

Lumbar Interbody Fusion



M. de Kleuver, M.D.,PhD

Sint Maartenskliniek
Nijmegen NL

Conflict of interest

I have no consultancy or commercial relationship to any commercial (implant) company

- in any way related to this lecture,
- nor to any of the implants shown in the slides,
- nor to my visit to Brasil.

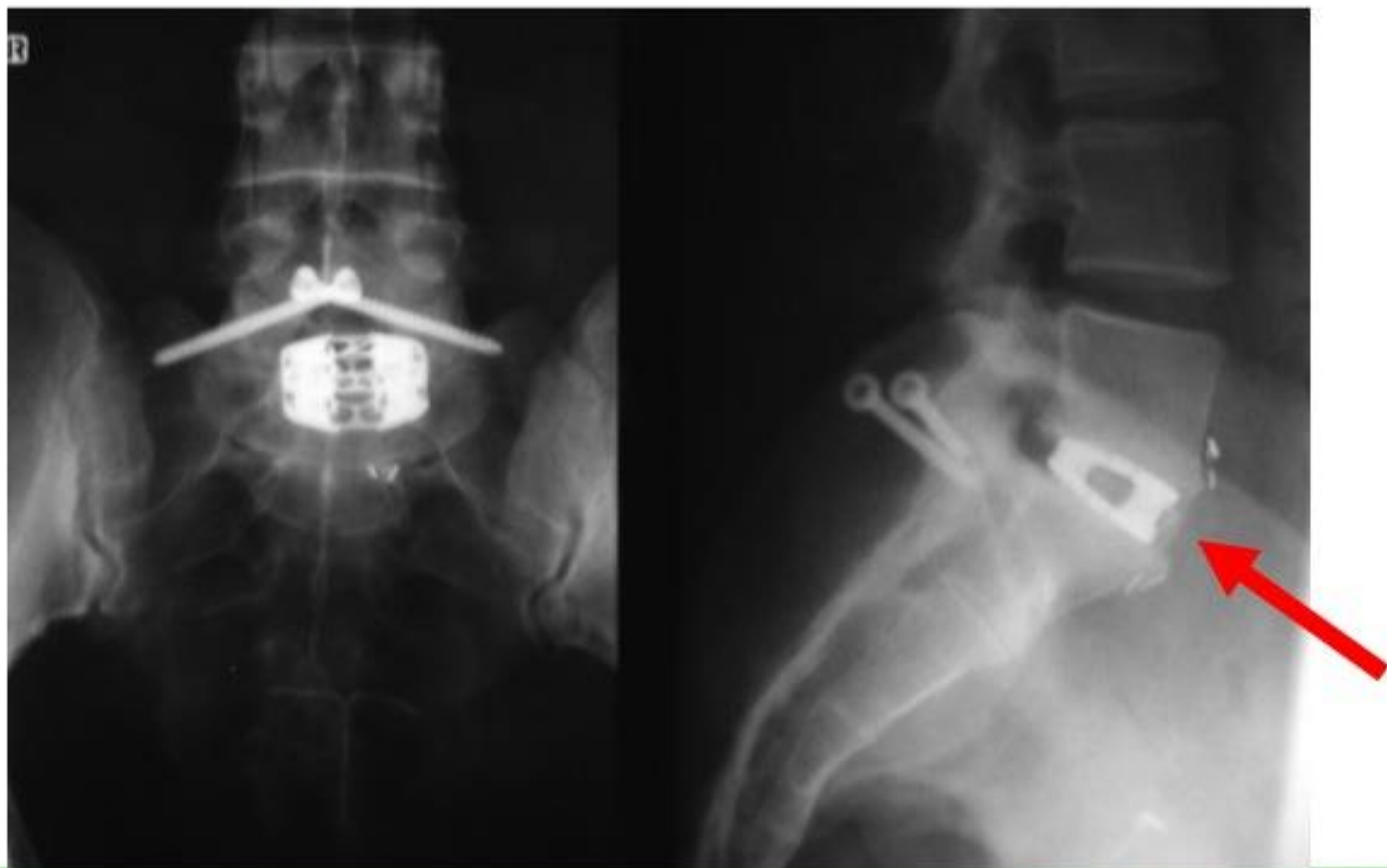
The travelcosts were paid by Congresso de Cirurgia.

I receive no speakers fee.

Presentation outline

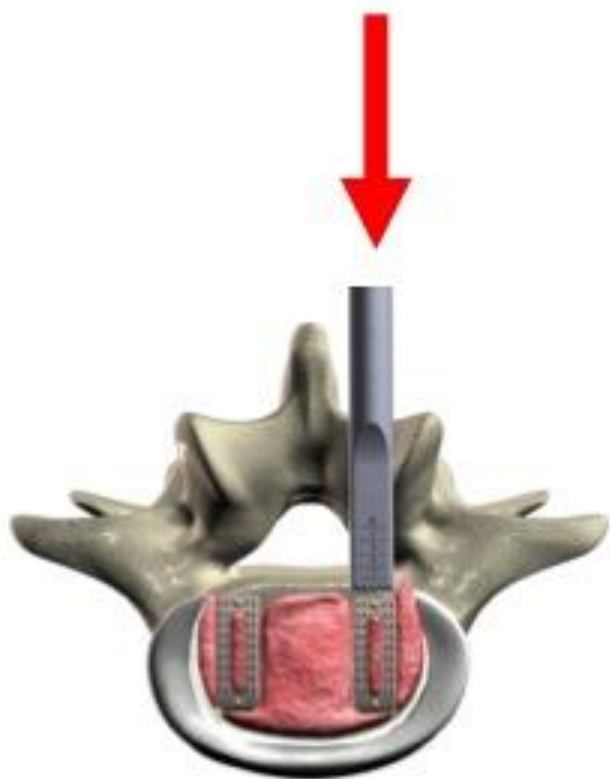
- Why interbody fusion ??
 - ALIF - PLIF / TLIF - AxiaLIF
- Approach issues
 - Spine related
 - Non-spine related
- Fusion
 - Bone graft and cages
- Long term results
 - Literature
 - SMK series

