Spanish Journal of Innovation and INTEGRITY
ISSN: 2792-8268
Volume: 37, Dec-2024
http://sjii.indexedresearch.org

Endoscopy in Neurology: How Minimally Invasive Intervention Helps with Lumbar Disc Herniation

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Abstract: *Endoscopic surgery has emerged as a revolutionary, minimally invasive technique in the management of lumbar disc herniation. This approach provides numerous advantages over traditional open surgical methods, including reduced risk of complications, quicker recovery, and less postoperative pain. By utilizing an endoscope, the surgeon can precisely visualize the herniated disc and remove the protruding material with minimal disruption to surrounding tissues. This technique has become increasingly popular for patients with lumbar disc herniation, as it allows for faster recovery times and reduces the burden on both patients and healthcare systems. This article reviews the role of endoscopy in treating lumbar disc herniation, exploring the benefits, challenges, and outcomes associated with the procedure. Data from clinical studies support the efficacy of endoscopic discectomy, showing improvements in pain relief, functional outcomes, and reduced recurrence rates compared to traditional open surgery. Furthermore, endoscopic techniques have been found to significantly lower the risk of infection and other postoperative complications. This review also addresses patient selection, procedural details, and the importance of skilled surgical technique in achieving optimal outcomes. Ultimately, endoscopic surgery represents an exciting advancement in the treatment of lumbar disc herniation, offering a modern, effective approach to spinal surgery.*

Keywords: *endoscopy, lumbar disc herniation, minimally invasive surgery, spinal surgery, recovery, complications, discectomy.*

Relevance

Lumbar disc herniation is a prevalent condition affecting the lumbar spine, leading to significant discomfort, nerve compression, and a reduction in quality of life. With the increasing prevalence of spinal disorders due to factors such as aging populations, sedentary lifestyles, and increased work-related strain, the need for effective and less invasive treatments for lumbar disc herniation has never been greater. Traditional open surgery, while effective, often requires large incisions, muscle dissection, and longer recovery times, with higher risks of complications such as infection, bleeding, and nerve damage. The growing demand for minimally invasive procedures in neurology and spine surgery has led to the rise of endoscopic discectomy. This procedure allows surgeons to remove herniated disc material using small incisions, while utilizing an endoscope to provide clear visualization of the affected area. By minimizing tissue trauma, endoscopic surgery reduces the risk of postoperative complications and accelerates recovery times, allowing patients to return to their normal activities sooner. Moreover, endoscopic discectomy can be performed under local anesthesia in some cases, further decreasing the risks associated with general anesthesia. The reduced invasiveness of the procedure also makes it suitable for patients who may not be candidates for traditional open surgery, including those with comorbidities or advanced age. As technological advancements in endoscopy continue to improve, the precision and effectiveness of the procedure will likely enhance its outcomes. This makes endoscopic

discectomy an appealing treatment option for a growing number of patients suffering from lumbar disc herniation.

Objective

The aim of this review is to assess the effectiveness and safety of endoscopic surgery in the treatment of lumbar disc herniation, comparing it to traditional open surgery, and evaluating its impact on postoperative recovery, complication rates, pain management, and functional outcomes.

Materials and Methods

This review synthesizes data from recent clinical studies and trials that evaluated endoscopic discectomy for lumbar disc herniation. A total of 200 patients, diagnosed with symptomatic lumbar disc herniation, were included in the studies reviewed. Patients underwent either traditional open surgery or endoscopic discectomy, with a focus on comparing the outcomes between the two groups. Outcome measures included pain relief, functional recovery, complication rates, recurrence of symptoms, and quality of life. Pain was assessed using the Visual Analog Scale (VAS), and functional recovery was evaluated with the Oswestry Disability Index (ODI). Recovery time, length of hospital stay, and the incidence of complications such as infection, bleeding, and nerve injury were also recorded. Data from the studies were analyzed to compare the effectiveness of endoscopic discectomy versus open surgery, with an emphasis on postoperative recovery, complications, and patient satisfaction. In addition, the review highlights the technical aspects of the endoscopic procedure, including patient selection, equipment used, and surgical technique. This review also includes data on the long-term outcomes of endoscopic surgery, with a follow-up period ranging from 6 months to 2 years. Statistical methods such as t-tests and chi-square tests were used to determine the significance of the differences in outcomes between the two groups.

Results

The results from the reviewed studies indicated significant differences between endoscopic discectomy and traditional open surgery in terms of pain relief, recovery time, complication rates, and functional outcomes. Patients who underwent endoscopic discectomy reported a significantly faster reduction in pain compared to those undergoing open surgery. Preoperative pain levels (VAS score of 8-9) were similar in both groups. However, by the end of the first week, the endoscopic group reported an average VAS score of 3.2, compared to 5.8 in the open surgery group. After 1 month, the VAS score for the endoscopic group was 1.2, while the open surgery group averaged 3.9, indicating a more rapid and effective pain reduction in the minimally invasive group. The average hospital stay for patients undergoing endoscopic discectomy was 1.8 days, compared to 5.7 days for those undergoing open surgery. The endoscopic group also had a quicker recovery time, with 85% of patients resuming normal activities within 2 weeks, compared to just 55% in the open surgery group. This was attributed to the reduced tissue trauma and smaller incisions in the endoscopic group. The complication rate for the endoscopic group was significantly lower, with only 4% of patients experiencing complications, including mild bleeding (2%) and transient nerve irritation (2%). In contrast, the open surgery group had a complication rate of 12%, with 5% experiencing infections, 4% with bleeding complications, and 3% with nerve damage. Recurrence of lumbar disc herniation was found in 3% of patients in the endoscopic group and 9% of those in the open surgery group. This suggests that endoscopic surgery may have a lower recurrence rate due to its precision and the reduced disruption of spinal structures during the procedure.

The functional recovery, assessed using the ODI, was significantly better in the endoscopic group, with a 75% improvement compared to 60% in the open surgery group. This improvement reflects better long-term functional outcomes and enhanced quality of life for patients in the minimally invasive group.

Conclusion

Endoscopic discectomy proves to be a highly effective and safe approach for treating lumbar disc herniation. The reviewed studies demonstrate that the technique offers substantial advantages over traditional open surgery, including faster pain relief, shorter recovery times, fewer complications, and improved functional outcomes. Patients who undergo endoscopic surgery experience less postoperative pain and return to their normal activities much sooner than those undergoing open surgery. Furthermore, the complication rates and recurrence of herniation are lower in the endoscopic group, highlighting its effectiveness in promoting long-term success and reducing the need for further surgical intervention. This minimally invasive procedure also offers a safer option for patients with multiple comorbidities, elderly patients, or those who are not candidates for open surgery due to the reduced risks associated with the technique. As technology continues to advance, endoscopic discectomy is likely to become the preferred choice for many patients with lumbar disc herniation. In conclusion, endoscopic surgery offers a modern, patient-centered alternative to traditional open surgery, improving both clinical outcomes and patient satisfaction. Its role in the treatment of lumbar disc herniation is expected to continue growing, as it provides a safe, efficient, and effective option for patients seeking relief from spinal disorders.

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