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 35-Year-Old with a Persistent, Frequent Cough

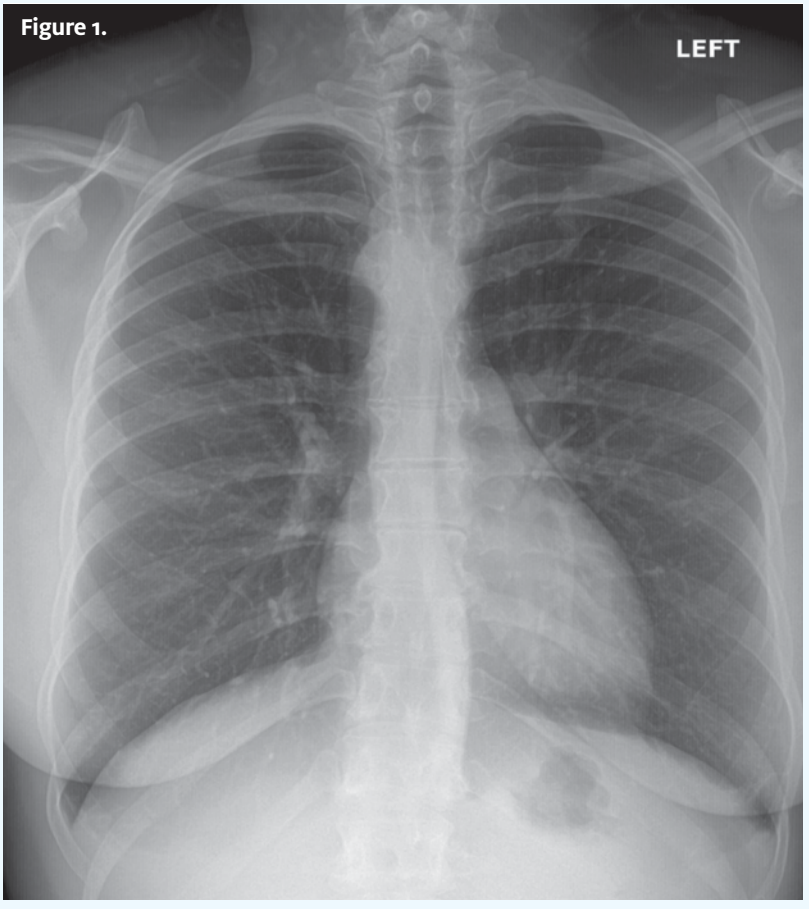


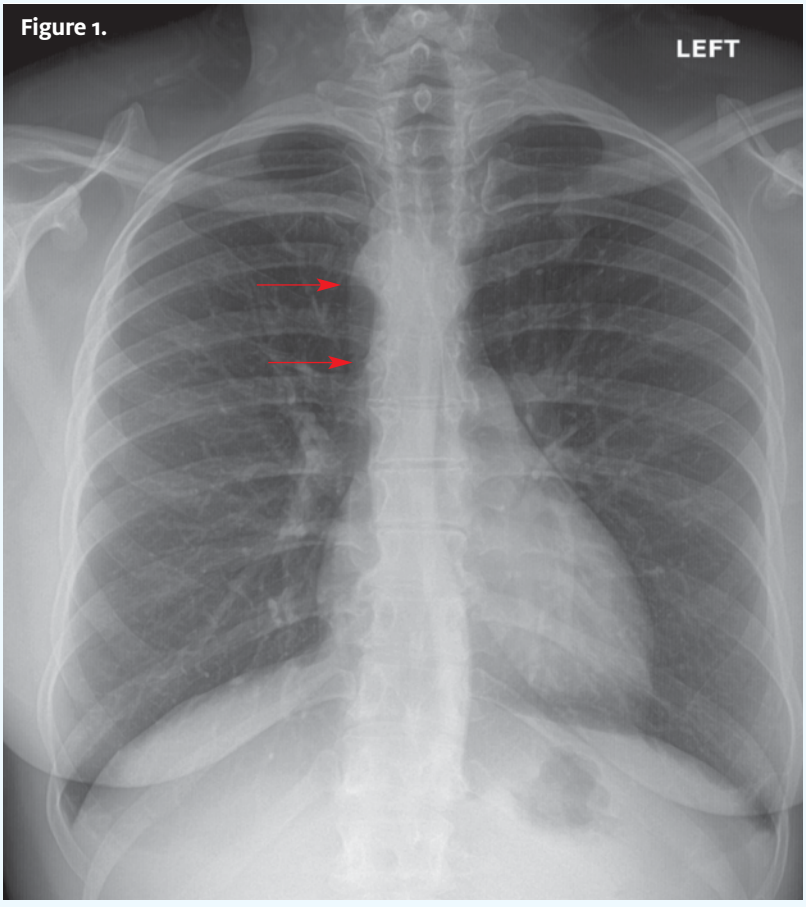
Figure 1.