Option 1: from anterior

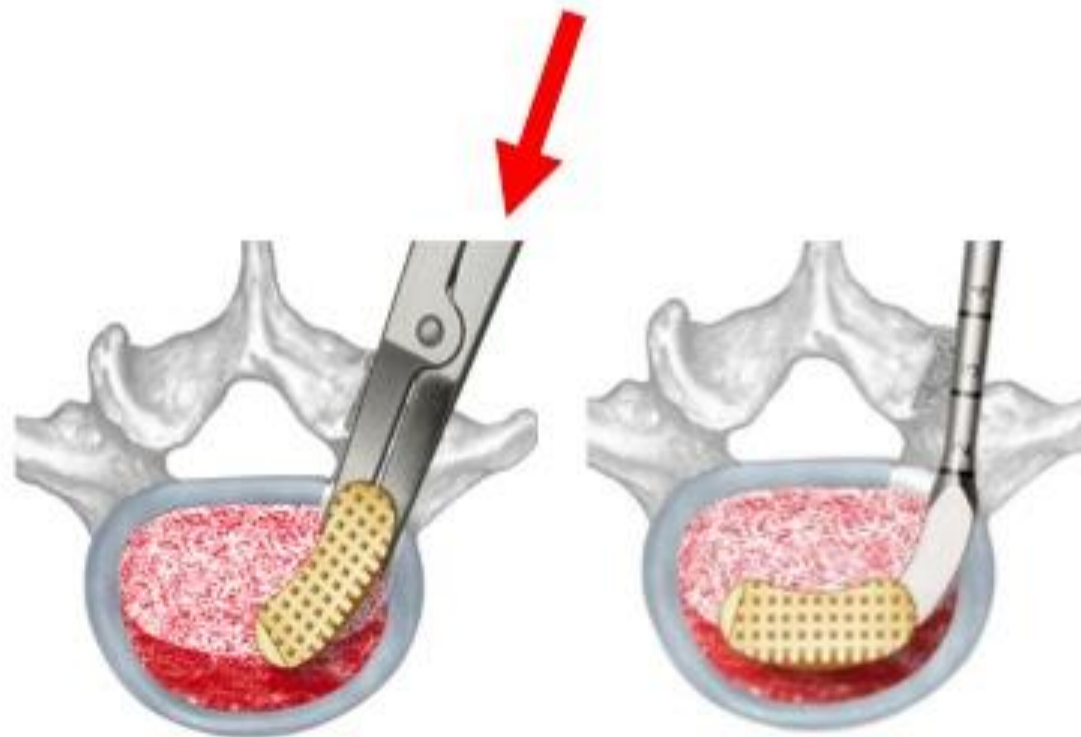


Option 2: from posterior

PLIF



TLIF



Option 3: from inferior

AxiaLIF



Approach issues: spine related

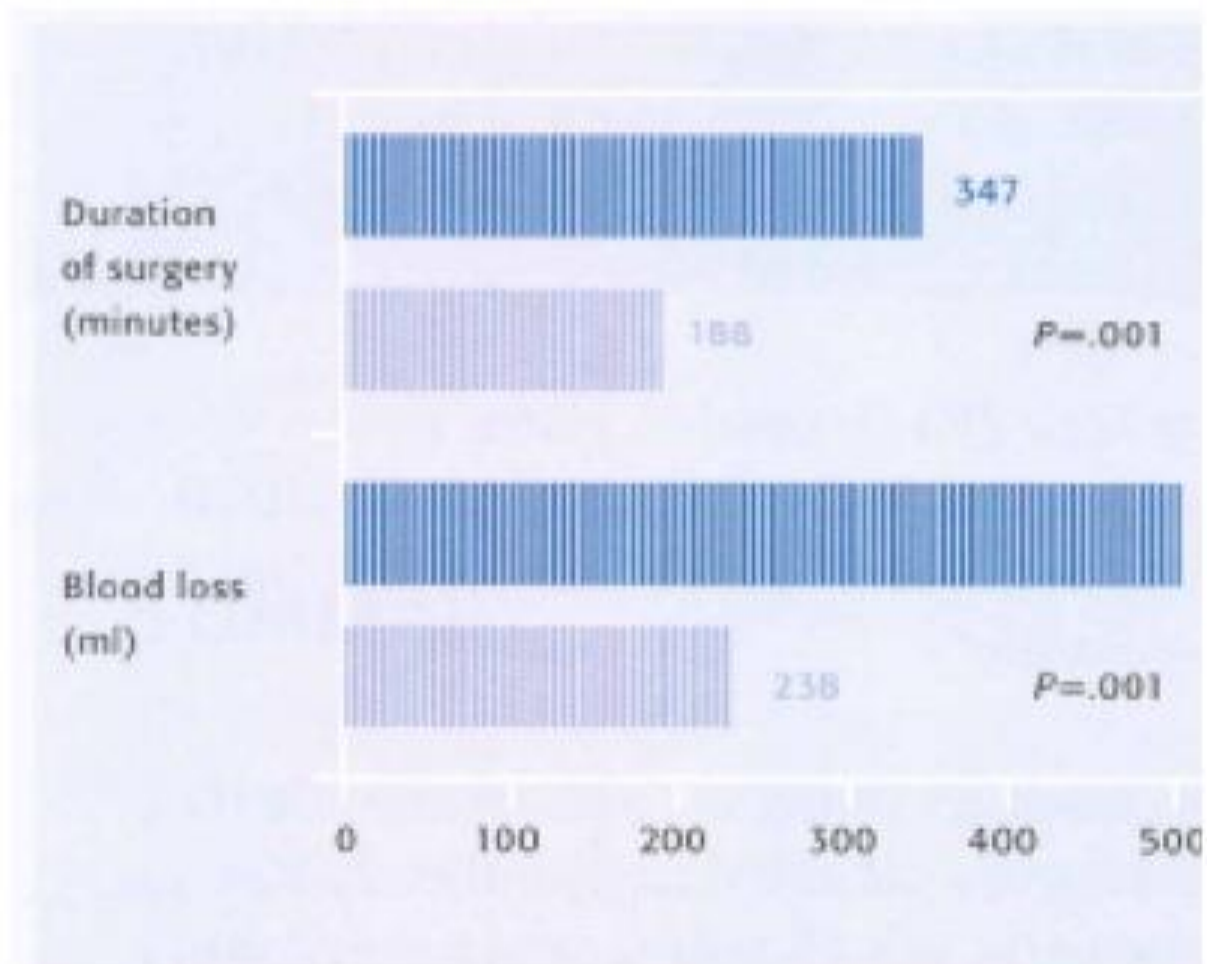
	ALIF	PLIF/TLIF	Instr. PL
Remove disc	+	+	--
Graft under compression	+	+	--
Large contact area	+	+	--
Post. Denervation Facet and muscle	-	+	+
Nerve root injury	-	+	+/-



