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The Spine Journal 6 (2006) 435–443

THE SPINE JOURNAL

Technical Report

Extreme Lateral Interbody Fusion (XLIF): a novel surgical technique for anterior lumbar interbody fusion

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Received 11 March 2005; accepted 25 August 2005

Abstract

BACKGROUND: Minimally disruptive approaches to the anterior lumbar spine continue to evolve in a quest to reduce approach-related morbidity. A lateral retroperitoneal, trans-psoas approach to the anterior disc space allows for complete discectomy, distraction, and interbody fusion without the need for an approach surgeon.

PURPOSE: To demonstrate the feasibility of a minimally disruptive lateral retroperitoneal approach and the advantages to patient recovery.

METHODS/RESULTS: The extreme lateral approach (Extreme Lateral Interbody Fusion [XLIF]) is described in a step-wise manner. There have been no complications thus far in the author's first 13 patients.

CONCLUSIONS: The XLIF approach allows for anterior access to the disc space without an approach surgeon or the complications of an anterior intra-abdominal procedure. Longer-term follow-up and data analysis are under way, but initial findings are encouraging.

Keywords: XLIF; Lateral; Retroperitoneal; Trans-psoas; Minimally Invasive; Split-blade retractor; EMG; Minimally disruptive

Introduction

Since 1991, when Obenchain described the first laparoscopic lumbar discectomy [1], the field of minimally invasive spine surgery has continued to evolve. Surgeon and patient alike have been attracted by the advantages of minimally invasive surgery, including less tissue trauma during the surgical approach, less postoperative pain, shorter hospital stays, and faster return to activities of daily living. These reported advantages led to the laparoscopic anterior lumbar approach and mini-open anterior lumbar interbody fusion (ALIF) becoming commonly performed procedures [2–7].

However, greater acceptance of these minimally invasive procedures has been hampered by known complications and challenges associated with endoscopic spine surgery. Reported problems include anesthetic complications [8], visceral damage [9], large vessel bleeding [10,11], and sexual dysfunction [12,13]. Surgeons attempting to use this surgical technique are challenged by the required technical skills, steep learning curve, and continued requirement for access surgeon.

The current report describes a novel, minimally disruptive spine procedure called the Extreme Lateral Interbody Fusion or XLIF (NuVasive, Inc., San Diego, CA). This technique is novel in that it can be used to gain access to the lumbar spine via a lateral approach that passes through the retroperitoneal fat and psoas major muscle. Hence, the potential complications with an anterior transperitoneal approach to the lumbar spine can be avoided, major vessels are not encountered, an anterior access is not required, and the procedure can be done through two, 3–4-cm incisions. Here we report the techniques of this approach to the lower lumbar spine.

FDA device/drug status: not applicable.

Nothing of value received from a commercial entity related to this manuscript.

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1529-9430/06/$ – see front matter
doi:10.1016/j.spinee.2005.08.012

Materials and methods

Patient selection and surgical indications

Patients who presented with axial low back pain without severe central canal stenosis were considered candidates for this surgery if they failed at least 6 months of conservative, traditional nonoperative management. Contraindications included significant central canal stenosis, significant rotatory scoliosis, and moderate to severe spondylolisthesis. In some patients, discography was used as a tool to assist in level selection. The group of patients is essentially the same as those with degenerative disc disease and considered candidates for fusion (ALIF) or more potentially lumbar disc arthroplasty. Figure 1 demonstrates images from a representative patient with degenerative disc disease at L2–L3.

Surgical technique

Patient preparation

With general endotracheal anesthesia achieved and intravenous lines started, the patient is placed in a true 90° right lateral decubitus position with the left side elevated and taped in this position. A cross-table anterior-posterior (AP) image helps to confirm the true 90° position. The table and/or patient should be flexed in such a way as to increase the distance between the iliac crest and the rib cage, especially useful at upper lumbar levels and at L4–L5. At times it is helpful to place a bump/roll under the contralateral flank (Fig. 2).

After aseptic treatment of the skin, a k-wire and lateral fluoroscopic image are used to identify the lumbar disc's mid-position (Fig. 2). A mark is made on the patient's lateral side, overlying the center of the affected disc space.

Fig. 1. Preoperative images demonstrating degenerative disc disease at L2–L3.