These cases have been removed of identifying information. These cases are intended for peer review and educational purposes only.

Welcome to the DCMC Emergency Department Radiology Case of the Month!

In conjunction with our pediatric radiology specialists from ARA, we hope you enjoy these monthly radiological highlights from the case files of the Emergency Department at DCMC. These cases are meant to highlight important chief complaints, cases, and radiology findings that we all encounter every day.

If you enjoy these reviews we invite you to check out Pediatric Emergency Medicine Fellowship Radiology Rounds, which are offered quarterly and are held with the outstanding support of the pediatric radiology specialists at Austin Radiologic Association.

If you have any questions or feedback regarding the Case of the Month format, feel free to email Robert Vezzetti, MD, at rmvezzetti@seton.org.

This Month: Shoulder injuries! They are common in children and required treatment often varies by age. We present several cases this month of all too frequent shoulder mishaps. Celebrate Independence Day and enjoy!

PEM Fellowship Conference Schedule: July 2016
6th - 9:15 Bone and Joint Infections…………………………Dr Allen
10:15 Conducting Research at DCMC…………………Dr Wilkinson
11:15 Rheumatologic Emergencies…………………………TBA

13th - 9:15 Medical Renal Disorders…………………..Dr Vezzetti
10:15 Vomiting, Diarrhea, Dehydration……..Dr Schwartz
11:15 GI Bleeding…………………………………..Dr Schwartz

20th - 9:15 EMTLA/Transfer Basics……….Drs Chu, Pittman, Yee
10:15 Local Transfer Process………..Drs Chu, Pittman, Yee
11:15 Transfers: Cases……………..Drs Chu, Pittman, Yee
12:15 ED Staff Meeting

27th - 9:15 M&M………………………………………Drs Remick and Hill
10:15 Board Review: Ophthalmology………Dr Whitaker
12:15 Research Update……………………………..Dr Wilkinson

Schedule subject to change.
Lectures are held at DCMC Command Rooms 3-4. All are welcome to attend!
Case 1: A 15 year old female comes to you with a complaint of right shoulder pain for the past 5 days. Apparently she fell while climbing some stairs and landed on her shoulder. She seemed ok, but the pain has persisted and it has becomes difficult for her to lift her arm without pain. There are no other symptoms. On exam, there is no deformity and she is neurovascularly intact. She has mild point tenderness over the distal portion of the clavicle. Her humerus, elbow, forearm, and wrist all appear to be normal. Time for some films! Or is it?

Case 2: Next is a 5 year old male who fell out of bed earlier this evening. The fall was unwitnessed but he has been crying and indicating that his left shoulder hurts. He did not have a reported loss of consciousness or other apparent injury. His exam is significant for a crying child who does not want you to touch anywhere on his left upper extremity. You do your best distraction techniques and employ the Child Life Department in the ED. This allows you to elicit tenderness over the left clavicle without other signs of injury. There’s probably a fracture, but do you need imaging to confirm this?

Case 3: Shortly later, a 18 year old male comes in. He was playing soccer when he fell while attempting to score a goal. He landed, you guessed it, on his shoulder. Initially he complained of tingling to the shoulder area, but this has resolved. Now he just has pain. His exams not that impressive, save for some mild tenderness to the POSTERIOR aspect, lateral margin, of the right scapula. Hmmmm. He is now neurovascularly intact and does not apparently have any other injuries. Could he have injured his scapula? If that’s the case, aren’t scapular fractures really bad? At least he scored a GGGGGGGGGGGGGGGGGGGGGGGGGGGGGGGGGGGGGGGG!

Case 4: Summertime is funtime, right? What’s more fun then the monkey bars in the neighborhood park, that is, until someone falls from them. That’s what happened with your next patient, a 6 year old girl, who landed on her right shoulder. There was no loss of consciousness or apparent head injury, but she complains of arm pain. Her exam is unremarkable except for decreased range of motion of her right proximal humerus with pain in that area. She is grossly neurovascularly intact. Maybe she has a humeral fracture. Do you need to cast those? Would shoulder films be adequate or do you need a complete forearm? What’s with all the shoulder stuff today anyway?

Ordering Shoulder Films: A Primer. OK, so you’ve decided to obtain shoulder imaging. Now what? What views do you order? Complete? Three view? Two view? Weighted view? What’s the difference? Here’s a handy guide to what’s what:

AP View, External Rotation: Can see obvious fractures and dislocations and evaluate the AC joint as well as greater tuberosity, but provides inadequate views of the glenohumeral joint. You can also evaluate the proximal humerus.

AP View, Internal Rotation: Can see obvious fractures and dislocations and evaluate the AC joint as well as tuberosity, but provides inadequate views of the glenohumeral joint. You can also evaluate the proximal humerus.

Scapular Y View: Good for shoulder dislocations, glenohumeral dislocations, and some scapular fractures.

Axillary View: Shoulder dislocations, humeral head impaction fractures, acromion fractures, glenohumeral joint evaluation. Requires the patient to abduct the arm, which may be difficult to do.
You decide to obtain some shoulder films; maybe there’s a clavicle fracture. Here are selected views of the patient’s shoulder. The immediate finding is the AC joint; it appears offset relative to the scapula (red arrow), which appears downwardly displaced relative to the clavicle (yellow arrow). The good news is that there is no obvious fracture or dislocation. The bad news is that this finding is suspicious for an AC separation.

Normal coracoclavicular distance varies between 11 mm and 13 mm; a distance > 5 mm is suggestive of disruption.