AOSpine assessment of current literature

Evidence-Based Spine Surgery

Operative characteristics



PLIF

ALIF

PLIF

ALIF

 AOSPINE

AOSPINE assessment of current literature

Evidence-Based Spine Surgery

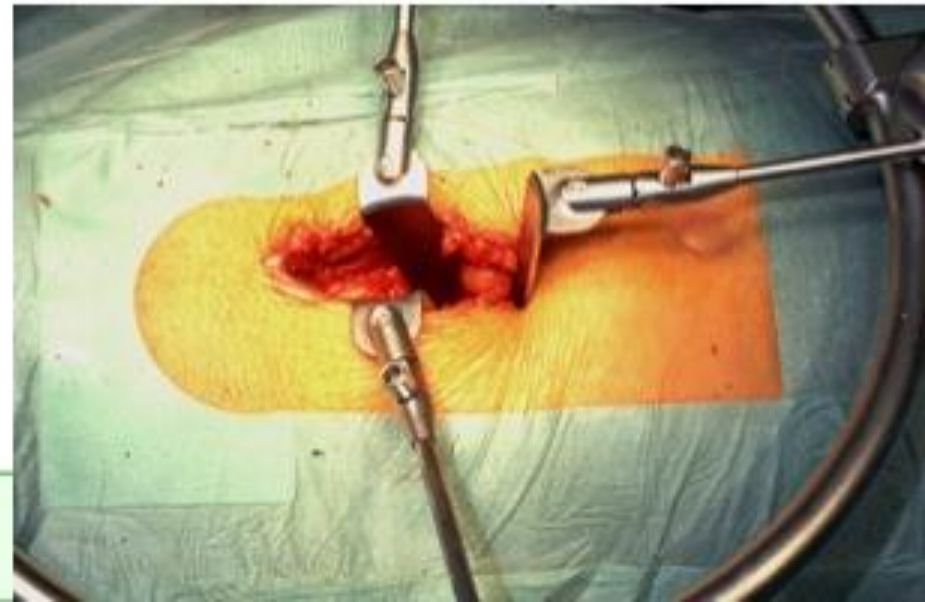
Sint Maartenskliniek

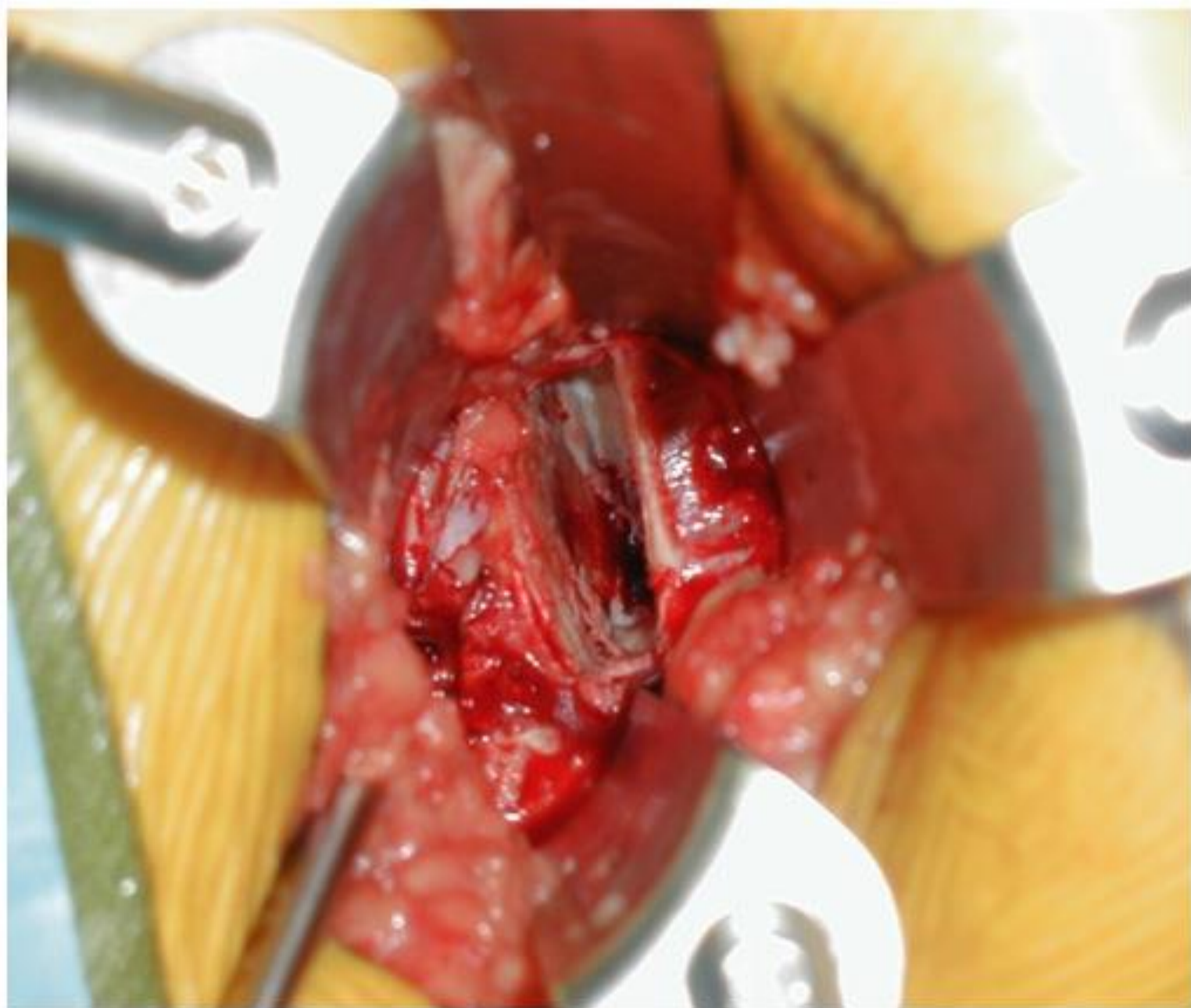
ALIF: Approach issues: non spine structures at risk

- Abdominal wall
- Aorta / iliac artery / segmental vessels
- Vena cava / iliac vein / iliolumbar veins
- Sympathetic nerves
 - Hypogastric plexus
- Visceral:
 - Gastro-intestinal
 - Ureter

Lumbosacral approach

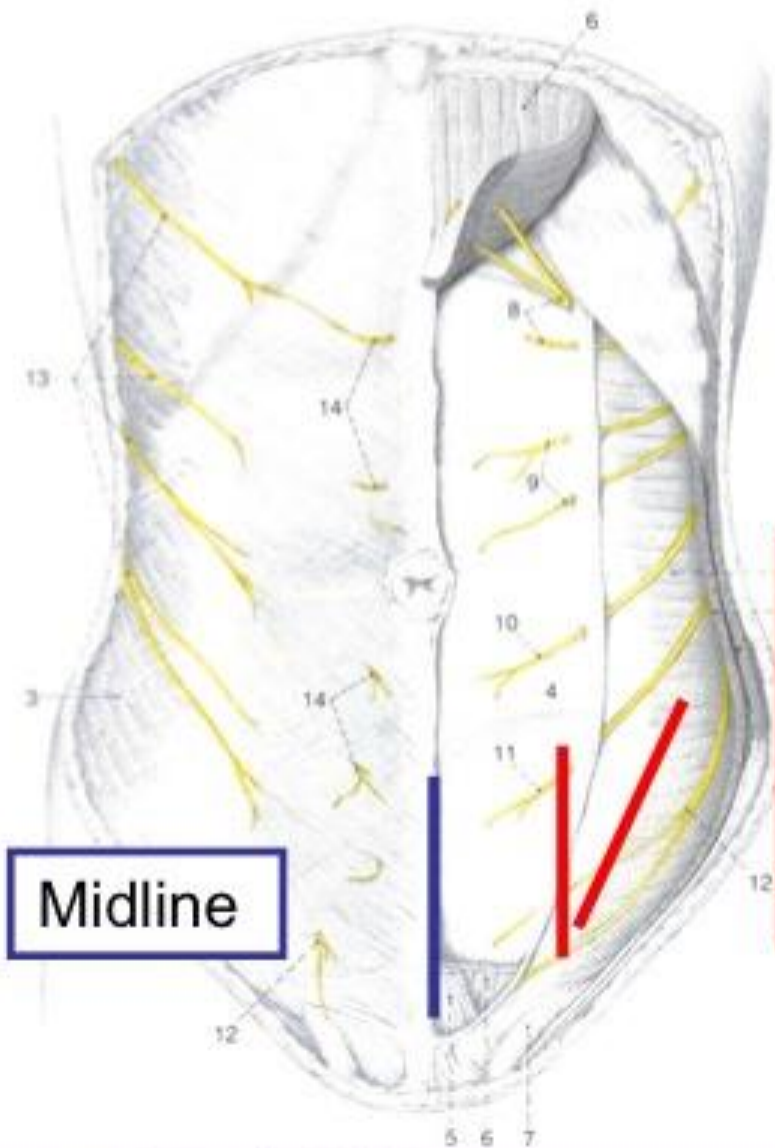
Less invasive
Mini-open approach





Sint Maartenskliniek

Abdominal wall: innervation



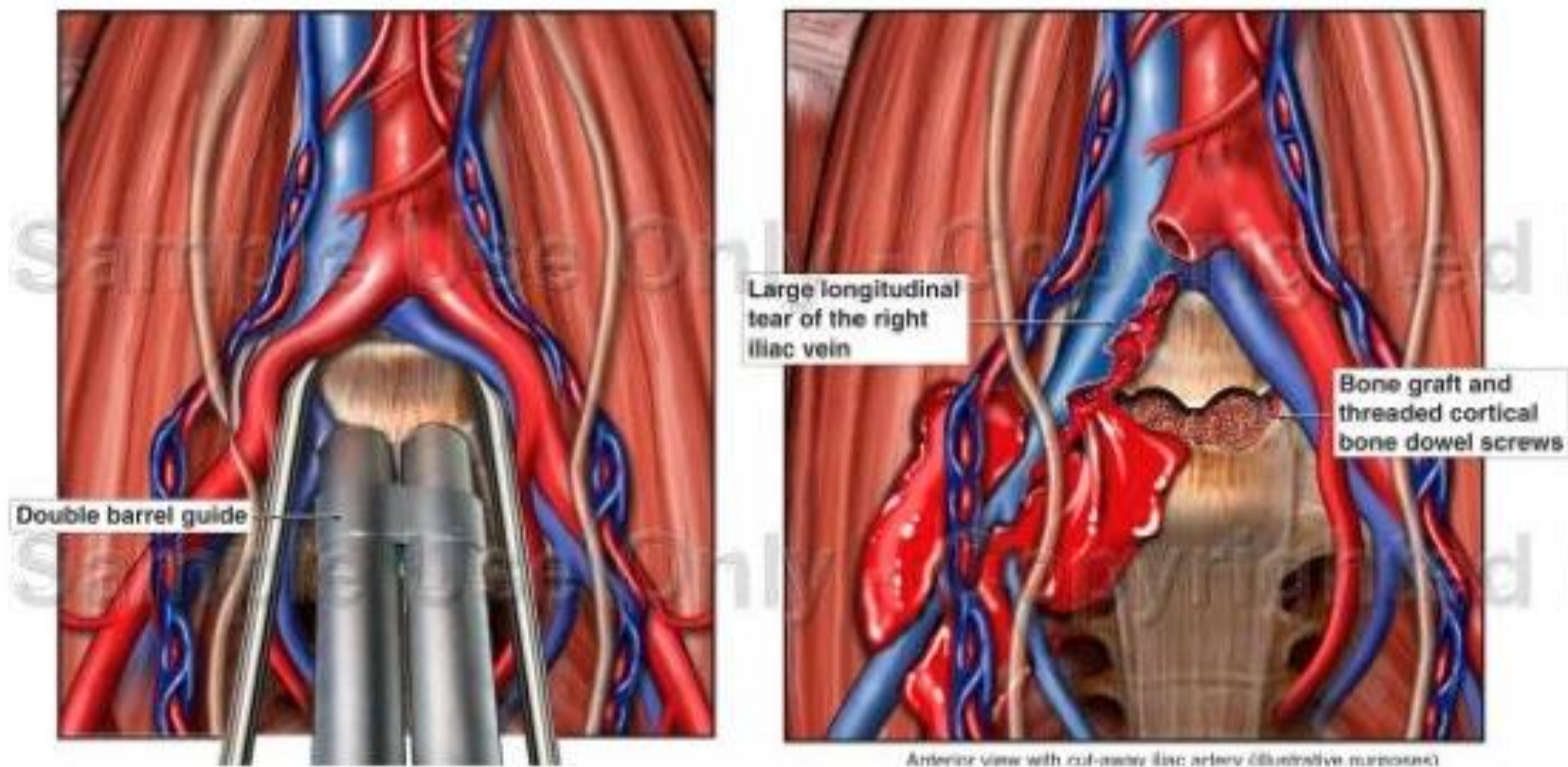
Midline

Denervation of
rectus possible

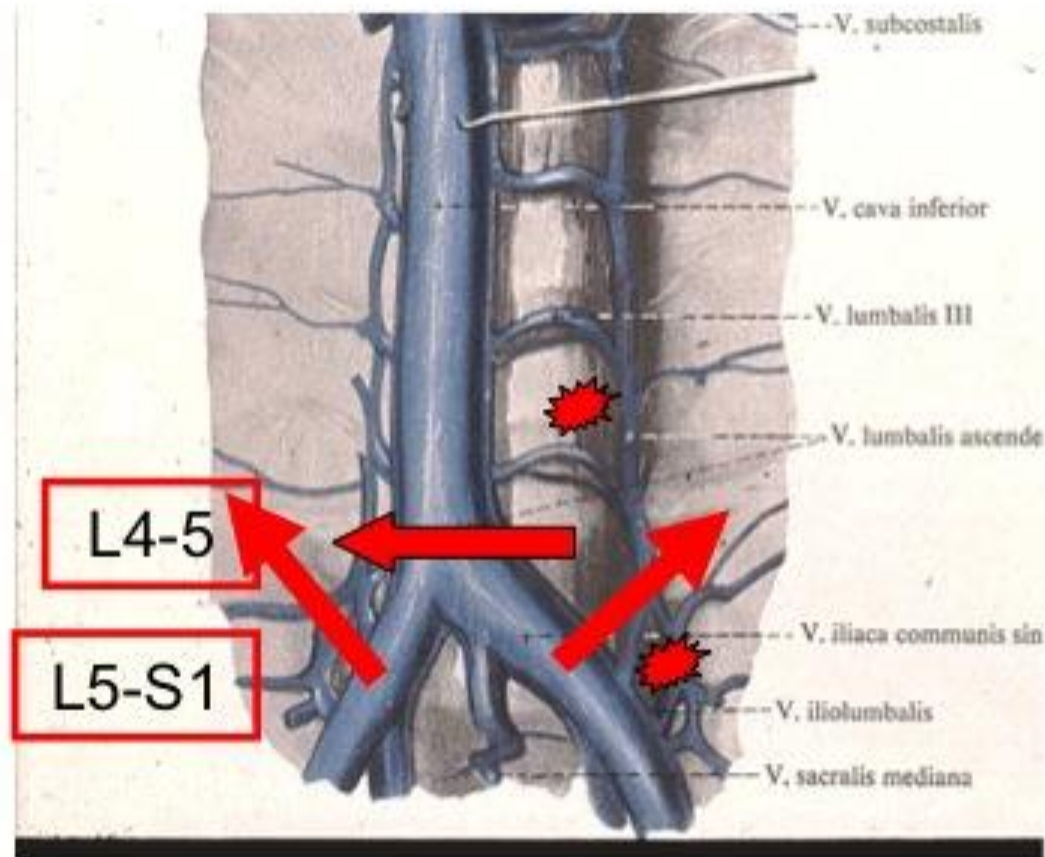
Para-rectal

Oblique (L4-S1)

Arterial lesions

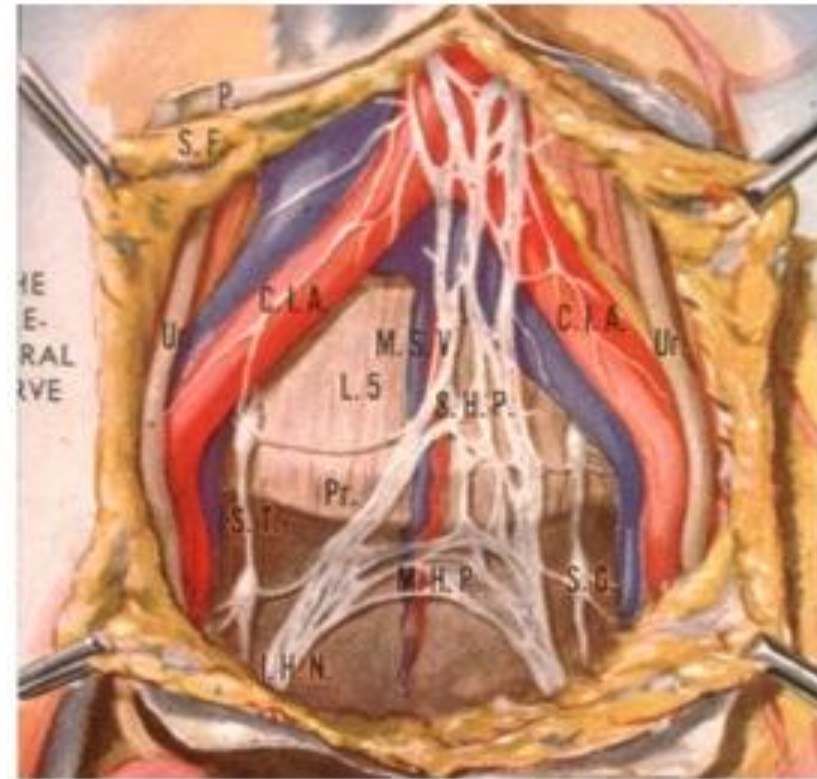


Venous network



SHP: retrograde ejaculation

- 45.5% - laparoscopic ALIF 47 pat.
 - Kaiser et al. Neurosurgery 2002
- 22.5% (17.5% perm.) - ALIF 40 pat.
 - Tiusanen et al. Eur Spine J 1995
- 4.1% (2.7% perm.) - ALIF 146 pat.
 - Burkus et al. J Spinal Disord 2002
- 0.1% - ALIF 684 pat.
 - Brau Spine J 2002
- **Common range:**
0.42-5.9% Sasso et al.
Review in Spine 2003



higher rate in transperitoneal approaches
higher rate using laparoscopic techniques

Interbody considerations

- Bone / cage?
- Stand alone?

Autologous bone graft

Bone autograft:



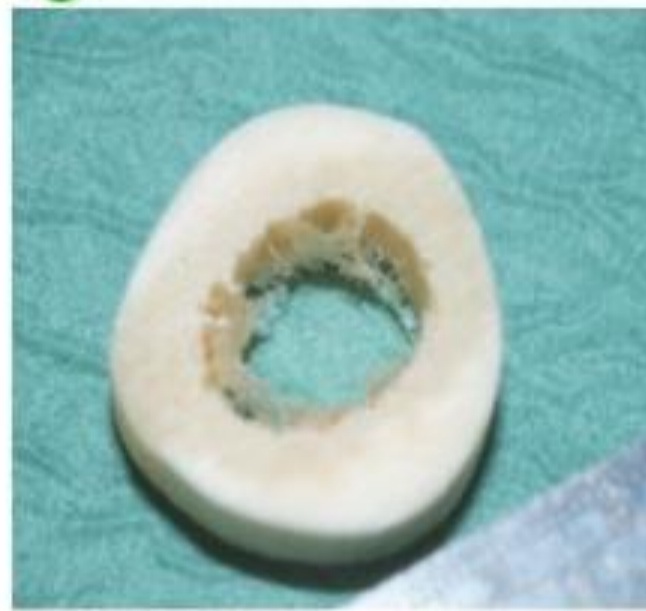
Osteoinductive
Slow reorganisation
Bone collapse
Lack of congruency
Donor site morbidity



Femoral ring allograft

Stand alone

- Radiography
 - 100% loss of disc space height
 - 46% narrower than pre-op
- Denis, Spine 1989

