Our Experience of Minimally Invasive Decompression for Degenerative Stenosis with Aseptic Inflammation of the Lumbar Spine Using the Ube Technique

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Abstract
Most researchers use the term "spinal canal stenosis" to describe symptoms caused by anatomical narrowing of the spinal canal. Aseptic (non-bacterial) spondylodiscitis is, in the modern understanding, edema of the bone marrow and non-bacterial inflammation in two adjacent vertebrae and the intervertebral disc located between them. Aim of the study — to analyze the results of surgical treatment of patients with spinal canal stenosis using the UBE technique of spinal canal decompression in aseptic spondylitis. Materials and methods: During 2024–2025, 46 patients were hospitalized in the self-supporting department of the National Center for Rehabilitation and Prosthetics of Persons with Disabilities, including 31 men and 15 women, with a mean age of 48±2.4 years. After preliminary preparation, all patients underwent minimally invasive spinal canal decompression using the UBE technique. Results: The most common clinical manifestations on admission were vertebrogenic pain syndrome and neurogenic intermittent claudication syndrome. 76% of patients achieved good results after UBE surgery. Conclusions: The use of the UBE technique in spinal canal decompression makes it possible to eliminate the factors causing compression of neurovascular structures through minimal access. At the same time, reduced muscle trauma and preservation of most structures of the posterior spinal support complex allow intraoperative blood loss to be minimized, enable early patient mobilization, and shorten the hospital stay.

Keywords: UBE technique, aseptic inflammation, lumbar spine, decompression.

Introduction

Most researchers use the term "spinal canal stenosis" to describe symptoms caused by anatomical narrowing of the spinal canal. Stenoses at the lumbar level are found in 74–86% of patients and are one of the most common causes of vertebrogenic pain syndrome, leading to temporary and, in some cases, permanent disability [10, 11]. Conservative therapy produces a lasting positive effect in only 44–69% of patients [4, 9, 16]. Aseptic (non-bacterial) spondylodiscitis is, in the modern understanding, edema of the bone marrow and non-bacterial inflammation in two adjacent vertebrae and the intervertebral disc located between them. In the English-language literature this pathology is named after Michael Modic (M. Modic), who in 1988 classified pathological changes (Modic changes) in vertebrae and intervertebral discs into 3 types: Type 1 Modic changes (aseptic spondylodiscitis), Type 2 Modic changes (fatty degeneration of vertebral bone marrow), and Type 3 Modic changes (condensation and sclerosis of vertebrae). All three types are regarded as stages of the same process, in which aseptic spondylodiscitis (Modic Type 1) is the initial, acute stage most closely associated with low back pain, while fatty bone marrow degeneration and vertebral sclerosis are considered late stages characterized by diminishing pain, subsidence of the inflammatory process, and reduction of bone marrow edema [22, 23].

In this regard, the number of surgical interventions in patients with spinal canal stenosis is increasing every year. Despite the relatively rare occurrence of spinal canal narrowing at the level of the arches, laminectomy with additional resection of the posterior support complex elements (hypertrophied facet joints, yellow ligaments) causing compression of neural structures remains the most common method of decompression for spinal canal stenosis [1, 16]. One of the main trends in modern surgery is a maximally effective and radical operation with minimal iatrogenic impact. Following these principles, Young et al. [23] developed and described unilateral foraminotomy for bilateral microdecompression in spinal canal stenosis in 1988. This approach was modified in 1991 by McCulloch et al. [12] and described as microsurgical fenestration. Later, Foley et al. [5] developed TLIF combined with bilateral decompression through a unilateral intermuscular approach [3, 5, 12, 23]. This technique is gaining an ever-growing number of proponents. The use of modern diagnostic studies (MRI, CT) makes it possible to identify all factors leading to spinal canal narrowing and to plan surgery to eliminate the pathological components causing it, with minimal resection of spinal motion segment structures. Sequential myodilation technique, specialized retractors, and percutaneous transpedicular screws allow reduction of trauma to surrounding soft tissues [9, 15, 16, 21].

