INSIGHTS IN IMAGES

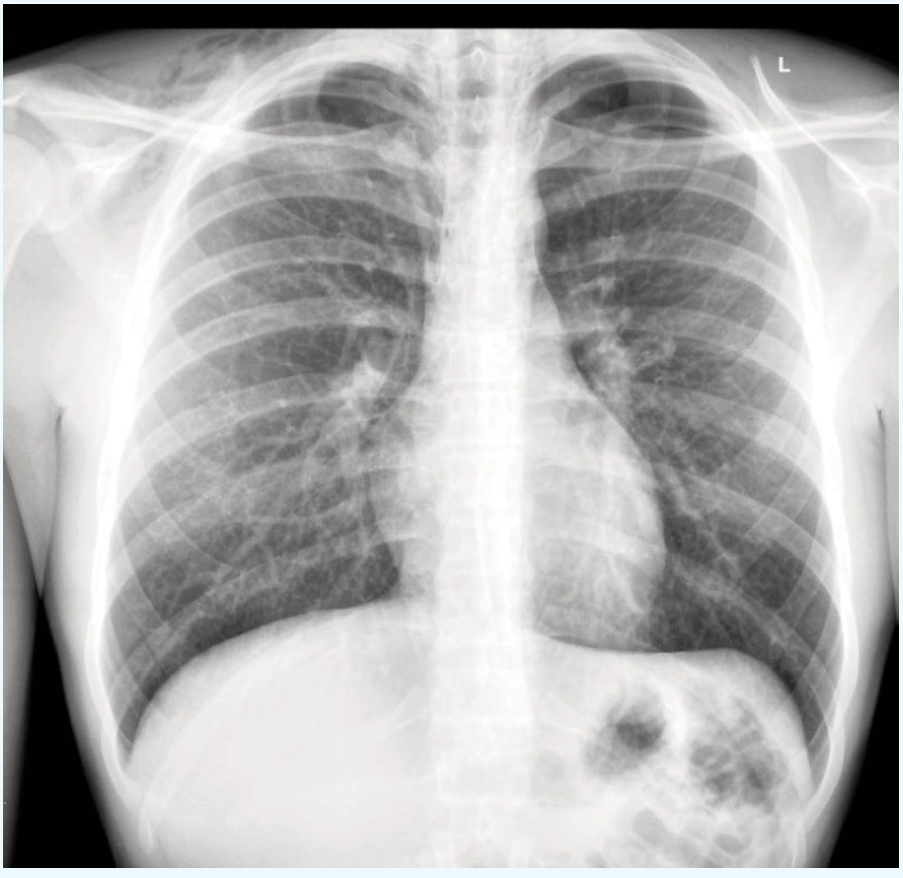
CLINICAL CHALLENGE: CASE 1

In each issue, *JUCM* will challenge your diagnostic acumen with a glimpse of x-rays, electrocardiograms, and photographs of conditions that real urgent care patients have presented with.

If you would like to submit a case for consideration, please email the relevant materials and presenting information to *editor@jucm.com*.

An 18-Year-Old Male with Shortness of Breath and 'Tightness' in His Chest

Figure 1.



Case

The patient is an 18-year-old male who presents to urgent care complaining of 1-day history of intermittent shortness of breath, as well as a sore throat. He reports that he woke up with "chest tightness" and "discomfort." He is unable to take a deep breath.

View the image taken and consider what the diagnosis and next steps would be. Resolution of the case is described on the next page.

THE RESOLUTION

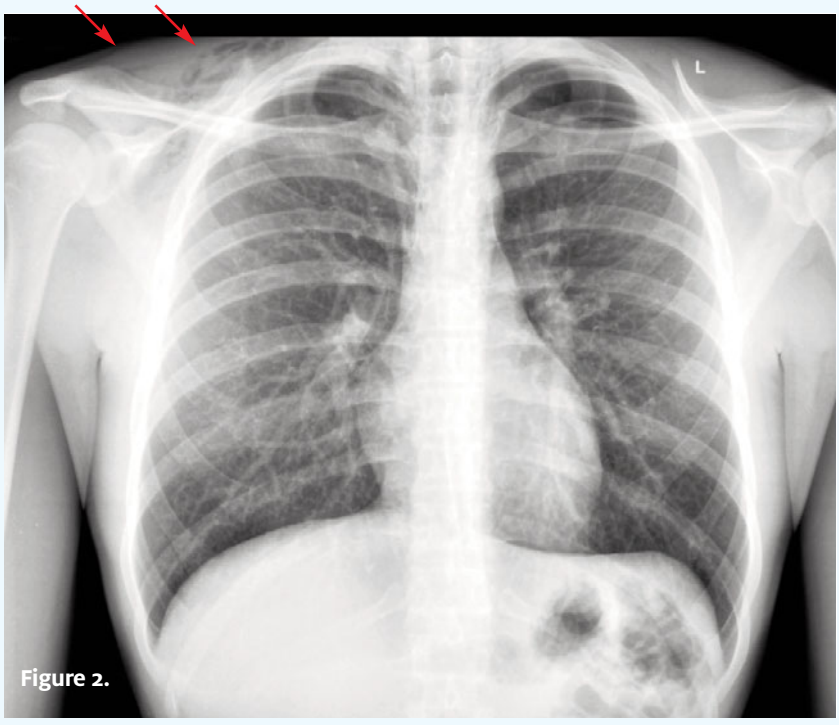


Figure 2.