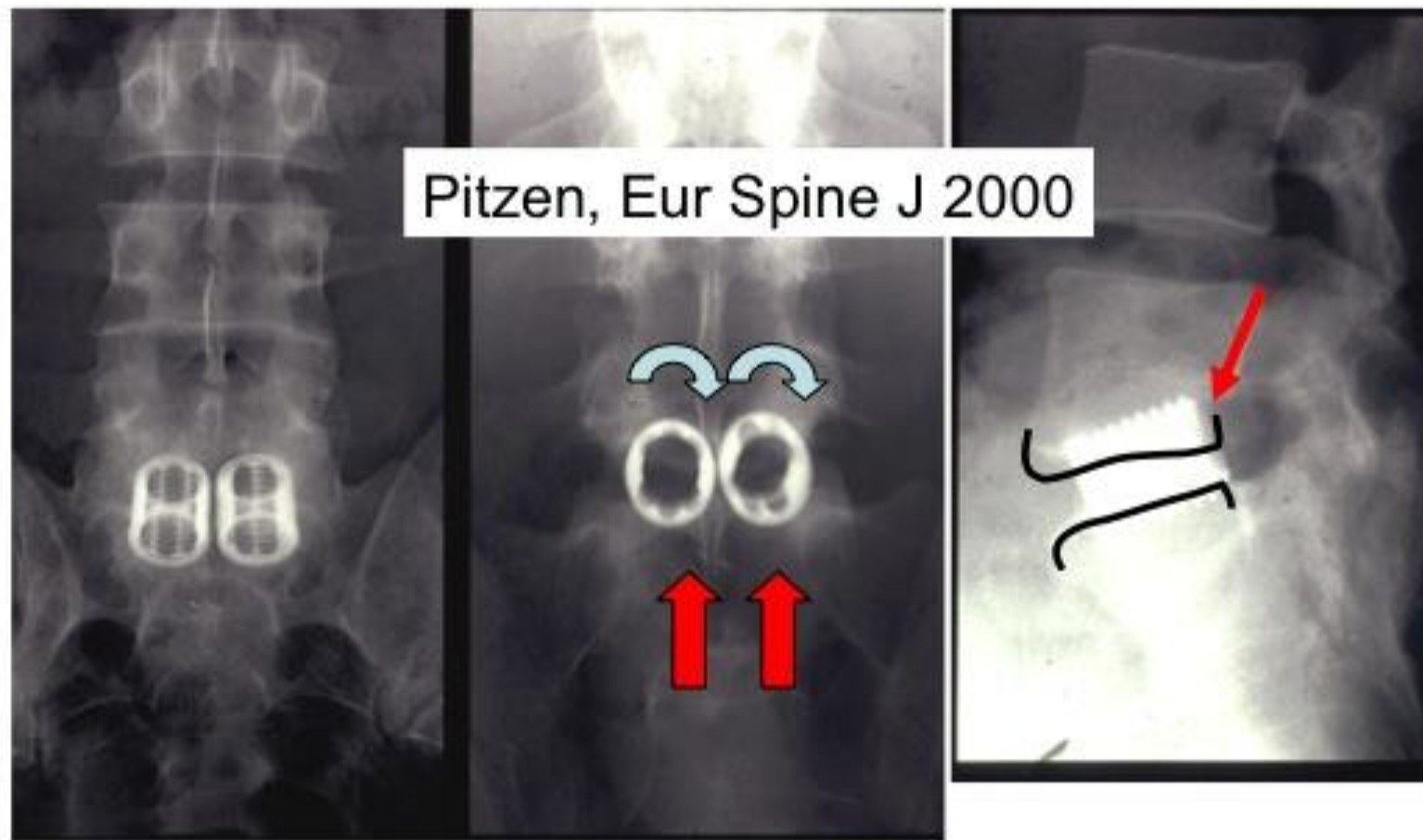


Circ. Fusion

- Clinical outcome:
 - FRA > Tit cages
- McKenna, ESJ 2005



Threaded cages

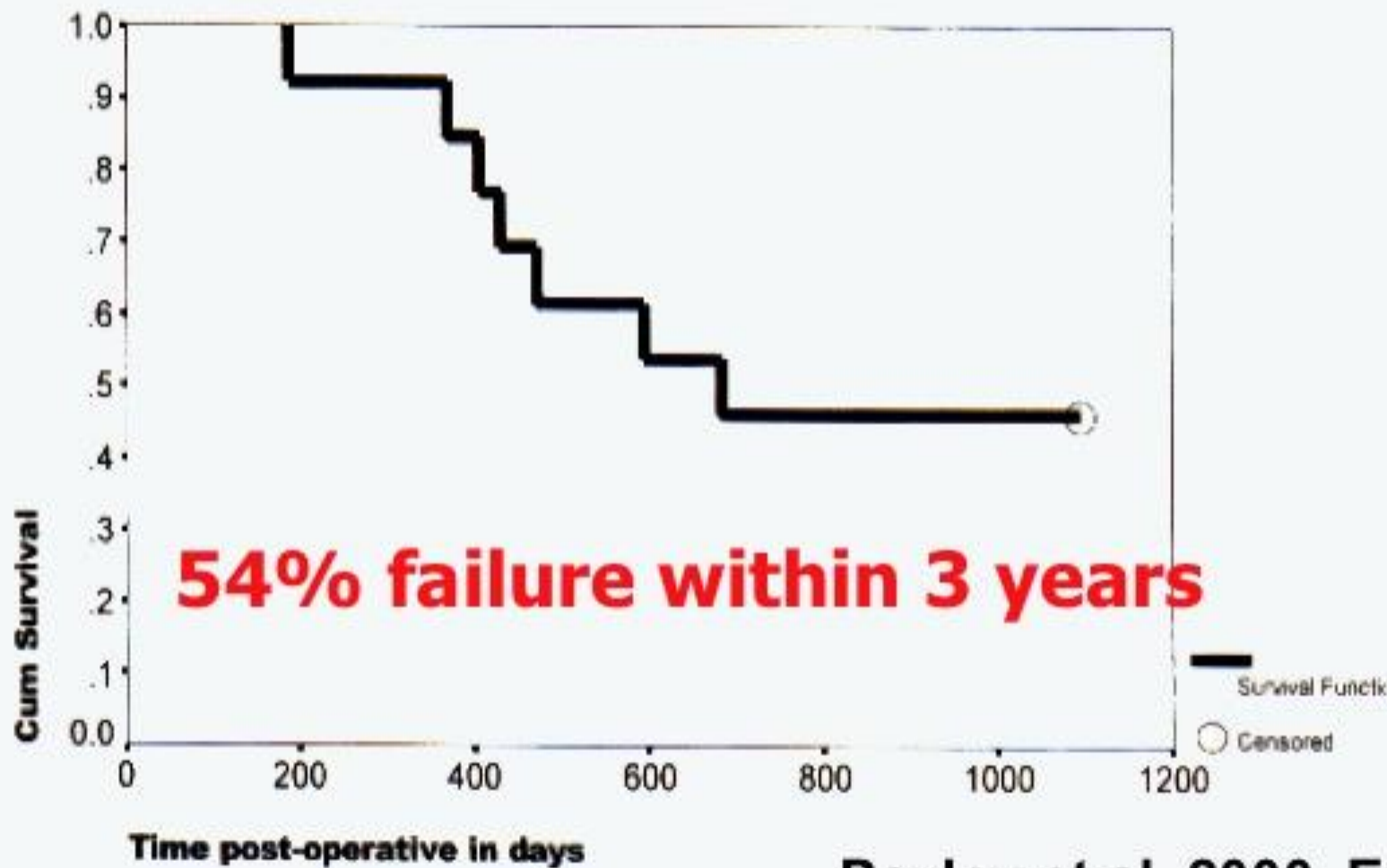


Small contact area
(9%!) Biederman 1996



1. Small fusion area
2. High contact stresses on endplates

ALIF with threaded fusion cages (Ray)