Case

The patient is a 35-year-old woman who presents with a frequent, light cough of several months' duration. Her medical history is unremarkable, including no history of COVID-19. She is a former "social smoker" who worked out on a treadmill sporadically before the cough began.

View the image 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

- Bronchiolitis
- Pneumonia
- Stridor
- Right aortic arch

Diagnosis

This patient was diagnosed with right aortic arch. The two most common patterns of right aortic arch are the right-sided aortic arch with mirror image branching and the right-sided aortic arch with aberrant left subclavian artery. This occurs in approximately 0.1% of the population.

Learnings/What to Look for

- Right arch with mirror image branching is associated with cyanotic congenital heart disease, including tetralogy of Fallot, truncus arteriosus, tricuspid atresia, and transposition of the great vessels
- Right arch with aberrant subclavian artery rarely produces symptoms as it usually has normal intracardiac anatomy. It is usually incidental although, rarely, it can cause esophageal and/or tracheal compression

Pearls for Urgent Care Management

- Generally, an isolated right aortic arch is a benign lesion
- Right aortic arch and left pulmonary artery anomalies may be more concerning, as well as being more difficult to identify
- Referral to cardiology is appropriate

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

A 10-Year-Old with Fever, Headache, Muscle Aches, Nausea—and a Suspicious Rash


Figure 1.

Case

The patient is a 10-year-old girl who presents to urgent care with 3 days of fever, headache, muscle aches, nausea, and a skin rash. She has a temperature of 102°F. On examination you find numerous erythematous macules and purpura on her palms and the soles of her feet.

The patient is immunocompetent with an unremarkable medical history. Her mother recounts no recent travel from their home in North Carolina, but notes that the patient spent a day gardening with her grandmother approximately 1 week prior to the appearance of the rash and other symptoms. The mother is concerned this could be an allergic response to contact with a toxic plant or a response to a bug bite.

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

THE RESOLUTION

Differential Diagnosis

- Human *Anaplasmataceae* infection
- Rocky Mountain spotted fever
- Acute meningococcemia
- West Nile virus

Diagnosis

This patient was diagnosed with Rocky Mountain spotted fever (RMSF). The rash in RMSF is characteristically seen on days 2–5 after fever, often with macules on wrists, forearms, or ankles and can spread to the hands or soles of feet. A petechial rash can be seen but often not until 5-6 days of illness with progressive disease and concomitant thrombocytopenia.

RMSF is caused by gram-negative *Rickettsia* riskettsii. It is spread by the American dog tick and Rocky Mountain tick. Infection occurs via a bite or by crushing the tick and transmitting the fecal matter to a mucosal surface (eg, by rubbing the eyes).

Despite its eponymous name, RMSF occurs over a wide distribution of locations throughout the contiguous United States, more commonly in Arkansas, Missouri, North Carolina, Oklahoma, and Tennessee. More than 90% of cases occur between April and September. Occurrence is more common in males, and higher in children than adults.

Case fatality rate without treatment, including in otherwise healthy adults and children, is 20% to 30% with a median time to death of 8 days. Though incidence in the U.S. has increased over the past several years (from 300–800 to 2,000 cases annually), fatalities have decreased due to enhanced recognition and early treatment.

