Session IV

Intraoperative Event during DLIF/OLIF

김 진 성
가톨릭의대

Invited Speaker

Complications Avoidance in MIS Oblique Lumbar Interbody Fusion

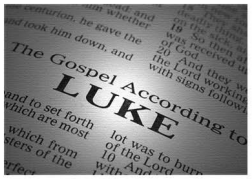
May 16-20 2016 Singapore SpineWeek
Marina Bay Sands Convention Centre

John 3:16

Disclosure

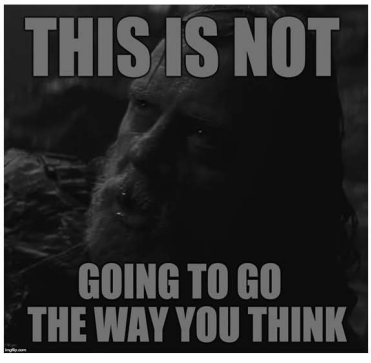
- Co-Founder of MEDRICS, Korea
- Scientific Board Advisory: INNOVASIVE, USA
- Consultant: Richard Wolf (RIWO Spine), Elliquence
- Academic Fund: Ministry of Trade, Industry and Energy, Republic of Korea, AOSpine, Medtronic, CG Bio
- Lecturer: Medtronic, GSM

My Real Disclosure



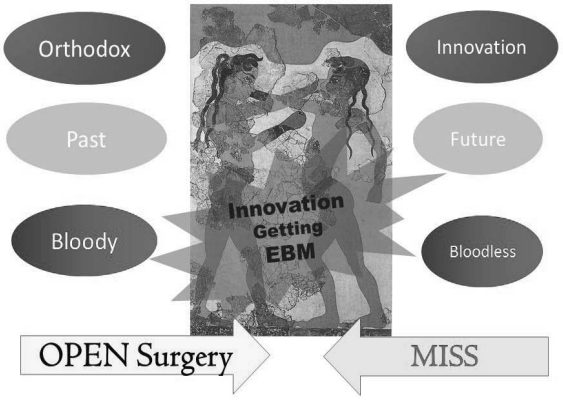
JS Luke Kim

부제



Spoiler

We are what they grow **beyond.**
- Star wars -



그러나,
한번쯤은...

Question to all of us

Past,
항상 청산의
대상인가...

Video Clip

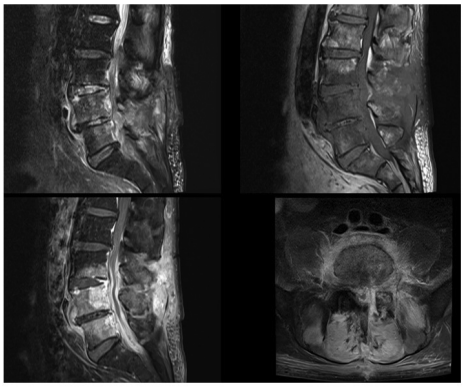
Let the past die, **Kill it** **if you have to.**

Case Example

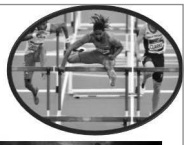
OLIF for L45
- high iliac crest

John 3:16

M/62, Spondylodiscitis

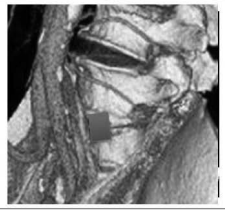


Two hurdles



- Iliac Crest

- Vessels



F/U 2 yrs, VAS_B: 0-1, VAS_L: 0

Strategy for
Lateral LIF at L45
- Transitional level

Anatomic consideration

- Narrow OLIF corridor
- Aortic bifurcation and iliocaval confluence above L45
- Iliolumbar vein more superior (mid-body of L5)

Consideration of Safety…

- Direct Lateral Approach may be safer than Oblique Lateral Approach

F/80

OLIF L23, 34
& DLIF L45

Subsidence?