Differential Diagnosis

- Acute coronary syndrome
- Boerhaave syndrome
- Pneumomediastinum
- Pneumothorax
- Pulmonary embolism

Diagnosis

Subcutaneous foci of air are noted in the right supraclavicular region. Air is seen tracking along the paratracheal regions and the mediastinum.

This patient was diagnosed with pneumomediastinum and subcutaneous emphysema.

Learnings/What to Look for

- Pneumomediastinum is the presence of extraluminal gas within the mediastinum. Gas may originate from the lungs, trachea, central bronchi, esophagus, and peritoneal cavity and track from the mediastinum to the neck or abdomen
- Causes include chest trauma, neck, thoracic, or retroperitoneal surgery, esophageal perforation, tracheobronchial perforation, vigorous exercise (childbirth, weightlifting, Valsalva), asthma, barotrauma, infection (tuberculosis, histoplasmosis, dental, or retropharyngeal infection, mediastinitis), interstitial lung disease, connective tissue disorders, interstitial lung disease, or may be idiopathic
- Rarely, tension pneumomediastinum may occur due to elevated mediastinal pressure which leads to diminished cardiac output from direct cardiac compression or reduced venous return
- When extensive subcutaneous and mediastinal gas is present, airway compression may also occur

Pearls for Urgent Care Management and Considerations for Transfer

- Patients with new-onset pneumomediastinum should be transferred for evaluation of the etiology and management
- If there is respiratory distress place oxygen and an IV while awaiting transport

Acknowledgment: *Images and case provided by Experity Teleradiology. (www.experityhealth.cm/teleradiology)*

CLINICAL CHALLENGE: CASE 2

A 50-Year-Old Male with Several Chronic Conditions and Foot Pain at an Amputation Site

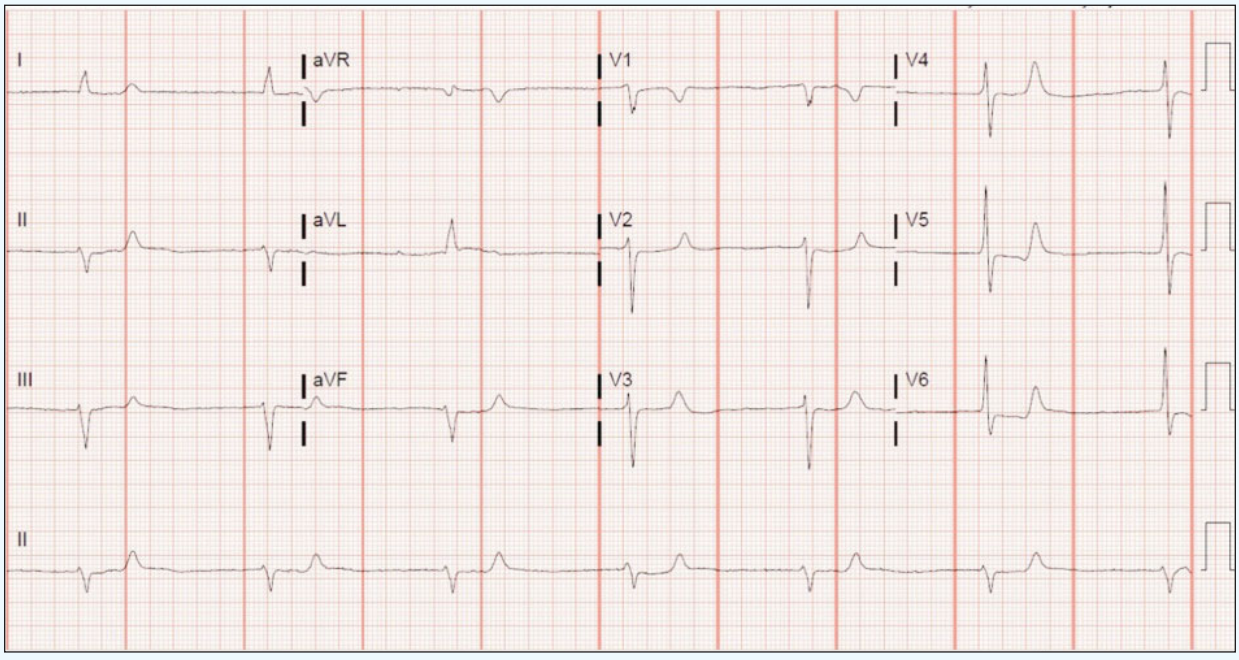


Figure 1.

