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

A 24-Year-Old Man with Ankle Pain After a Fall


Figure 1.


Figure 2.

Case

The patient is a 24-year-old male who reports to urgent care with right ankle pain after falling from a ladder while cleaning out the gutters at his parents' home. He reports that he was only a few rungs up but that he landed "awkwardly" and immediately felt a sharp pain on the front of the ankle. He is unable to bear weight but denies any numbness or tingling.

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

THE RESOLUTION

Differential Diagnosis

- Ankle sprain
- Adult Tillaux fracture
- Medial malleolus fracture

Diagnosis

This patient suffered an adult Tillaux fracture, which is a fracture of anterolateral tibial epiphysis. This occurs more commonly in adolescents and only rarely in adults. This is seen as an oblique lucency extending from the lateral distal tibia toward the midline articular surface of the distal tibia. This is an avulsion fracture of the anterolateral part of the tibial plafond.

Learnings/What to Look for

- In adult Tillaux fracture, the avulsed fragment is triangular, while in juvenile Tillaux fracture it is quadrangular
- The mechanism of injury is an inversion of the ankle while the foot is in supination with external rotation resulting in an avulsion fracture of the anterolateral tibial plafond due to a taut intact anteroinferior tibiofibular ligament
- It is not well seen on AP and lateral standard radiographic views of the ankle, so an oblique view (mortise) should be performed if this injury is suspected
- It can rarely be associated with injury of the medial malleolus or deltoid ligament

Pearls for Urgent Care Management

- If fracture displacement is <2 mm, this injury can be managed conservatively (ie, non-weightbearing cast or brace for 6 weeks, followed by physical therapy as needed)
- If the fracture fragment is displaced >2 mm, referral to an orthopedist for surgical consideration is warranted. The patient may need to undergo closed reduction or open reduction and internal fixation

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

A 34-Year-Old Man with Pain and Burning in Both Eyes


Figure 1

Case

The patient is a 34-year-old male who presents with bilateral ocular pain and burning. He is noted to have excessive tearing and continuous eye rubbing. He comments that his eyes itch persistently and that both eyes feel as if there is something in them. Scaly plaques and crust are visible along the top and bottom eyelid.

