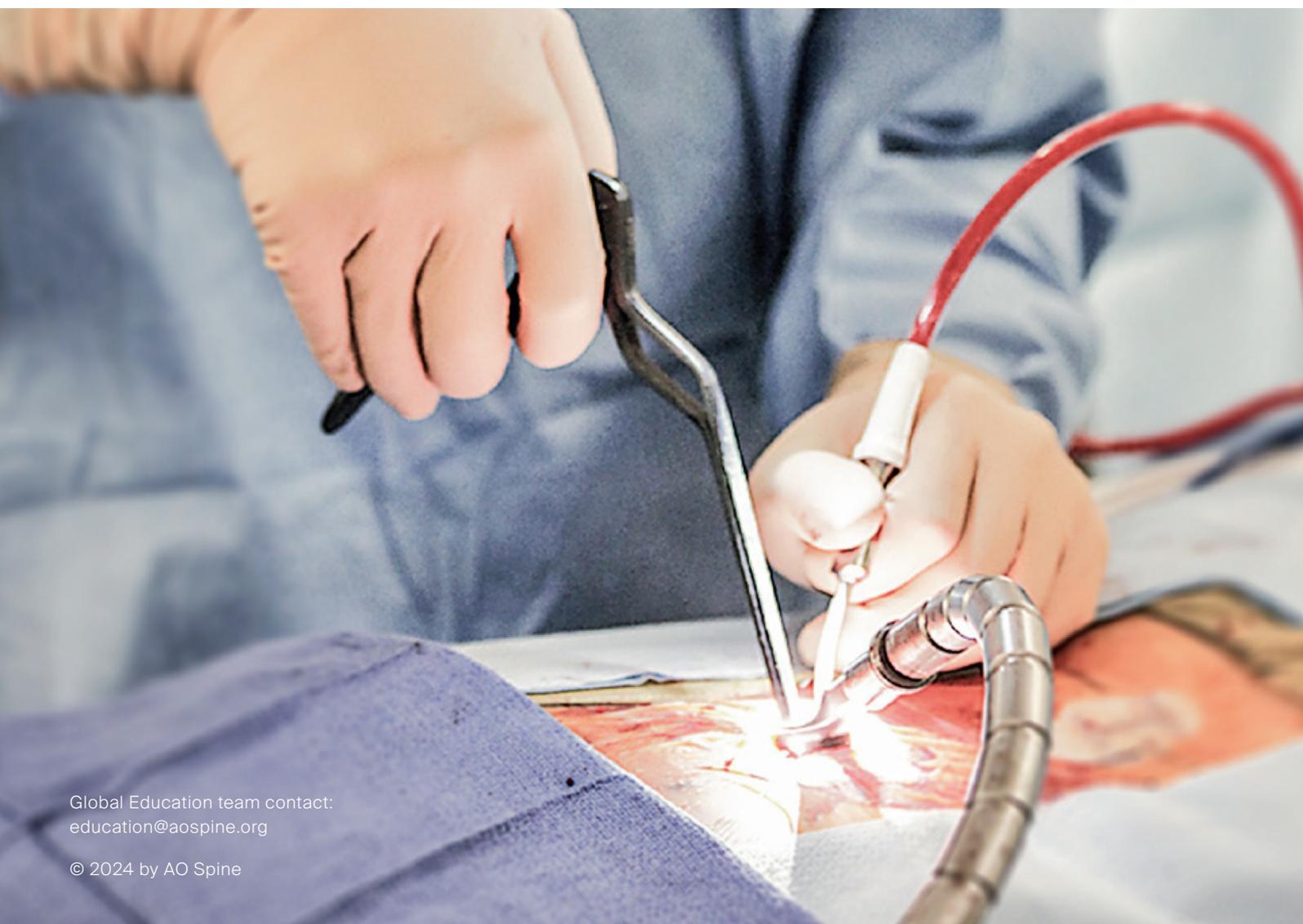


# Minimally Invasive Spine Surgery (MISS) Curriculum

AO Spine MISS Curriculum Task Force  
2018–2024



---

Minimally invasive spine surgery (MISS) is a suite of technology-dependent techniques and procedures that reduces local operative tissue damage and systemic surgical stress enabling earlier return to function striving for better outcomes than traditional techniques.

