

Complications Associated with Posterior Approaches in Minimally Invasive Spine Decompression

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KEYWORDS

- Minimally invasive surgery • Minimally invasive spine • Spinal decompression • Complications
- Laminectomy • Foraminotomy • Diskectomy

KEY POINTS

- Complications associated with posterior approaches for minimally invasive decompressions may be categorized as related to the intraoperative approach and decompression, need for reoperation, infections, or perioperative medical concerns.
- The incidence and nature of these complications are presented.
- Complications may be prevented with careful surgical technique.

INTRODUCTION

Minimally invasive approaches for spinal decompression are increasingly used for a wide range of degenerative pathology. These techniques have been developed to allow equivalent or improved outcomes compared with their open counterparts, with decreased iatrogenic disruption of the normal anatomy.¹ Minimally invasive spine surgeries have been associated with less morbidity and quicker return to work compared with traditional open techniques, with a similar to possibly decreased overall risk of complications.²⁻⁷ All surgical procedures carry risk of complications, however, and the complication profile varies by procedure and approach.

Common minimally invasive posterior spine procedures include the foraminotomy, diskectomy, and laminectomy. These posterior decompressive

procedures may be used in the cervical, thoracic, or lumbar spine. Cervical and thoracic approaches are used to address radiculopathy and/or myelopathy, with surgical indications and goals similar to traditional open laminectomies, diskectomies, and foraminotomies. In the lumbar spine, these same procedures are similarly used for decompression in the treatment of lumbar radiculopathy or neurogenic claudication.

Although these approaches are largely successful, it is important for surgeons and patients to understand the potential complications associated with these procedures. The learning curve for minimally invasive techniques is more significant than the open surgical correlates, and perspective on the anatomy encountered during a minimally invasive approach may be less familiar to surgeons. These factors may contribute to either intraoperative complications or to disease

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recurrence requiring reoperation. Understanding the risk of infection and medical complications associated with surgery is critical for managing patients in the postoperative period. This article presents relevant data regarding these classes of complications associated with posterior minimally invasive decompressions. A case example helps demonstrate important considerations for complication avoidance (Figs. 1–7).

A literature review of recent high-quality studies demonstrating complications for posterior minimally invasive spinal decompression was performed. These studies were individually reviewed for further understanding of the nature and incidence of complications. The data were further aggregated across complication classes according to spinal region (Table 1). Studies were included if they were designed to capture the relevant complications and sufficient data were provided to allow result aggregation. Cumulative data are shown for the cervical and lumbar regions; none of the included studies provided data regarding complications of procedures in the thoracic spine. The reported results were also compiled according to complication class (Tables 2–5).

INTRAOPERATIVE COMPLICATIONS

Minimally invasive approaches to spine surgery are increasingly common and surgeons are

increasingly trained in these techniques. These minimally invasive approaches continue to have a steep learning curve, however, secondary to the use of long bayoneted instruments through narrow corridors, with less visualization of anatomic landmarks and the requirement for interpretation of intraoperative fluoroscopic imaging. Additionally, the surgical anatomy is encountered from a different perspective than the traditional open techniques. As a result, these procedures are associated with unique sets of intraoperative complications. Specifically, this section addresses technical complications associated with surgical approach and decompression, such as durotomy, injury to neural elements, hematoma formation, surgery performed at the incorrect level or side, and inadvertent facet fracture.

Incidence

Technical intraoperative complications have been reported in the literature as between 1.9% and 25.7%.^{4,8} In a multicenter study, Matsumoto and colleagues⁹ reported on a total of 5609 patients treated with a microendoscopic discectomy or microendoscopic laminectomy/fenestration with an intraoperative complication rate of 2.2%. In another large study by Wu and colleagues,⁴ an intraoperative complication rate of 1.9% was reported in 873 patients treated with a microendoscopic

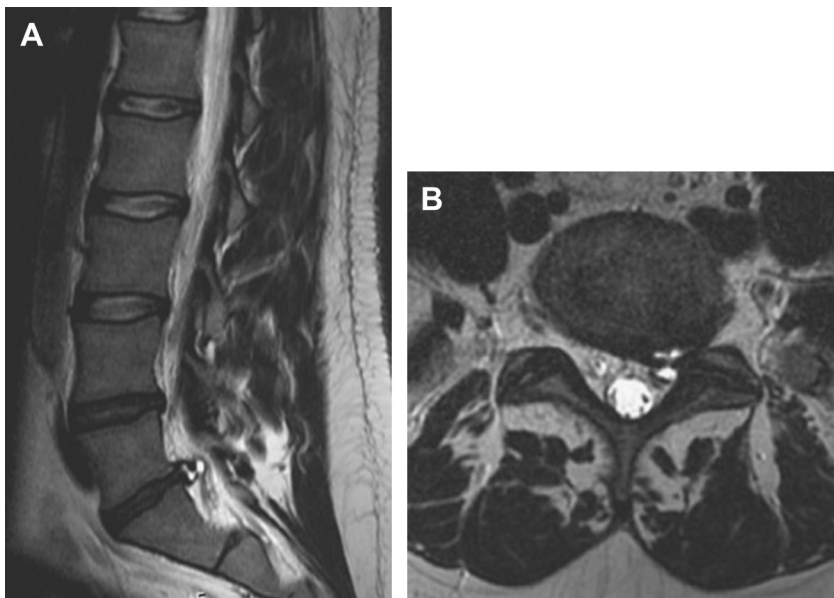


Fig. 1. Case example. The patient is a 23-year-old man presenting with signs and symptoms consistent with a left S1 radiculopathy. MRI of the lumbar spine demonstrates a left herniated disk at L5-S1, shown on (A) parasagittal and (B) axial images. After failing conservative management, he is taken for elective left L5-S1 minimally invasive microdiscectomy.

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