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

THE RESOLUTION

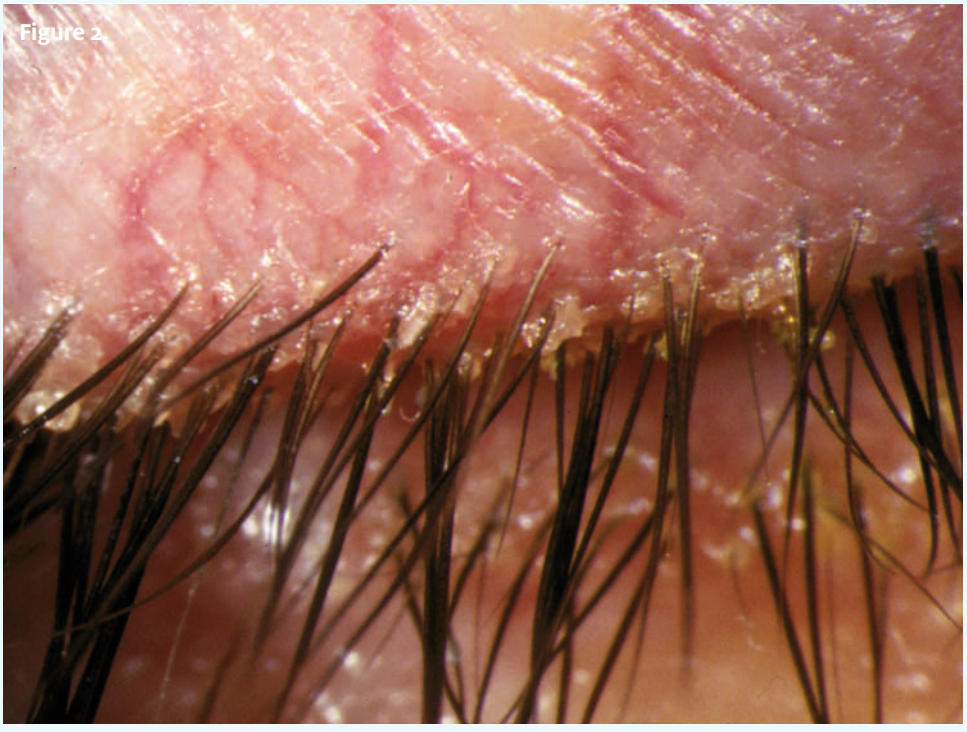
Figure 2

Differential Diagnosis

- Allergic conjunctivitis
- Blepharitis
- Seborrheic dermatitis

Diagnosis

This patient was diagnosed with blepharitis, sometimes referred to as meibomitis, which is a chronic inflammatory condition of the eyelid margin associated with eye irritation. It is more common in individuals with fair skin phototypes and closely linked with dry eye syndrome.

Learnings/What to Look for

- Patients will commonly describe eyelid erythema, eyelid swelling, eyelid itching, foreign body sensation in the eye, burning of the eye, excessive tearing, blurry vision, photophobia and collections of matter around the eyelashes upon awakening
- Patients with blepharitis are also prone to having multiple styes or chalazions on the eyelids

Pearls for Urgent Care Management

- For minor blepharitis, first-line treatment is self-care measures—washing the eyes, lid massage, artificial tears, and applying warm compresses
- If self-care measures do not resolve the problem, consider topical ophthalmic antibiotics (ie, erythromycin ophthalmic, bacitracin ophthalmic) in addition to self-care measures
- For severe cases, oral antibiotics such as tetracycline or doxycycline may be used

Acknowledgment: *Images and case presented by VisualDx (www.VisualDx.com/JUCM).*

INSIGHTS IN IMAGES

CLINICAL CHALLENGE: CASE 3

A 38-Year-Old Female with Abdominal Pain and Chest Tightness

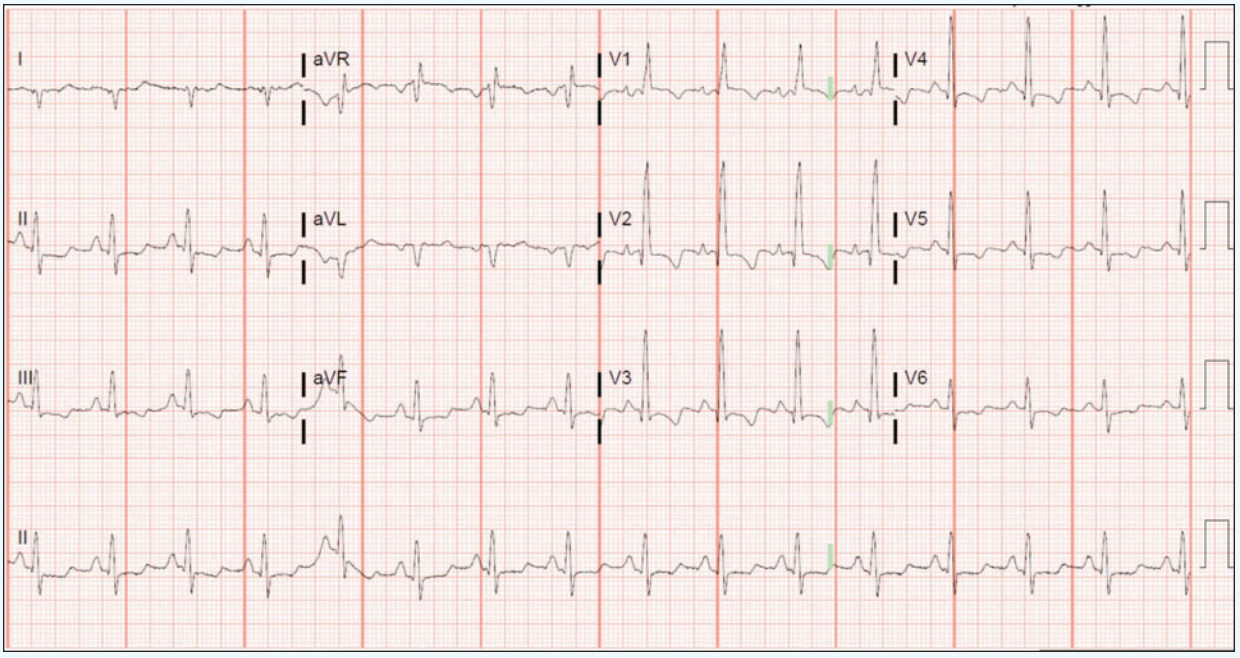

Figure 1.