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

Learnings/What to Look for

- Early clinical manifestations of RSMF include high fever, severe headache, myalgia, vomiting, and macular rash. Later manifestations include petechial rash, photophobia, confusion, ataxia, seizures, cough, dyspnea, arrhythmias, jaundice, and severe abdominal pain
- Thrombocytopenia or hyponatremia may be seen

Pearls for Urgent Care Management

- Diagnosis is made clinically, especially in prevalent areas during peak seasons. Serologic testing is available but typically not effective until after the first 5 days of symptoms when antibodies are detectable
- Doxycycline is the treatment of choice for all ages, including children and pregnant women and is most effective at preventing severe complications if started within 5 days of onset[1]
- Fever typically subsides within 24 to 48 hours of initiating treatment. Severe illness may require longer periods of treatment before resolution of fever
- Atypical presentations, severe illness, or prolonged symptoms should involve infectious disease experts for more comprehensive evaluation

References

1. Centers for Disease Control and Prevention. Rocky Mountain Spotted Fever (RMSF). Available at: https://www.cdc.gov/rmsf/healthcare-providers/treatment.html#:~:text=Doxycycline%20is%20the%20treatment%20of,children%20%3C8%20years%20of%20age. Accessed March 28, 2022.

CLINICAL CHALLENGE: CASE 3

A 58-Year-Old Male with Chest Pain

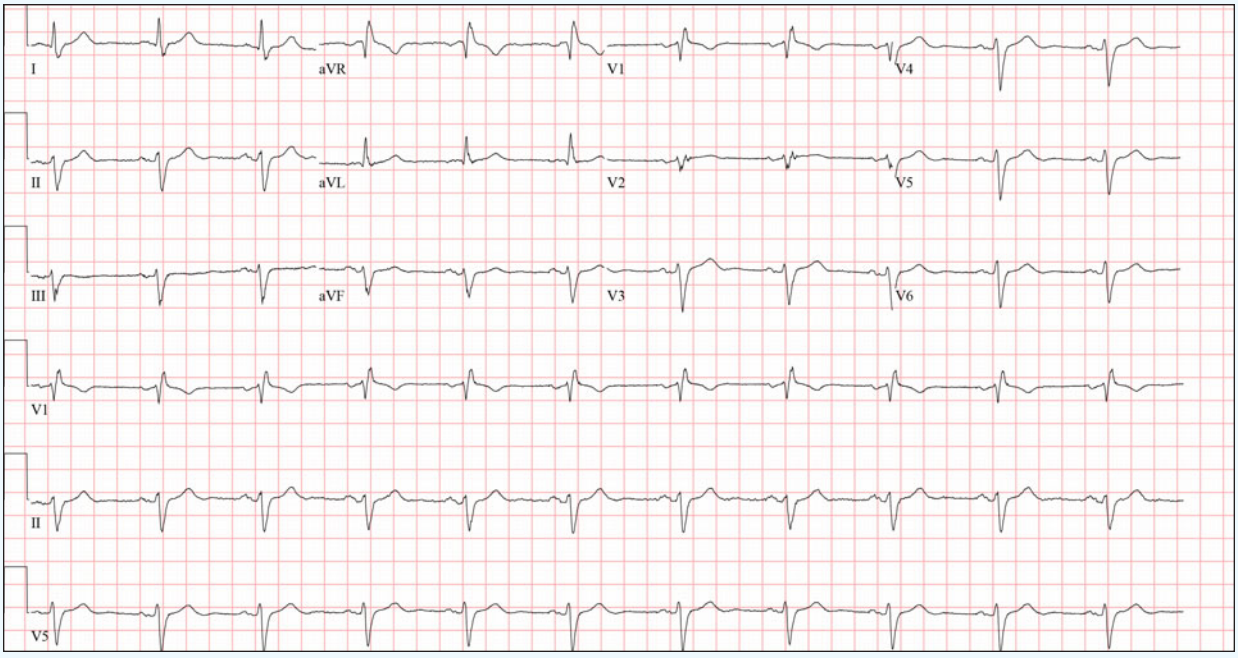


Figure 1. Initial ECG.