Pavlov et al, 2000, ESJ

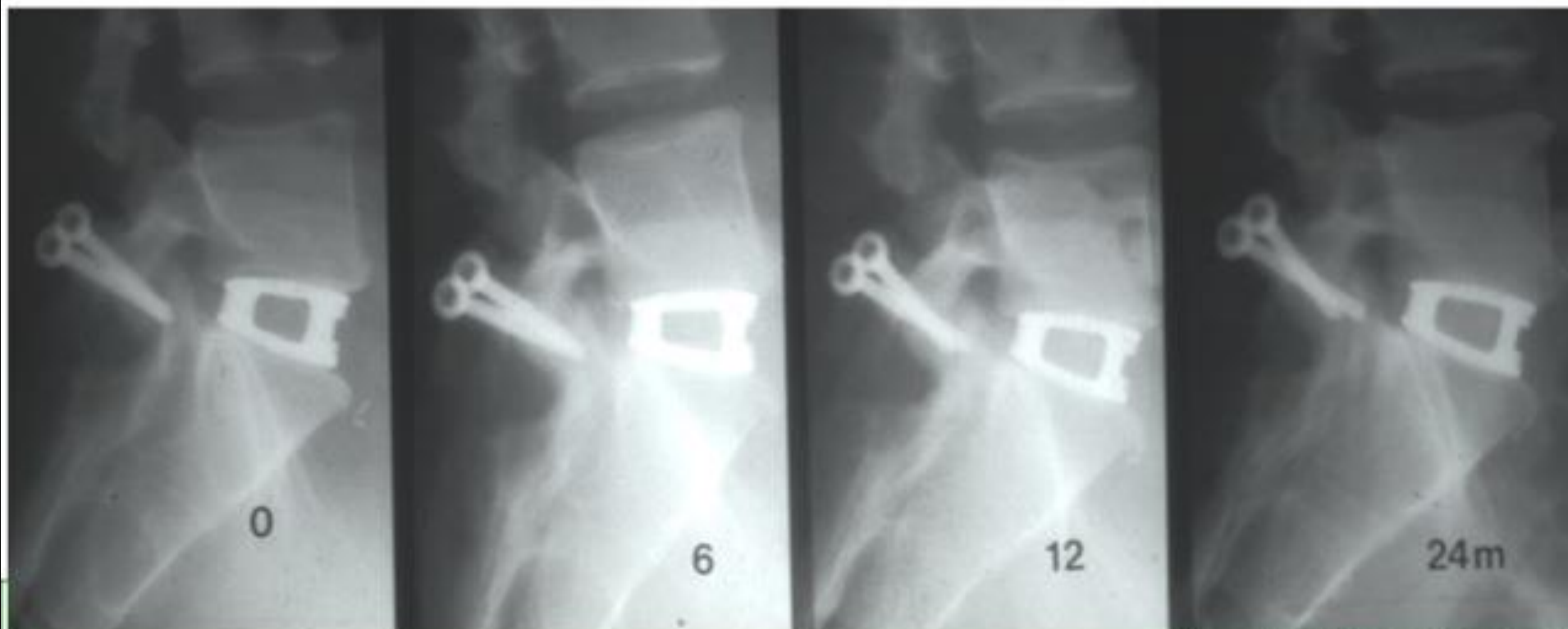
Interbody fusion – stand alone?

- Additional *posterior* fixation provides better stability esp in extension
- *Anterior* placed cages stabilise more than *posterior* placed cages

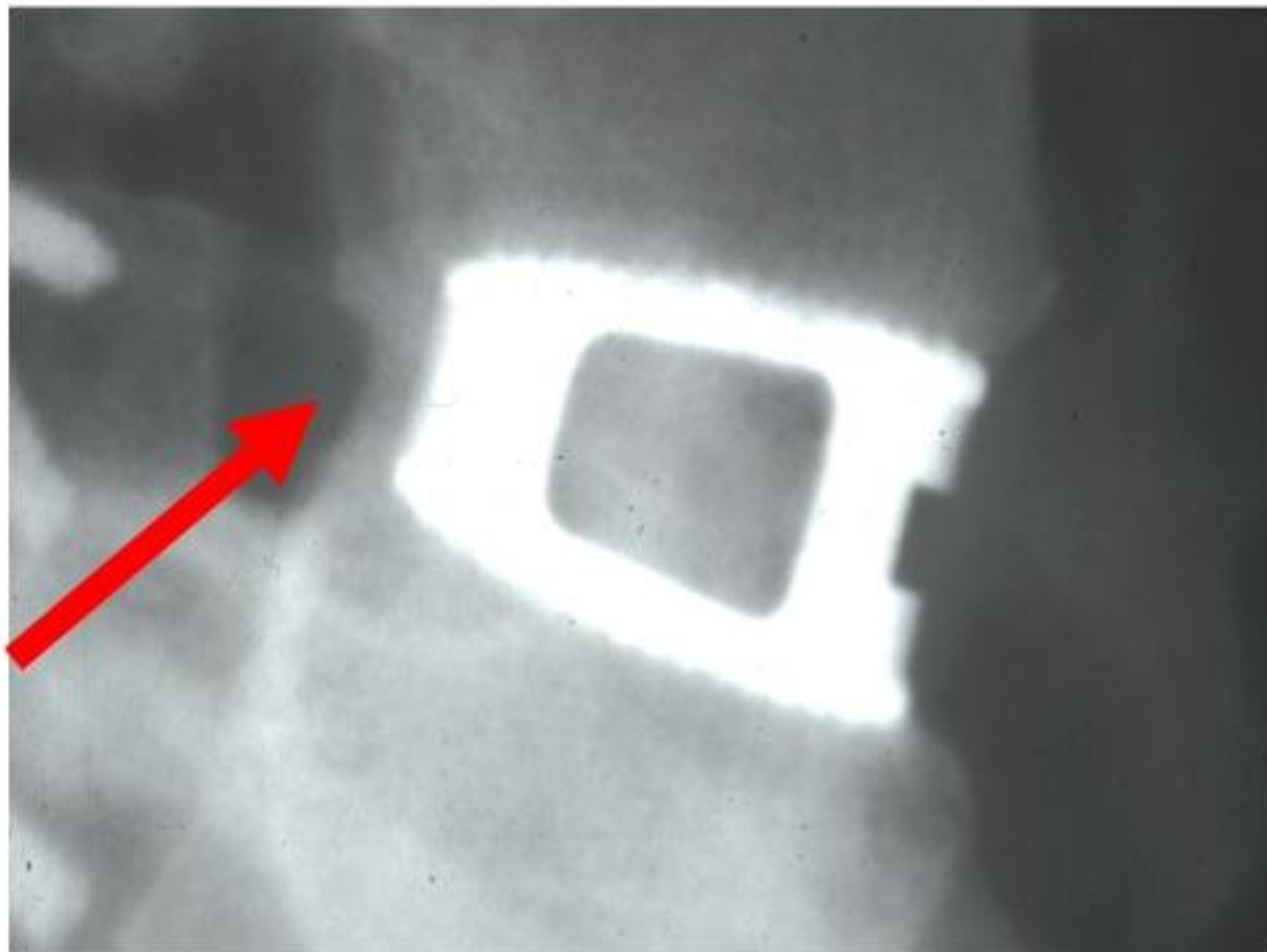
Oxland, Eur Spine J 2000

Good Outcome and Restoration of Lordosis After Anterior Lumbar Interbody Fusion With Additional Posterior Fixation

