Postoperative radiographic evaluation: should I go back?

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Immediate postoperative radiographic assessment is essential to allow evaluation of fracture repair. High-quality orthogonal radiographs, and occasionally oblique projections, must be thoroughly assessed in order to identify surgical errors, which present either an immediate problem (e.g. intra-articular screw placement) or potential problems with respect to implant or construct failure and/or fracture healing. Identification of significant errors will necessitate returning to theatre to allow rectification. Addressing issues immediately postoperatively can often prevent the development of complications, allowing for early return of limb function and uncomplicated fracture healing.

In order to facilitate accurate assessment it is useful to consider the three As.

- **Alignment:** pay attention to the axial and rotational alignment of the joints above and below the fracture. With an articular fracture, appropriate alignment of the joint surface and mechanical axis is imperative in aiming for optimal joint function
- **Apposition:** where the fracture has been anatomically reconstructed, accurate apposition of the fracture fragments is imperative. Poor fracture reduction and small gaps at the fracture site, whilst appearing innocuous, have the potential to result in premature implant failure. When a comminuted fracture is stabilized using bridging osteosynthesis, apposition can be substituted for adjacency. In this situation appropriate adjacency of the main fracture fragments to the region of comminution is important; too large a gap may prevent fracture healing
- **Apparatus:** this refers to the implants that have been used to achieve fracture repair, in particular their location, placement, security and size. It should be remembered that the implants used have to meet the mechanical demands as dictated by patient's fracture. Errors associated with the apparatus are likely to result in poor limb use, implant/construct failure and/or complications of fracture healing.

Clinical and radiographic assessment during the healing period is essential to assess for expected limb function and fracture healing. The timing of follow up is dependent on many factors including the nature of the injury, apparatus used, expected healing time as well as financial constraints. When assessing follow-up radiographs, in addition to the three As, the addition of a fourth A is beneficial.

- **Activity:** this refers to assessment of fracture healing. For every patient it must be decided if type of fracture healing is as expected (i.e. primary or secondary) and if it is progressing at the anticipated

rate. Activity, be it too little or too much, and which does not correlate with that which was expected, may suggest postoperative complications are present or developing.

When complications of fracture healing are present, thorough radiographic interpretation is imperative as multiple factors are likely to be contributing. All must be identified and considered to allow construction of a problem list, and to facilitate revision surgery planning.

KEY LEARNING OBJECTIVES

- Describe a systematic approach to postoperative radiographic evaluation
- Recognize errors or complications which may require intervention
- Appreciate the importance of being self-critical

MULTIPLE CHOICE QUESTIONS

1. When assessing the immediate postoperative radiograph what are the three As that should be considered?
 - (A) Alignment, accuracy and apposition
 - (B) Alignment, apparatus and apposition
 - (C) Accuracy, apparatus and alignment
 - (D) Apparatus, apposition and accuracy
2. When assessing the immediate postoperative radiographs, which one of the following could most likely predispose to failure of the bone plate?
 - (A) An anatomically reconstructed transverse diaphyseal radial fracture
 - (B) A reconstructed transverse diaphyseal radial fracture with a small gap on the cis-cortex
 - (C) A reconstructed transverse diaphyseal radial fracture with a small gap on the trans-cortex
 - (D) Comminuted radial and ulnar diaphyseal fractures which been stabilized using bridging osteosynthesis with plates applied to the radius and the ulna
3. A 3-year-old Border Collie sustained mid-diaphyseal transverse radial and slightly comminuted mid-diaphyseal ulnar fractures. The fractured antebrachium was stabilized using a bone plate applied to the dorsal aspect of the radius following its anatomical reconstruction. At follow-up assessment 8 weeks postoperatively, the patient is free from lameness. What type of activity would be anticipated on follow-up radiographs?
 - (A) Primary bone healing of the radius and the ulna
 - (B) Secondary bone healing of the radius and primary bone healing of the ulna
 - (C) Secondary bone healing of the radius and ulna
 - (D) Primary bone healing of the radius and secondary bone healing of the ulna

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