



Skills Lab Faculty Guide

Damaged implant removal (Option 1)

At this station, you will teach participants how to use instruments specially designed for the purpose of removing worn or broken screws.

Implant removal is sometimes considered relatively simple surgery, commonly performed by orthopedic trainees, often without attending supervision. But what may be a common, straightforward task can easily become a nightmare. Imagine you are about to remove a

screw. You take your screwdriver, couple it with the screw and rotate it. Suddenly you feel there is no purchase, the screwdriver turns but the screw does not move. The coupling mechanism of the head of the screw is destroyed. On another note, imagine you are about to loosen the screw when suddenly, the screw head breaks off the shaft.

This station provides the opportunity to practice these two scenarios.



Learning outcomes

After completing this station, participants will be able to:

- Identify the function of different instruments to aid screw removal
- Remove a screw with a destroyed coupling mechanism
- Remove a broken screw

Take-home message

- Use undamaged screw drivers
- Clean the hexagonal coupling mechanism of the screw head
- Everything in the removal set is left threaded

Station sequences (your tasks)

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

- Familiarize yourself with the poster which includes information about the station learning outcomes and tasks.
- Check the set-up before participants arrive at this station.

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

- Explain the task to participants and introduce the different damaged/broken screws.
- Use the Screw Removal Set as indicated by its manufacturer. Emphasize that everything in the removal set is left threaded.
- Instruct participants:
 - The 3.5 mm screws should be removed with the 2.5 mm screwdriver. However, the screw heads are damaged and thus, the lack of coupling between screwdriver and screw heads permits removal of the screws.
 - Insert the conical extraction screw into the worn screw head. Press firmly in an axial direction and turn tool counterclockwise to remove the screw.
 - The 4.5 mm screws have been prepared so that their head breaks off as soon as a participant tries to tighten the screw with

a screwdriver. The hollow reamer is used to remove the bone around the shaft of the screw, prior to be able to remove the shaft with the hollow extraction bolt. Enough bone must be removed to allow coupling of the shaft with the extraction bolt even if you need to drill all the way through the cortex.

- Once the shaft has been cleared, use the extraction bolt to get a grip on the screw and remove it. The bolt must be turned counterclockwise around the shaft of the broken/drilled screw for it to grasp and then be removed.
- Encourage participants to test their skills with different damaged/broken screws.

Discussion points

- Discuss how to use the implant removal instrument set.
- Review means to avoid screw coupling destruction.
- Summarize the take-home messages.

While participants are changing tables:

- Exchange the artificial bone models in the bone holders when all screws have been extracted.
- Clean the table and the instruments with a cleaning towel, if necessary.

Before you leave the station after the Skills Lab module:

- Ensure the extraction sets are complete.

Frequently asked questions (FAQs)

How do you prevent coupling problems when removing a screw?

The main way to prevent destroying the coupling mechanism of a screw is ensuring adequate screwdriver-screw coupling when placing and removing the implant. The surgeon must feel and see that the screwdriver has fully attached to the screw and has a good grip. When removing the implant, care should be taken to check that all tissue has been removed from the coupling hole to allow perfect matching between driver and screw. Turn the driver slowly with your hands while pushing it against the screw head. Feel if there is a good catch between the screwdriver and the screw. If it feels loose, recheck its position.

Ensure the adequate tools for removing the implant are available; that is, having a screwdriver that is the right size and shape. Do not use damaged screwdrivers. Finally, do not underestimate any surgical procedure. Always use a careful surgical technique and pay attention to every detail.

What should be done if a coupling problem develops or if a head breaks (or is broken)?

Ensure all the necessary instruments are available for difficult implant removal. If no instruments are available, consider rescheduling the surgery or reconsider the necessity of implant removal. Always remember that the first rule of medical action is do no harm, so always carefully consider a harm/benefit analysis when faced with failed implant removal.

Finally, remember to explain to your patient before the removal surgery that there is a possibility of failure to remove the implant. That way he/she will know there is always a slight chance that, even after the procedure, the implant may not have been successfully removed.

Why not use a power drill with the hollow reamer?

Be aware of the fact that a lot of heat is produced (see station „Heat generation during drilling“) when drilling or reaming. The benefit in time you might gain when using a power drill will be devoured by the damage created to the bone by heat necrosis.