Translaminar Approach for Treatment of Hidden Zone Foraminal Lumbar Disc Herniations: Surgical Technique and Preoperative Selection of Patients with Long-Term Follow-Up

Christian Cossandi[1], Andrea Fanti[1,2], Andrea Gerosa[1,2], Andrea Bianco[1], Riccardo Fornaro[1], Emanuela Crobeddu[1], Sara Forgnone[1], Gabriele Panzarasa[1], Andrea Di Cristofori[1,3]

BACKGROUND: **Lumbar disc herniation is a common degenerative disease of the lumbar spine with a prevalence of 1%–3% in some population studies. In 10% of patients, there is a fragment migrated cranially in Macnab's "hidden zone." In selected cases, this fragment can be removed with a translaminar approach that was described in 1998. We provide a detailed description of the technical advantages and pitfalls of the translaminar approach in a consecutive series of 32 patients treated at our institution.**

METHODS: **Patients were divided preoperatively and postoperatively into 5 classes based on the Oswestry Disability Index (ODI): class 1, ODI 0%–20% (minimal disability); class 2, 20%–40% (moderate disability); class 3, 40%–60% (severe disability); 60%–80% (crippled); 80%–100% (bedridden or disabling symptoms).**

RESULTS: **Four (12.5%) patients were upgraded 1 ODI class after the operation; 6 (18.7%) patients were upgraded 2 classes, 8 (25%) patients were upgraded 3 classes, and 11 (34.4%) patients were upgraded 4 classes. In 3 (9.4%) patients, ODI class did not change after the operation. After surgery, 7 (21.9%) patients developed mild low back pain. Mean follow-up was 25 months.**

CONCLUSIONS: **When performed by dedicated spinal neurosurgeons, the translaminar approach is safe and effective in patients with long-term follow-up. Most patients showed an improvement in ODI. Major pitfalls were related to surgical selection and the narrow working space.**

INTRODUCTION

Lumbar disc herniation (LDH) is a common degenerative disease of the lumbar spine with a prevalence of 1%–3% in some population studies.[1] LDH often determines the onset of low back pain associated with radicular pain. In approximately 30% of cases, patients show no response to conservative treatment and require removal of the disc herniation with standard surgical treatment.[2] Standard surgical treatment usually consists of an interlaminar approach as described by Caspar et al.,[3] which is performed either with laminotomy or interlaminectomy and, when required, with a facetectomy. In some cases, this surgical approach may produce iatrogenic spinal instability depending on the extent of interlaminectomy.[4-7]

In cases of extruded LDH, extensive exposure of the intervertebral disc may not be required, as in those cases removal of the extruded fragment alone without discectomy can be performed.[8,9] In approximately 10% of patients presenting with extruded LDH, the fragment is migrated cranially at the level of the posterior aspect of the vertebral body (**Figure 1**).[5-7] This zone of migration is called the hidden zone and was described in 1971 by Macnab.[10] Migration of the LDH in the hidden zone may result in a conflict with both the exiting and the transient nerve roots.

Key words
- Foraminal approach
- Lumbar disc herniation
- Lumbar discectomy
- Lumbar hidden zone
- Intraforaminal disc herniation
- Translaminar approach

Abbreviations and Acronyms
LDH: Lumbar disc herniation
ODI: Oswestry Disability Index

From the [1]Division of Neurosurgery, Azienda Ospedaliero–Universitaria Maggiore della Carità, Novara; [2]Department of Clinical Surgical Diagnostic and Pediatric Sciences, Università degli Studi di Pavia, Pavia; and [3]Division of Neurosurgery, Azienda Socio Sanitaria Territoriale Monza–Ospedale San Gerardo, Monza, Italy

To whom correspondence should be addressed: Andrea Di Cristofori, M.D. [E-mail: andrea.dicristofori@gmail.com; andrea.dicristofori@unimi.it]

Christian Cossandi and Andrea Fanti are co–first authors.

