objective:
For hemodynamically unstable patients in whom blunt abdominal trauma is suspected, fluid resuscitation should be initiated and followed by focused assessment with sonography for trauma. If free intraperitoneal fluid is present, the patient should have urgent laparotomy.

References

- Investigation of blunt abdominal trauma.
- An experience with blunt abdominal trauma: evaluation, management and outcome.

A 54-year-old man is brought to the emergency department 10 minutes after being involved in a motor vehicle accident. He was an unrestrained driver and hit a car while speeding on the highway. On arrival to the emergency department, he is spontaneously breathing and noncyanotic. His temperature is 37°C (98.6°F), blood pressure is 104/50 mm Hg, pulse is 122/min, and respirations are 16/min. Examination shows facial lacerations and multiple ecchymoses on the anterior chest and abdomen. He appears obtunded. Which of the following is a component of the Glasgow coma scale (GCS) assessment for this patient?

- A. Capillary refill
- B. Deep tendon reflexes
- C. Eye opening
- D. Gag reflex
- E. Pupillary reaction

Submit

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- A. Capillary refill [0%]
- B. Deep tendon reflexes [1%]
- ✔ C. Eye opening [87%]
- D. Gag reflex [1%]
- ✘ E. Pupillary reaction [9%]

Incorrect
Correct answer
C

87%
Answered correctly

4 Seconds
Time Spent

09/25/2018
Last Updated

Explanation

This patient presents after a trauma with obtunded mental status and multiple ecchymoses on the chest and abdomen. All trauma patients should be first assessed using the GCS, which estimates the severity of the patient's neurologic injury for triage. The GCS can also give some prognostic information when used in conjunction with the patient's age and presence of concomitant adverse clinical findings, such as hypoxia, cardiovascular compromise, increased intracranial pressure, and radiographic evidence of a midline shift of the brain. Calculation of GCS score is shown below.

Eye Opening	
Spontaneous	4
To verbal command	3
To pain	2
None	1
Verbal Response	
Oriented	5
Disoriented / Confused	4
Inappropriate words	3
Incomprehensible sounds	2
None	1
Motor Response	
Obeys	6
Localizes	5
Withdraws	4
Flexion posturing (Decorticate)	3
Extension posturing (Decerebrate)	2
None	1

The GCS is used to predict the prognosis of coma and other medical conditions, such as bacterial meningitis, traumatic brain injury, and subarachnoid hemorrhage. However, the GCS is not used to diagnose coma in a

The GCS is used to predict the prognosis of coma and other medical conditions, such as bacterial meningitis, traumatic brain injury, and subarachnoid hemorrhage. However, the GCS is not used to diagnose coma in a patient. Findings used to diagnose coma include impaired brainstem activity (e.g., disruption of the pupillary light, extraocular, and corneal reflexes), motor dysfunction (e.g., decorticate or decerebrate posturing), and impaired level of consciousness **(Choice E)**.

(Choice A) Capillary refill is a marker of peripheral perfusion. It can be delayed beyond the normal 3 seconds in hypotension and volume depletion but is not used in the GCS.

(Choice B) Exaggerated deep tendon reflexes can be seen in locked-in syndrome, which mimics coma but is due to an ischemic or hemorrhagic stroke of the brainstem area. Patients have total paralysis of the limbs and an inability to speak, retain cognition and alertness, and can only communicate with their eyes.

(Choice D) The gag reflex is tested to evaluate for proper cranial nerve function and swallowing mechanism to prevent foreign objects from entering the pharynx, larynx, or trachea. Up to 20% of the normal patients can have an absent gag reflex. This is not used as a test in the GCS.

Educational objective:
All trauma patients should be triaged using the Glasgow coma scale (GCS), which can predict the severity and prognosis of coma, during the primary survey. The GCS assesses the patient's ability to open his/her eyes, motor response, and verbal response.

