Orthopedic Issues in Family & Emergency Medicine

Clavicle Fractures 101

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Introduction

Physicians need skills in the diagnosis and management of commonly occurring injuries. In many places, subspecialist help is not available or affordable.[1] These basic skills reflect the reality of community medical practice for a variety of specialties staffing rural emergency rooms, primary care offices, and mission hospitals. For younger physicians, most academic medical centers teach a curriculum of "Refer to Ortho." Hatch et al have described the epidemiology of common fractures in the community.[2]

Many training programs have no incentive to install and maintain basic imaging equipment. Patients with possible fractures are triaged to the hospital before they receive any evaluation at the point of initial service. This is a lost opportunity for the development of these skills.

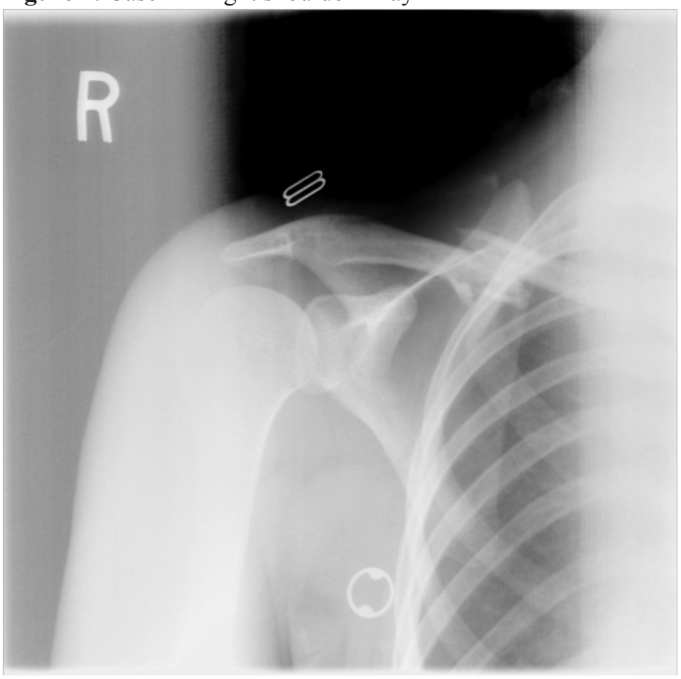
Most injuries require screening with imaging. When detected, most fractures can be managed conservatively while maintaining quality in the community. The trick is to find the fracture. Then physicians can start to develop the knowledge of selecting those cases that require surgery and conservatively manage the others.[3-6] This series is dedicated to those physicians serving in areas where resources are scarce and the hours are long.

Case 1 (Figures 1 and 2)

A 22-year-old female tripped and fell last night. Recent open access policies at the clinic allowed her to "walk-in" without an appointment. Her past medical history is noncontributory, but she reports pain in her right shoulder. This is aggravated by moving her right arm. Her vital signs are normal, and neurovascular exam of the right arm is normal. She has difficulty localizing the pain and wants a shot for pain relief.

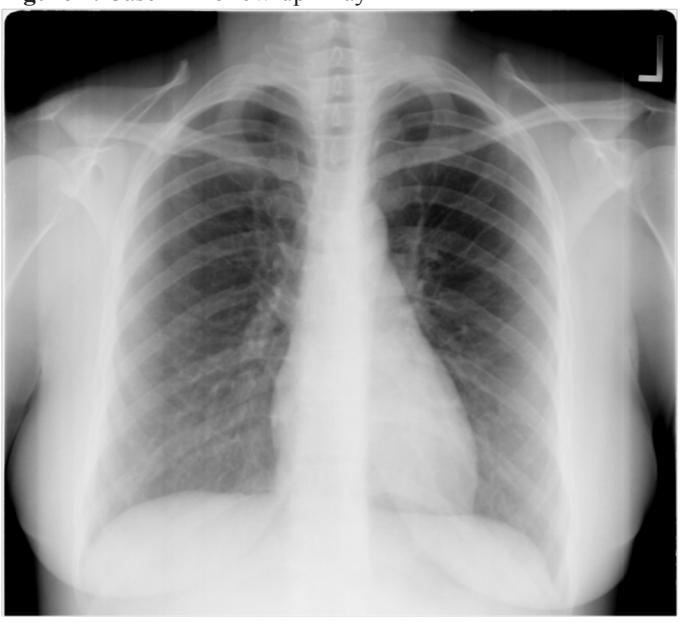
1. Based on the radiographic image below (Figure 1), the most likely diagnosis is:
   a. A severe sprain of the right shoulder rotator cuff
   b. Non-displaced, non-angulated fracture
   c. Non-displaced, angulated fracture
   d. A fracture that is angulated and displaced
   e. A fracture that is displaced but not angulated
2. The most appropriate management would be:
   a. Refer to the emergency room
   b. Refer to surgery for open reduction and internal fixation
   c. Place into figure of eight splint for now
   d. Place right arm in sling for comfort