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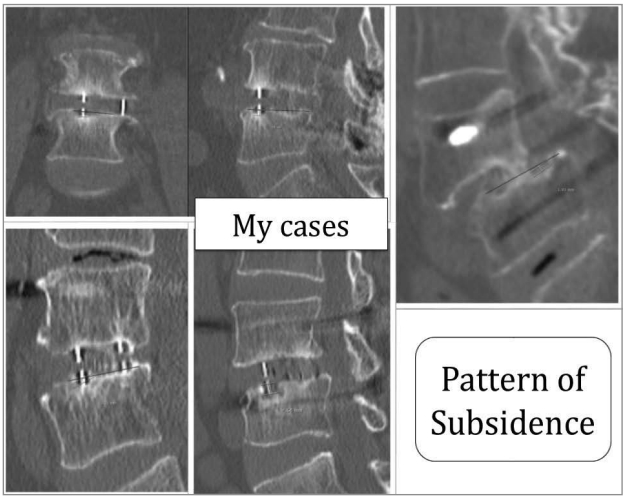

My cases

Pattern of Subsidence

Subsidence of Polyetheretherketone Intervertebral Cages in Minimally Invasive Lateral Retroperitoneal Transpsoas Lumbar Interbody Fusion

Tien V. Le, MD, Ali A. Baaj, MD, Elias Dakwar, MD, Clinton J. Burkett, MD, Gisela Murray, MD, Donald A. Smith, MD, and Juan S. Uribe, MD

- Subsidence occurred in **14.3%** of patients, with only **2.1%** becoming symptomatic, and in 8.8% of levels fused.
- Longer constructs have a positive correlation with subsidence risk.
- Implant length does not affect subsidence rates
- Implant with a large surface area(a 22-mm width) decreases the rate of subsidence.
- Therefore, the widest possible implant should be used whenever feasible.

Pattern of Subsidence after OLIF L25, single center, retrospective

Background
Oblique lateral interbody fusion (OLIF) is a minimally invasive surgical method that can access L2-5 levels of lumbar spine via retroperitoneal anteropsoas approach. While OLIF has advantage of using interbody cages with larger footprints compared to posterior approach fusion methods, some have reported similar levels of subsidence compared to posterior approaches. This study aims to evaluate the rates of radiological subsidence by operated levels, classify the types of subsidence by location and pattern, and compare the clinical outcomes between subsidence and no subsidence groups.

Study design/setting
A retrospective clinical study

Methods
The radiological data and medical records of 68 patients who underwent OLIF between June 2013 and April 2015 were reviewed. All patients were followed up for minimum of 12 months. Computed tomography (CT) scans were taken postoperatively, and at 6 and 12 months' follow up visits. Fusion status and subsidence was assessed using CT data. Subsidence was defined as cage settling of ≥2mm into the adjacent endplates. Intraoperative endplate violation was defined as subsidence that was identified on postoperative CT. The pattern of subsidence was classified as: caudal contralateral (type I), bilateral caudal (type II), and bilateral cranial and caudal (type III). For clinical assessment, VAS and ODI scores were measured preoperatively and at each follow up visits. Any perioperative/postoperative complications were also noted.

Results
Mean age was 64.6±8.6(40-79) and mean bone density was -1.6±0.7(-4.0-1.0). Total number of operated levels was 97 (single level: 46, two levels: 15, three levels: 7). Overall subsidence rate was 32.4% (22 of 68 patients) and incidence rate was 24.7% (24 of 97 levels). Intraoperative endplate violation accounted for 12.5% (3 of 24) of total subsidence. Mean subsidence depth was 2.7±1.0(2-5)mm. The types of subsidence by location were: caudal contralateral (type I) in 41.7% (10 of 24), bilateral caudal (type II) in 33.3% (8 of 24) and bilateral cranial and caudal (type III) in 25.0% (6 of 24). Overall fusion rates at 12 months were 93.9% and 92.3% in the subsidence and no subsidence group respectively. (p=0.78). The level with highest incidence of subsidence was L4-5 (16.5%) followed by L3-4 (8.2%). VAS and ODI significantly improved in both groups postoperatively with no significant difference between subsidence and no subsidence groups.

Conclusion
The authors classified subsidence by pattern and location. Contralateral caudal subsidence was most common pattern of subsidence, and lower levels were more vulnerable, especially L4-5. Fusion rates and clinical outcomes were not significantly affected by radiological subsidence. In order to minimize subsidence the authors recommend more meticulous endplate preparation and cage insertion, as well as extra attention to angle of cage insertion especially during operation of L4-5 level. nt complication without the aid of IOM.