---

**AO Spine MISS Curriculum Task Force May 3, 2018**

The MISS Task Force aims at enabling AO Spine to become the leading educator in minimally invasive techniques and procedures and meet surgeons' needs for improved surgical outcomes and reduced morbidity. The key objectives of the Task Force are based on the following focus areas:

**Target** - Optimized patient selection

**Technology** - Optimal combination of access, visualization, navigation, instrumentation, biologic augmentation

**Technique** - Microsurgery, neural protection, decompression, stabilization

**Training** - Simulation, observation, mentorship

**Testing the boundaries** - MISS for deformity, robotics

**Talent**

The idea and goal to establish the MISS curriculum framework was to create a pathway for surgeons into MISS.

This introduction to MISS should be independent of surgeon's background and his training level, which he is practicing and therefore should be applicable to all surgeons world-wide.

The MISS framework should be independent of available types of resources a surgeon has access to, i.e. referring to operating tools, resources, etc. Therefore, this pathway into MISS was created, that hopefully is applicable for most surgeons worldwide.

[It's important to create a curriculum on MISS.](#)

As in many other surgical specialties, we realized that the best way to teach technology is to go from "simple" to "complex". Therefore, the "simple" starts with the indications for surgeries, progresses with the tools and technologies and proceeds into the "complex" level on teaching the surgical techniques.

This document is meant to support AO Spine faculty members in focusing on the standards to teach MISS techniques from the "simple" to more "complex" technologies.

We believe this is the best opportunity to convey the knowledge of MISS to surgeons globally.

---

# The curriculum

## Competencies

(these are the basis for the learning objectives for all our educational events)

1. Diagnose the patient problem correlating the clinical findings with imaging and work up
2. Recognize appropriate indications based on your skill set and case experience and outcomes
3. Select the appropriate MISS procedure for the pathology and indication, and recognize when MISS is not the appropriate option
4. Correctly set up the technology, OR, and the team for the procedure
5. Perform selected microscopic MISS procedures
6. Perform selected endoscopic MISS procedures
7. Perform selected instrumented MISS procedures and apply strategies to optimize arthrodesis
8. Manage complications and apply a backup plan
9. Use MISS techniques for revision surgery

## Target audiences

- Surgeons doing open surgery but with little or no MISS experience
- Surgeons with some experience with microscopes and tubes but not for complex MISS
- Surgeons with experience in MISS who use microscope and burr including complex MISS
- Surgeons of any level without any experience with endoscope

## What our curriculum offers faculty

(AO Spine Faculty Lounge) and participants (website)

[aospine.org > faculty lounge](https://aospine.org/faculty-lounge)

[aospine.org/MISScurriculum](https://aospine.org/MISScurriculum)

- Course and module templates
- Curriculum guides

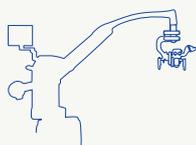
- Step-by-step procedure guides and assessment tools (metrics)

- Lectures
- Cases
- Guides for practical exercises

- Videos
- Book chapters
- Online and paper resources

- Assessment questions and procedure metrics

# General skills and learning objectives



## Using a microscope

- Identify the advantages of using a surgical microscope for minimally invasive spine surgeries
- Identify the differences between microscopes and loupes
- Recognize the main characteristics of modern surgical microscopes
- Describe how to place a surgical microscope in the OR
- Apply basic techniques in the use of surgical microscopes



## Using an endoscope

- Describe the characteristics and setup of working channel endoscopes
- Identify the differences between microscopes and endoscopes
- Describe how to handle an endoscope
- Explain the key differences of working channel endoscopes for transforaminal vs interlaminar approaches



## Using a burr with an endoscope

- Describe the various types of burrs used in full endoscopic spine surgery
- Identify key differences between the use of burrs in microscopic compared to endoscopic spine surgery
- Explain how to utilize burrs in full endoscopic surgery
- Describe strategies for avoiding complications related to burrs