The patients is a 58-year-old male who presents with chest pain. He describes it as sharp, lasting seconds, and worsened by lifting objects at work.

Review the initial ECG taken and consider what your diagnosis and next steps could be. Resolution of the case is described on the next page.

(Case presented by Tom Fadial, MD, Assistant Professor, McGovern Medical School, The University of Texas Health Sciences Center of Houston.)

THE RESOLUTION

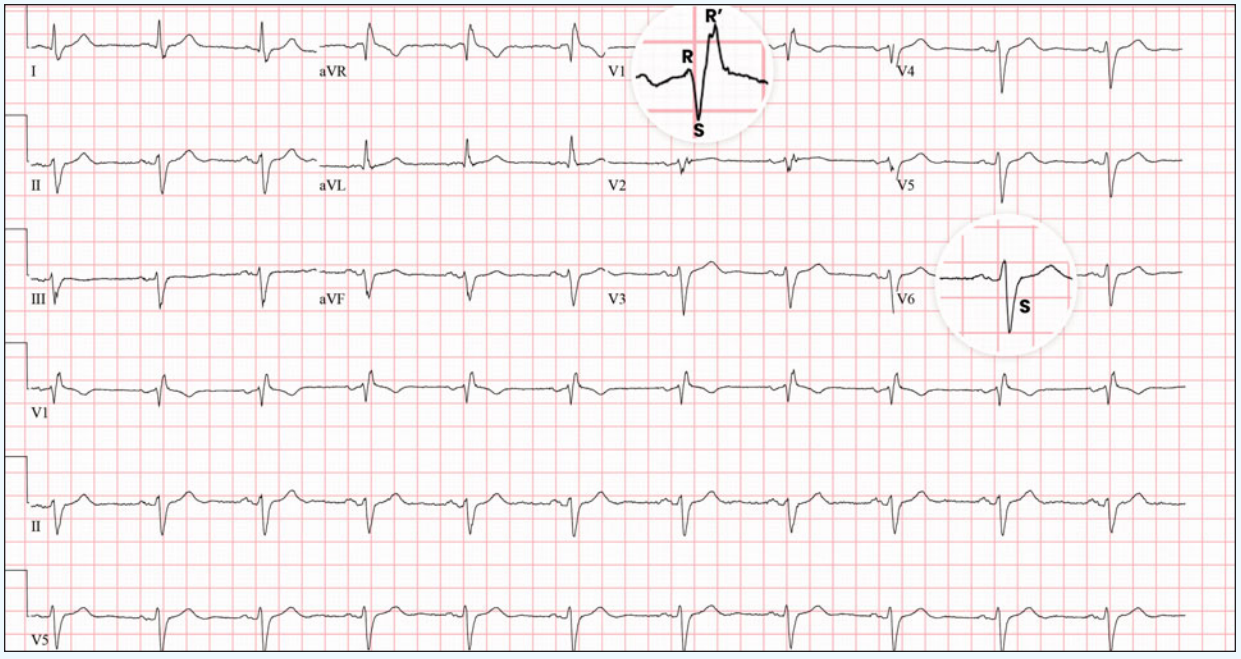


Figure 2. Inlays show an RSR' in V1 and a deep S-wave in V6, characteristic of a RBBB.

Differential Diagnosis

- Ventricular pacing
- Ventricular preexcitation (Wolff-Parkinson-White)
- Accelerated idioventricular rhythm
- Bifascicular block
- Hyperkalemia

Diagnosis

The ECG shows a normal sinus rhythm at a rate of 66 bpm. There is leftward axis deviation with normal PR/QT intervals and a widened QRS complex (>120ms). There are no overt signs of ischemia.

This patient was diagnosed with a bifascicular block.

When evaluating the cause of the widened QRS, we note an RSR' in the anterior precordial leads (V1, V2), as well as a deep S-wave in the lateral leads (I, V6) suggestive of a right bundle branch block (RBBB) (**Figure 2**).

