

## INSIGHTS IN IMAGES CLINICAL CHALLENGE: X-RAY

Editor's Note: While the images presented here are authentic, the patient cases are hypothetical.

## 13-Year-Old With Inversion Injury



A 13-year-old boy presents to urgent care after "rolling" his left foot. He explains that he tripped on a cement curb while riding his skateboard. He has foot and ankle pain that is worse with weight. An x-ray is ordered. Review the image 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).



#### **Differential Diagnosis**

- Left midfoot sprain
- 5th metatarsal avulsion fracture
- 5th metatarsal shaft fracture

#### Diagnosis

The correct diagnosis is an avulsion fracture of the base of the 5th metatarsal adjacent to the oblique apophysis. It does not involve the diaphysis, and there is no skin tenting or rotation. As seen in the image, normal apophysis is noted at the base of the 5th metatarsal as well as a transverse lucency at base of 5th metatarsal. Avulsion fracture is among the more common fractures of the foot and is predisposed to poor healing due to the limited blood supply to the specific areas of the 5th metatarsal base.

#### What to Look For

- On x-ray, a normal apophysis may be seen at the base of the 5th metatarsal
- Tenderness to palpation, erythema, or swelling at the base of the 5th metatarsal may be present

#### Pearls for Urgent Care Management

- Subtle avulsion fractures may require anterior posterior view or anterior posterior oblique (mortise) view of ankle to visualize
- Symptoms may last 2-6 months
- Nonoperative treatment includes protective weight bearing in a stiff soled boot or cast
- Follow-up with orthopedics or podiatry may be indicated for evaluation of operative management in cases of non-union



55-Year-Old With Diffusely Dry Skin



A 55-year-old woman presents to urgent care because of skin dryness and scaling on her legs that developed 2 weeks prior. The patient was recently diagnosed with psoriasis by a different provider and was treated with a combination therapy of tazarotene and a topical steroid for over 4 weeks. Diffuse dryness and white scales were seen on her legs. 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).



#### **Differential Diagnosis**

- Acquired ichthyosis
- Atopic dermatitis
- Eczema craquelé
- Xerosis

#### Diagnosis

The correct diagnosis in this case is xerosis—a condition of rough, dry skin texture with associated fine scales, which is often pruritic. Incidence increases with age, and xerosis is typically caused by a decrease in the amount of lipids in the stratum corneum and a deficiency in the waterbinding capacity of this layer. Environmental causes include factors such as low humidity, frequent bathing, and harsh soaps. Disease states such as ichthyoses, atopic dermatitis, hypothyroidism, Down syndrome, renal failure, malnutrition, HIV, lymphoma, liver disease, Sjögren syndrome, and carcinomatosis can also cause the condition.

#### What to Look For

- Xerosis is more common in older patients
- Dry ashy skin with fine scale will be visible
- Pruritus is frequently present

#### Pearls for Urgent Care Management

- Encourage the patient to use mild skin cleansers and minimize skin washing
- Use a humidifier indoors to increase air humidity
- Moisturize the skin with thick and greasy emollients



# 63-Year-Old With Sudden Visual Disturbance



A 63-year-old man presents to urgent care with suddenonset floaters and blurred vision in his right eye for one day. He denies trauma, headache, or flashes of light. He has no history of similar symptoms. His past medical history includes hypertension and type 2 diabetes.

Vital signs are normal. Visual acuity measures 20/40 OD and 20/25 OS. No facial asymmetry or eyelid swelling is noted. Visual fields are intact bilaterally. A non-dilated fundoscopic exam is attempted but is limited. Blood glucose is within normal limits. With concern for retinal pathology, a point-of-care ultrasound (POCUS) of both eyes is performed using a linear probe over closed eyelids.

View the POCUS images above and consider the likely diagnosis and next steps. The resolution of the case is described on the following page.

Case provided by Tatiana Havryliuk, MD, emergency physician in New York, NY, and founder of Hello Sono.

#### THE RESOLUTION

#### **Differential Diagnosis**

- Posterior vitreous detachment (PVD)
- Retinal detachment
- Vitreous hemorrhage
- Retinal tear
- Retinal hemorrhage
- Ocular migraine
- Optic neuritis
- Retinal arterial or venous occlusion
- Diabetic retinopathy

#### Diagnosis

POCUS of the right eye revealed a thin, mobile, echogenic (white) membrane in the vitreous chamber, not tethered to the optic nerve, consistent with PVD. Scattered mobile hyperechoic opacities were also noted—suggestive of vitreous hemorrhage. The unaffected eye showed no such findings.

Based on the POCUS findings—showing no signs of retinal detachment—and the patient's relatively preserved visual acuity, the provider arranged next-day follow-up with ophthalmology rather than immediate emergency department referral. The ophthalmologist confirmed the diagnosis of PVD with associated vitreous hemorrhage and initiated expectant management with close outpatient monitoring.

#### Discussion

PVD must be suspected when a patient presents with sudden floaters. The incidence of PVD rises with age, affecting 11–46% of those aged 65–90 years.<sup>1</sup> PVD results from the separation of the posterior vitreous cortex from the retina, often due to age-related vitreous degeneration or trauma.<sup>2</sup> Although PVD is usually benign, patients are at increased risk for retinal tears or detachment, particularly in the first 6 weeks following symptom onset.<sup>3,4</sup> The presence of vitreous hemorrhage or reduced visual acuity (worse than 20/40) elevates this risk.<sup>4</sup>

POCUS has emerged as a valuable tool for evaluating acute vision changes when direct fundoscopy is inconclusive or technically challenging.<sup>5,6</sup> Sonographic findings of PVD include a thin, mobile, hyperechoic membrane seen floating in the vitreous chamber. Unlike retinal detachment, this membrane is not tethered to the optic disc.<sup>7</sup> Vitreous hemorrhage appears as swirling, mobile echogenic debris within the vitreous chamber.<sup>78</sup> A recent meta-analysis found that ocular POCUS performed by emergency physicians had sensitivities of 94% for retinal detachment, 90% for vitreous hemorrhage, and 67% for PVD.<sup>9</sup>

Rapid POCUS evaluation can help differentiate urgent vision-threatening pathology (eg, retinal detachment) from benign conditions (eg, isolated PVD) that can be managed with outpatient follow-up. For urgent care providers, this distinction is critical in optimizing resource utilization and patient outcomes.

#### What to Look For

- A mobile, hyperechoic membrane in the posterior chamber not tethered to the optic nerve indicates PVD
- Hyperechoic particles in the vitreous suggest vitreous hemorrhage
- A ribbon-like flap tethered at the optic disc is consistent with retinal detachment

#### Pearls for Urgent Care Management

- Ocular POCUS is a simple, accurate tool for evaluating acute visual complaints when ophthalmoscopy is inconclusive
- If retinal detachment is suspected—even with preserved vision—immediate ophthalmology referral is critical<sup>10</sup>
- Patients diagnosed with PVD should be educated about the risk of retinal tear/detachment. Advise them to seek prompt care if symptoms worsen or vision deteriorates

#### References

1. Weber-Krause B, Eckardt C. Incidence of posterior vitreous detachment in the elderly. *Ophthalmologe*. 1997;94(9):619–623.

3. Hollands H, Johnson D, Brox AC, et al. Acute-onset floaters and flashes: is this patient at risk for retinal detachment? *JAMA*. 2009;302(20):2243–2249.

4. Bond-Taylor M, Jakobsson G, Zetterberg M. Posterior vitreous detachment prevalence and risk factors for retinal tears. *Clin Ophthalmol*. 2017;11:1689– 1695.

 Blaivas M, Theodoro D, Sierzenski PR. A study of bedside ocular ultrasonography in the emergency department. *Acad Emerg Med.* 2002;9(8):791–799.
Mackay DD, Garza PS, Bruce BB, et al. The demise of direct ophthalmoscopy:

a modern clinical challenge. *Neurol Clin Pract*. 2015;5(2):150–157.

7. Baker N, Amini R, Situ-LaCasse EH, et al. Can emergency physicians distinguish retinal detachment from posterior vitreous detachment with POCUS? *Am J Emerg Med.* 2018;36(5):774–776.

8. Lahham S, Shniter I, Thompson M, et al. POCUS in diagnosing retinal detachment, vitreous hemorrhage, and vitreous detachment. *JAMA Netw Open*. 2019;2(4):e192162.

9. Lahham S, Shniter I, Thompson M, et al. *JAMA Netw Open*. 2019;2(4): e192162.

10. Feltgen N, Walter P. Rhegmatogenous retinal detachment—an ophthalmologic emergency. *Dtsch Arztebl Int*. 2014;111(1–2):12–22.

<sup>2.</sup> Flaxel CJ, Adelman RA, Bailey ST, et al. Posterior Vitreous Detachment, Retinal Breaks, and Lattice Degeneration Preferred Practice Pattern. *Ophthalmology*. 2020;127(1):P146–P181.



# 33-Year-Old With Pleuritic Chest Pain



Figure 1: Initial ECG

A 33-year-old female presents to urgent care with pleuritic chest pain that is gradual in onset over the preceding several days and worse when lying flat. She denies fever, cough, and shortness of breath. She is well appearing with normal vital signs. 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 Benjamin Cooper, MD, MEd, FACEP, McGovern Medical School at the University of Texas Health Science Center at Houston

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



Figure 2: Blown-up images of PQRST complexes in leads I, II, and V6. PR-segment depressions are in green and concave up ST-segment elevations are in blue.

