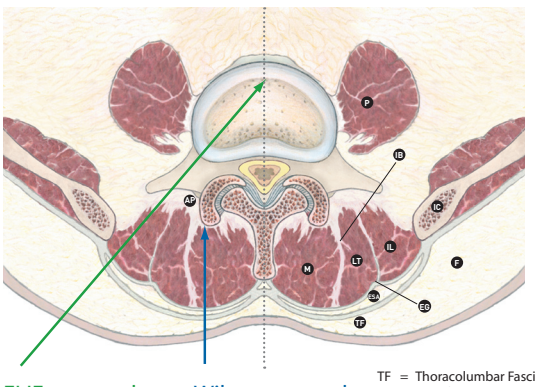
# Unilateral ELIF

## (Unilateral Extraforaminal Lumbar Interbody Fusion)

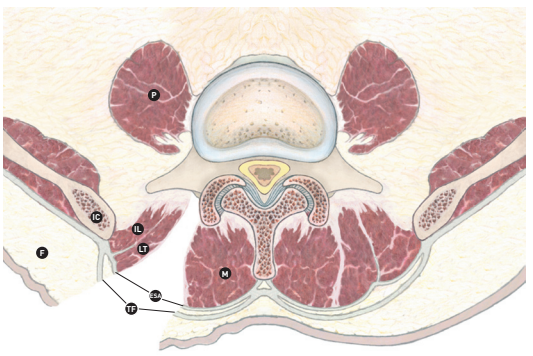
## Surgical technique, fusion assessment by CT scan on 75 cases

D. Recoules-Arche, D. Alcaix, T. Somon
Groupe Hospitalier du Havre, Hôpital Jacques Monod, Le Havre, France




ELIF approach 45 degrees

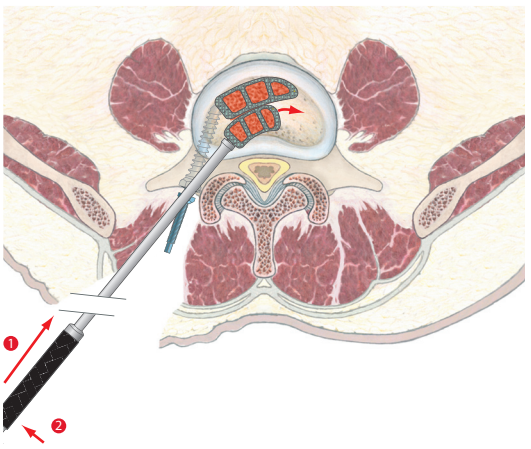
Wiltse approach



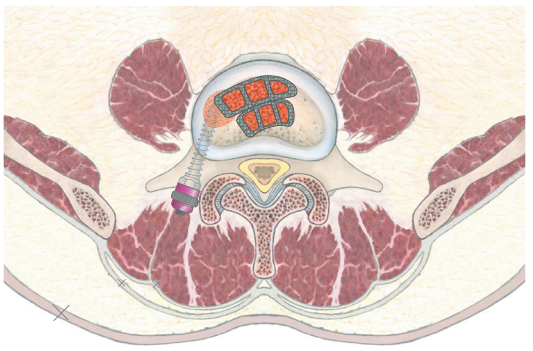

TF = Thoracolumbar Fascia
M = Multifidus
LT = Longissimus Thoracis, Pars Lumborum
IL = Iliocostalis Lumborum, Pars Lumborum
IB = Interfascial Boundary
ESA = Erector Spinae Aponeurosis
F = Fat
P = Psoas Major
IC = Iliac Crest
EG = ELIF Groove
AP = Accessory Process

**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 erecta spinae aponeurosis are incised. The longissimus is separated atraumatically from the multifidus to create the ELIF plane.




**Pedicle screws and composite cages in place**
The 45˚ angle of attack allows anatomical placement for pedicle screws and composite cages.



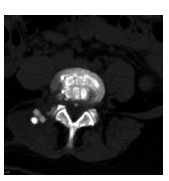
**ELIF fusion construct unilateral composite cages, plate & pedicle screw fixation**
A composite plate is preferred for its stability in rotation. The ELIF plane is closed, returning the longissimus lateral to the multifidus. The thoracolumbar fascia and the erecta spinae aponeurosis are repaired.