Keywords: minimally invasive surgery, lumbar spine, oblique lat
violation, subsidence

Before submission

Complication case
– retroperitoneal hematoma

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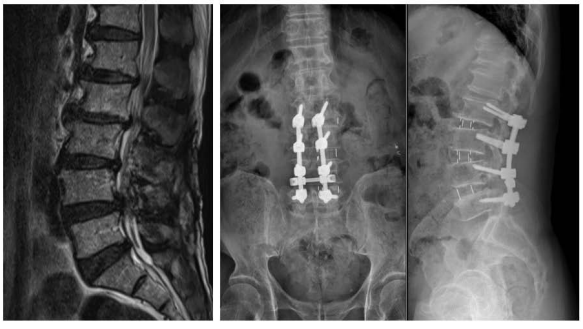
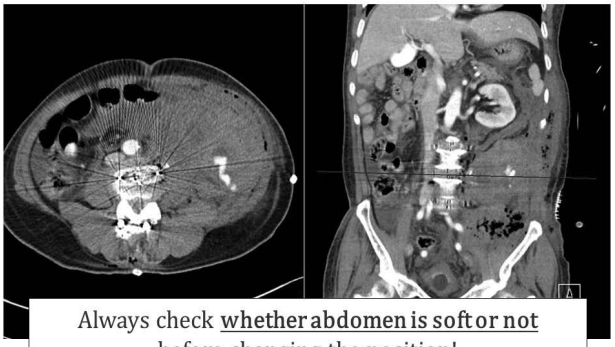
M/64, bilateral leg radiating pain, NIC



Emergency operation was done, bleeding focus?



Always check <u>whether abdomen is soft or not</u>
before changing the position!

Complication case
– injury to sympathetic chain

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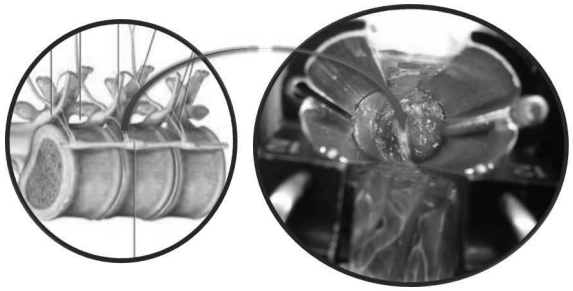
Injury to Sympathetic chain



POD # 3 wks

- VAS back: 3
- Mild hypesthesia on Lt inguinal area
- dull ache on left ankle
- Mild edema

POD # 3 mos

- Sx. subsided at POD # 3 months

Complication case
– Ureter injury

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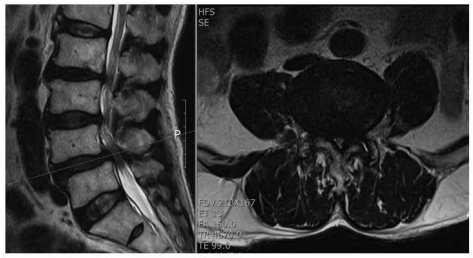
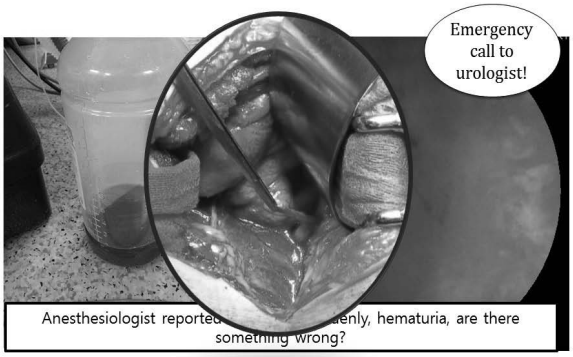
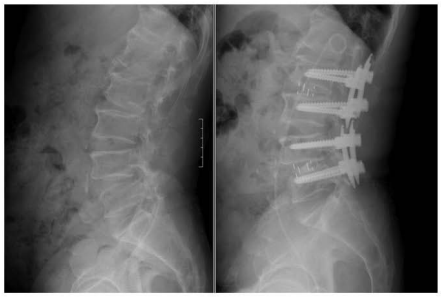


Ureter injury by No.11 blade at L2-3 level

Early Detection is very important for prevent subsequent complications!



Repair was successful, no sequelae



World Neurosurgery 2017

Complication case
– Chyle leakage

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Eur Spine J (2007) 16 (Suppl 3):S332–S337
DOI 10.1007/s00586-007-0305-2

CASE REPORT

Spontaneous healing of retroperitoneal chylous leakage following anterior lumbar spinal surgery: a case report and literature review