A 3-year-old girl is brought to the emergency department with lethargy and fever. She had diarrhea for several days, and her parents say that "she suddenly took a turn for the worse". The girl has refused liquids for the past 12 hours and has not urinated today. She has no allergies and takes no medications. Her temperature is 39.7 C (103.5 F), blood pressure is 60/28 mm Hg, and pulse is 145/min. On examination, she is lethargic and has poor skin turgor. Her capillary refill time is 5 seconds centrally. Despite numerous attempts, it is not possible to start a peripheral intravenous line, and the child's condition continues to deteriorate. Which of the following is the best next step in management of this patient?

- A. Attempt arterial line placement
- B. Attempt central venous catheter placement
- C. Attempt intraosseous cannulation
- D. Attempt nasogastric tube placement
- E. Attempt peripheral intravenous line placement
- F. Transport to intensive care unit for central venous catheter placement

Submit

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- A. Attempt arterial line placement [1%]
- ✗ B. Attempt central venous catheter placement [10%]
- ✓ C. Attempt intraosseous cannulation [73%]
- D. Attempt nasogastric tube placement [1%]
- E. Attempt peripheral intravenous line placement [0%]
- F. Transport to intensive care unit for central venous catheter placement [12%]

Incorrect
Correct answer
C

73%
Answered correctly

4 Seconds
Time Spent

08/14/2018
Last Updated

This child's presentation is concerning for hypovolemic or septic **shock** and requires emergency **fluid resuscitation**. When intravenous access cannot be obtained in emergency cases, **intraosseous (IO)** access should be attempted immediately. IO access requires less skill and practice than central line placement, and clinical trials have demonstrated IO lines to be safer and faster than central lines. IO catheters provide a cannula large enough to deliver fluids and medications rapidly and to obtain blood samples for laboratory testing.

The most common site for IO access is the **proximal tibia** due to its wide, flat surface and distance from the sternum in case cardiopulmonary resuscitation is performed simultaneously. However, any large bone can be used. IO catheters can be placed manually or with a driver. Contraindications to IO placement include infection (eg, cellulitis) overlying the access site, fracture or previous IO attempts in the chosen extremity, or bone fragility (eg, osteogenesis imperfecta).

(Choice A) Arterial lines are used for continuous blood pressure monitoring and to draw laboratory studies. They are not used for fluid resuscitation and should be placed after the patient has been resuscitated as the procedure takes time and great skill.

(Choices B and F) Central catheters take longer to place than IO lines and require a higher amount of procedural skill and practice. This child needs immediate access for fluid resuscitation, and transporting her within the hospital will cause delays. A central line can be placed later if necessary when the patient is stable.

(Choice D) Although nasogastric fluids are preferred for mild to moderate dehydration associated with gastrointestinal disease, they are not recommended in shock, when the splanchnic circulation is constricted. At this point, absorption of enteral fluids will not be rapid enough to correct the patient's hypovolemia.

(eg, osteogenesis imperfecta).

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(Choice E) Several attempts at peripheral intravenous insertion have already failed. Given that the child is in uncompensated shock, access should be escalated to IO placement.

Educational objective:
Intraosseous lines can be placed rapidly when emergency access is necessary and peripheral access cannot be obtained. Intraosseous access can be performed with less required skill and practice than central venous access.

References

- Comparison of umbilical venous and intraosseous access during simulated neonatal resuscitation.

A 4-year-old boy is brought to the office due to bedwetting. Toilet-training was initiated at age 2 when he learned the words "pee" and "poop." His parents are concerned that the boy still urinates in his bed at least 1 night a week despite avoiding fluid intake 2 hours prior to bedtime. The patient's older sisters were toilet-trained during the day and night by age 3. He has a soft bowel movement in the toilet every day. The boy is active and plays outside for at least an hour a day. He has no medical problems and takes no medications. Physical examination shows a well-nourished, talkative boy. There is no sacral dimple or hair tuft. Testes are descended bilaterally, and the urethral meatus is at the tip of the glans. He can hop on each foot for a few seconds. He identifies the colors of "pee" and "poop" as yellow and brown, respectively. What is the best next step in management of this patient?

