





CIS Self-Study Lesson Plan

Lesson No. CIS 246 (Instrument Continuing Education - ICE)

Sponsored by:



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basics of SPINAL INSTRUMENTS

LEARNING OBJECTIVES

1. Provide a description of the anatomy of the spine
2. Present an overview of the three approaches to the spine during a surgical procedure
3. Identify basic instruments used in posterior spinal surgeries
 - Retractors
 - Elevators
 - Rongeurs
 - Nerve hooks
 - Curettes

Instrument Continuing Education (ICE) lessons provide members with ongoing education in the complex and ever-changing area of surgical instrument care and handling. These lessons are designed for CIS technicians, but can be of value to any CRCST technician who works with surgical instrumentation.

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ONE MUST FIRST UNDERSTAND THE ANATOMY OF THE SPINE AND know the common spinal procedures that are performed before detailed information about spinal instruments can become most useful. These instruments can be classified into five categories, and each has a very important and different role to play in successful surgical procedures. This lesson provides a foundation of general information and instrument identification that should be understood by all Certified Instrument Specialist (CIS) technicians.

OBJECTIVE 1: PROVIDE AN OVERVIEW OF THE ANATOMY OF THE SPINE

The human spine extends from the skull to the pelvis. It is comprised of individual bones, called vertebrae, that are grouped together in four regions:

- The cervical spine refers to the neck area that contains seven vertebrae.
- The thoracic spine spans the chest area and contains 12 vertebrae.
- The lumbar (low back) area contains five vertebrae.
- The sacrum and coccyx complete the spine in the pelvis area, with fused non-separated vertebrae.

Diagram 1 shows a lateral (side) view of each of the four spinal regions.

OBJECTIVE 2: PRESENT AN OVERVIEW OF THE THREE APPROACHES TO THE SPINE DURING A SURGICAL PROCEDURE

The surgeon's approach to the spine during surgery impacts the type of instruments that will be used for the procedure. The three possible approaches are anterior (from the front of the spine), posterior (from the back of the spine), or lateral (on the side of the spine).



Diagram 1: Lateral View of Spinal Column1

The anterior approach to the thoracic and lumbar spine requires the assistance of a vascular or general surgeon who can manipulate vessels and organs out of the way. Then the orthopedic or neurospinal surgeon can operate on the spine itself. Note: When operating from the posterior or lateral approach, these vessels and organs are not in the path of the posterior or lateral spine. The anterior approach also requires additional retractors and vascular clamps that are not needed for posterior or lateral spinal cases, and the lateral approach uses minimally invasive instruments. Note: The instrument



Photo 1: Derrico retractor



Photo 2: Adson Cerebellar retractor



Photo 3: Top: Caspar nerve root retractor;
Bottom: Derrico nerve root retractor

discussion in this lesson plan focuses primarily on instruments used for the posterior approach to the spine.

Common spinal procedures include:

- Discectomy (any level of spine) – to remove herniated disc material pressing on a nerve root or the spinal cord
- Laminectomy – a spinal operation to remove the lamina: part of the vertebral bone
- Anterior Lumbar Interbody Fusion (ALIF) – use of front approach to fuse lumbar spinal bones together by removing a between-vertebrae disc and replacing it with a bone or metal spacer. This procedure can also be performed with a Posterior Lumbar Interbody Fusion (PLIF) that approaches the spine through the low back, or a Thoracic Lumbar Interbody Fusion (TLIF) that is performed at the higher (thoracic) level of the spine.
- Anterior Cervical Discectomy and Fusion – this procedure is performed to relieve neck and other pain caused by spinal cord or nerve root pressure from a cervical disc herniation
- Spine realignment of scoliosis (side-ways curve of the spine) or kyphosis (humpback curve of the thoracic spine).

OBJECTIVE 3: IDENTIFY BASIC INSTRUMENTS USED IN POSTERIOR SPINAL SURGERIES

Five basic instrument categories are generally used for all spinal surgeries: retractors, periosteal elevators, rongeurs, nerve hooks, and curettes. Since the size of individual vertebra bones increase in size as they progress from the cervical spine to the lumbar area, the size of bone

instruments used differ according to the location of the surgery.

RETRACTORS

To expose the spine, the surgeon will require an electro cautery pencil, knife handle, elevator, and self-retaining retractor. The type of retractor will depend on the depth of the incision. For all spine surgeries, Weitlaner retractors (not pictured) of different lengths are initially used to establish retraction of the skin and muscle. As the wound deepens and lengthens, the Derrico retractor (Photo 1) or Adson Cerebellar retractor (Photo 2) may be used. The body of the Derrico retractor is longer to accommodate a longer incision. The hand-held Meyerding retractor or Taylor retractor (not pictured) are commonly used when obtaining bone from the iliac crest for bone fusion in the spine.