Acromioclavicular joint injuries are common, especially in young males. Usually they are caused by a direct blow to the shoulder. Typically the AC ligament will rupture. There is a classification system (see above) to qualify the degree of injury; the most commonly used is the Rockwood Classification System. It is helpful when examining these patients to do so while they are sitting, as lying down can mask AC instability. Remember that some patients can have remarkable range of motion, even in severe injury. Management is typically conservative, rather than surgical, in most cases. Complications include residual instability and acromioclavicular arthritis. What happened to this patient? Read on….
Case 2

So you obtain imaging of the child’s left shoulder; a selected view is seen to the right. There is definitely something amiss. This child has a mid shaft clavicular fracture. Clavicle fractures are not unusual in children. One view is usually sufficient, but ideally two views (an AP and Cephalic tilt view) should be obtained. It is very common in children to have apparently normal radiographic but have still have a fracture present. There are sometimes associated injuries, so look carefully at the ribs, scapula, and lung fields (for pneumothorax).

Treatment traditionally consisted of a figure of eight dressing, but this is no longer recommended. Most fractures heal well and only a sling is required. In some cases, especially where there is significant displacement, angulation, or shortening, surgical intervention may be required. If there is any question, consult your friendly Pediatric Orthopedist!

Beware of skin tenting! This patient is at risk for skin breakdown, infection, and necrosis. If tenting is present, consult Pediatric Orthopedics. Surgery may be needed.

Figure of eight splints are uncomfortable and not well-tolerated. A sling (with or without a swathe) is just as elected and better tolerated!
Posterior, lateral scapular pain is a little unusual. You obtain films and the selected images are seen to the right. Look carefully, but there is a scapular fracture (red arrow).

Scapular fractures are not common, accounting for 3-5% of all shoulder fractures. The thing of it is, a pretty good amount of energy is required to produce these type of fractures. Common mechanisms include motor vehicle accidents and falls. Acromion fractures usually results from direct blows; coracoid fractures usually results from avulsion injuries, and glenoid rim fractures usually results from dislocations.

There are 4 types of scapular fractures:
I - acromion, scapular spine, or coracoid process
II - Scapular neck
III - intra-articular fractures of the glenoid fossa.
IV - Body of the scapula.

These fractures are often associated with high impact trauma and other high risk mechanisms, so they are often missed or overlooked. Most of these fractures, even severe ones, heal well on their own with conservative treatment. Slings are used for immobilization and analgesia is important. Displaced fractures, particularly of the acromion process, may impinge on the joint and need surgical management. Displaced glenoid fractures need open reduction and internal fixation.

A scapular fractures should prompt one to look for other associated injuries, particularly of the lung, chest, and shoulder. Neurologic complications can be an issue, especially of the brachial plexus and vascular injury (the axillary artery) can be present.

The Declaration of Independence was actually a letter to King George that had been written on July 2 by Thomas Jefferson. It was a formal explanation of why the Continental Congress voted to declare independence from Great Britain. It was meant to justify a revolt against the British, with a list of charges against the British king.
Well, you obtain images of the shoulder and humerus, since this is where the child appears the most uncomfortable. These images are noted to the right. There is a humerus fracture present ([blue arrow]). Now what? Humerus fractures are relatively common. They tend to separate along physical lines, which lends to four fracture areas: Anatomic neck, Greater tuberosity, Lesser tuberosity, and Proximal humeral shaft.

When examining a patient with a potential humerus fracture, attention should be paid to the axillary nerve, brachial plexus, and axillary artery, as these structures are at risk for injury. Most fractures have minimal displacement and can be managed conservatively, with pain control and a sling or sling and swathe. Operative management is usually reserved for older patients, who tend to have more severe injuries.

Complications include adhesive capsulitis ("frozen shoulder syndrome"), which is often prevented with physical therapy programs, and vascular necrosis of the humeral head. AVN is seen with the most severe fractures, which are unusual in pediatrics.

In this image, we see a mid-shaft humerus fracture. If you look carefully, you can see the presence of a multi-cystic lesion ([yellow arrow]) which serves as a pathologic point for the fracture ([red arrow]). This lesion is a bone cyst and is quite common. It is not malignant.

There is a **fallen fragment sign** in this image. This is the presence of a bone fracture fragment resting dependently in a bone cystic lesion.

"Yankee Doodle" was originally sung by British military officers prior to the Revolution as a means to mock the disorganized American colonists who fought alongside them during the French and Indian Wars.

**Case 4**

This child fell while playing, you guessed it, soccer.
Teaching Points

1. Shoulder injuries in children are common and often represent contusions or strains, but clavicular and humeral fractures are often seen.

2. Consider the various views available when imaging a shoulder. Some views are more useful than others for evaluating specific conditions.

3. While there are different degrees of AC joint injury/separation, most are managed conservatively, with attention to pain control with NSAIDS and a sling for support of the arm. Rarely is surgical repair required.

4. Clavicle fractures tend to heal well on their own and children generally tolerate a sling well. A sling and swathe may also be utilized. Conservative management is the norm. If there is tenting of the skin then reduction may be required.

5. Scapular fractures typically require high force, so look for other injuries when encountering this type of fracture. Most of these fractures respond well to conservative management and do not require operative repair.

6. Humeral fractures usually heal well on their own. Be aware of associated injury to the axillary nerve and artery, as well as the brachial plexus.

7. As always, maintain a high suspicion of non accidental trauma in children presenting with shoulder injuries whose histories or developmental abilities do not make sense!

References