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*.

A 55-Year-Old Female with Hip Pain

Figure 1.

Case

The patient is a 55-year-old woman who presents with what she calls minor pain in her left hip. She denies any trauma, and insists the pain "isn't that bad." She's only seeking care as a precautionary measure in advance of a family camping trip.

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

- Bony dysplasia
- Chondroid lesion
- Fibrous cortical defect
- Osteoblastoma
- Osteoid osteoma
- Synovial herniation pit of the femoral neck

Diagnosis

The correct diagnosis is synovial herniation pit of the femoral neck. These are formed by mechanical pressure from the thick anterior hip joint capsule during repetitive hip flexion and extension, which pushes the synovium or soft tissues into the cortical defects in anterior femoral neck. Femoroacetabular impingement may also have a role in their origin. The lesions are acquired and usually stable but can grow over a period of time. They could be symptomatic in a minority of patients, but typically are incidental findings on the radiographs of asymptomatic patients.

Learnings/What to Look for

- Radiographically, they are visualized as 3 mm to 15 mm diameter round or oval lucent lesions with thin sclerotic margins typically located in anterosuperior femoral neck and 1 cm below the superior neck cortex
- On CT they are low attenuation cortical and subcortical lesions with thin sclerotic margins
- On MRI, the lesion is seen as a smoothly marginated cortical and subcortical mass with low signal on T1 and bright fluid signal on T2 images
- Surrounding bone marrow signal remains normal in bulk of the patients. In symptomatic herniation pit, edema may be present in the surrounding bone marrow

Pearls for Urgent Care Management and Considerations for Transfer

- No therapy is indicated in asymptomatic lesions
- Symptomatic patients with MRI-documented bone marrow edema surrounding the herniation pit are treated with intra-articular steroid injection

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

A 54-Year-Old Female with Nonproductive Cough and Rhinorrhea

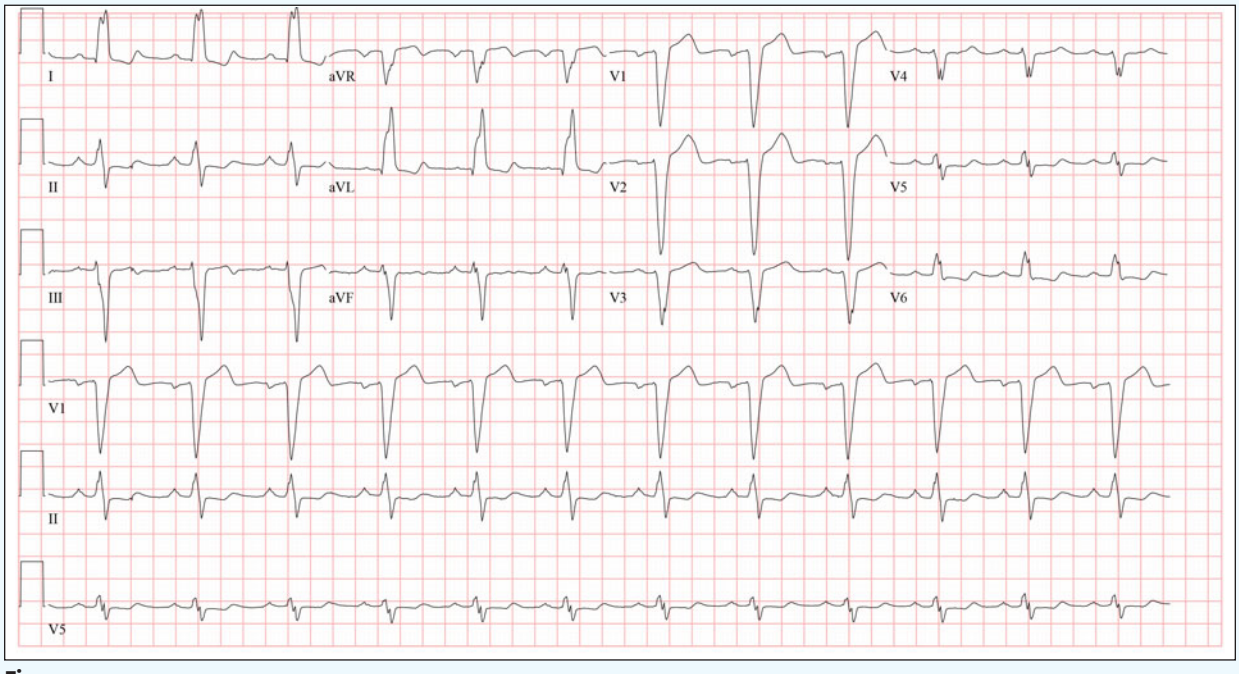

Figure 1.

Case

The patient is a 54-year-old female woman who presents to urgent care with a 3-day history of nonproductive cough with associated rhinorrhea. She does endorse some chest pain after coughing episodes, which resolve with NSAIDs. She otherwise denies nausea, vomiting, diaphoresis, or exertional symptoms. Personal medical history is remarkable for hypertension.

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

THE RESOLUTION

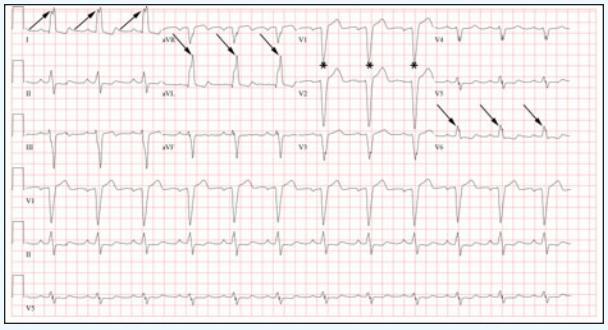

Figure 2. The wide QRS (>120 msec), dominant S wave in V1 (asterisks), broad notched R wave in the lateral leads (arrows), and absent q waves in lead I, V5, and V6 indicates the presence of a left bundle branch block.

Differential Diagnosis

- ST-Elevation MI (STEMI)
- Left ventricular hypertrophy (LVH) with strain
- Hyperkalemia
- Left bundle branch block (LBBB)
- Ventricular tachycardia

Figure 3. The Normal His-Purkinje Conduction System

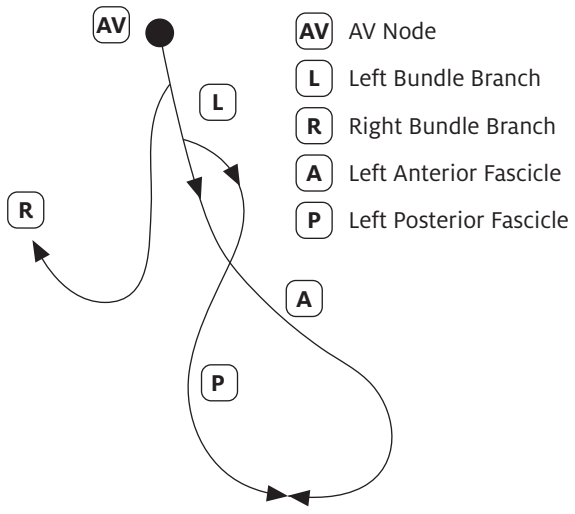

Image used with permission from ddxof.com

Diagnosis

This patient was diagnosed with left bundle branch block.

The ECG reveals a regular, wide-complex, sinus rhythm at a rate of 75 beats per minute. The wide QRS complex (>120 msec), dominant S wave in V1, broad-notched R wave in the lateral leads (I, aVL, V6), and left axis deviation indicate the presence of an LBBB.

Table 1. Abbreviated electrocardiographic criteria for complete LBBB[4]

- QRS duration ≥120 msec in adults
- Broad notched or slurred R wave in leads I, aVL, V5, and V6
- Absent q waves in leads I, V5, and V6, but in the lead aVL, a narrow q wave may be present in the absence of myocardial pathology
- R peak time >60 msec in leads V5 and V6 but normal in leads V1, V2, and V3
- Associated features:
  - ST and T waves usually opposite in direction to QRS
  - Left axis deviation

Our current conceptual understanding of the trifascicular framework of the intraventricular conduction system derives from a series of seminal papers by Rosenbaum, et al from 1969 to 1973. These works elucidated three conduction terminals—one in the right ventricle (the right bundle) and two in the left ventricle (the anterior and posterior divisions of the left bundle) (**Figure 3**).[1-3] Conduction disturbances of any or all three conduction terminals may result from structural abnormalities of the His-Purkinje system caused by necrosis, fibrosis, calcification, infiltrative disease, electrolyte disturbances, or impaired vascular supply.[4] When conduction is impaired to both left ventricular terminals, the result is an LBBB. Electrocardiographically, the presence of an LBBB can be established via the criteria listed in **Table 1**.