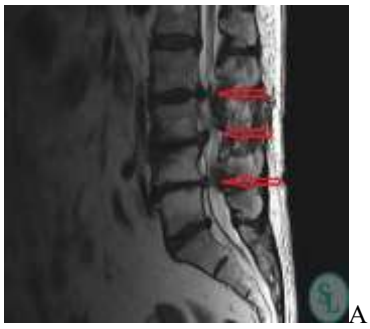
Aim of the study: To analyze the results of surgical treatment of patients with spinal canal stenosis using the UBE technique of spinal canal decompression in aseptic spondylitis.

Materials and methods

During 2024–2025, 46 patients were hospitalized in the self-supporting department of the National Center for Rehabilitation and Prosthetics of Persons with Disabilities, including 31 men and 15 women, with a mean age of 48±2.4 years. All patients underwent a comprehensive diagnostic workup (evaluation by related specialists, instrumental and laboratory tests). After preliminary preparation, all patients underwent minimally invasive spinal canal decompression using the UBE technique. The most common indication for surgery was spinal canal stenosis in patients who had previously suffered spondylitis. The main clinical manifestations of the disease were: pain in the legs and buttocks, sensory disturbances in the legs, constant pain in the lumbar spine, and postural disturbances. MRI and CT findings revealed signs of a prior inflammatory process and spinal canal narrowing in all patients. The selection criteria for surgical treatment were clinical manifestations confirmed by CT and MRI and the absence of effect from comprehensive conservative therapy conducted for at least three months. Pain intensity was assessed using the VAS scale before surgery, after surgery, and at 6 months postoperatively.

Fig. Modic change types

Surgical technique. Operations were performed through a unilateral paramedian approach 3–5 cm lateral to the spinous process line using two incisions and a port. Transmuscular access was made to the facet joint and the interlaminar space. Partial resection of the lower edge of the upper hemilamina and, to a lesser extent, the upper edge of the lower hemilamina was performed. Medial facetectomy was performed on the ipsilateral side. Subsequently, with preservation of the yellow ligament to protect the dura mater, a high-speed drill and bone rongeurs were used to resect the base of the spinous process and perform medial facetectomy on the contralateral side (Fig. 1). The yellow ligaments were then resected and decompression of the root canals was carried out (Fig. 2). In patients with signs of instability, percutaneous transpedicular fixation and TLIF were performed in 8 patients. In 27 cases in which no clinical or radiological signs of instability were found on preoperative assessment and more than 50% of the articular process surface was preserved during resection, only percutaneous transpedicular fixation was performed. In 11 patients, signs of a formed spontaneous bone block were noted on preoperative CT, and therefore fixation was not performed.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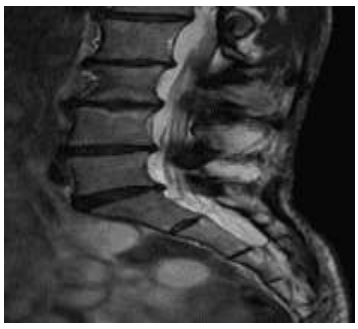
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Fig. 1 (A, B). Surgical treatment of multilevel spinal canal stenosis

Results

The most common clinical manifestations on admission were vertebrogenic pain syndrome and neurogenic intermittent claudication syndrome. Leg pain was noted in 44 patients before surgery, sensory disturbances in 36, pareses in 38, and pelvic organ dysfunction in 6. In 23 cases decompression was performed at one level, in 16 at two levels, and in 7 at three levels. No significant intraoperative blood loss was observed.

Control CT within 24 hours after surgery was used to assess the dimensions of the spinal canal and the correct placement of the transpedicular screws. Dural tear occurred in 1 patient intraoperatively. No infectious complications were observed in any patient. 76% of patients achieved good results after UBE surgery.

Conclusions

The use of the UBE technique in spinal canal decompression makes it possible to eliminate the factors causing compression of neurovascular structures through minimal access. At the same time, reduced muscle trauma and preservation of most structures of the posterior spinal support complex allow intraoperative blood loss to be minimized, enable early patient mobilization, and shorten the hospital stay. In cases of spinal motion segment instability, percutaneous stabilization is advisable.

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