CASE REPORT

Usefulness of the anterior lumbar interbody fusion (ALIF) technique in failed back surgery syndrome

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ABSTRACT

Failed back surgery syndrome is a postsurgical phenomenon that involves persistent low back pain following one or more spinal surgeries. The multidisciplinary approach to its management includes both conservative and surgical treatments. Anterior lumbar interbody fusion (ALIF) has stood out as a surgical option for refractory pain. We present five cases of patients with failed back surgery syndrome treated with ALIF. These patients demonstrated reduced pain scores and significant improvement in functional capacity after the application of the abovementioned technique, suggesting its effectiveness in this group of patients who are refractory to conservative treatments. It should be noted that previous studies supporting the usefulness of ALIF mention the importance of careful patient screening, considering both preoperative factors (pain pathophysiology and accurate assessment of the underlying cause) and postoperative factors (pain recurrence and biomechanical changes), to ensure the success of the technique. Therefore, while ALIF appears to be a promising surgical option for these patients—whose condition is challenging—the need for further studies with larger samples is highlighted to provide stronger scientific evidence supporting its efficacy for this condition.

Keywords: Failed Back Surgery Syndrome; Second-Look Surgery; Low Back Pain; Neurosurgery; Spinal Fusion (Source: MeSH NLM).

INTRODUCTION

Failed back surgery syndrome is a widely known concept in neurosurgery, but is not officially recognized. It was first described in 1991 by North et al. as a medical term for persistent or recurrent low back pain, with or without radicular syndrome, following one or more spinal surgeries [1].

Over the years, there have been several definitions that intend to encompass this group of patients [2]. However, Waguespack et al. proposed a functional definition, stating that it occurs when the outcome of lumbar spine surgery does not meet the expectations set by the patient and surgeon prior to surgery, which is more useful and related to the mechanism of pain [3].

The treatment of failed back surgery syndrome requires a multidisciplinary approach after evaluation by a neurosurgeon. Currently, modern medical approach organizes the care team around the patient; in this case, spine neurosurgeons, physical therapists and psychiatrists are at the cutting-edge of current pain management strategies [4]. The most conservative strategy, i.e., nonsurgical treatment, focuses on multimodal anesthesia, including nonsteroidal anti-inflammatory drugs, opioids and even antidepressants [5,6].

Surgical approach is an accepted option in the treatment of failed back surgery syndrome. The high intraoperative and postoperative morbidity associated with various posterior approaches for revision surgery in patients postoperatively treated for this condition obliges the neurosurgeon to carry out an objective reassessment in terms of functional disability caused by pain and the recovery perceived by the patient [7]. However, anterior lumbar interbody fusion (ALIF) is the treatment of choice for revision surgery for failed posterior fusion [8]. Ideal candidates for ALIF are those who have exhausted all conservative alternatives evidencing refractory pain; moreover, its success has been widely described in the literature [9-11]. This paper presents a series of five successful cases of ALIF approach in patients with failed back surgery syndrome in a private medical center.

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CASE SERIES

In all five cases, the decision for surgical approach with ALIF was based on each patient's medical records and diagnostic tests. All patients had previously undergone spinal surgery via a posterior approach; in addition, each case was managed by a multidisciplinary team including specialists in physical therapy, psychiatry and pain management. The clinical presentation included low back pain, radiation to the lower limbs, signs of nerve irritation and difficulty walking. Patients in the case series were assessed using the Visual Analog Scale (VAS) for pain and the Oswestry Disability Index (ODI) for low back pain in both the preoperative and postoperative periods. In addition, a description was made of the duration of the technique during the intraoperative period, as well as the associated complications, e.g., number of days in hospital and surgical reinterventions (Tables 1 and 2).

Table 1. Preoperative and postoperative evaluation of the case series

Case	Age	Level of ALIF	Preoperative evaluation		Postoperative evaluation	
			VAS	ODI (%)	VAS	ODI (%)
1	26	L5-S1	10	95	2	2
2	52	L4-L5 L5-S1	10	80	1	2
3	24	L4-L5 L5-S1	8	85	1	1
4	45	L4-L5	10	80	0	1
5	33	L4-L5 L5-S1	10	90	1	5

VAS: Visual Analog Scale. ODI: Oswestry Disability Index.

Table 2. Intraoperative and postoperative description of the case series

Case	Duration of the ALIF procedure (min)	Number of days in hospital	Surgical reintervention following ALIF?	Complications
1	56	5	NO	None
2	58	6	NO	None
3	65	5	NO	None
4	52	6	NO	None
5	60	7	NO	None

Case 1

A 26-year-old woman was admitted due to an exacerbation of severe left-sided axial and radicular pain with decreased strength in the left lower limb, which had worsened over the past two days. She could not tolerate sitting or standing. Her medical history included spinal surgery—specifically, a transforaminal lumbar interbody fusion (TLIF) and transpedicular fixation system (TPFS) at L5-S1—due to a herniated nucleus pulposus (HNP) at the same level (Figures 1A, 1B). Physical examination revealed paraspinal tenderness on palpation, bilateral positive Lasègue and Bragard signs, claudication while walking and decreased strength in the left leg. Anterior surgical treatment was proposed due to extensive posterior fibrosis (Figures 1C, 1D).