Case

The patient is a 50-year-old man who presents with foot pain at the site of a right-foot amputation. He has a history of chronic renal disease, diabetes mellitus, and hypertension.

View the ECG taken and consider what the diagnosis and next steps would be. Resolution of the case is described on the next page.

THE RESOLUTION

Differential Diagnosis

- Normal sinus rhythm
- Sinus bradycardia
- Anterior ischemia
- Junctional rhythm due to hyperkalemia
- Complete heart block

Diagnosis

This patient was diagnosed with hyperkalemia. This ECG shows a rate of 42 BPM, which is bradycardic. There are no discernable P waves, and the typical junctional rate is between 40 and 60 BPM, so this is consistent with a junctional rhythm. Additionally, notice that the T waves appear peaked, a sign of hyperkalemia. These should be differentiated from tall hyperacute T waves of ischemia, which produce a broader base.

Hyperkalemia can cause many electrocardiographic changes, but hyperacute T waves, absence or flattening of P waves, bradycardia, and QRS widening are a few.

Case Resolution

This patient's potassium returned at 7.9 meq/L. He was treated with 4 g IV calcium gluconate, 10 mg albuterol, and 5 units of insulin with an ampule of D50W—after which the following ECG was obtained:

(Note that in the post-treatment ECG, P waves have appeared, the rate is faster, and the QRS is narrower.)

Hyperkalemia is a cardiac membrane destabilizer, and recognition of its electrocardiographic findings is paramount to avoid deterioration into a more unstable rhythm like complete heart block or ventricular fibrillation. Three electrocardiographic findings have been demonstrated to predict short-term adverse outcomes: bradycardia <50 BPM, QRS widening >110 msec, and the presence of a junctional rhythm.

This patient's ECG demonstrated all three. Classic electrocardiographic changes are shown in the following table, but it important to recognize that hyperkalemia is implicated in all kinds of electrocardiographic changes (not limited to those in the table).

Serum Potassium	Potential ECG Changes
5.5-6.5 mEq/L	Tall, peaked T waves with narrow base QT interval shortening ST-segment depression
6.5-8.0 mEq/L	Peaked T waves PR-interval prolongation P wave decreased amplitude or disappearance QRS widening R-wave amplification
> 8.0 mEq/L	P-wave absence QRS widening Intraventricular/fascicular/bundle branch blocks Sine wave

Learnings/What to Look for

- Always obtain an ECG if hyperkalemia is suspected (ie, when dialysis is missed)
- Typical electrocardiographic findings of hyperkalemia include peaked T waves, flattening or absent P waves, and QRS widening
- If unrecognized and untreated, hyperkalemia can deteriorate into ventricular fibrillation
- Three electrocardiographic findings predict short-term adverse events: bradycardia < 50 BPM, QRS widening >110 msec, and the presence of a junctional rhythm

Pearls for Urgent Care Management and Considerations for Transfer

- Hyperkalemia can be treated with membrane stabilizers like intravenous calcium gluconate (or calcium chloride if unstable), potassium shifters like beta agonists and insulin, and potassium excreters like furosemide and oral polystyrene sulfonate
- Patients with hyperkalemia should be transferred to an emergency department for consideration of emergent dialysis, but if resources are available, consider the above treatments prior to transfer

Acknowledgment: *Images and case provided by Benjamin Cooper, MD, FACEP, assistant professor and associate program director, McGovern Medical School, Department of Emergency Medicine, The University of Texas Health Science Center at Houston.*

CLINICAL CHALLENGE: CASE 3

An 8-Year-Old Girl with Persistent Sore Throat and Fever

Figure 1.

Case

The patient is an 8-year-old girl who is brought to your urgent care center by her father, who reports his daughter has had a sore throat and a fever for "a few days." Most recently, a petechial rash has appeared, spreading from her head and neck down to her torso. She also started complaining of nausea. The father also observes that her tongue appears redder than usual.

View the image taken and consider what your diagnosis and next steps would be.

THE RESOLUTION

Figure 2.

Differential Diagnosis

- Toxic shock syndrome
- Kawasaki disease
- Scarlet fever
- Mononucleosis

Diagnosis

The patient was diagnosed with scarlet fever, an acute toxin-mediated disease caused by infection with group A beta-hemolytic streptococci (*Streptococcus pyogenes*), and most common in children under 10 years of age.

Learnings/What to Look for

- The characteristic rash associated with scarlet fever begins within 12 to 48 hours of fever onset
- Associated prodromal symptoms include fever and malaise
- Sore throat and swollen, tender anterior cervical lymph nodes are typical
- Abdominal pain, nausea, and vomiting are common in younger children
- Petechiae may be present on the soft palate

Pearls for Urgent Care Management and Considerations for Transfer

- Penicillin or amoxicillin is considered first-line treatment for scarlet fever
- In patients who are allergic to penicillin, a narrow-spectrum cephalosporin, clindamycin, azithromycin, or clarithromycin would be appropriate

Acknowledgment: *Images and case courtesy of VisualDx (www.VisualDx.com/JUCM).*