

The unilateral ELIF* for treatment of post-discectomy disc disease

*Extra Foraminal Lumbar Interbody Fusion

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Introduction:

Post-discectomy disc disease often requires an interbody fusion surgery. The posterior approach to the lumbar spine is destructive to the posterior musculature. Due to fibrosis, it also presents the risks inherent to the dissection of the cauda equina. With its well-known vascular, plexic and digestive risks, a surgeon's enthusiasm for the anterior approach depends on training. A third approach can be used in healthy tissue: The unilateral extraforaminal interbody Fusion (ELIF). Surgery is performed outside the spinal canal and allows a lateral access to the zygapophysial joint and the intervertebral disc space, while leaving many healthy structures intact. It also provides access to lateral disc herniation fragment and still assures sufficient stability for fusion.

Objective:

Determine the advantages of the ELIF unilateral fusion in the treatment of post-discectomy disc disease.

Background data and methods:

From 2003 to 2006, thirty-six patients with persistent lumbar and radicular pain despite previous discectomy for intracanal herniation have been treated with the unilateral ELIF fusion.

All patients received static and dynamic X-ray, as well as MRI to assess the discopathy, the inflammatory signals or a possible recurrent herniation.

ELIF surgical intervention:

By a single incision, 3 inches lateral from the midline, the extraforaminal approach was used to reach the disc, according to an angle of at least 30° from the sagittal plane. For cases with intracanal disc herniations, the superior articular process was removed.

Two specially designed cages made of ostaPek** composite were inserted after new discectomy. An osteosynthesis was added from the same approach. ostaPek** composite plate and titanium pedicle screws were used to stabilize segments where the superior articular process was removed or when instability was observed in situ.

Fusion was assessed by a reconstructive CT scan at six months and confirmed when at least an osseous bridge links the 2 vertebrae.

Patients were examined at 1st, 3rd and 6th post-operative month in a retrospective study.

Clinical results were evaluated according to the Lickert scale (results from 0 to 5).

Patient series:

36 patients (19 males/17 females)
12 of the 36 patients with recurrent herniation
Mean age: 48 (29 to 79)
Mean time between 1st discectomy and interbody fusion: 39 months (3 to 86)
Operated levels: L5-S1 (12), L4-L5 (23), L3-L4 (1)
Unilateral pedicle fixation was used in 20/36 patients.
Mean operative time: 120 min
Blood loss was less than 50 cc for all patients.
Mean hospital stay was 6 days

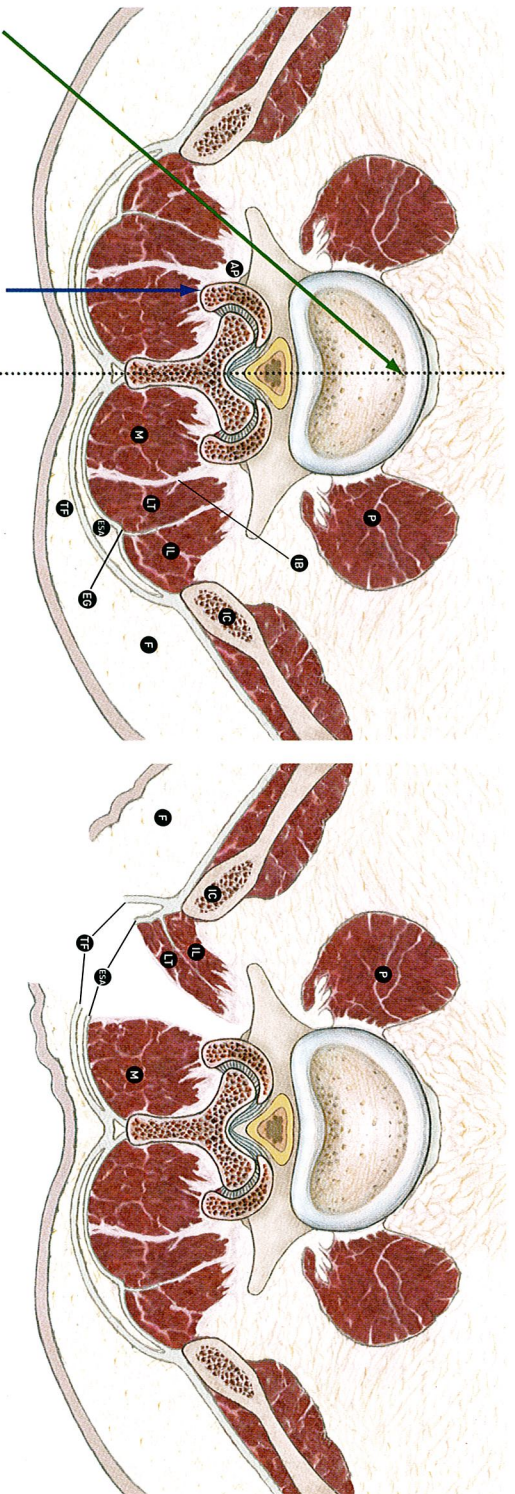
Results:

Clinical results, according to Lickert scale, are from 3,6 (preop) to 1,2 (postop) for low back pain, and 3,7 (preop) to 0,4 (postop) for radicular pain.
There was neither motor loss, nor vascular injury. Four cases presented a transient foraminal radicular pain which disappeared in 1 to 4 weeks in each case.
Fusion was always confirmed, except in 1 case.
On 21 workers: 15 returned to original profession, 3 found a new profession and 3 stopped working.

Discussion:

The absence of complications is explained by the ability of the ELIF unilateral approach to work in healthy tissue, leaving most structures in place (muscles, ligaments and bones). The respect of these structures – in particular an intact facet joint – means, that pedicle fixation is not always required. The authors used ostaPek composite plating for patients over 60 years and when a destabilizing resection of the superior articular process was performed.
Surgical results compare to those of ALIF, PLIF or TLIF series reported in the literature. The ELIF unilateral extraforaminal approach can be considered as a reliable option in post-discectomy disc disease, which respects structures such as muscles, ligaments and bones, while avoiding potential neural and vascular complications.

** ostaPek composite is long carbon fiber reinforced polymer (colligne AG Switzerland)



ELIF approach
45 degrees

Wiltse approach

TF = Thoracolumbar Fascia
M = Multifidus
LT = Longissimus Thoracis Pars Lumborum
IL = Iliocostalis Lumborum, Pars Lumborum

IB = Interspinal Boundary
ESA = Erector Spinae Aponeurosis
F = Fat
P = Psoas Major

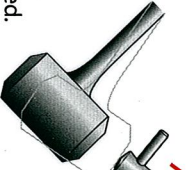
IC = Iliac Crest
EG = ELIF Groove
AP = Accessory Process

Angle of attack. ELIF vs Wiltse

The ELIF is at 45°, lateral to the superior articular process of the facet.
The Wiltse approach is parallel to the midline and the facet joint, preventing access to the disc interspace.

ELIF Surgical exposure

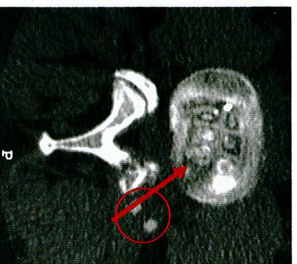
Each plane is identified and separated. Only the thoracolumbar fascia and the erector spina aponeurosis are incised. The longissimus is separated atraumatically from the multifidus to create the ELIF plane.



Case 1. Recurrent disc herniation. Post discectomy L4-L5.



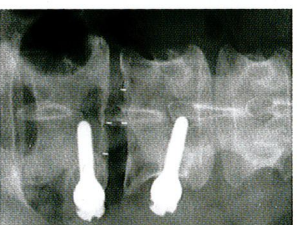
Recurrent disc herniation adjacent to the superior L5 articular process.



Axial CT at 6 months
The superior L5 articular process is removed to reach the recurrent disc herniation. Note the outline of the radiolucent ostapek cages and plates are apparent.



Lateral x-ray
Images four days post surgery show pedicle screws and radiolucent ostapek composite plate.