#### **Differential Diagnosis**

- Early repolarization
- Hyperkalemia
- Acute pericarditis
- ST-elevation myocardial infarction
- Brugada syndrome

#### Diagnosis

The diagnosis in this case is acute pericarditis. The ECG reveals sinus tachycardia with a rate of 108 beats per minute. There are diffuse, concave up ST-segment elevations without reciprocal changes and diffuse PR-segment depression (**Figure 2**).

#### Discussion

Acute pericarditis is an inflammatory condition of the pericardium, often causing symptoms like pleuritic chest pain that improve when leaning forward. Common causes include medications (eg, hydralazine, penicillin), infections (bacterial, viral, or fungal), malignancies, rheumatologic conditions (eg, lupus, rheumatoid arthritis), post-myocardial infarction syndromes (eg, Dressler syndrome), uremia, and idiopathic origins.<sup>1</sup> Diagnosis requires meeting 2 out of 4 criteria:<sup>2.3</sup>

- 1. Typical symptoms (pleuritic, sharp chest pain relieved when leaning forward)
- 2. New pericardial effusion
- 3. Presence of a friction rub
- 4. Typical ECG findings

Differentiating pericarditis from ST-elevation myocardial infarction (STEMI) can be challenging, but careful attention to several electrocardiographic features can help. Features suggesting pericarditis over STEMI include diffuse concave up ST elevations without reciprocal changes, PR depression, PR elevation in aVR, ST-elevation in lead II greater than lead III, and Spodick's sign (down-sloping of the TP segment).<sup>4</sup> The test characteristics of any single electrocardiographic feature are insufficient to rule in/out pericarditis; the feature with the highest odds ratio for predicting STEMI (over pericarditis) is reciprocal ST-depressions. Acute pericarditis tends to follow a natural progression of electrocardiographic findings, starting with the aforementioned features in the first two weeks, followed by resolution of ST elevation, T wave flattening, T wave inversion, and finally returning to baseline over several weeks (**Figure 3**).<sup>5</sup>



Figure 3: Morphologic features of the various stages of pericarditis.

Treatment includes non-steroidal anti-inflammatory medications tapered over 3-4 weeks and colchicine for 3 months. It's also reasonable to prescribe a proton pump inhibitor to counteract gastrointestinal side effects. Corticosteroids are reserved for patients with contraindications to initial therapy but are not preferred due to increased recurrence.<sup>2</sup>

Although early repolarization can produce similar ECG patterns, the patient's presenting symptoms favor acute pericarditis. Hyperkalemia can cause various ECG changes, but it does not typically result in the diffuse, concave-up ST elevation observed here. Furthermore, Brugada syndrome, characterized by ST elevation in leads V1 and V2 due to a sodium channelopathy, is inconsistent with the presented ECG.

#### THE RESOLUTION

#### What To Look For

- Electrocardiographic features that suggest acute pericarditis include diffuse concave up ST elevations without reciprocal changes, PR depression, ST-elevation in lead Il greater than lead III, and Spodick's sign (down-sloping of the TP segment).
- The presence of reciprocal ST-changes is very specific for an occlusive process.

## Pearls For Initial Management, Considerations For Transfer

- Patients with a clear diagnosis of acute pericarditis with a benign etiology and reliable follow up can be initiated on non-steroidal anti-inflammatory medications +/- colchicine.
- Pericardial effusion must be considered in all cases of pericarditis; however, clinically meaningful effusions occur in less than 3% of cases of acute pericarditis. It is worth noting that pericardial tamponade is more common in patients with identifiable causes compared to idiopathic cases.<sup>3</sup> Tamponade and myocarditis should be considered in patients with tachycardia and/or hypotension; ED referral is indicated in such cases.

**FIND YOUR PEOP** 

If the diagnosis is in question, the etiology is unclear, vital signs are unstable, or the patient lacks reliable follow up, referral to an emergency department is appropriate.

#### References

1. Mattu A, Tabas J, Brady W. Electrocardiography in Emergency, Acute, and Critical Care. 2nd ed. The American College of Emergency Physicians; 2019. 2. LeWinter MM. Acute Pericarditis. *NE J Emerg Med.* 2017;371(25):349-359. doi:10.1016/j.pcad.2016.12.001

3. Cremer PC, Klein AL, Imazio M. Diagnosis, Risk Stratification, and Treatment

of Pericarditis: A Review. JAMA. 2024;332(13). doi:10.1001/JAMA.2024.12935 4. Witting MD, Hu KM, Westreich AA, Tewelde S, Farzad A, Mattu A. Evaluation of Spodick's Sign and Other Electrocardiographic Findings as Indicators of STEMI and Pericarditis. J Emerg Med. Published online March 2020. doi:10.1016/j.jemermed.2020.01.017

5. Spodick DH. Diagnostic electrocardiographic sequences in acute pericarditis. Significance of PR segment and PR vector changes. *Circulation*. 1973;48(3):575-580. doi:10.1161/01.CIR.48.3.575

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