“Pearls” for avoiding spine surgery complications

By Jennie McKee

Oko Articles highlight prevention and management strategies

“Surgeons must not only know how to identify and diagnose complications after spine surgery, they must also be able to formulate a management plan for dealing with the issue and talk to the patient about it,” said Jeffery L. Stambough, MD, MBA.

Dr. Stambough, who has more than 23 years of experience as an orthopaedic spine surgeon, served as lead author of a 5-part series on spine surgery complications for Orthopaedic Knowledge Online (OKO). AAOS Now spoke with Dr. Stambough to learn more about these complications and what orthopaedic spine surgeons can do to manage or avoid them.

AAOS Now: How can surgeons successfully deal with cervical and lumbar dural tears?

Dr. Stambough: If the surgeon recognizes the tear when it occurs and repairs it in a watertight fashion by suturing it and gluing it with fibrin glue, there are generally no long-term sequelae (Fig. 1). Scarring can occur inside the dura if too much blood gets in, however, and recurrent or persistent leakage that requires additional treatment is possible.

When a watertight seal isn’t possible or tears from leakage through the wound become evident after surgery, the surgeon can place a tube into the dural sac and divert the cerebrospinal fluid outside the body. Drainage has its own risks— infection, headaches, and other types of problems—but it allows an essentially irreparable tear to heal itself.

AAOS Now: How can nerve root injuries be avoided?

Dr. Stambough: Certain nerve roots—including the C5 and the L5 nerve roots—seem to be predisposed to injury. To avoid injuring them, the surgeon should avoid pulling, moving, or otherwise manipulating them too much. That predisposition to injury is likely related to the anatomy of the nerve.

Neurologic deficits as a result of spine surgery are rare, but when they do occur, the cause usually relates to patient positioning. For example, in a patient with cervical stenosis, a procedure on the lumbar spine may result in a neurologic deficit if the patient is not in a prone position and the neck is extended. Even if the patient is in a prone position, paralysis of the extremities may result if the nerve is not attentive to the positioning of the patient’s arms or legs.

Instrumentation is another possible cause of neurologic injuries. A device that’s too big or too sharp placed underneath a nerve can injure the nerve. Intraoperative monitoring, such as through electromyography, can alert the surgeon to any issues related to the spinal cord or patient positioning.

AAOS Now: You noted that improper implant positioning can injure the spinal cord, nerve roots, and vascular and visceral structures. How can these injuries be prevented?

Dr. Stambough: Pedicle screws are the main type of instrumentation used in the lumbar spine. In the cervical spine, facet fixation procedures are used with a posterior approach. These implants will endanger any structure they pass, such as the dura, the spinal nerve root, the aorta, and the vena cava. The spinal cord in the lumbar spine and the vertebral border in the cervical spine may also be injured, although this is unusual.

If the spinal anatomy has been changed by scoliosis, prior surgery, or trauma, positioning a screw is difficult, even with fluorescopy or radiographic guidance (Fig. 2). To prevent these injuries, the surgeon must have a clear understanding of the anatomy of the affected pedicles. In addition, it’s critical to know the general size and diameter of the screw that should be used and to use some sort of guidance, such as fluoroscopy or radiographs.

AAOS Now: What are some of the key concepts related to evaluating, managing, and preventing surgical site infections?

Dr. Stambough: Surgeons should be concerned about infection if the patient has a fever, drainage, and increased back pain, fluctuation of the wound, erythema, and other signs and symptoms related to infection within 3 weeks of surgery. The clinical evaluation is more important for making an accurate diagnosis than ancillary testing with magnetic resonance imaging and computed tomography (CT) scans, which can confirm a collection of fluid.

Management of surgical site infections centers on debridement, irrigation, and drainage, as well as identifying the organism involved.

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Fig. 1 Treatment algorithm for dural tears


Fig. 2 Axial CT scan through T12 demonstrates both medial and anterolateral malpositioning of thoracic pedicle screws. Six months after surgical treatment, the patient sought a second opinion because of back pain despite a normal neurologic examination. Medial screw positioning places the spinal cord at risk. Anterolateral positioning places the aorta, pleura, and lungs at risk.


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