## Using a burr in MISS

- Describe the types of burrs commonly used in MISS
- Describe how to correctly use a burr in MISS
- Identify advantages of using a burr in MISS
- Recognize potential risks and dangers of using a burr



## Using 2-D and 3-D navigation and assistive technologies

- Describe the types of navigation and their pros and cons
- Describe how to integrate navigation into the surgical workflow, eg, pedicle screw insertion
- Optimize set-up and technique intraoperatively to achieve the best imaging



## Managing a dural tear

- Describe the use of different methods of closing dural tears (incidental durotomy) in MISS
- Describe safe microsurgical techniques to prevent the creation of a dural tear
- Describe how to perform techniques to safely close a dural tear in the OR
- Explain how to manage patients with dural tears intraoperatively and postoperatively, and apply rescue strategies



## Bleeding control

- Describe the different hemostasis options in MISS
- Describe how to perform hemostasis in a tubular surgery
- Identify the vascular anatomy in posterior, oblique and lateral approaches
- Identify the different bleeding control techniques for the approaches
- Recognize the importance of hemostatic and soft tissue management in MISS



## Radiation reduction

- Describe the advantages and disadvantages of intraoperative imaging
- Describe how to reduce radiation exposure to the surgeon, team, and patient
- Identify all ways to optimize intraoperative imaging and reduce radiation exposure

---

# General skills and learning objectives

---

## Using an optical navigation system in endoscopic spine surgery

- Describe the differences and potential benefits and drawbacks of optical and electromagnetic navigation
- Describe how to integrate the navigation system during the workflow of an endoscopic procedure
- Optimize the setup and describe how to prevent pitfalls to achieve the best imaging and outcomes

---

## Using an EM Navigation System in endoscopic spine surgery

- Describe the differences and potential benefits and drawbacks of optical and electromagnetic navigation
- Describe how to integrate the navigation system during the workflow of an endoscopic procedure
- Optimize the setup and describe how to prevent pitfalls to achieve the best imaging and outcomes

---

## Using 3D navigation for freehand pedicle screw insertion in MISS

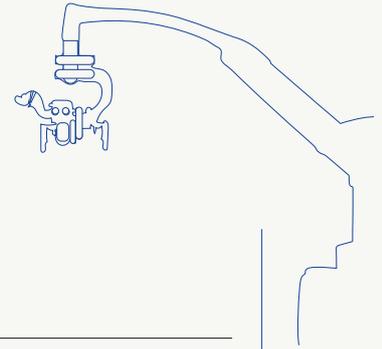
- Describe the key steps in using 3D navigation for percutaneous freehand pedicle screw insertion in MISS

---

## Basic skills for robotic-assisted spine surgery

- Describe the basic steps in robotic-assisted surgery including registration, reference frame, and all preparation

## Specific procedures



### Microscopic tubular procedures

Interlaminar microscopic tubular lumbar discectomy (IMTLD)

Microscopic tubular unilateral laminotomy for bilateral decompression (MT-ULBD)

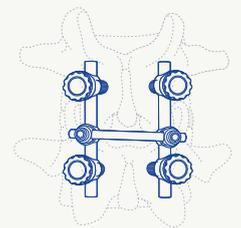
Posterior microscopic tubular cervical foraminotomy (PMTCF)

Extraforaminal microscopic tubular lumbar discectomy (EMTLD)

Microscopic tubular cervical unilateral laminotomy for bilateral decompression (Cervical MT-ULBD)

Microscopic tubular tumor resection

### Instrumented procedures



Percutaneous screw and rod placement

MISS TLIF

Anterolateral interbody fusion (ALIF)

Lateral lumbar interbody fusion (LLIF)

Pre/anterior lumbar interbody fusion

ALIF/LLIF/percutaneous screws/tubular decompression combined

Anterior column realignment (ACR)



## Endoscopic procedures

### Lumbar

Interlaminar endoscopic lumbar discectomy (IELD)

Transforaminal endoscopic lumbar discectomy (TELD)

Lumbar endoscopic unilateral laminotomy for bilateral decompression (LE-ULBD)

Interlaminar endoscopic lateral recess decompression (IELRD)