- A. Initiate enuresis alarm therapy
- B. Obtain urinalysis
- C. Order bladder ultrasound
- D. Prescribe desmopressin
- E. Provide reassurance
- F. Recommend family therapy
- G. Restrict play time until bedwetting resolves

Submit

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- A. Initiate enuresis alarm therapy [20%]
- B. Obtain urinalysis [5%]
- C. Order bladder ultrasound [0%]
- D. Prescribe desmopressin [1%]
- ✔ E. Provide reassurance [70%]
- F. Recommend family therapy [0%]
- G. Restrict play time until bedwetting resolves [1%]

This patient is a developmentally normal child who has not yet achieved complete urinary continence. Most children are ready to **begin toilet-training** at **age 2-4 years** with the acquisition of the following skills:

- Walking
- Imitating others' actions (eg, sitting on toilet)
- Following 2-step commands
- Removing pants
- Communicating the need to urinate and stool
- Voluntarily controlling sphincters

Premature initiation of toilet-training can prolong the duration of training. Once developmentally ready, most children master daytime continence within months, but nighttime continence can sometimes take years to accomplish. Parents should be **reassured** that **bedwetting is normal before age 5**. Also, boys generally complete toilet-training later than girls. Most cases even beyond age 5 resolve spontaneously but often require intervention due to family and child frustration or embarrassment.

(Choices A and D) Enuresis alarm therapy and initiation of desmopressin are considered first-line therapies in patients seeking treatment for nocturnal enuresis, defined by urinary incontinence in children age ≥5. These interventions are unnecessary in a 4-year-old with occasional episodes of incontinence.

(Choice B) When incontinence persists beyond age 4, urinalysis should be performed to screen for urinary tract infection, diabetes mellitus, and diabetes insipidus. These comorbidities are unlikely in an otherwise asymptomatic young child who is gradually achieving complete continence.

interventions are unnecessary in a 4-year-old with occasional episodes of incontinence.

(Choice B) When incontinence persists beyond age 4, urinalysis should be performed to screen for urinary tract infection, diabetes mellitus, and diabetes insipidus. These comorbidities are unlikely in an otherwise asymptomatic young child who is gradually achieving complete continence.

(Choice C) Bladder ultrasound can help identify bladder dysfunction, which can present with enuresis. However, other expected symptoms include daytime incontinence, weak stream, or hesitancy. This child's isolated, occasional nocturnal enuresis does not warrant imaging.

(Choice F) Secondary enuresis, or return of incontinence after ≥6 months of dryness, can be caused by social stressors (eg, divorce, new school) and may improve by addressing such stressors in therapy. This boy has no identifiable stressors and has primary nocturnal enuresis.

(Choice G) Punishment (eg, restriction of activities, corporal punishment) can lead to increased stress and anxiety, resulting in prolonged bedwetting. Encouragement and positive reinforcement should be provided when the child demonstrates readiness and succeeds in staying dry.

Educational objective:
Bedwetting is normal before age 5. Mastery of nighttime continence can take months to years, and boys generally achieve this milestone later than girls.

References

- Toilet training.

A 25-year-old man is brought to the emergency department by ambulance after falling 6 m (20 ft) from a ladder. He was placed on a backboard for spinal stabilization. Intravenous access was obtained en route, and he received infusion of crystalloids. The patient is comatose on arrival. His blood pressure is 92/45 mm Hg, pulse is 127/min, and respirations are 6/min. Pulse oximetry is 86% on 100% oxygen nonrebreather facemask. Evaluation shows several superficial facial lacerations, a depressed temporal skull fracture, and a forearm fracture. There are no periorbital or periauricular hematomas, and there is no significant neck edema. Which of the following is the most appropriate next step in management of this patient?

