AO Foundation

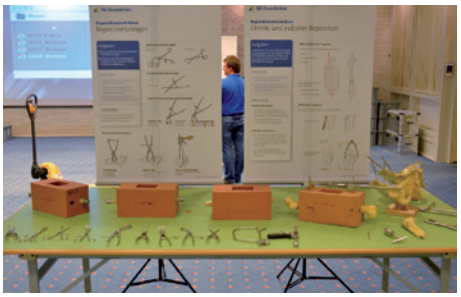
STATION F

Skills Lab Faculty Guide
Techniques of reduction

At this station, you will introduce participants to different reduction techniques and tools, as well as their applications and limitations.

Fracture reduction is probably the most difficult task in surgery. Accomplishing successful reduction without destroying the blood supply to the bone and soft tissues is key for the success of the intervention.

This station provides a variety of reduction clamps, two pelvis models, as well as a number of fractured artificial bones in foam blocks. After you have explained the differences between the clamps and tools on the table, the participants will try to reduce the fractures with the devices available.



Learning outcomes

After completing this station, participants will be able to:

- Differentiate between direct and indirect reduction
- Relate both techniques to specific indications and bone segments
- Identify the degrees of freedom for each reduction clamp
- Recognize difficulties in the application of the different devices
- Analyze biological advantages and shortcomings of different clamps

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

Station sequences (your tasks)

When you arrive at the station for the Skills Lab module:

- Familiarize yourself with the posters which include information about the station learning outcomes and tasks.
- Check the set-up before participants arrive at this station; ensure that all clamps are there.

During the group activity (to be repeated for each group):

Use of reduction clamps

- Explain the different types and functions of reduction clamps. Point out that similar clamps can have different locking mechanisms.
- Encourage participants to look at and feel each different clamp and practice reducing various fractures. The bone fractures set in foam boxes facilitate three different approaches:
  - Putting the clamps directly through the window (open approach).
  - Using the window as if it were a „permanent" C-arm, placing the clamp through a small incision on the side of the foam (minimally invasive approach).
  - Cover the window and let participants work only through the side incisions by tactile perception.
- Explain how the femoral distractor is used and name its advantages and disadvantages.

Direct and indirect reduction

- Explain the task to participants, encouraging them to test their skills with different bone models and bone-holding mechanisms; ideally, every participant tries at least one direct and one indirect reduction.

Discussion points

- Discuss different degrees of freedom and reduction capacity of the reduction tools: compression, distraction, rotation, and combinations thereof.
- Summarize the take-home messages.

While participants are changing tables:

- Remove all reduction tools from any bones.
- Put the foam models and clamps back into order.
- Check that none of the clamps are missing.

Before you leave the station after the Skills Lab module:

- Check the station and make sure all clamps are still there.

Frequently asked questions (FAQs)

Why do we have different reduction techniques?
In order to understand reduction one must also take into account what kind of fixation and stability is going to be used. In that order there will be some discussion on the difference between anatomical reduction and anatomical alignment (see next FAQ) and between absolute and relative stability (a topic discussed at Station E: Fracture healing).

What is anatomical reduction and anatomical alignment?
Anatomical reduction is a technique where you put back together all the fracture fragments in their original anatomical positions to reestablish the original shape and form of the fractured bone. Anatomical reduction is used to reduce articular fractures.
Anatomical alignment refers to reestablishing the original axis of the bone without as much regard to the exact position of every fragment. It is used in metaphyseal and diaphyseal fractures.

How is all this clinically relevant?
The surgical treatment of a fracture comprises three main steps that ought to be included in a complete preoperative plan: surgical approach, fracture reduction, and fracture fixation. Reducing the fracture is one of the difficult steps in this surgical process and is often underestimated. Since there are many reduction techniques and reduction-aiding devices, getting to know and adding them to your surgical arsenal is important if you want to successfully reduce any kind of fracture. Developing a refined surgical reduction technique that respects the biological principles of fracture fixation (open, closed, or minimally invasive) is a major step in becoming an accomplished surgeon.