Question 1: Orthopedic Injuries: Femur and Hip

A 40-year-old man presents with worsening pain and tenderness across the lateral right hip. There is no history of trauma. An x-ray shows no fracture; however, there is a poorly marginated line across the greater trochanter (see image). Which of the following is the correct diagnosis?

- calcific bursitis ✔️
- myositis ossificans ✗
- osteosarcoma ✗
- stress fracture ✗

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**Remediation:**
Bursal calcification can be seen on radiographs as an amorphous, poorly marginated line that is clearly separate from the cortex of the femur.

Repeated acute or chronic inflammation of the bursa can occasionally lead to calcification of the bursa, usually referred to as "calcific bursitis." The calcium deposits appear during the inflammation and remain after it has resolved. Calcific bursitis most commonly occurs at the shoulder (in the bursa adjacent to the rotator cuff tendons) or hip (in the bursa at the greater trochanter) and the gluteal area.

The cause of both calcific bursitis and peritendinitis (calcified tendon at insertion) is similar to that of myositis ossificans (calcification within muscle) (direct trauma, fractures, surgery, chronic overuse inflammation, or joint dislocations).

No relationship has been documented between the radiographic findings and acute symptoms. Treatment consists of stretching and strengthening the affected joint.

**References:**

Question 2: Congenital Heart Disease in the Adult

A 16-year-old boy who has just moved into your school district from Central America comes to you for medical clearance prior to playing football at his high school. Other than "typical" childhood diseases, his medical history is unremarkable. He is physically active, with no history of dyspnea on exertion and no history of cyanosis.

On physical examination, you detect a widely split second heart sound without respiratory variation and a soft systolic ejection murmur (grade 2/3) in the pulmonary area at the upper left sternal border.

What is the most likely cause of these physical findings?

- ventricular septal defect
- coarctation of the aorta
- **atrial septal defect**
- bicuspid aortic valve

**Remediation:**
The most likely cause is atrial septal defect. This type of defect is the most common congenital heart disease (CHD) encountered in adults (incl. teenagers), accounting for up to 15% of all adult cases of CHD. Overall, atrial septal defect is the third most common type of CHD, occurring as an isolated anomaly in 5% to 10% of all patients with congenital heart defects.

About 30% to 50% of children with multiple congenital heart defects have an atrial septal defect as one of their cardiac anomalies. The incidence is higher in females; combined with common ostium secundum defects, the female to male ratio is 2:1.

**References:**


**Question 3: Trauma: Thoracic – Esophageal Injuries**

A 46 year-old patient is rushed to your facility after a motor vehicle collision. He was a restrained driver in a small car and impacted the non-air bagged steering wheel. In the field, he had flaccid paralysis from the neck down and a flail chest, and required intubation. Which of the following statements is correct about esophageal injuries in blunt trauma victims?

- **✗** Esophageal trauma occurs in approximately 10% of victims with a combination of blunt thoracic trauma and injuries to the cervical spine.
- **✗** Esophageal ruptures from blunt thoracic trauma are typically located in the distal posterolateral esophagus (Boerhaave’s syndrome).
- **✓** **Cervical spinal fractures may lead to penetrating injuries of the esophagus**
- **✗** Combined esophageal and tracheal rupture is seen in approximately 1% of patients with blunt thoracic trauma.

**Remediation:**
This particular patient could have suffered esophageal trauma by two mechanisms. In 5% of patients with cervical spine injuries, bony fragments will lead to upper esophageal perforation. About 1% of blunt thoracic trauma victims suffer esophageal trauma either because sharply increased luminal forces against a closed upper esophagus rupture the esophagus or the shearing forces of sudden deceleration exceed esophageal elasticity.

Esophageal injuries are very easily missed in the critically injured, blunt trauma patient with an associated neck fracture because esophageal injuries are rare in the blunt trauma patient and the thought to search for such an injury simply does not occur.

Blunt thoracic trauma tends to result in esophageal ruptures in the mid-thoracic area rather than the more common site of the Boerhaave's syndrome. This difference is possibly due to the dual mechanism of shearing and intraluminal pressure forces that act on the esophagus during blunt thoracic trauma.

Tracheobronchial tears occur in about 1-3% of patients with blunt chest trauma. The presence of a tracheobronchial tear should prompt a search for an esophageal tear - approximately 20% of patients with tracheobronchial injuries will have a concomitant esophageal perforation.

Pearl: Esophageal perforation also has been reported to occur during the placement of cervical fixation devices.