- A. Laryngeal mask placement
- B. Nasotracheal intubation
- C. Needle cricothyroidotomy
- D. Orotracheal intubation
- E. Surgical tracheostomy

Submit

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- ✗ A. Laryngeal mask placement [2%]
- B. Nasotracheal intubation [8%]
- C. Needle cricothyroidotomy [9%]
- ✓ D. Orotracheal intubation [71%]
- E. Surgical tracheostomy [8%]

Incorrect
Correct answer
D

71%
Answered correctly

4 Seconds
Time Spent

10/09/2018
Last Updated

Management of cervical spine trauma	
Prehospital	• Spinal immobilization (eg, backboard, rigid cervical collar, lateral head supports) • Careful helmet removal (eg, motorcycle helmet) • Airway oxygenation
Emergency department	• Orotracheal intubation preferred unless significant facial trauma present • Rapid-sequence intubation added for unconscious patients who are breathing but need ventilatory support • In-line cervical stabilization suggested unless it interferes with intubation • CT of entire cervical spine • Monitoring for neurogenic shock from spinal cord injury

This patient likely has cervical spine trauma after a fall. The first step in evaluating this type of patient in the field is to stabilize the cervical spine and spinal column with a backboard, rigid cervical collar, and lateral head supports until a spinal injury is excluded. The next step is to assess the airway. Unstable lesions above the third cervical vertebra level can cause immediate paralysis, and lower cervical lesions can damage the phrenic nerve. Cervical spine injuries can be associated with oral maxillofacial trauma, hemorrhage in the retropharyngeal space, and significant airway and neck edema; all could prevent adequate landmark visualization during intubation.

This patient is hypopneic and hypoxic and requires **emergency airway access**. He has superficial facial lacerations with a depressed temporal fracture and no significant neck edema. **Orotracheal intubation** with rapid-sequence intubation is the preferred way to establish an airway unless there is significant facial trauma. Four people are required for this procedure: one manually stabilizes the patient, one administers induction anesthesia, one applies cricoid pressure to prevent passive regurgitation until endotracheal tube placement is confirmed, and one places the endotracheal tube. Manual stabilization requires firmly holding either side of the patient's head, with the neck midline and on a firm surface, without applying traction. This prevents neck flexion or rotation during intubation. A difficult intubation kit should be available in case the attempt is unsuccessful.

(Choice A) Laryngeal mask placement is a **temporary** measure to stabilize the patient until another airway can be established if orotracheal intubation fails.

(Choice B) Nasotracheal intubation is a blind procedure that is **contraindicated** in apneic/hypopneic patients. It is also contraindicated if the patient has a basilar skull fracture as such fractures are associated with a risk of cribriform plate disruption, which could lead to inadvertent intracranial passage of the tube.

(Choice C) Due to the risk of carbon dioxide retention, needle cricothyroidotomy is not ideal in patients with head injury who might require hyperventilation to prevent or treat intracranial hypertension. However, it is preferred to surgical cricothyroidotomy in **children** age <12 as it is easier to perform anatomically.

(Choice E) Tracheostomy is no longer a first option for establishing an airway due to its complications. Surgical cricothyroidotomy is preferred over surgical tracheostomy but should be converted to formal tracheostomy in 5-7 days if prolonged airway control is needed. Prolonged use of cricothyroidotomy has a high incidence of tracheal stenosis.

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Educational objective:
Patients with cervical spine injuries require initial stabilization of the cervical spine. Orotracheal intubation with rapid-sequence intubation is preferred for establishing an airway in an apneic patient with a cervical spine injury.

References

- Potential cervical spine injury and difficult airway management for emergency intubation of trauma adults in the emergency department--a systematic review

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19

Exhibit Display

Clinical manifestations of basilar skull fractures

- Hematoma of the mastoid process or periauricular hematomas (Battle's sign)
- Bilateral peri-orbital hematomas (raccoon eyes)
- Hemotympanum
- Cerebrospinal fluid otorrhea
- Cranial nerve palsies (resulting in anosmia, vertigo, tinnitus, or hearing loss)

Zoom In | Zoom Out | Reset | Add To Flash Card

Patients with cervical spine injuries require initial stabilization of the cervical spine. Orotracheal intubation with

A 12-month-old boy is brought to the office by his parents for a routine well-child visit. He was born at 39 weeks gestation. Birth weight was 3.4 kg (7 lb 8 oz) and length was 50.8 cm (20 in). He was primarily breastfed until last week, when he was transitioned to cow's milk. The patient can feed himself small pieces of table food with his thumb and first finger and drinks from a sippy cup. His only words are "mama," "dada," and "doggy." His parents are concerned about his growth because some children at his day care center seem taller. The patient weighs 12 kg (26.5 lb) and is 76.2 cm (30 in) tall. On examination, he can pull himself up to stand and stand unassisted but requires holding onto objects for support while walking. He comes to his parents when called by name but does not speak during the examination. Which of the following is the most appropriate assessment of this patient's development?

	Growth	Motor	Language
A.	Delayed	Delayed	Delayed
B.	Delayed	Delayed	Normal
C.	Delayed	Normal	Delayed
D.	Delayed	Normal	Normal
E.	Normal	Delayed	Delayed
F.	Normal	Delayed	Normal
G.	Normal	Normal	Delayed

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B.	Delayed	Delayed	Normal
C.	Delayed	Normal	Delayed
D.	Delayed	Normal	Normal
E.	Normal	Delayed	Delayed
F.	Normal	Delayed	Normal
G.	Normal	Normal	Delayed
H.	Normal	Normal	Normal

Submit

[2%]

C. Delayed Normal Delayed [1%]

D. Delayed Normal Normal [8%]

E. Normal Delayed Delayed [3%]

F. Normal Delayed Normal [11%]

G. Normal Normal Delayed [9%]

✔ H. Normal Normal Normal [62%]

Correct

62% Answered correctly

9 Seconds Time Spent

08/01/2018 Last Updated

Explanation

Developmental milestones during first year of life				
Age (months)	**Gross Motor**	**Fine Motor**	**Language**	**Social/cognitive**
2	• Lifts head/chest in prone position	• Hands unfisted 50% of the time • Tracks past midline	• Alerts to voice/sound • Coos	• Social smile • Recognizes parents
4	• Sits with trunk support • Begins rolling	• Hands mostly open • Reaches midline	• Laughs • Turns to voice	• Enjoys looking around
6	• Sits momentarily propped on hands (unsupported by 7 months)	• Transfers objects hand to hand • Raking grasp	• Responds to name • Babbles	• Stranger anxiety
9	• Pulls to stand • Cruises	• 3-finger pincer grasp • Holds bottle or	• Says "dada," "mama"	• Waves "bye" • Plays "pat-a-

9	• Pulls to stand • Cruises	• 3-finger pincer grasp • Holds bottle or cup	• Says "dada," "mama"	• Waves "bye" • Plays "pat-a-cake"
12	• Stands well • Walks first steps independently • Throws ball	• 2-finger pincer grasp	• Says first words other than "dada," "mama"	• Separation anxiety • Comes when called

Routine well-child visits are an opportunity to assess growth and development, as delays can signify a serious medical condition. Infants grow rapidly during the first 6 months of life, gaining approximately 1 oz (30 g) a day for the first 3 months and doubling their birth weight by age 4 months. By age **12 months**, an infant's **weight triples** and **height increases by 50%**, as seen in this patient.

At age 12 months, an infant should **stand unassisted** and **walk while holding objects for support**. Although infants may begin to take independent steps at age 12 months, it is considered developmentally normal to not walk independently until age 15 months. A 12-month-old infant typically uses a **2-finger pincer grasp** (ie, thumb and first finger) to pick up objects and eat table foods, as seen in this patient. Saying at least **1 word** other than "mama" and "dada" is typical language development at this age, and an infant should also be able to follow a **1-step command** (eg, come when called) accompanied by a gesture.

Although this patient may not demonstrate full language abilities at the physician's office due to shyness in an

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Although this patient may not demonstrate full language abilities at the physician's office due to shyness in an unfamiliar environment, his reported language development is age-appropriate. This patient also exhibits normal motor milestones and will likely begin walking independently within the next few months. The parents should be reassured that their son is growing and developing normally.