Case 2

A 52-year-old man was admitted to the emergency department after a traffic accident, presenting with severe axial pain radiating to both lower limbs, mainly to the right side. He could not tolerate walking or sitting for more than two minutes. His history included spinal surgery with TPFS at the L4-L5-S1 levels due to lumbar stenosis (Figures 1E, 1F). Physical examination revealed a positive Dandy sign at L3-L4-L5-S1 as well as bilateral positive Lasègue and Bragard signs. Lumbar paraspinal muscle contracture was noted on palpation, along with pain during flexion and extension of the spine and claudication while walking on toes and heels. Combined anterior and posterior surgical treatment was indicated. Surgical treatment via an anterior approach was proposed due to extensive posterior fibrosis (Figures 1G, 1H).

Case 3

A 24-year-old woman presented with low back pain radiating to both lower limbs, predominantly on the left side. She could not tolerate standing or sitting, and presented claudication when walking short distances. Her medical history included spinal surgery with posterior instrumentation and posterior decompression at the L4-L5-S1 levels (Figures 1I, 1J). Physical examination revealed a positive Dandy sign at L4-L5-S1 as well as bilateral Lasègue and Bragard signs. Lumbar paraspinal muscle contracture was noted on palpation, along with pain during flexion and extension and claudication when walking on heels. An anterior approach was proposed, given the patient's history of posterior surgery with extensive fibrosis (Figures 1K, 1L).

Case 4

A 45-year-old man presented with low back pain radiating to the right lower limb after a fall from height. Initial evaluation revealed a fracture at L3-L4 and L4-L5; and insertion of a posterior fixation system was performed (Figures 1M, 1N). One month later, he presented with right radiculopathy and axial pain and was diagnosed with a traumatic herniation at L4-L5. Physical examination revealed Lasègue and Bragard signs on the right side, along with heel paresis. Complementary treatment via an anterior approach was indicated (Figures 1O, 1P).

Case 5

A 33-year-old man, with a history of previous surgery involving a TPFS at L4-L5-S1 together with two TLIFs at L4-L5 and L5-S1 levels (Figures 1Q, 1R), had presented with severe axial pain in the lumbar region radiating to the lower limbs for the past two months. This pain limits his ability to walk, causing claudication while walking. Physical examination revealed paraspinal muscle contracture in the lumbar region. In addition, clinical findings showed that the Dandy sign could not be assessed, while bilateral Lasègue and Bragard signs were positive. The patient underwent both anterior and posterior approaches (Figures 1S, 1T).

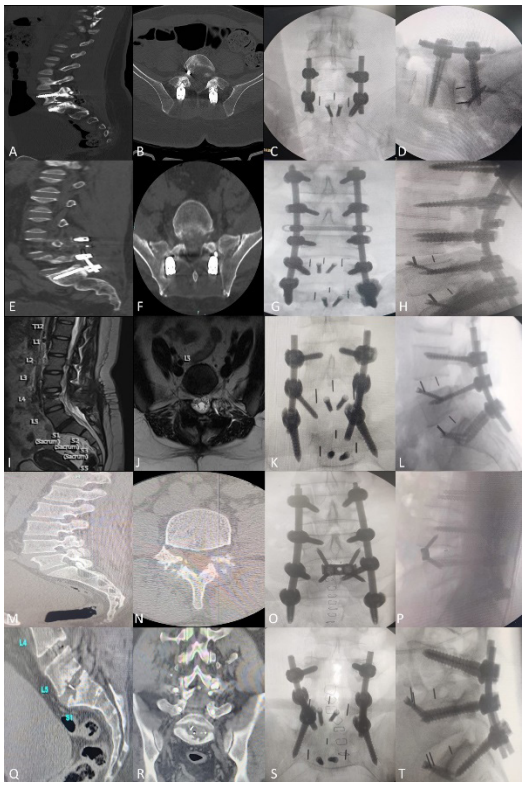

Figure 1. Preoperative and postoperative images of the case series. Case 1: Preoperative non-contrast sagittal and axial lumbosacral CT scans (A and B) reveal an interbody cage in the right foramen. Postoperative anteroposterior and lateral X-rays (C and D) show a TPFS with an anterior interbody cage at the L5-S1 level. Case 2: Preoperative non-contrast sagittal and axial lumbosacral CT scans (E and F) indicate breakage of the left S1 transpedicular screw. Postoperative anteroposterior and lateral X-rays (G and H) show a TPFS with anterior interbody cages at the L4-L5 and L5-S1 levels. Case 3: Preoperative non-contrast sagittal and axial lumbar MRI scans (I and J) reveal a herniated nucleus pulposus at the L4-L5 level. Postoperative anteroposterior and lateral X-rays (K and L) demonstrate a TPFS with an anterior interbody cage at the L4-L5 and L5-S1 levels. Case 4: Preoperative non-contrast sagittal and axial lumbosacral CT scans (M and N) show a pars interarticularis fracture at L4-L5 and L3-L4. Postoperative anteroposterior and lateral X-rays (G and H) reveal a TPFS with an anterior interbody cage at the L4-L5 level. Case 5: Preoperative non-contrast sagittal and axial lumbosacral CT scans (Q and R) indicate interbody cage subsidence at L4-L5 and L5-S1 into the vertebral body. Postoperative anteroposterior and lateral X-rays (S and T) show a TPFS with anterior interbody cages at the L4-L5 and L5-S1 levels.