Figure 1: Case 1 - Right shoulder x-ray



3. Below is an image (Figure 2) of the same patient taken nine months later. She reports no symptoms relating to the right arm and shoulder. Based on this image, the best choice below would be:
   a. An operation was performed and the result is satisfactory
   b. An operation was performed but the result was not satisfactory
   c. No operation was performed and the result is satisfactory
   d. No operation was performed and the result is not satisfactory

Figure 2: Case 1 - Follow-up x-ray



4. This injury and the subsequent result will likely result in:
   a. Gradually worsening arthritis of the R shoulder.
   b. A subtle but discernible loss of strength for the right arm.
   c. A cosmetic deformity leading to avoidance of evening gowns.
   d. Full return to work and with no restrictions.
   e. Full return to work with no restrictions but an annoying cosmetic deformity.

Case 2

A 57-year-old Latino construction worker fell one week ago and reports continuing pain despite daily massage therapy by "huesero" who provides services for orthopedic injuries. He has not been getting better and wishes to return to work as soon as possible. His past medical history is unremarkable, and his neurovascular examination is normal. He has limited range of motion of his right shoulder.

Figure 3: Right shoulder x-ray

1. Upon obtaining this radiograph, what is your diagnosis?
   a. Type II (lateral third) displaced, angulated, comminuted fracture.
   b. Type I (mid-shaft) displaced, angulated, comminuted fracture.
   c. Type III (medial third) non-displaced, non-angulated, comminuted fracture.
   d. Type I non-displaced, angulated, comminuted fracture.

2. After diagnosis, what would be most appropriate?
   a. Panic, send patient to emergency room and refer to orthopedics.
   b. Have him schedule another appointment with a different huesero.
   c. Give patient pain medication and a work excuse for

three weeks and have him follow up in the office.

d. Put the patient in a figure-8 brace and advise no lifting for six weeks.

3. With conservative management, what is the likelihood of a good result for this patient? (Good meaning bone union, resolution of pain, without gross deficit in function or cosmetic abnormality)
   a. 73%
   b. 27%
   c. 0%
   d. 50%

4. Which case of clavicular fracture must be considered for surgical consult?
   a. Simple fracture with severe pain and deformity
   b. Patient has neurovascular compromise
   c. Angulated fracture
   d. Comminuted fracture

5. When can wearing the figure-8 brace be discontinued?
   a. When the patient gets tired of wearing it.
   b. When the patient no longer experiences pain, and there is no palpable fracture motion when scapula is retracted or elevated.
   c. Only after six weeks and a satisfactory follow-up film is obtained.
   d. After one year.