Educational objective:
By age 12 months, an infant's weight triples and height increases by 50%. Developmental milestones include standing unassisted and learning to walk independently, using a 2-finger pincer grasp, saying 1 word other than "mama" and "dada," and following a 1-step command with a gesture.

References

- Developmental milestones.
- Growth of breastfed infants.

A 34-year-old male is involved in a high-speed highway motor vehicle collision. He is intubated by rescue workers at the accident scene. In the emergency department, the patient has decreased breath sounds on the right side, normal breath sounds on the left, and hypotension. A right-sided chest tube is placed. Physical examination reveals multiple bruises over the entire chest wall as well as subcutaneous emphysema. A few hours later, his chest x-ray shows an accumulation of air in the pleural space as well as pneumomediastinum. Which of the following is the most likely diagnosis?

- A. Myocardial contusion
- B. Bronchial rupture
- C. Myocardial rupture
- D. Esophageal rupture
- E. Diaphragmatic rupture
- F. Hemothorax
- G. Aortic injury

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- ✗ A. Myocardial contusion [1%]
- ✓ B. Bronchial rupture [61%]
- C. Myocardial rupture [0%]
- D. Esophageal rupture [26%]
- E. Diaphragmatic rupture [5%]
- F. Hemothorax [2%]
- G. Aortic injury [0%]

Incorrect
Correct answer
B

61%
Answered correctly

4 Seconds
Time Spent

09/22/2018
Last Updated

This patient has suffered rapid deceleration chest trauma, likely in association with forceful impact with his vehicle's steering wheel. Chest radiography is the most important initial diagnostic study in all stabilized patients (airway, breathing and circulation secure) following blunt chest trauma. This patient's chest x-ray shows a persistent pneumothorax despite chest tube placement and pneumomediastinum, and he has subcutaneous emphysema (palpable crepitus below the skin) on physical examination. Though rare, the most likely explanation for these radiographic and clinical findings is tracheobronchial perforation secondary to blunt thoracic trauma. The right main bronchus is most commonly injured in these cases. The diagnosis can be confirmed with high-resolution CT scanning, bronchoscopy, or surgical exploration. Operative repair is indicated.

(Choice A) Myocardial contusion classically causes tachycardia, new bundle branch blocks or arrhythmia. Sternal fracture is a commonly associated injury.

(Choice C) Myocardial rupture causes cardiac tamponade, which manifests with muffled heart sounds, hypotension and distended neck veins. The diagnosis can be made rapidly with ultrasound, and emergent surgical repair is warranted.

(Choice D) Esophageal rupture following blunt trauma is rare. Iatrogenic (e.g., with endoscopy) and esophagitis-related etiologies are more common. Manifestations of esophageal rupture include pneumomediastinum and pleural effusions.

(Choice E) Patients suffering diaphragmatic rupture may experience abdominal pain, pain referred to the shoulder, shortness of breath, and/or vomiting. Radiographic studies may show abdominal viscera above the diaphragm and/or loss of the diaphragmatic contour.

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(Choice D) Esophageal rupture following blunt trauma is rare. Iatrogenic (e.g., with endoscopy) and esophagitis-related etiologies are more common. Manifestations of esophageal rupture include pneumomediastinum and pleural effusions.

(Choice E) Patients suffering diaphragmatic rupture may experience abdominal pain, pain referred to the shoulder, shortness of breath, and/or vomiting. Radiographic studies may show abdominal viscera above the diaphragm and/or loss of the diaphragmatic contour.

(Choice F) Hemothorax may result from injuries to the aorta, myocardium, hilar blood vessels or lung parenchyma. Symptoms depend on the degree of blood loss and can range from shortness of breath to shock.

(Choice G) Aortic injury can cause sudden death due to aortic rupture and exsanguination. Patients sustaining rapid deceleration injuries to the chest require radiographic evaluation for aortic injury with x-ray, CT scanning and possibly transesophageal echocardiography as well.

Educational objective:
Persistent pneumothorax and significant air leak following chest tube placement in a patient who has sustained blunt chest trauma suggests tracheobronchial rupture. Other findings include pneumomediastinum and subcutaneous emphysema.