Transforaminal endoscopic lateral recess decompression (TE-LRD)

Transforaminal endoscopic lumbar foraminotomy (TELF)

Interlaminar contralateral endoscopic lumbar foraminotomy (ICELF)

Interlaminar contralateral endoscopic lumbar foraminotomy (ICELF) for foraminal stenosis

Biportal endoscopic discectomy, left-sided approach

Biportal lumbar endoscopic unilateral laminotomy, bilateral decompression (BLE-ULBD)

### Cervical

Posterior endoscopic cervical foraminotomy (PECF) and Posterior endoscopic cervical discectomy (PECD)

Cervical endoscopic unilateral laminotomy for bilateral decompression (CE-ULBD)

---

# Implementing the MISS Curriculum

## Steps for the chairperson to design the program

- Read the curriculum framework and background information in the Faculty Support Package from the AO Spine Faculty Lounge and ask the EA to also review the material
- Define your target audience and the pathologies and patient problems you will cover in the course
- Based on the curriculum competencies, select the ones you want participants to achieve from your event (adapt some if necessary)
- Select the skills and procedures you want to include in your event—decide which simulations you will use
- Insert the AO Spine MISS lecture at the start of your program—review it and the supporting videos from the curriculum taskforce on implementing the curriculum (GSC launch)
- Create your program based on an existing approved template (templates are available in the Faculty Support Package)
- Share the program with a regional member of the MISS curriculum taskforce member and the EA for feedback (check if one of them can support you as faculty at the course: this needs to be done as early as possible)

## Faculty support and preparation

- Communicate with the faculty and assign the various activities when you have gathered their expertise profiles in the various types of MISS
- Share the general skills and specific procedures folders with the faculty and recommend that they teach the topics based on the phases, steps, etc they find there
- Ask faculty to view the videos explaining one of the general skills and one specific procedure at the GSC launch
- Ask faculty to review all the procedure and skills videos, guides, etc for their assigned topics (they should also be familiar with the content in the blended learning materials shared with participants)
- Ask faculty to view the existing videos of the set up for practical exercises, along with the instrument lists, step by step info, etc

## Blended learning and resources for participants

- If your participants will use the materials, request the standard blended learning material from [education@aospine.org](mailto:education@aospine.org) with the help of your event organizer
- If you want to include moderated discussion in the blended learning, appoint 2 faculty and request they follow the tasks and timeline
- Identify any other materials in the package that you want to precirculate

---

# Task force members



**Roger Härtl**

Task Force Leader,  
Weill Cornell Medical College  
New York, United States



**Richard Assaker**

Centre Hospitalier Regional  
Universitaire Lille, France



**Muhammed Assous**

Razi Spine Clinic  
Amman, Jordan



**Christoph Hofstetter**

University of Washington  
Seattle, United States



**JinSung Kim**

The Catholic University of Korea  
Seoul, South Korea



**Avelino Parajon**

Hospital Universitario  
Ramón y Cajal Madrid, Spain



**Néstor Taboada**

Clinica PortoAzul  
Barranquilla, Colombia



**Paul Taylor**

SpinesWA Mount Hospital  
Perth, Australia

## Supporting surgeons

**Kevin Foley**, North America

**Dan Gelb**, North America

**Andreas Korge**, Europe

**Peter van Daele**, Europe

**Rasha Al-Kanash**, Middle East

**Ibrahim Hussain**, North America

**Vit Kotheeranurak**, Asia Pacific

**Lynn McGrath Jr**, North America

**Zeeshan Sardar**, North America

**Don Park**, North America

**Siravich Suvithayasiri**, Asia Pacific

**Jung Hoon Kim**, Asia Pacific

**Ashwinkumar Khandge**, Asia Pacific

For more information, visit the education pages at

[www.aospine.org/MISScurriculum](http://www.aospine.org/MISScurriculum)

and

[www.aospine.org > faculty lounge](http://www.aospine.org > faculty lounge)

## AO Spine Global Education

Stettbachstrasse 6

8600 Duebendorf

Switzerland

[www.aospine.org](http://www.aospine.org)

[education@aospine.org](mailto:education@aospine.org)