**Unilateral ELIF**
(Unilateral Extraforaminal Lumbar Interbody Fusion)
- circumvents scar tissue
- is away from the cauda equina
- avoids vascular structures
- preserves viable muscle tissue

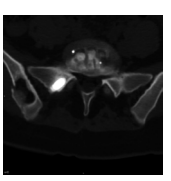
Builds a 360˚ fusion construct
- composite cages
- and pedicle fixation

### Case 1. ELIF without intracanalar lesion.

**Lateral discography pre op**



**Axial CT scan L4-L5, post op 6 months**



**Axial CT scan L5-S1, post op 6 months**

**Lateral CT scan L4-L5-S1, post op 6 months**

**3D bone reconstruction, post op, showing ostaPek composite cages and plate**

**ostaPek* composite ELIF cages and spinal plate with titanium pedicle screws**

Patient information
Age 34 Y, Sex F
Degenerative disc disease L4-L5/L5-S1
Chronical bilateral lumbar radicular pain

- extra articular approach
- extra canalar approach

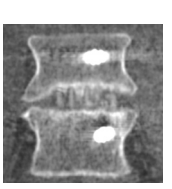
Even if the lateral superior articular process is partially removed, the bone structure – even the facet joint – leaves intact. ostaPek composite plate is preferred for its mechanical and dynamic properties.

### Case 2. ELIF with intracanalar lesion.

**MRI pre op**

**MRI pre op**

**Axial CT scan, post op 6 months**



**Coronal CT scan, post op 6 months**

**Lateral CT scan, post op 6 months**

**ostaPek* composite ELIF cages and spinal plate with titanium pedicle screws**

Patient information
Age 44 Y, Sex F
Recurrent disc herniation
Post discectomy L4-L5

- partial or complete facetectomy

The ipsilateral superior articular process is resected to reach the disc herniation. ostaPek composite plate is preferred for its rotational stability.

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

**Introduction**
Lumbar Interbody Fusion is the classical treatment for disc disease or lumbar instability and could be performed by posterior (PLIF), anterior (ALIF) or transforaminal (TLIF) approach.
The authors propose a novel, unilateral, extraforaminal (ELIF) approach which respects muscles, ligaments and bones, minimizes the risk of destabilization and preserves the vascular and neural structures.

**Objective**
To assess this extraforaminal lumbar interbody fusion (ELIF) through CT scan at six months post-op on 75 patients.

**Method**
75 patients (20 men, 55 women, average age: 57 yrs) with lumbar radicular pain due to:
- Single or 2 levels degenerative discopathy (54 cases)
- Spondylolisthesis (21 cases: 17 degenerative, 4 lytic)

Each patient had a pre-operative CT scan and/or a MRI.
Instability had been detected by dynamic X-rays.
Operated levels: L5-S1 (27), L4-L5 (39), L3-L4 (10) and L2-L3 (1)

**Technique**
This extraforaminal approach is made through the cleavage plane between the multifidus and the longissimus muscles, at a 45° angle from the sagittal plane.
This 45° angle is obtained through a far lateral skin incision, 6 cm long and 8 cm laterally from the spinous process midline. The incision also permits iliac crest graft harvest.

If there is no intracanalar lesion (see case 1), the fusion can be achieved by:
- extra canalar approach
- extra articular approach

If there is an intracanalar lesion (herniation, cyst or unilateral stenosis), a removal of the superior facet or the entire articular mass can be easily performed to reach the spinal canal (see case 2).

After discectomy, 2 specifically designed ostaPek composite cages are inserted. When necessary, a unilateral osteosynthesis using eVos ostaPek composite plate can be performed through the same incision.

The fusion was assessed by a CT scan protocol at the 6th month with axial, coronal and oblique sagittal reconstruction slides at the same angle as the cages.
Fusion was confirmed by a radiologist when there was observed to be at least one osseous bridge.

**Results**
In 73 of 75 cases, fusion was achieved. Only 2 cases could be discussed. No case of pseudoarthrosis has been observed.

**Conclusion**
The major assets are:
- respect of the anatomical structures
- no vascular or neural complications
- minimal blood loss (less than 50 cc in all patients)
- shortened surgery time (mean time 105 min)
- significant reduction of post-op pain and long term sequelae
- ability to utilize pedicle fixation through same incision
- ability to perform procedure at L5-S1

The ELIF is a maximally effective and minimally invasive alternative to more traditional lumbar fusion operations achieving results which meet or exceed standard anterior and posterior fusions.

| Series | | | |
|---|---|---|---|
| **Population studied** | | **Levels operated** | |
| **Cases** | **75** | L5-S1 | 27 |
| Men | 20 | L4-L5 | 39 |
| Women | 55 | L3-L4 | 10 |
| (Average age 57 years) | | L2-L3 | 1 |
| **Indications** | | | |
| Single or 2 levels degenerative discopathy | | | 54 cases |
| Spondylolisthesis (17 degenerative, 4 lytic) | | | 21 cases |

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