Historically, LBBB was thought to prevent accurate recognition of acute myocardial infarction, resulting in poor allocation of reperfusion therapy.[5] In fact, for many years (until 2013), new or presumed new LBBB was considered equivalent to an ST-elevation myocardial infarction.[6] We are now able to utilize the

Table 2. Modified Sgarbossa criteria for determining myocardial infarction in the presence of a LBBB[7]

- ST-segment elevation ≥1 mm and concordant with the QRS in at least 1 lead
- ST-segment depression ≥1 mm in any of leads V1–V3
- Excessively discordant ST-segment elevation in any one lead
  - Defined by most negative ratio of ST/S and at least 1 mm of STE
  - Cut point for ST/S ratio < -0.25

Note that the presence of any one of the three criteria rules in for myocardial infarction.

THE RESOLUTION

Figure 4.

Panel A shows concordant ST-segment elevation. Panel B shows concordant ST-segement depression in leads V1, V2, or V3. Panel C shows excessively discordant ST-segment elevation. *Images used with permission from ddxof.com.*

Sgarbossa/modified Sgarbossa criteria to help identify underlying myocardial infarction in patients with symptoms of acute coronary syndrome and an LBBB (**Table 2**, **Figure 4**).

The patient in our scenario does not meet any Sgarbossa criteria, nor does the clinical presentation suggest acute coronary syndrome. She has an LBBB, which indicates significant conduction disease, but urgent action is not indicated, and this patient is appropriate for outpatient referral to a cardiologist.

Learnings/What to Look for

- Electrocardiographic findings of LBBB include a wide QRS and a notched or slurred R wave in leads I, aVL, V5, and V6 (see **Table 1** for additional criteria)
- Apply Sgarbossa/modified Sgarbossa criteria in patients with symptoms of acute coronary syndrome with LBBB
- Always compare with prior ECGs

Pearls for Urgent Care Management and Considerations for Transfer

- Acutely symptomatic patients with symptoms concerning for acute coronary syndrome should be transferred to an emergency department immediately for evaluation
- A new LBBB in and of itself does not indicate the need for emergent reperfusion; however, the provider must always consider the entire clinical picture

References

1. Rosenbaum MB. The hemiblocks: diagnostic criteria and clinical significance. *Mod Concepts Cardiovasc Dis*. 1970;39(12):141-146.
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4. Surawicz B, Childers R, Deal BJ, Gettes LS. AHA/ACCF/HRS Recommendations for the Standardization and Interpretation of the Electrocardiogram. Part III: Intraventricular Conduction Disturbances: A Scientific Statement From the American Heart Association Electrocardiography and Arrhythmias Committee, Council on Clinical Cardiology; the American College of Cardiology Foundation; and the Heart Rhythm Society. *J Am Coll Cardiol*. 2009.
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6. Antman EM, Anbe DT, Armstrong PW, et al. ACC/AHA Guidelines for the Management of Patients with ST-Elevation Myocardial Infarction - Executive Summary: A Report of the American College of Cardiology/American Heart Association Task Force on Practice Guidelines (writing committee to revise the 1999 guidelines for the management of patients with acute myocardial infarction). *Circulation*. 2004;110(5):588-636.
7. Meyers HP, Limkakeng AT, Jaffa EJ, et al. Validation of the modified Sgarbossa criteria for acute coronary occlusion in the setting of left bundle branch block: a retrospective case-control study. *Am Heart J*. 2015;170(6):1255-1264.

Acknowledgment: *Case presented by Jonathan Giordano, DO, MS.*