I-Chang Su · Chang-Mu Chen

Eur Spine J (1997) 6: 270–272
© Springer-Verlag 1997

CASE REPORT

A. L. Bhat
G. L. Lowery

Chylous injury following anterior spinal surgery: case reports

Avoiding complication
– vascular injury

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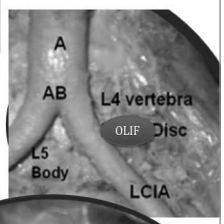
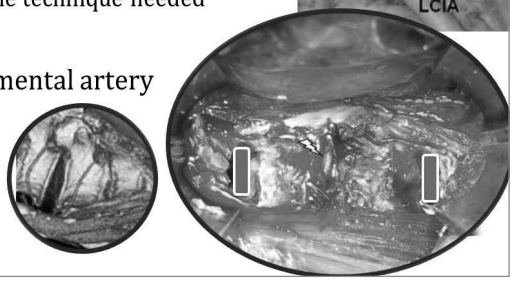
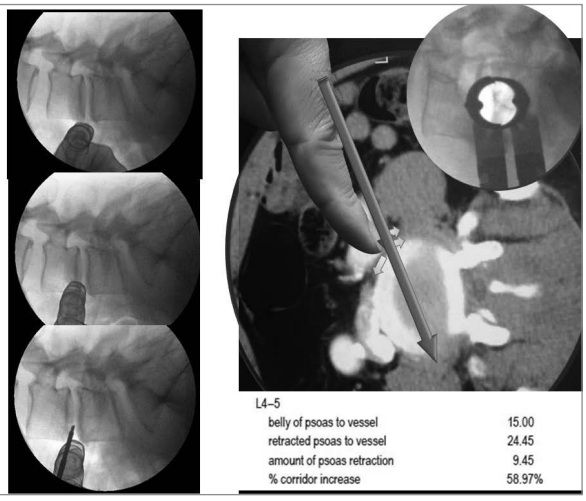
Two arteries not to be injured

- Common iliac artery
  - The size of OLIF corridor
  - The technique needed
- Segmental artery





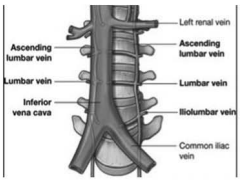
Bleeding from segmental artery

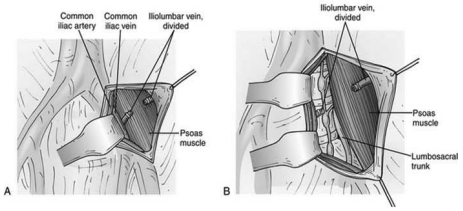


L4–5	
belly of psoas to vessel	15.00
retracted psoas to vessel	24.45
amount of psoas retraction	9.45
% corridor increase	58.97%

Injury on Vein

- Common iliac vein
- Iliolumbar vein





Complication case

– laceration injury on ventral dura & neural tissue

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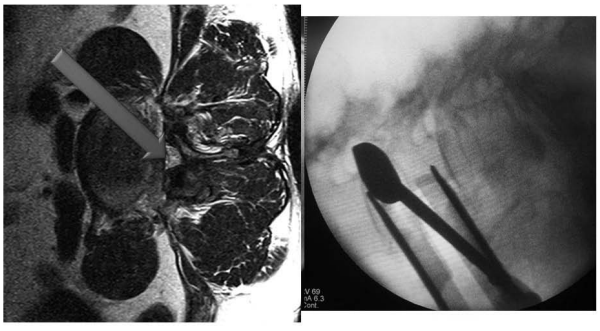
What is the situation?



Video Clip

Ventral dural tear & rootlets herniation

World Neurosurgery, Dec 2016

Video Clip

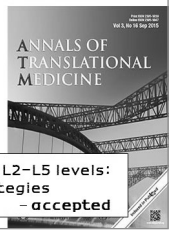
Total laminectomy & Rearrangement of herniated rootlets and repair of dorsal dura

Orthogonal C-arm View

Keep in mind 'Orthogonal'!

- Probable complications
  - ① Lumbar plexopathy
  - ② Sympathetic symptoms
  - ③ Retroperitoneal hematoma
  - ④ Ureter injury
  - ⑤ Vascular complications
    - a. Segmental artery
    - b. Common iliac artery
  - ⑥ Neural damages
    - a. Ventral dural tear
    - b. Contralateral root injury
  - ⑦ Chyle leakage

Hope… **My complications may decrease your complications**



Complications on minimally invasive OLIF at L2–L5 levels: A review of the literature and surgical strategies – accepted

Yes, failure most of all.
The greatest teacher, failure is.

(동료의) 간접경험을
(나의) 직접경험으로 만드는 것.
그것이 가장 큰 학습법이다.

Hope is like the **sun**.
If you only believe in it when you can see it,
you'll never make it through the night.

Leia Organa

RIP