Delicate work near the disc can require the use of the Derrico nerve root retractor (Photo 3; bottom) or Caspar nerve root retractor (Photo 3; top), along with the Micro Williams retractors (not pictured), which have deep and narrow blades. Note: nerve root retractors have a crooked design so they can be placed deep in the wound to retract a nerve root while angling out of the surgeon's visual path so he or she can see the surgical site. The person's hand holding the retractor must be out of the midline view of the spine, so the nerve can be retracted to the side while the surgeon works around it.

ELEVATORS

The Hoen Sedilot elevators (Photo 4) and Cobb elevators (Photo 5) are commonly

used to expose the bone of the spine. The Cobb elevator has various lengths of handles and sizes of paddles, depending on the level of spine in which the procedure is performed. The surgeon uses the Cobb elevator and a surgical sponge to elevate and push the muscle away from the bone to allow visualization of the spine. More dissection is required if spinal implants and bone fusion are planned. When more delicate work is needed, the Penfield 4 elevator (Photo 6) is used.

RONGEURS

Depending on the procedure, a large amount of bone removal is needed. The Stille-Luer Horsley rongeur (Photo 7; left), Leksell rongeur (Photo 7; middle), and Duckbill rongeur (Photo 7; right) are used to remove the spinous process (the bony projections on each vertebra where the muscles and ligaments attach to the spine). Note: the Stille-Luer Horsley and Leksell rongeurs point straight from the handle, while the duckbill points to the side. The Stille-Luer Horsley rongeur provides a 10 mm bite to remove bone while the Leksell and Duckbill are available in a variety of widths.

The Kerrison rongeur (Photo 8) is used to remove bone from smaller areas of the spine. Its features include:

- Variable jaw widths, including 1 mm, 2 mm, 3 mm, 4 mm, and 5 mm.
- Two jaw slants (40° and 90°)
- Can be used for up or down biting (most commonly used is up biting)
- Has a longer shaft length for spinal cases than shorter shaft instruments used for ear, nose, and throat (ENT) surgeries



Photo 4: Hoehn Sedillot elevator



Photo 5: Cobb elevator



Photo 6: Penfield 4 elevator



Photo 7: Left: Stille-Luer Horsley rongeur; Middle: Leksell rongeur; Right: Duckbill rongeur



Photo 8: Kerrison rongeurs



Photo 9: Pituitary rongeurs



Photo 10: Casper serrated pituitary rongeur



Photo 11: Micro straight pituitary rongeur



Photo 12: Peapod pituitary rongeur

Pituitary rongeurs (Photo 9) are used to remove disc and tissue in small spaces. Their features include:

- Can be used for straight, up, and down biting
- Available in several jaw widths, including 2 mm, 3 mm, and 4 mm.
- Proper length of shaft to accommodate spinal procedures

Some rongeurs, such as the Casper pituitary rongeur (Photo 10), have serrated jaws to help remove disc and tissue. Micro-disectomy procedures require the use of a microscope, and three rongeurs are commonly used in these procedures

to remove disc tissue: the micro straight pituitary rongeur (Photo 11), the Peapod pituitary rongeur (Photo 12), and the Micro Williams pituitary rongeur, commonly called “snaggetooth” (Photo 13).

NERVE HOOKS

Surgeons use nerve hooks to explore areas around the delicate nerves located in the spine, and three main nerve hooks should be part of every basic set used in spinal surgeries. These include the Dandy blunt nerve hook (Photo 14), which has a short and blunt design, the Cushing Gasserian blunt nerve hook (Photo 15), which is longer in length, and the Weary



Photo 13: Micro Williams pituitary rongeur



Photo 14: Dandy blunt nerve hook



Photo 15: Cushing Gasserian nerve hook



Photo 16: Weary Black nerve hook



Photo 17: Malis (micro) nerve hook



Photo 18: Right: Angled curette; Left: Straight curette



Photo 19: Epstein curette

Black nerve hook (Photo 16), which has a thinner and more pointed design. When working under a microscope, the Malis (micro) nerve hook (Photo 17), which is smaller, may be required.

CURETTES

Curettes help to remove bone and are available with various sizes of cups. Note: Curette cups can be periodically sharpened for better performance, but attention to maintaining the cup size specifications is very important, and they must be verified. Also, after multiple sharpenings, the depth of the cup will be compromised and, if used, the instrument will not meet the surgeon's expectations.

Curettes can be straight (Photo 18; bottom) or angled (Photo 18; top), and surgeons will be very specific about their requirements. The Epstein curette with a reverse-angled cutting cup (Photo 19) is typically requested for micro-discectomy surgeries.

The variety of spinal implants can present a learning challenge for CIS technicians because there are implant systems designed for each level of the spine. Each

system may involve different screws, hooks, plates, and rods to stabilize the spine.

IN CONCLUSION

Spinal instrumentation and implants have developed through the years. However, the basic instruments required to gain access to and expose the spine have remained the same for several decades, and this instrumentation is common to

spine sets throughout the surgical world. Nurses, CIS technicians, and other sterile processing professionals must become very familiar with these basic spine instruments. As they do so, proper care and inspection will better ensure that the surgeon will have the needed tools to accomplish the spinal surgeries.

CIS SELF-STUDY LESSON PLANS

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