Techniques of reduction

Direct and indirect reduction

Tasks
Examine bone models; reduce fractures directly or indirectly, according to fracture pattern, location, and surgical approach.

Learning outcomes
- Differentiate between direct and indirect reduction
- Relate both techniques to specific indications and bone segments

Take-home message

Direct reduction
- Fracture site is exposed, hands or instruments directly manipulate fracture fragments
- Reduction achieved is directly visible

Indirect reduction
- Fracture site is not exposed, reduction is performed by applying corrective forces and moments at a distance from the fracture
- Reduction is checked clinically or using image intensifier, x-rays

Metadiaphyseal segment
Indirect reduction to obtain
- Length
- Axial alignment
- Rotational alignment

A diaphyseal fracture is a black box
- No visualization
- No direct contact

Articular segment
Anatomical reconstruction of the joint surface

Direct reduction

Indirect reduction, ligamentotaxis
Techniques of reduction

Use of reduction clamps

Tasks

1. Examine a variety of reduction clamps/forceps
2. Apply different tools at different anatomical sites

Learning outcomes

- Identify the degrees of freedom for each clamp
- Recognize difficulties in the application of the different devices
- Analyze biological advantages and shortcomings of different clamps

Take-home message

Use proper tools according to the anatomical and technical conditions

Pointed reduction clamps

Matta clamp
Weber clamp

Toothed reduction clamp

Spanier clamp

Bone holding clamp

Farabeuf clamp
- Compression
- Shear
- Pull and push

Jungbluth clamp
- Compression and distraction
- Shear
- Pull and push

Verbrugge
Reduction onto the plate

Collinear reduction clamp

Compression
Pulling the plate end towards the screw

Pelvic reduction clamps

Farabeuf clamp

Jungbluth clamp

Collinear reduction clamp

Allows minimally invasive direct reduction