DISCUSSION

ALIF has become a widely accepted surgical technique by neurosurgeons and orthopedic spine surgeons (Figure 2). Since 1932, this technique has evolved significantly with the objective of reducing the morbidity of spinal surgeries. However, controversy remains regarding the optimal surgical approach or approaches for treating various lumbar spine conditions [9]. A review of the literature provides evidence that ALIF is an effective treatment for degenerative disc disease, spondylolisthesis, combined anterior lumbar interbody fusion and instrumented posterolateral fusion for degenerative lumbar scoliosis in adults [9-13].

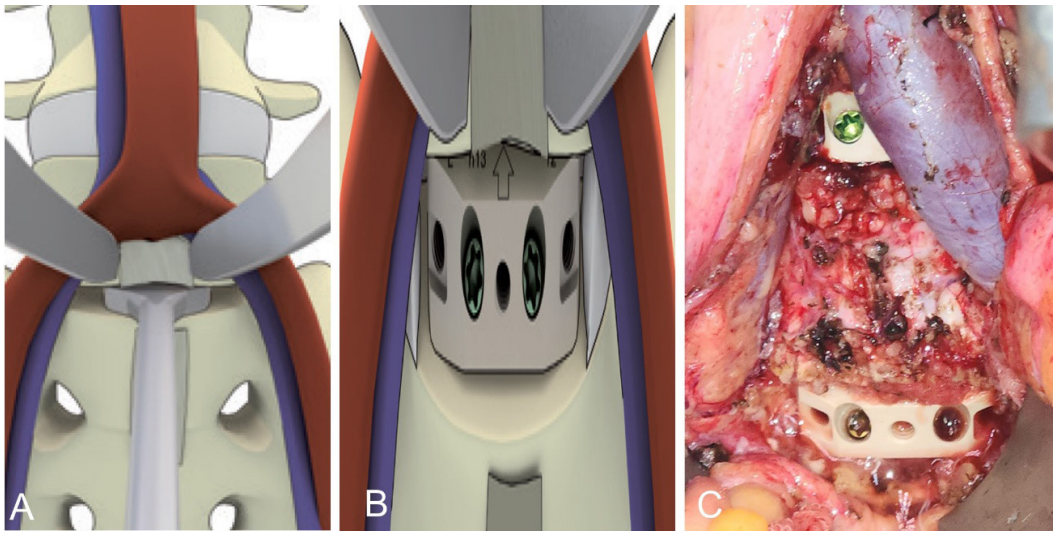

Figure 2. Anterior lumbar interbody fusion (ALIF) technique. A schematic representation of the ALIF technique is shown, illustrating the preparation of the L5-S1 intervertebral disc space (A), with subsequent placement of the L5-S1 interbody cage (B). A representative intraoperative outcome from the case series is also presented (C).

The clinical results of ALIF are sufficiently acceptable for the overall recommendation of the technique. The literature has reported solid evidence of small groups of patients with failed back surgery syndrome benefiting from the ALIF technique since 1969 [11]. The series described by Rao et al. (2015) is the largest reported to date; their retrospective study of 125 postoperative patients with the ALIF technique, with a two-year follow-up, evidenced promising results in 71 % of cases with failed back surgery syndrome [10]. Therefore, ALIF has proven to be beneficial for this group of patients; however, a larger sample of individuals is still needed to establish the significant relevance of the results and the ALIF technique.

Candidates for spinal surgery—particularly for the ALIF technique—must be carefully selected by neurosurgeons to avoid unnecessary interventions. The pathophysiology of pain in failed back surgery syndrome is believed to result from a combination of nociceptive and neuropathic pain, as well as psychological and social factors that cause chronic pain following spinal surgery [14]. Preoperative factors mainly depend on the accurate diagnosis of the patient's pain etiology, which is closely linked to a thorough medical record, physical examination, and imaging procedures [7]. On the other hand, it should be taken into account that postoperative factors such as pain recurrence have a multifactorial origin, i.e., anything from a new spinal pathology to biomechanical changes caused by muscle tension can lead to stiffness, inflammation and fatigue [7,15]. The abovementioned considerations form the basis for the ALIF technique to offer patients diagnosed with failed back surgery syndrome an effective and safe surgical approach [8,11,16].

In conclusion, failed back surgery syndrome is a common neurosurgical condition that occurs in patients who experience persistent or recurrent low back pain after one or more spinal surgeries. ALIF has proven to be an effective surgical treatment in a selected group of patients who meet certain criteria. However, larger sample sizes are required to support the technique with scientific evidence. ALIF represents a promising alternative for patients who have not improved with conservative approaches and who wish a definitive solution for chronic pain.

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