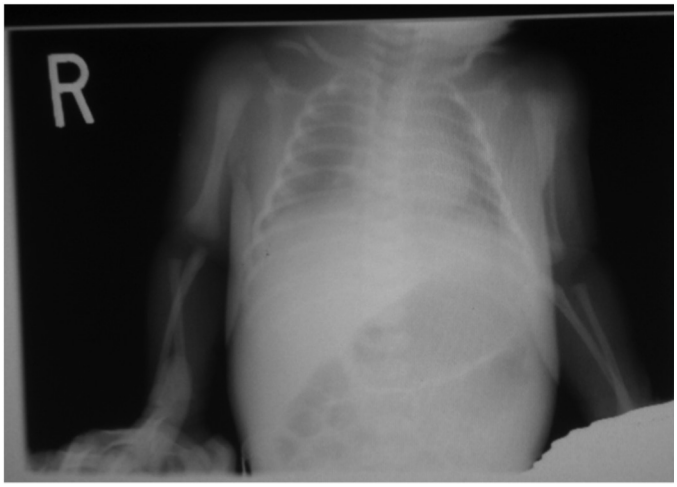
Case 3: (Figures 4 and 5)

This four-day-old baby will not move his arm. He was a term delivery with Apgars of 8 and 9. His birth weight was reported to be 9 pounds 7 ounces. He is feeding normally. His vital signs are normal, and the only physical finding is a limited use of the right arm.

Figure 4: Baby will not move arm - first view

1. Upon obtaining this radiograph (Figure 4), is there anything wrong with this picture?
   a. No, this is a normal infant X-ray.
   b. Yes, non-displaced, non-angulated fracture.
   c. Yes, displaced, angulated fracture.
   d. Yes, displaced, non-angulated fracture.

Figure 5: Baby will not move arm – second view



2. After obtaining your diagnosis, what would be appropriate?
   a. Panic and call the orthopedic resident.
   b. Put the child in an infant-sized figure-8 brace.
   c. Apologize to the family for causing this very rare and dangerous event during delivery.
   d. Reassure the family that this is a common complication of vaginal delivery and that the child will do fine.

3. Which treatment is appropriate for this child?
   a. Attempt closed reduction of the fracture.
   b. Obtain written consent from family for open reduction internal fixation (ORIF) surgical procedure.
   c. Do nothing.
   d. Put the patient in a body cast.

4. If the patient seems to be in significant discomfort, what can be done?
   a. Give the infant pain medicine and a referral to Ortho.
   b. Place child in figure-8 splint for one week and lay the child on his back.
   c. Immobilize the ipsilateral arm by safety-pinning the long shirtsleeve to the shirt (for 7-10 days) and counsel parents to avoid unnecessary movement of extremity.
   d. Nothing.

5. What is a key element in the treatment of this patient?
    a. Reprimanding the physician who broke the patient's clavicle during delivery.
    b. Apologizing to family for this rare complication that should have never happened.
    c. Tell the parents that their child will require a longer hospital stay to monitor his progress.
    d. Reassure the parents that their child will be fine and that they will notice a bump over the broken bone that will heal and go away in about six months.

Case 4: (Figures 6 and 7)

A 17-year-old boy falls and experiences immediate pain in his left shoulder. Normally, a pediatrician sees him, but they do not have radiology services. He has been sent to the ER but comes to Medicos instead. His past medical history is unremarkable, and his vital signs are normal. His physical examination is normal except for pain in the area of the left shoulder and limited range of motions secondary to pain.

Figure 6: Left shoulder

1. Based on the information available in Figure 6, the physician concludes:
    a. Non-displaced, angulated oblique fracture.
    b. Displaced, angulated, spiral fracture.
    c. Displaced, angulated, transverse fracture.
    d. Displaced, angulated torus fracture.

2. For this young man, which conservative measure would be appropriate?
    a. Send patient on to emergency room.
    b. Set up referral for orthopedics.
    c. Put patient in an arm sling and have him follow up in two weeks.
    d. Put the patient on bed rest for three weeks.

3. As part of recovery, which therapy is recommended for this fracture?
    a. Lightweight shoulder raise while standing.
    b. Massage therapy
    c. Therapeutic ultrasound
    d. Forward elevation, and external rotation stretches of affected extremity while supine.

Figure 7: Nine months later, the 17-year-old returns for evaluation of a groin abscess

4. Based on the information available in Figure 7, the physician would conclude which one of the following.
    a. Unsatisfactory result with loss of function.
    b. Satisfactory healing with normal function and strength.
    c. Painful malunion in need of surgical correction.
    d. Malunion requiring figure-8 brace.

