



**Challenge your diagnostic acumen:** Study the following x-rays, electrocardiograms, and photographs and consider what your diagnosis might be in each case. While the images presented here are authentic, the patient cases are hypothetical. Readers are welcome to offer their own patient cases and images for consideration by contacting the editors at [editor@jujm.com](mailto:editor@jujm.com).

## 29-Year-Old With Pain After Foot Inversion



A 29-year-old man presents to urgent care on a Saturday with pain in his left foot after playing tennis. A series of x-rays is ordered.

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

*Acknowledgment: Images and case provided by Experity Teleradiology ([www.experityhealth.com/teleradiology](http://www.experityhealth.com/teleradiology)).*



### Differential Diagnosis

- Midfoot sprain
- Avulsion fracture of the base of the 5th metatarsal
- Jones fracture (proximal 5th metatarsal fracture extending into the intermetatarsal joint)
- Os peroneum (ossicles in the peroneus longus)

### Diagnosis

The correct diagnosis is an avulsion fracture of the base of the 5th metatarsal. The x-ray shows transverse lucency at the base of 5th metatarsal, not involving the diaphysis. The Lawrence-Butte classification is a commonly used nomenclature for proximal 5th metatarsal fractures, which are categorized into zones. Zone 1 includes a tuberosity (styloid process) avulsion fracture. Zone 2 includes a Jones fracture. Zone 3 includes a diaphyseal stress fracture.

### What to Look For

- Pain located on the lateral midfoot at the 5th metatarsal tuberosity
- Does not always result from major trauma or injury and can happen with repetitive exercise

### Pearls for Urgent Care Management

- Treatment may include protected weight bearing in a stiff soled shoe, boot, or cast
- Besides rest, anti-inflammatory medications can be used for pain management
- Surgical intervention may be needed, which includes intramedullary screw fixation



## 16-Year-Old With Rash After Septoplasty



A 16-year-old girl presents to urgent care with complaints of fever, chills, and a diffuse sunburn-like rash that developed over the past day. The patient underwent septoplasty 2 days prior for a deviated septum, and nasal packing was utilized to manage her postoperative bleeding. On examination in urgent care, she was febrile to 104°F (40°C), tachycardic, and hypotensive. Widespread erythematous blanching macules and patches were seen.

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

*Acknowledgment: Image and case presented by VisualDx ([www.VisualDx.com/jucm](http://www.VisualDx.com/jucm)).*



### Differential Diagnosis

- Kawasaki disease
- Leptospirosis
- Rocky Mountain spotted fever
- Toxic shock syndrome

### Diagnosis

The correct diagnosis in this case is toxic shock syndrome (TSS), a severe exotoxin-mediated bacterial infection that is characterized by the acute onset of high fever, headache, conjunctival injection, erythema of the pharynx, vomiting, diarrhea, and hypotension. Two subtypes of TSS are defined by the bacterial etiology: *Staphylococcus aureus*; and group A streptococci. Patients with mild disease may rapidly progress to shock and organ failure.

In the 1980s, staphylococcal TSS most affected menstruating young White females using tampons, however, increased public education and the discontinuation of high-absorbency tampons has led to a decline in menstrual TSS cases since. Current staphylococcal TSS cases are seen in postsurgical interventions, burn patients, patients with dialysis lines, and those with nasal packing following nasal surgery, as in this case.

### What to Look For

- Dermatologic manifestations of staphylococcal TSS include: diffuse erythematous patches that begin on the trunk and spread toward the extremities; erythema and swelling of the palms and soles with or without generalized nonpitting edema; desquamation of the palms and soles usually 1-3 weeks after the initial onset of the rash; and erythema of the mucous membranes (strawberry tongue and conjunctival hyperemia)
- Laboratory examination may show leukocytosis, bacteremia, elevated blood urea nitrogen, and elevated creatinine

### Pearls for Urgent Care Management

- As this is a life-threatening condition, management includes immediate and rapid transfer to the emergency department for stabilization
- If available, IV fluids should be initiated while awaiting transport





## 27-Year-Old with History of Asthma

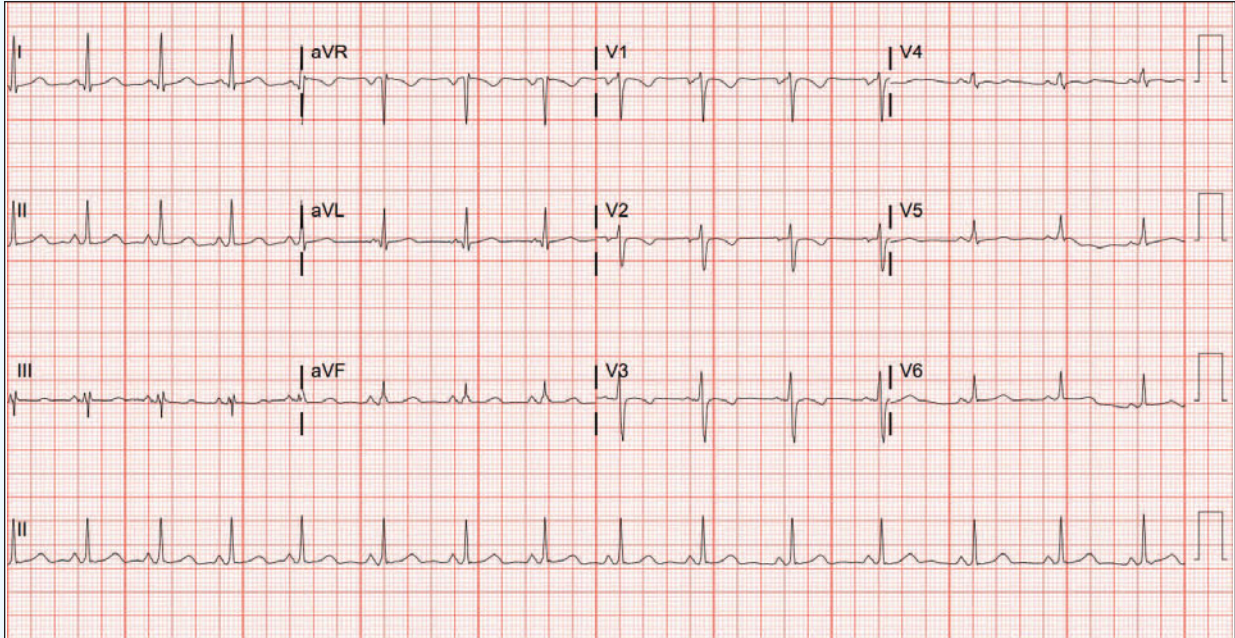


Figure 1: Initial ECG

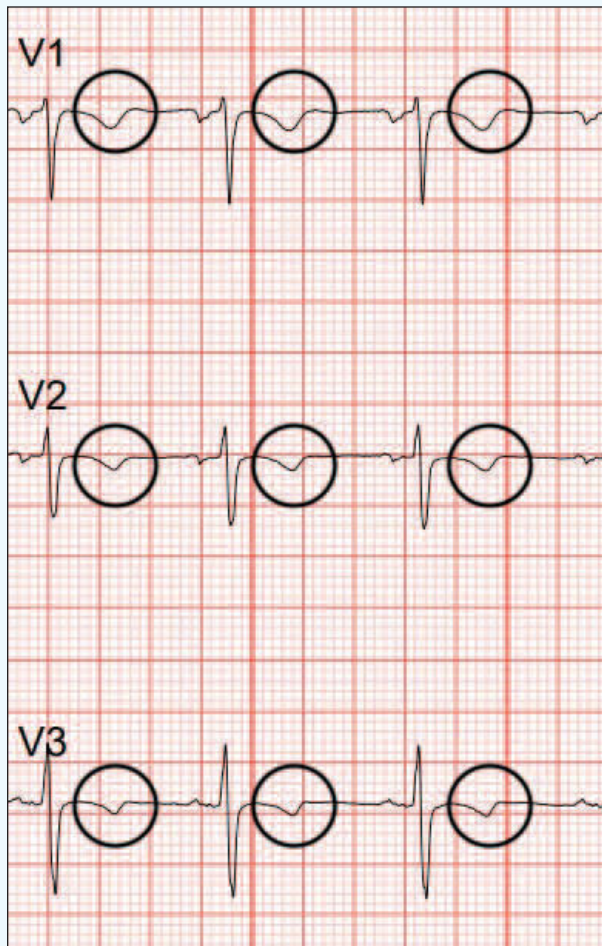
A 27-year-old female with history of asthma presents to urgent care on a Friday morning with dyspnea for 1 day. She denies palpitations, syncope, or chest pain. An ECG is obtained.

