



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 e-mail the relevant materials and presenting information to editor@jucm.com.

A 35-Year-Old with Ankle Pain and a History of Gunshot Wound



A 35-year-old male presents with progressive pain in his ankle. He reports a history of a gunshot to the foot without any aftercare.

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

**Differential Diagnosis**

- Chondrocalcinosis
- Lead arthropathy
- Lead synovitis
- Osteoarthritis

Diagnosis

The correct diagnosis is lead arthropathy. The x-ray shows a large dominant posterior bullet fragment with innumerable metallic densities overlying the degenerated ankle joint. The retained intra-articular bullet caused a severe proliferative synovitis and a progressive, destructive arthritis. Systemic lead intoxication has been reported when bullets remain bathed in synovial fluid.

Learnings/What to Look for

- The radiographic identification of intra-articular bullet fragments should prompt an urgent orthopedic consultation. Timely removal of lead particles and debridement of the bone and cartilage fragments will prevent both lead arthropathy and toxicity

Pearls for Urgent Care Management

- If lead arthropathy is identified, synovectomy and joint replacement are often necessary. All patients with lead arthropathy should be evaluated for systemic lead toxicity

Acknowledgment: Image and case presented by Experity Teleradiology (www.experity.com/teleradiology).



A 33-Year-Old with New, Painful ‘Lumps’ on Her Legs



A 33-year-old female presents with painful “lumps” on her legs that developed over the past few days. She decided to seek care when some of them began to drain pus. She had no trauma and feels well. Her past medical history is significant for type 2 diabetes mellitus. On examination she is afebrile, with scattered tender nodules, some with purulent drainage, on the legs.

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

Figure 1.



Differential Diagnosis

- Folliculitis
- Furunculosis
- *Mycobacterium marinum* infection
- Ecthyma

Diagnosis

This patient was diagnosed with furunculosis, cutaneous abscesses associated with hair follicles. *Carbuncles* are a continuous collection of furuncles.

Furuncles are infectious, with the most common causative agent being *Staphylococcus aureus* (either methicillin-sensitive [MSSA] or methicillin-resistant [MRSA]). The infecting strain of *Staphylococcus* is usually colonized in the nares, umbilicus, or perineum.

Learnings/What to Look for

- Furuncles are painful and may have purulent drainage
- Furuncles usually occur on the face, neck, axillae, buttocks, thighs, and perineum
- Furunculosis most commonly affects males, especially adolescents and young adults
- Predisposing factors include *Staphylococcus* carriage, friction, malnutrition, poor hygiene, diabetes, hyper-IgE syndrome, and HIV infection

Pearls for Urgent Care Management

- Treatment is incision and drainage; warm compresses may facilitate drainage
- Furuncles may resolve within 2 weeks without treatment in uncomplicated patients
- Antibiotics (ie, cephalexin, TMP/SMX, doxycycline) may be used in febrile patients or patients in whom furuncles persist

Acknowledgment: Image and case presented by Experity Teleradiology (www.experity.com/teleradiology).



A 20-Year-Old Female with Weakness, Vomiting, and a History of Alcohol Abuse

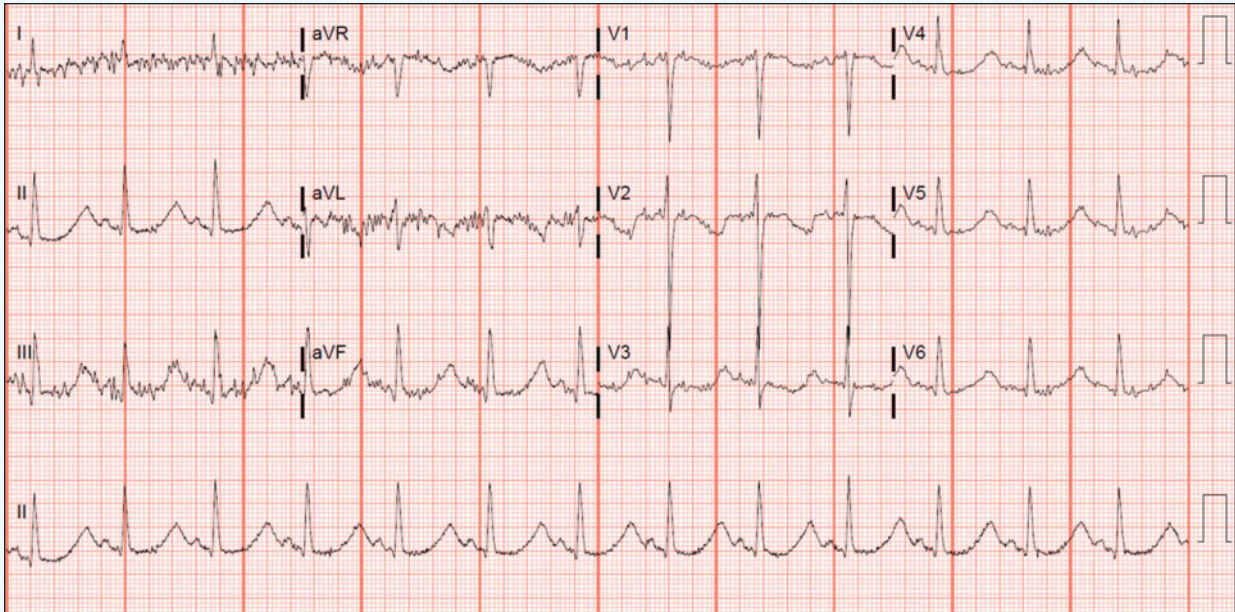


Figure 1. Initial ECG.