A 38-year-old female with no past medical history presents to an urgent care with right upper quadrant abdominal pain and chest tightness, worsening for 1 week. She reports that her chest tightness is associated with shortness of breath, and is worse when walking and lying on her side. She denies fever, cough, dysuria, headache, or weakness.

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

(Case presented by Catherine Reynolds, MD, The University of Texas Health Science Center at Houston McGovern Medical School.)

THE RESOLUTION

Figure 2.

Differential Diagnosis

- Right bundle branch block
- Non ST-elevation myocardial infarction
- Wellens syndrome
- Right heart strain
- Left ventricular hypertrophy

Diagnosis

This patient was diagnosed with right heart strain. The ECG shows a regular, narrow-complex rhythm at a rate of 96 bpm. There is a right axis deviation (QRS axis >90°). The anterior leads (V1-V4) have T wave inversions, and ST depressions are present in the inferior leads (II, III, aVF). A dominant R wave in V1 is also present.

Together, these findings are concerning for right heart strain or right ventricular strain, a pattern seen in patients with right ventricular hypertrophy or dilatation. Any condition that causes deformation of the muscle of the right ventricle can cause these ECG findings, including but not limited to:

- pulmonary hypertension
- pulmonary embolism
- lateral myocardial infarction
- chronic lung disease such as COPD
- pulmonic stenosis
- bronchospasm[1]

While it is clear that right heart strain is present on this ECG, it is impossible to know from just the ECG what condition is causing this pattern. In this particular case, the patient had a pulmonary embolism causing right heart strain.

This constellation of findings can be easily confused with other conditions and should be viewed within the context of the patient's clinical presentation. For example, patients with Wellens syndrome will classically have anterior T wave inversions whose morphology may resemble those seen in right heart strain. However, in a patient with Wellens syndrome, T wave inversion in lead III is less likely and we would expect the patient to be completely pain-free following a painful episode. Similarly, if an ECG is taken out of context or interpreted incompletely rather than as a whole, it can be easy to mistake a right ventricular strain pattern for a simple right bundle branch block or nonspecific ischemia.

Learnings/What to Look for[2]

Some key electrocardiographic features of right heart strain are:

- Right axis deviation
- Dominant R wave in V1
- Dominant S wave in V5 or V6
- T wave inversions and ST depressions in right precordial (V1-4) and inferior leads (II, III, aVF)
- S1Q3T3: a "classic" but not specific or sensitive finding of deep S-wave in lead I, Q wave in lead III, and inverted T wave in lead III

THE RESOLUTION

- Incomplete or complete right bundle branch block
- Sinus tachycardia

Pearls for Urgent Care Management

- ECGs are an important triage tool when assessing for right heart strain—they are easier to obtain than an echocardiogram or CTA, and can convey useful information to help risk stratify patients
- No one specific finding is diagnostic of right heart strain, and it is impossible to know from just an ECG what is causing the right ventricular dysfunction. Use the ECG findings as a building block to help guide your diagnosis and management, and maintain a broad differential
- Right ventricular strain pattern on ECG is associated with poor short-term outcomes in patients with pulmonary embolism and normal blood pressure[3]
- Initiate transfer to the ED in patients where you suspect PE with findings of right heart strain on ECG

References

1. Matthews JC, McLaughlin V. Acute right ventricular failure in the setting of acute pulmonary embolism or chronic pulmonary hypertension: a detailed review of the pathophysiology, diagnosis, and management. *Curr Cardiol Rev.* 2008;4(1):49-592.
2. Marchick MR, Courtney DM, Kabrhel C, et al. 12-lead ECG findings of pulmonary hypertension occur more frequently in emergency department patients with pulmonary embolism than in patients without pulmonary embolism. *Ann Emerg Med.* 2010;55(4):331-335.
3. Shopp JD, Stewart LK, Emmett TW, et al. Findings from 12-lead electrocardiography that predict circulatory shock from pulmonary embolism: systematic review and meta-analysis. *Acad Emerg Med.* 2015;22(10):1127–1137.

Acknowledgment: JUCM *appreciates the assistance of ECG Stampede (www.ecgstampede.com) in sourcing content for electrocardiogram-based cases for Insights in Images each month.*

ECG STAMPEDE