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

Case presented by Catherine Reynolds, MD, McGovern Medical School at UTHealth Houston.

Case courtesy of ECG Stampede ([www.ecgstampede.com](http://www.ecgstampede.com)).

ECG STAMPEDE



**Figure 2:** Inverted T-waves are circled. They are asymmetric and  $< 3$  mm in depth.

### Differential Diagnosis

- Myocardial infarction
- Anterior ischemia
- Left bundle branch block
- Arrhythmogenic right ventricular cardiomyopathy (ARVC)
- Persistent juvenile T-wave pattern (PJTWP)

### Diagnosis

The diagnosis in this case is persistent juvenile T-wave pattern. The ECG shows a normal sinus rhythm with a rate of 90 beats per minute. There are inverted T-waves in leads V1-V3 with no Q waves or ST-elevations.

### Discussion

Inverted T-waves in V1-3 are a normal finding in children—the result of right ventricular dominance. While in utero, the neonate's right ventricle strengthens as it

pushes against the pulmonary circulation. After birth, this right ventricular prominence decreases and the juvenile ECG pattern of T-wave inversion in V1-3 gradually evolves into an adult pattern (inversion only in V1) by about age 10.<sup>1</sup>

In some patients, inversions in V1-3 carry on into adulthood. This persistent juvenile T wave pattern is most commonly found in African American women under the age of 30. The pattern does not portend structural changes; it is purely electrical and physiologically normal. While there are no specific diagnostic criteria, the hallmark ECG finding is asymmetric, shallow ( $< 3$  mm), inverted T-waves in leads V1-V3 (**Figure 2**).<sup>2</sup>

While ischemia or infarction can cause T-wave inversions, ischemic T wave inversions are generally symmetric and often accompanied by dynamic changes on subsequent ECGs. AVRC, a cause of sudden cardiac death in young people, may also have inverted T-waves in V1-V3, however the most specific finding is epsilon waves. Consider ARVC in patients with unexplained syncope or ventricular dysrhythmias. The QRS is narrow, excluding the possibility of bundle branch blocks.

Persistent T-wave pattern is a benign condition that requires no additional workup or treatment. While there are not strict diagnostic criteria for this pattern, it remains primarily a diagnosis of exclusion.

### What to Look For

- Persistent juvenile T-waves are asymmetric, shallow ( $< 3$  mm), inverted T-waves in leads V1-3
- PJTWP is primarily seen in young African American females under the age of 30
- PJTWP should only be diagnosed after considering more dangerous causes of inverted T-waves including ischemia, pulmonary embolism, and ARVC

### Initial Management, Considerations for Transfer

- The PJTWP is benign and does not require additional workup or transfer

### References

1. Dickinson DF. The normal ECG in childhood and adolescence. *Heart*. 2005 Dec;91(12):1626-30.
2. Marcus FI. Prevalence of T-Wave Inversion Beyond V1 in Young Normal Individuals and Usefulness for the Diagnosis of Arrhythmogenic Right Ventricular Cardiomyopathy/Dysplasia. *Am J Cardiol*. 2005;95:1070-1071.