The patient is a 20-year-old female who presents complaining of 1 day of generalized weakness and vomiting. She has a history of alcohol abuse and denies chest pain, shortness of breath, lower extremity swelling, fevers, chills, or any infectious symptoms.

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

(Case presented by Jonathan Giordano, DO, MS, MEd, Department of Emergency Medicine, McGovern Medical School at UTHealth Houston.)

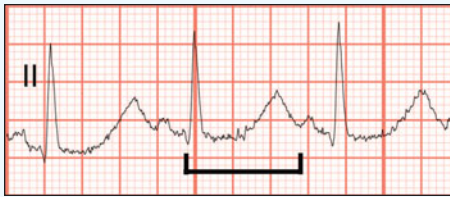


Figure 2: The QT Interval shown here from lead II, is clearly longer than half of the R-R interval (a simple way to determine if the QT interval is long for the given rate).

Differential Diagnosis

- Hyperkalemia
- ST-elevation myocardial infarction (STEMI)
- Atrial flutter
- Hypokalemia
- Digoxin use

Diagnosis

This patient was diagnosed with hypokalemia. The ECG reveals some baseline artifact, a narrow-complex sinus rhythm at a rate of 78 beats per minute, and a normal axis. There are no ST-changes to suggest acute ischemia. The QT interval is prolonged, with a QTc of approximately 660 msec.

Hypokalemia (as well as other electrolyte abnormalities, including hypocalcemia and hypomagnesemia, hypothermia, and many drugs) can cause prolongation of the QT interval. Other changes due to hypokalemia include prolongation of the PR interval, ST depressions, T-wave flattening/inversion, and U-waves. In this example, the T waves in V₂ and V₃ are likely inverted and fused with U waves, creating the appearance of a biphasic T wave with terminal positivity.

ECG changes due to hyperkalemia include peaked T-waves, P-wave flattening, prolonged PR interval, widened/abnormal QRS morphology, bradyarrhythmias, and a sine wave appearance (see the January 2023 issue of *JUCM*, pages 47 and 48, for an ECG demonstrating hyperkalemia).

Downsloping, “scooped” ST-segments resembling Salvador Dali’s mustache, are a finding seen in digoxin use but does not necessarily imply toxicity.

Discussion

Hypokalemia, hypomagnesemia, and hypocalcemia can all cause a prolongation of the QT interval. While hypokalemia and hypomagnesemia both delay the repolarization phase (phase 3) of the of the cardiac action potential (creating wide-based T waves, U waves, or a fusion of both), hypocalcemia prolongs the QT interval by way of extending the plateau phase (phase 2) of the cardiac action potential (lengthening the ST segment but with a normal T wave).

Tachycardia is protective in patients with hypokalemia because as the heart rate decreases, the QT interval lengthens. With profound bradycardia and a long QT interval, the heart may depolarize while still in the repolarization phase. We call this an R-on-T phenomenon, and it may cause patients to go into torsades de pointes, a special type of polymorphic ventricular tachycardia. Treatment includes electrolyte replacement, removal of the offending drug, and potentially overdrive pacing at a rate fast enough to eliminate the risk of R on T phenomenon.

Learnings/What to Look for

- With moderate-severe hypokalemia, look for:
 - Increased width and amplitude of the P wave
 - Prolonged PR interval
 - T-wave flattening or inversion
 - ST depression
 - Prominent U-waves
 - Long QT interval
- In severe hypokalemia, patients develop ectopic beats, supraventricular tachyarrhythmias, and eventually ventricular arrhythmias (particularly torsades de pointes)

Pearls for Urgent Care

- Hypokalemia is often accompanied by hypomagnesemia; don’t forget to check and replace both to decrease the risk of ventricular arrhythmias
- Treatment of hypokalemia involves oral supplementation in the urgent care setting, as well as identification and treatment of the underlying cause of the electrolyte disorder
- Transfer for parenteral potassium administration is indicated when the QT interval is >500 msec, as these patients are at risk for torsades de pointes
- In patients with ECG and laboratory findings consistent with hypokalemia, consider transfer to telemetry capable facilities

Resources

- Diercks DB, Shumaik GM, Harrigan RA, et al. Electrocardiographic manifestations: electrolyte abnormalities. *J Emerg Med.* 2004;27(2):153–160.
- Glancy DL, Wiklow FE, Rochon BJ. Electrocardiogram after 2 weeks of diarrhea. *Proc (Bayl Univ Med Cent).* 2010;23(2):173–174.
- Levis JT. ECG diagnosis: hypokalemia. *Perm J.* 2012;16(2):57.

Case courtesy of ECG Stampede (www.ecgstampede.com).

ECG STAMPEDE