**References:**
Esophageal Perforation Kimchi ET - OTGS - September 2006; 8(3); 156-160

**Question 4: MRSA in the Pediatric Population**

A 10-year-old boy presents with a 1-week history of right knee pain and limp. He is generally healthy, has no prior hospitalizations, and is on no medications. He is a physically active boy with multiple events of minor skin injuries but is not aware of any particular trauma to the area.

Physical exam shows a well-appearing child, temp: 99.9; pulse: 90; resp: 20. Physical exam is normal except for the right lower extremity. There is some mild swelling over the proximal tibia with slight warmth to touch, no erythema or marked tenderness. There is normal range of motion at the knee and no joint effusion. He is able to bear some weight on the right, but not full weight, and walks with an antalgic gait. Laboratory evaluation of his serum shows a leukocyte count of 12,000; platelets of 374,000; CRP of 21; ESR of 65. X-ray of the knee is normal. MRI shows diffuse abnormal signal intensity on T1 and T2 weighted images in the marrow of the right proximal tibia.

The best next step in the management of this patient includes:

- surgical consultation and treatment with IV vancomycin
- oncologic consultation and bone marrow biopsy
- Lyme titer and treatment with IV ceftriaxone
- rheumatology consultation and treatment with oral prednisone
- treatment with non-steroidal anti-inflammatories

**Remediation:**

This patient’s presentation is most consistent with osteomyelitis. Osteomyelitis should be treated with surgical drainage and/or debridement when possible, and antibiotics that include coverage for methicillin-resistant Staphylococcus aureus (MRSA).

*Staphylococcus aureus* is the most common pathogen, followed by *Streptococcus pneumoniae* and *Streptococcus pyogenes*. Community-associated methicillin-resistant *S aureus* (CA-MRSA) continues to be a major and most common cause in many regions of the United States.

Osteomyelitis in children is often the result of hematogenous seeding. The initial bacteremia may occur from a skin lesion, infection, or even from microtrauma during tooth brushing. The sluggish blood flow in metaphyseal capillaries due to sharp turns results in venous sinusoids which give bacteria time to lodge in bones. In addition, the low pH and low oxygen tension around the growth plate assist in bacterial growth. Typically, infection occurs after the local bone defenses have been overwhelmed by bacteria that spread through bone via the Haversian and Volkmann canal systems. Purulence develops in conjunction with osteoblast necrosis, osteoclast activation, release of inflammatory mediators, and blood vessel thrombosis.

The WBC count is only elevated in only one half of patients with or without thrombocytosis, whereas the C-reactive protein and erythrocyte sedimentation rate (ESR) are almost always elevated.
When bacteremia is suspected (based on history and/or serum lab results) or there is involvement of the joint, IV vancomycin 60 mg/kg/day is the empiric treatment of choice. If the patient is stable without joint involvement or bacteremia, IV clindamycin 40 mg/kg/day is an alternative if the clindamycin resistance in the local community is low (<10%). Linezolid and daptomycin are potential alternatives as well.

Duration of therapy should be individualized, but in general 4-6 weeks of antibiotics is recommended for osteomyelitis. Once sensitivities are determined, overall healthy patients are often able to transition from IV to oral therapy.

While Lyme disease is a consideration, this patient does not present with the typical findings of Lyme arthritis, so investigation and treatment for Lyme disease is not the best next step. Patients with Lyme arthritis typically present with a large effusion, restricted range of motion, and minimal tenderness. They are usually able to bear weight on the affected leg.

Oncologic consultation and bone marrow biopsy are not indicated. Patients presenting with acute leukemia should have abnormal cells noted on complete blood count, and may have other physical exam findings such as splenomegaly. Leukemia does not usually cause significant elevation of CRP.

Juvenile idiopathic arthritis (JIA), also known as juvenile rheumatoid arthritis (JRA), presents with joint pain for at least 6 weeks. Children typically will bear weight on affected joints. Physical exam may show effusion and restricted range of motion, but usually minimal tenderness. Early MRI findings will include abnormalities in the joint, such as synovial hypertrophy and effusion, rather than abnormal marrow intensity.

Non-steroidal anti-inflammatories are the treatment of choice for transient synovitis. Transient (or toxic) synovitis often presents with a history of a recent viral illness. It most often affects the hip and can mimic septic arthritis. A sterile joint effusion is usually present, and inflammatory markers such as CRP and ESR are normal.

References:


