ORTHOPAEDICS

FOR PRIMARY HEALTH CARE

LION

LEARNING INNOVATION VIA ORTHOPAEDIC NETWORKS

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Approach to orthopaedic X-rays

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Learning objective

1. Systematically describe a fracture on an X-ray.

Basics

You can remember a simple approach an XRs through the acronym **ABCS** (Adequacy, Bone, Cartilage, Soft tissue).

Specific views need to be requested depending on the suspected injured joint.

Joint	Views
C-spine	AP, lateral, open mouth (dens injuries)
Shoulder	AP, Y-view, axillary view
Elbow	AP, lateral, Greenspan (radial head and neck #)
Wrist	Scaphoid views
Pelvis	AP, inlet view, outlet view
Acetabulum	AP, judet views - objurator oblique, iliac oblique
Ankle	AP, lateral, Mortise views (talar shift and syndesmotic injuries)
Foot	AP, lateral, oblique
Markers for GSWs	help understand bullet tracts
Stress views	Done by orthopod

A. Adequacy

Is this an adequate X-ray regarding demographic information of the patient, date, time, and site/side, view or projection? (e.g. AP X-ray of the right shoulder showing distal to the midshaft of the humerus and medial to past the mid clavicle but not including the sternoclavicular joint), Rule of Twos.

The Rule of Twos: When requesting and evaluating orthopaedic X-rays, it is important to always apply the Rule of Twos:

- **2 views**: Usually AP and lateral.
- **2 joints**: Include the joint above andbelow the bone with the pathology.
- **2 limbs**: Useful for comparison, particularly in children with growth plates provided the other side is normal.
- **2 opinions**
- **2 occasions**: PaPrticularly in fracturesbefore and after reduction or application of splints/casts.

B. Bone

Assess from outside (cortex) to inside (medullary cavity) and trace the outline of the bone.

- **Density**; 'Darker', less distinct bone projection with thin cortices is described as osteopaenic. Lesions are described compared to the surrounding bone: Lytic = density is

- lower, sclerotic = density is higher, or a combination described as mixed.

Osteolytic lesion of an osteochondroma, a common and benign cartilage lesion affecting young people (Image: Thomas Hilton)

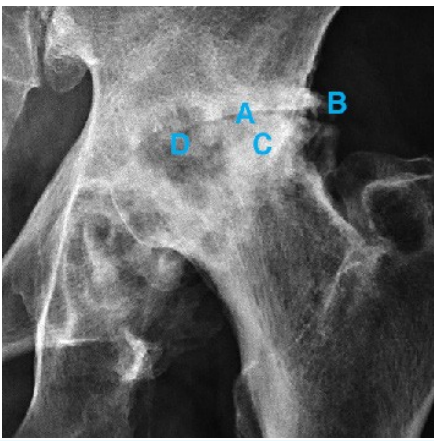
- **Fracture**: Any disruption or break in the cortex should be described according to its location (diaphysis, metaphysis, epiphysis, intra or extra articular), pattern (simple or complex/ comminuted) and displacement.
- **Displacement** describes how the distal part of the bone has moved relative to the proximal part of thebone. The displacement should bedescribed in at least 2 planes, the coronal plane as seen on an AP X-ray and the sagittal plane as seenon a lateral X-ray. The axial plane displacement is rotation and oftenneeds to be assessed clinically as it is not obvious on AP and lateral X-ray. Displacement can be described as LARA (length, apposition, rotation and angulation).

Example: The midshaft transverse tibia fracture is shifted 25% medial and 25% posterior with 10° of varus tilt and 30° of anterior tilt, there is a5mm of impaction.

C. Cartilage/joint

Assess for joint **congruency; subluxation** is when the joint is partially in tact and dislocation is when there is no contact between the articular surfaces.

Assess for signs of cartilage **degeneration or osteoarthritis**; joint space narrowing, osteophytes, subchondral sclerosis and subchondral cysts.



Osteoarthritis of the left hip

A) joint space narrowing; B) osetophytes; C) subchondral sclerosis and D) subchondral cysts

S. Soft tissue

- **Swelling** or signs of joint effusion or haemarthrosis.
- **Gas** suggesting an open wound or infection.
- **Foreign body**, e.g. glass.
- **Discontinuity** of the soft tissue line or dressings, indicating a wound.

References

Modified images

1. Osteolytic lesion: https://commons.wikimedia.org/wiki/File:Ganglio_intraosseo.png
2. Osteoarthritis: https://commons.wikimedia.org/wiki/File:Severe_(T%C3%B6nnis_grade_3)_osteoarthritis_of_the_hip.jpg

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ABOUT THE BOOK

Informed by experts: Most patients with orthopaedic pathology in low to middle-income countries are treated by non-specialists. This book was based on a modified Delphi consensus study* with experts from Africa, Europe, and North America to provide guidance to these health care workers. Knowledge topics, skills, and cases concerning orthopaedic trauma and infection were prioritised. Acute primary care for fractures and dislocations ranked high.

Furthermore, the diagnosis and the treatment of conditions not requiring specialist referral were prioritised.

* Held et al. Topics, Skills, and Cases for an Undergraduate Musculoskeletal Curriculum in Southern Africa: A Consensus from Local and International Experts. JBJS. 2020 Feb 5;102(3):e10.

THE LION

The Learning Innovation via Orthopaedic Network (LION) aims to improve learning and teaching in orthopaedics in Southern Africa and around the world. These authors have contributed the individual chapters and are mostly orthopaedic surgeons and trainees in Southern Africa who have experience with local orthopaedic pathology and treatment modalities but also in medical education of undergraduate students and primary care physicians. To centre this book around our students, iterative rounds of revising and updating the individual chapters are ongoing, to eliminate expert blind spots and create transformation of knowledge.

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