5. Which immobilization technique for clavicle fracture is best?
    a. Figure-8 brace
    b. Sling
    c. Sling and swathe
    d. All are adequate; there is no evidence supporting one form as superior.

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Bibliography

1. Rodney WM. Forward in Pfenningere JL, Fowler GC. *Procedures for Primary Care Physicians*. Mosby, St. Louis, 1994. New edition 2002.
2. Hatch RL, Rosenbaum CI. Fracture care by family physicians: A review of 295 cases. *J Fam Pract*. 1994;38:238-244.
3. Warren JS, Lara K, Hahn RG. Correlation of emergency department radiographs: results of a quality assurance review in an urban community hospital. *J Am Board Fam Pract*. 1993;6:255-9.

4. Halvorsen JG, Kunian A, Gjerdingen D, et al. The interpretation of office radiographs by family physicians. *J Fam Pract*. 1989;28:426-432.

5. Simon HK, Khan NS, Nordenberg DF, Wright JA. Pediatric emergency physician interpretation of plain radiographs: Is routine review by a radiologist necessary and cost-effective? *Ann Emerg Med*. 1996;27:295-298.

6. Smith P, Temte J, Beasley J, Mundt M. Radiographs in the Office: is a second reading always needed? *J Am Board Fam Prac*. 2004;17:256-263.

7. Nordqvist A, Petersson CJ, Redlund-Johnell I. Mid-clavicle Fractures in Adults: End Result Study After Conservative Treatment. *Journal of Orthopaedic Trauma*. 1998;12(8),572-576.

8. Pujalte GGA, Housner JA. Management of Clavicle Fractures. *Current Sports Medicine Reports*. 2008(September/October);7(5),275-280.

9. Stefanos Lazarides, MD, and George Zafiropoulos MD, MPhil. Conservative treatment of fractures at the middle third of the clavicle: The relevance of shortening and clinical outcome. *Journal of Shoulder and Elbow Surgery.* Mar-Apr 2006;15(2),191-194.

Recommended Reading

1. Beaty JH, Kasser Jr (eds.). *Rockwood and Wilkins' Fractures in Children*. 5th Edition. Philadelphia: Lippincott Williams & Wilkins. 2001. ISBN 0781725097. Pages 757-765.

2. Rockwood CA Jr., Green DP, Bucholz RW (eds.). *Fractures in adults*. 3rd edition. Philadelphia: Lippincott. 2001. ISBN 0397512309 (v.1). pp 1041-1074.

3. Resnick D. *Bone and Joint Imaging*. 2nd edition. Philadelphia: W.B. Saunders. 1996. ISBN 0721660436. pp 761-762.

4. Muller NL, Silva CIS (eds.). *Imaging of the Chest*. 1st edition. Saunders Elsevier. 2008. ISBN 978-1-4160-4048-4.

5. Connolly JR. *Fractures and Dislocations – Closed Management*. WB Saunders. 1984. Two volumes. ISBN 0-7216-2601-7.

6. Greens WB (ed.). *Essentials of Musculoskeletal Care*. 2nd edition. American Academy of Orthopedic Surgeons. 2001. ISBN 0-89203-217-0.

Recommended Websites

Procedural Skills and Office Technology. Senior Editor Wm. Rodney. www.psot.com www.learningradiology.com.

Answer Key

Case 1:

1-e

2-c

3-c

4-d

Case 2:

1-b

2-d

3-a Explanation: Nordqvist and colleagues found that 62/85 cases of comminuted Type I fractures had a good outcome with conservative measures.7

4-b

5-b

Case 3:

1-d

2-d Explanation: Type I fractures account for 90% of all obstetrical fractures and occur in 1-13% of all vaginal deliveries.

3-c

4-c

5-d

Case 4:

1-c

2-c

3-d Explanation: Rockwood and Green give these exercises as helpful rehab activities.

4-b

5-d Explanation: Pujalte and colleagues state that there is not enough evidence to deem one method best for immobilization.[8]

Dates are subject to change.