The Postoperative Spine
What the Spine Surgeon Needs to Know

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KEYWORDS

• Postoperative spine • Spinal surgery • Imaging • Complications

KEY POINTS

- Imaging plays a crucial role in the evaluation of the postoperative spine and significantly influences subsequent clinical management of the patient.
- A basic understanding of spine surgical procedures is essential to the proper evaluation of the postoperative spine.
- Imaging allows for excellent delineation of both normal and abnormal findings in the postoperative spine. It is critically important to learn to differentiate normal findings from abnormal findings to be of clinical use.
- This article provides the radiologist the basic tools required to evaluate the manifestations and complications of spine surgery properly on imaging studies.

INTRODUCTION

Radiologists are often tasked with the interpretation of postoperative spine imaging, the goal being to assist the surgeon in the continued clinical management of the patient. Imaging evaluation of the postoperative spine is complex and requires a detailed understanding of the initial spinal pathologic condition, the surgical procedure performed, the clinical presentation of the patient, and the time interval from the surgery to the imaging study. Imaging plays a crucial role in the assessment of the postoperative spine. It is essential in identifying the location and integrity of surgical implants, in evaluating the success of decompression procedures, in delineating fusion status, and in identifying postoperative complications.

This article provides the reader with the fundamental tools required to evaluate postoperative spine imaging and create effective reports to guide the spine surgeon in patient management. It addresses the basic surgical procedures and hardware commonly used in modern spine surgery. In addition, proper evaluation of the spine following these procedures is delineated, with an emphasis on the information most critical to the treating physician. Finally, general postsurgical complications pertaining to the spine are also reviewed.

SURGICAL TECHNIQUES

A thorough evaluation of the postoperative spine begins with a clear understanding of the patient's presentation history and surgical procedure performed.

Spine surgeries can be divided into 3 main categories of procedures,[1–4] as listed in **Box 1**.

This section reviews some of the more common surgical techniques as well as the hardware involved in these procedures.

Decompressive Procedures

The decompressive procedures are most often performed to remove herniated disc material encroaching on the neural elements or to relieve

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Box 1
Types of spine surgery

Decompressive procedures

Deformity correction, stabilization/fusion procedures

Lesion excision procedures (tumor excision, infection debridement, abscess drainage)

a segment of spinal stenosis. These procedures are most often performed from a posterior midline approach at the level of the lumbar spine, which provides optimal access to the posterior elements, spinal canal, and the intervertebral disc. There are 3 typical decompressive techniques, laminotomy, laminectomy, and laminectomy with facetectomy.[1,4]

Laminotomy involves only partial resection of the inferior portion of the cephalic lamina and, if necessary, partial resection of the superior portion of the caudal lamina. This procedure often includes a microdiscectomy.[1,4]

Laminectomy involves complete removal of the lamina of the vertebral body and may be unilateral or bilateral. Unilateral laminectomy involves excision of only one lamina of the vertebral body. Bilateral, or total, laminectomy is by definition removal of both laminae as well as the spinous process (**Fig. 1**). In certain cases, portions of the adjacent lamina may also be removed to achieve appropriate decompression or greater exposure of the spinal canal. Laminectomy is often performed to relieve spinal stenosis or when removal of larger disc material is necessary. A notable exception to this rule occurs at the L5-S1 level, where a discectomy often requires only removal of the ligamentum flavum without bony excision.[1,4]

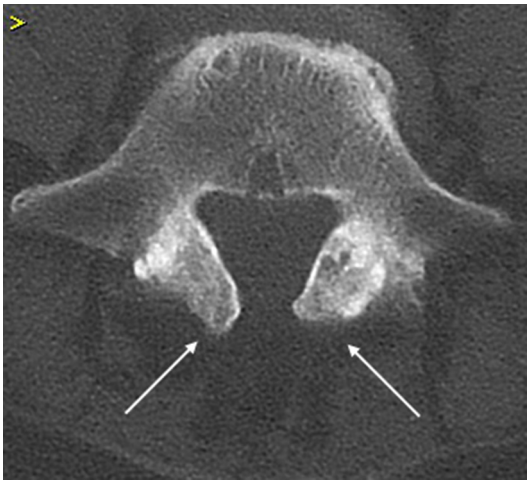

Fig. 1. Axial CT image in bone window algorithm in a 51-year-old female patient after partial bilateral laminectomy (*white arrows*) with removal of the spinous process at the L4-5 intervertebral disc level.

Laminectomy with complete or partial facetectomy is performed when there is a need to access the neural foramen to relieve nerve root compression. It is important to preserve as much of the lateral facet joint as possible during the decompression so as not to create instability of the spinal segment. Too radical a resection of the facet joint may lead to an iatrogenic spondylolisthesis.[1,4]

Varying degrees of discectomy may be involved in all of the above decompressive procedures.

Stabilization and Fusion Procedures

Spinal stabilization and fusion procedures are performed to address various clinical scenarios including degenerative disc disease, spondylolisthesis, trauma, tumors, and infection. Surgical hardware is used to stabilize the spine, maintain its anatomic alignment, or replace excised components. The specific surgical approach as well as the instrumentation used depends on the clinical setting and the specific pathologic condition to be treated.[1,2,5–7]

Surgical hardware

To gain a better understanding of the specific surgical stabilization techniques, it is important to review the different surgical implants used during spinal stabilization and fusion surgery.

Plates and rods with transpedicular screws Pedicle screws and rods are most often used to form a construct, which stabilizes and/or affixes several vertebral levels (**Fig. 2**). These are routinely used anywhere from the thoracic spine to the sacrum. Rods are attached to screws for multilevel fusion. Each rod can be individually shaped, with cross bars and screws positioned at varying vertebrae so as to provide secure fixation of the spine. Rods and screws are usually attached to the vertebral bodies using transpedicular screws in the thoracic and lumbar spine (lateral mass screws and other screws are used in the cervical spine).[1–3] The screws traverse the pedicle and enter the vertebral body. Although there is no consensus on the optimal length of transpedicular screws, the tip of the screw should not breech the anterior vertebral body cortex, except for the sacrum. The main advantage of using a screw/rod-based construct is that it provides immediate postoperative internal fixation. This fixation allows for maintenance of spinal deformity correction or stabilization of an unstable segment. The application of hardware also ensures an increase in fusion rates.[1–3,5–8]

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