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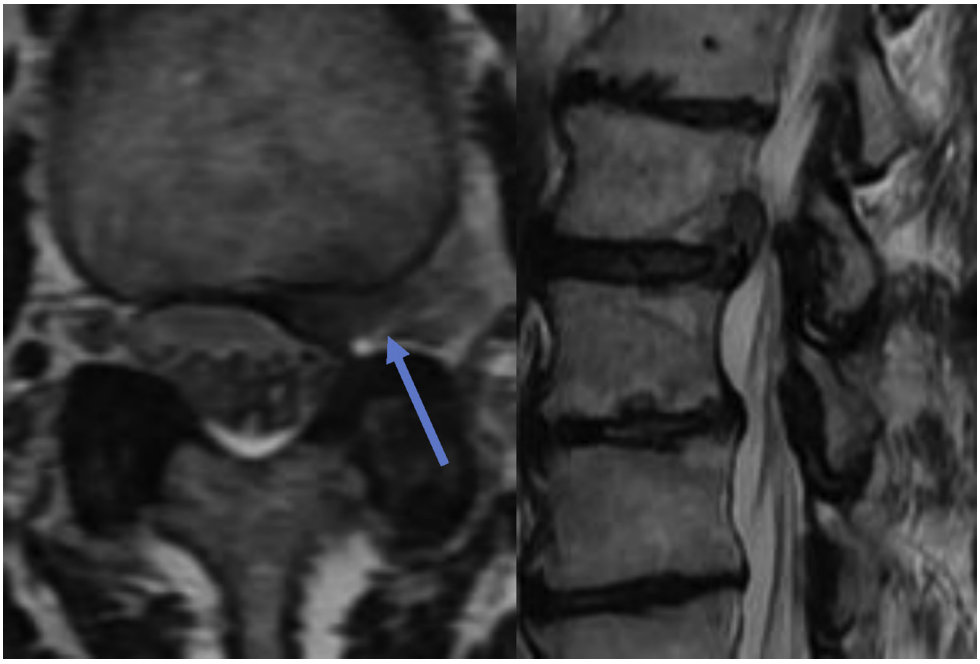

Figure 1. Prolapsed intraforaminal right-sided L4-5 disc (*arrow*) that was treated with an intralaminar approach.

Exposure of Macnab's hidden zone may be problematic with the Caspar approach, as an extensive laminectomy may be required to achieve sufficient exposure of the LDH.[3,4] For this reason, in 1998, Di Lorenzo et al.[11] described an approach targeting exposure of Macnab's hidden zone. Their approach was based on unroofing the posterior wall of the hidden zone through fenestration of the pars interarticularis. This approach is called a translaminar approach and allows removal of the extruded fragment without extensive removal of the bone. The aim of this article is to provide a detailed description of the technical advantages and pitfalls of the translaminar approach. In addition, to understand the problems of this surgical strategy, our experience of a consecutive series of patients treated with a translaminar approach for a craniolaterally extruded LDH is reported along with their long-term follow-up.

MATERIALS AND METHODS

This study was approved by the ethics committee of our hospital, and all patients included in the study signed a consent form before surgery. The study comprised a consecutive series of patients with an intraforaminal LDH with radicular pain who underwent surgery at our institution between April 2013 and April 2017. Surgery was performed by dedicated spinal neurosurgeons (C.C. and G.P.). All patients underwent surgery when they had 1) radicular symptoms fitting with a compression of the nerve root by LDH in the hidden zone or 2) radicular pain that failed to respond to medical conservative management performed at the pain clinic of our institution. Preoperative work-up included lumbar spine magnetic resonance imaging. Preoperative and postoperative low back pain and radicular pain were assessed using the Oswestry Disability Index (ODI).[12] ODI score was evaluated with omission of the sex life section to have more homogeneous results. Clinical follow-up was performed at the neurosurgical outpatient clinic. The preoperative ODI questionnaire was completed by the patient the day before surgery, while the postoperative ODI questionnaire was collected by an independent telephone operator. The postoperative enquiry was performed in November 2017. We divided patients into 5 classes based on ODI: class 1, ODI 0%—20% (minimal disability); class 2, 20%—40% (moderate disability); class 3, 40%—60% (severe disability); class 4, 60%—80% (crippled); class 5, 80%—100% (bedridden or disabling symptoms).

Surgical Technique

The patient is placed in prone position after the induction of general anesthesia. An x-ray is obtained to check the level of the LDH by introducing a spinal needle between the spinous processes of the upper and lower vertebrae. Given the oblique orientation of the lumbar laminae in sagittal position, it is useful to tilt the operating table in a head-upward direction to obtain a horizontal lamina orientation (parallel to the floor). A midline 3-cm linear skin incision at the level of the disc herniation is performed. Paraspinal muscles are elevated with a sharp periosteal elevator from the side of the disc herniation allowing the exposure of the ligamentum flavum and the hemilamina of the upper vertebra. A second intraoperative x-ray is obtained to check the position of the pedicle in relation to the isthmus and to assess the accuracy of the level