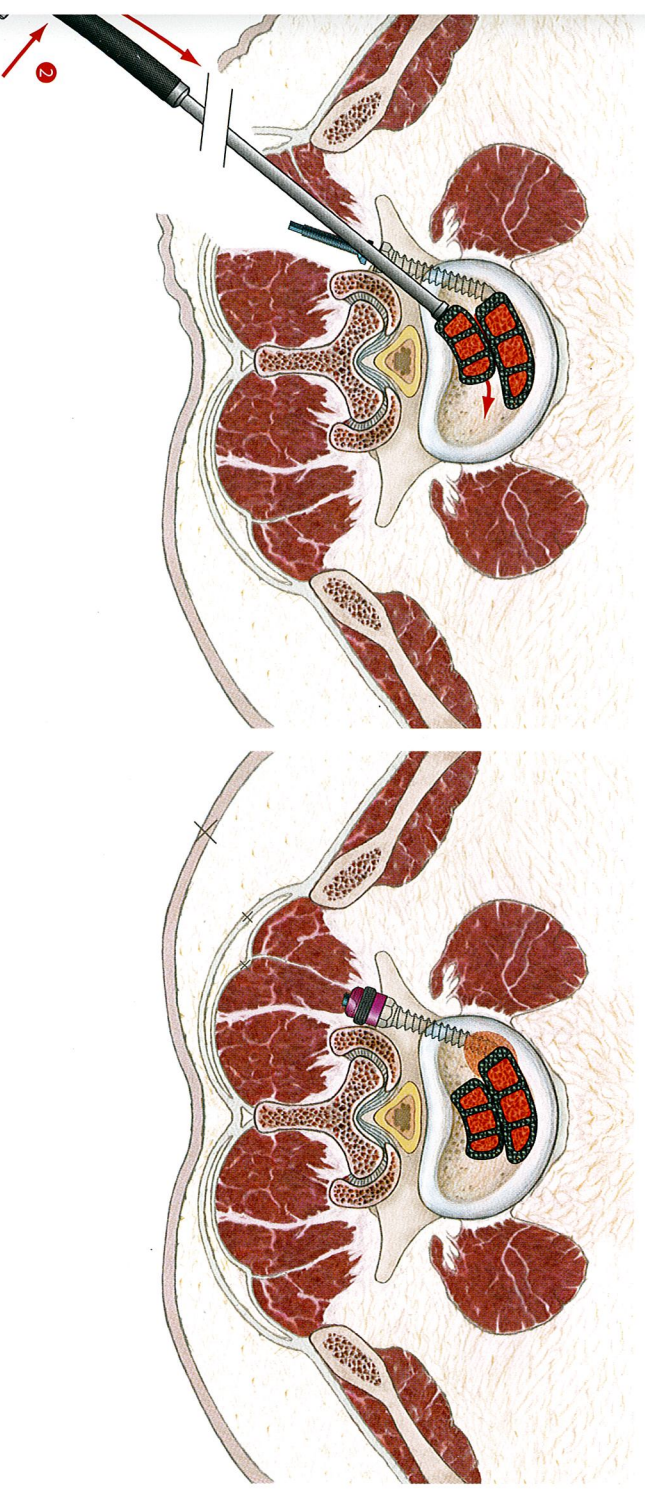
AP x-ray
Images show pedicle screws and the ostapek composite plate.



ostapek composite ELIF cages and spinal plate and titanium pedicle screws.**

Patient information
Age 45Y, Sex M
Previous discectomy, L4-L5. Two years post discectomy, low back pain and L5 radicular pain.

The contralateral facet and adjacent muscles are untouched.
The ipsilateral superior articular process is resected to reach the disc herniation, ostapek plate is preferred for its rotational stability.



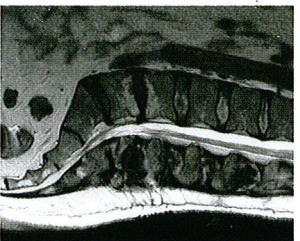
Pedicle screws and composite cages in place

The 45° angle of attack allows anatomical placement for pedicle screws and composite cages.

ELIF fusion construct unilateral composite cages, plate & pedicle screw fixation

A composite plate is preferred for its stability in rotation. The ELIF plane is closed, returning the longissimus lateral to the multifidus. The thoracolumbar fascia and the erecta spina aponeurosis are repaired.

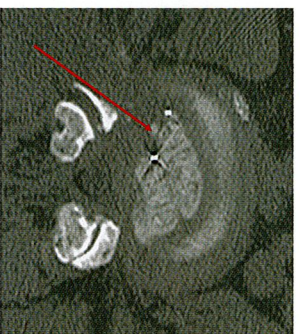
Case 2. Post discectomy discolopathy L4-L5.



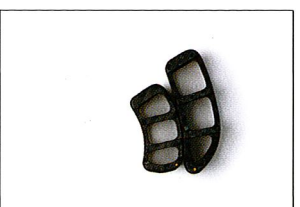
**Lateral MRI
discolopathy L4-L5**



Preop Axial MRI
Interspace access will be lateral to the superior articular process.



Postop Axial CT at 6 months
The lateral aspect of slightly hypertrophic superior articular process was partially removed for access to the interspace.



oStaPek composite
ELIF cages.**

Patient information
Age 32Y, Sex M
Previous discectomy L4-L5.
Current symptoms modic 1 low back pain and leg pain.

This leaves a stable functioning facet joint. It was therefore elected to use oStaPek composite cages and not pedicle fixation.

Unilateral ELIF

(Extra foraminial Lumbar Interbody Fusion)

- circumvents scar tissue
- is away from the cauda equina
- avoids vascular structures
- preserves viable muscle tissue

Builds a 360° fusion construct

- composite cages
- functionally intact facet joints
- and/or pedicle fixation

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