

## 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

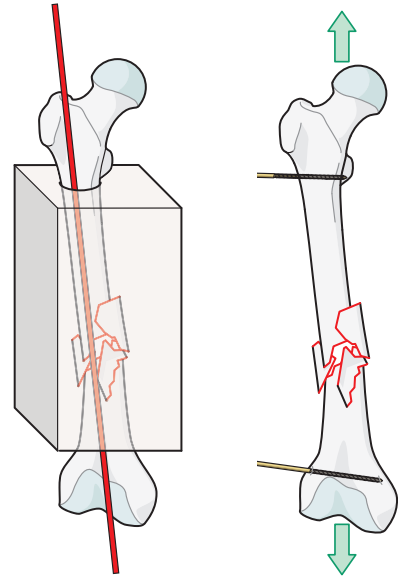
#### Metadiaphyseal segment

Indirect reduction to obtain

- Length
- Axial alignment
- Rotational alignment

A diaphyseal fracture is a black box

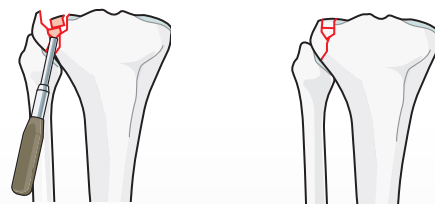
- No visualization
- No direct contact



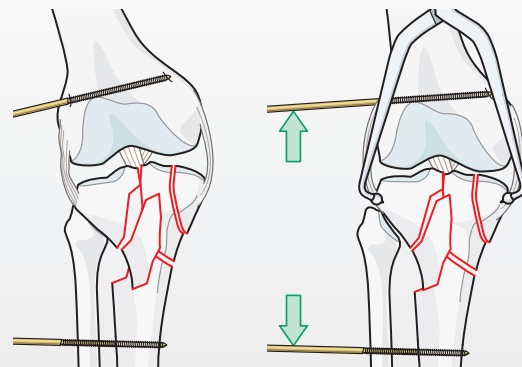
#### Articular segment

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

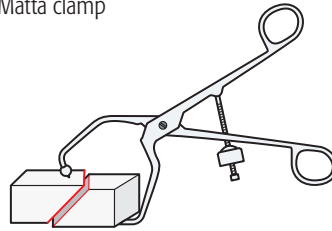
- Identify the degrees of freedom for each clamp
- Recognize difficulties in the application of the different devices
- Analyze biological advantages and shortcomings of different clamps

### Take-home message

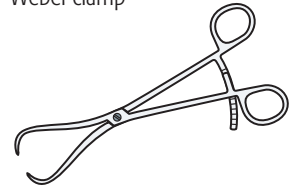
Use proper tools according to the anatomical and technical conditions

#### Pointed reduction clamps

Matta clamp

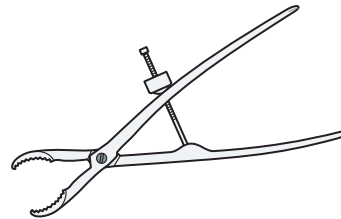


Weber clamp



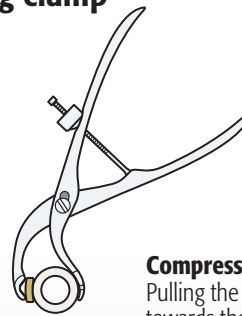
#### Toothed reduction clamp

Spanier clamp

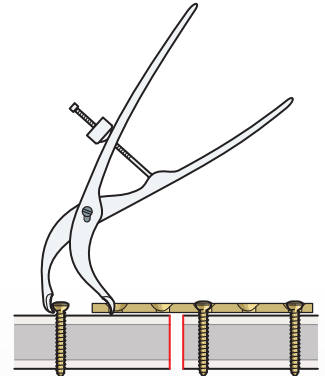


#### Bone holding clamp

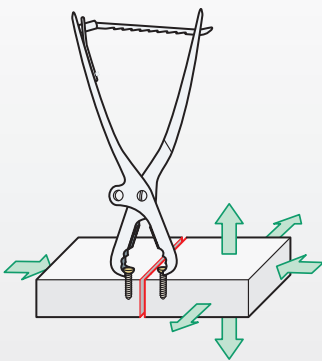
**Verbrugge**  
Reduction onto the plate



**Compression**  
Pulling the plate end towards the screw

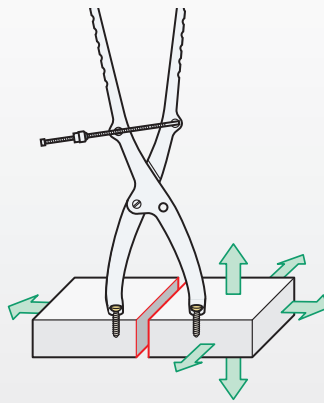


#### Pelvic reduction clamps



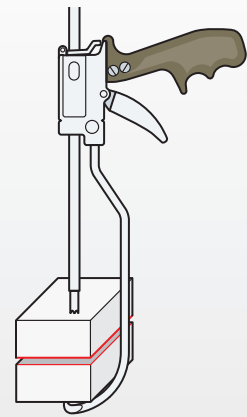
**Farabeuf clamp**

- Compression
- Shear
- Pull and push



**Jungbluth clamp**

- Compression and distraction
- Shear
- Pull and push



**Collinear reduction clamp**

Allows minimally invasive direct reduction