This finding does not, however, explain the leftward axis deviation as isolated right bundle branch blocks maintain normal activation of the left ventricle (the predominant contributor to the QRS axis). Other causes of leftward axis deviation are absent:

1. There is no left bundle branch block or paced rhythm
2. No q-waves are identified to suggest inferior myocardial infarction
3. No criteria for left ventricular hypertrophy are met
4. There are no signs of ventricular preexcitation (WPW)

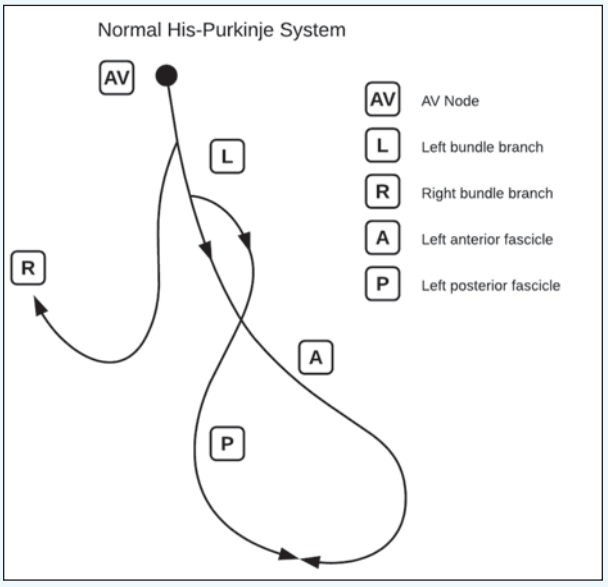


Figure 3. His-Purkinje system.

In this case, the leftward axis deviation points to the disruption of another infranodal conduction pathway—the left anterior fascicle.

The normal infranodal conduction divides into the right and left bundles; the latter is further subdivided into anterior and

THE RESOLUTION

Figure 4. Upright in lead 1, downgoing in lead aVF pointing to left axis deviation.

Figure 5. (A) qR complex in aVL, (B) prolonged R wave peak time in aVL >45ms.

posterior divisions or "fascicles" (**Figure 3**). Disruption of both fascicles produces the familiar left bundle branch block (LBBB) pattern, but each fascicle can be affected independently, resulting in either left anterior fascicular block (LAFB) or left posterior fascicular block (LPFB).

When the left anterior fascicle is disrupted, current passes along the posterior fascicle and the left ventricle is depolarized in a leftward/upward direction, producing left axis deviation (and often an extreme left axis deviation, ie, more than 45° of leftward deviation). Conversely, an LPFB results in depolarization in a rightward/downward direction and produces right axis deviation.

Our patient's ECG demonstrates disruption of two fascicles, the right bundle and the left anterior fascicle, and is termed a "bifascicular" block. While theoretically a left bundle branch block affects two fascicles, the term is reserved for the combination of an RBBB with LAFB or LPFB.

The clinical significance of bifascicular blocks is heavily dependent on the clinical context. As discussed previously, infranodal conduction disturbances can suggest structural heart disease. However, the rates of progression to dysrhythmias warranting intervention (eg, complete heart block requiring permanent pacemaker placement) are low—particularly in asymptomatic patients.[1]

Learnings/What to Look for

The combination of a right bundle branch block with otherwise unexplained axis deviation suggesting corresponding left anterior or posterior fascicular block defines bifascicular block.

In isolation, left anterior fascicular block (LAFB) are defined by:[2]

- QRS <120ms
- Left axis deviation (**Figure 4**)
- qR complexes in leads I, aVL (**Figure 5A**)
- Prolonged R wave peak time in aVL >45ms (**Figure 5B**)

Pearls for Urgent Care Management

For asymptomatic patients with incidental identification of bifascicular blocks, no further evaluation or therapy is indicated. Symptomatic patients (presyncope, syncope) should be transferred for telemetry monitoring, echocardiography, and possible electrophysiologic evaluation.

References

1. McAnulty JH, Rahimtoola SH, Murphy E, et al. Natural history of "high-risk" bundle-branch block: final report of a prospective study. *N Engl J Med*. 1982;307(3):137-143.
2. Surawicz B, Childers R, Deal BJ, et al. 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. Endorsed by the international society for computerized electrocardiology. *J Am Coll Cardiol*. 2009;53(11):976-981.

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