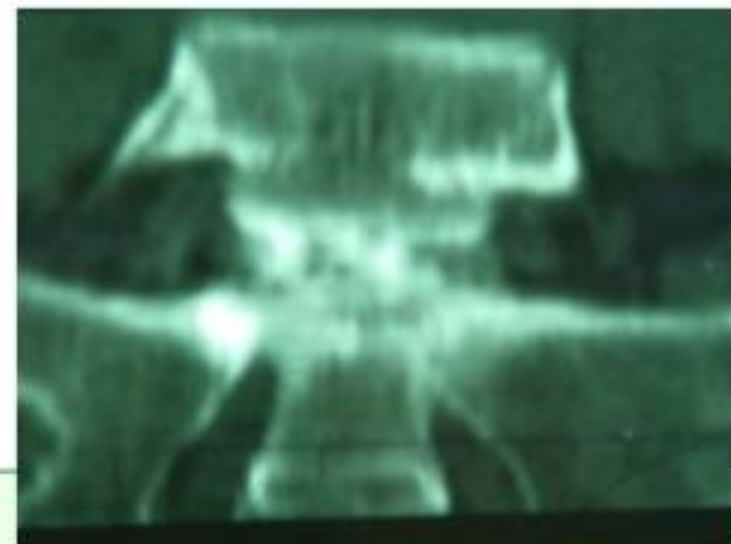
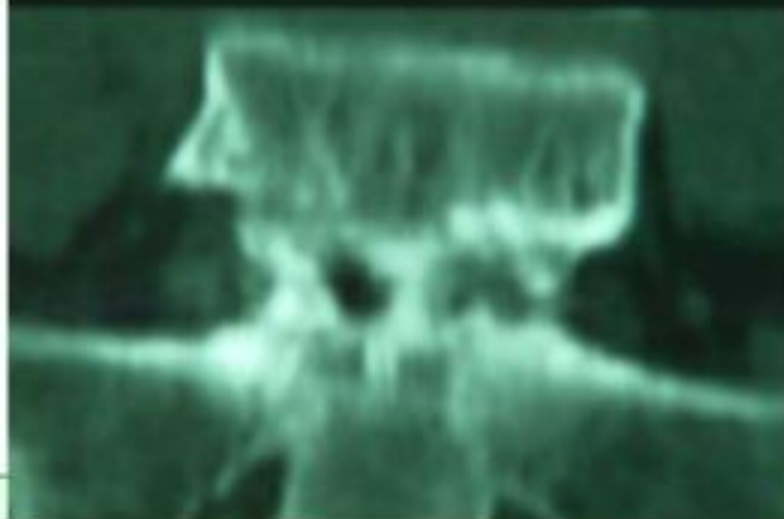
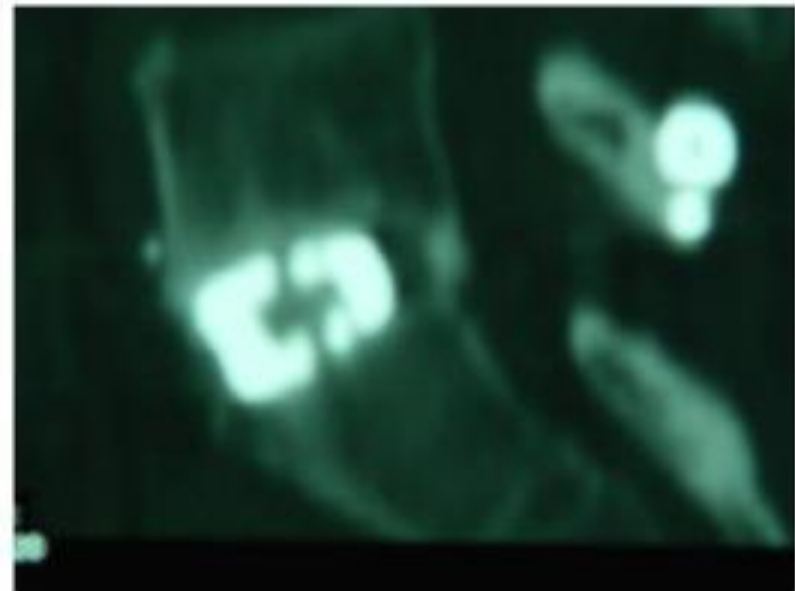
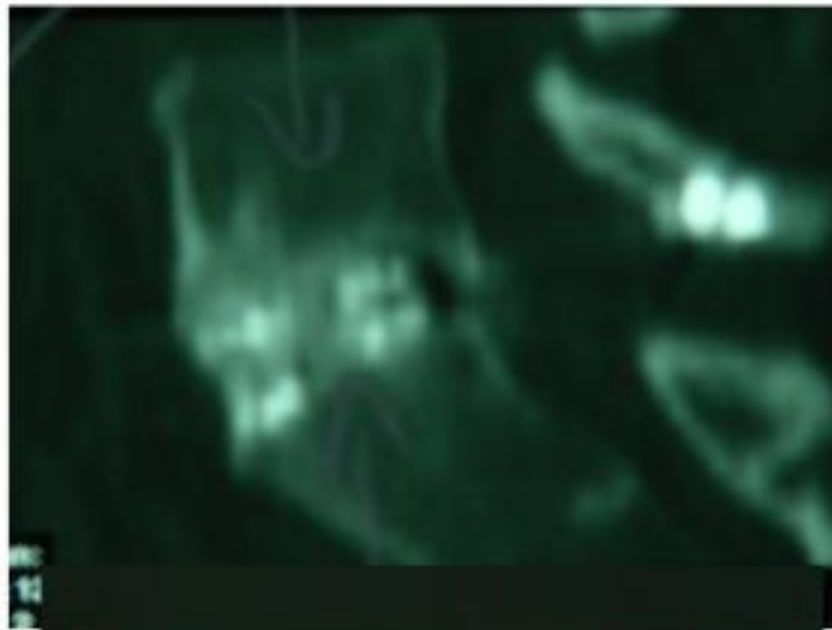
Paul W. Pavlov, MD,* Hjalmar Meijers, MD,* Jaques van Limbeek, MD, PhD,†
Wilco C.H. Jacobs, MS,† J. Albert M. Lemmens, MD, PhD,‡ Marina Obradov-Rajic, MD,¶
and Marinus de Kleuver, MD, PhD*



Fusion *outside* the cage



Fusion *through* the cage



Long term adjacent segment

- Magnetic resonance imaging 20 years after anterior lumbar interbody fusion.

Wai EK, Santos ER, Morcom RA, Fraser RD.
Spine. 2006 Aug 1;31(17):1952-6.

- 20 year follow-up after *stand-alone ALIF* with normal adjacent segment (discography)
 - 30% advanced degeneration, often multilevel
 - 21% adjacent segment degeneration
 - No relation radiography / outcome
 - = Natural history?

SMK series

- N = 32 (TLS = 30, PS = 2)
- >10 yr follow up N = 25 (78%)

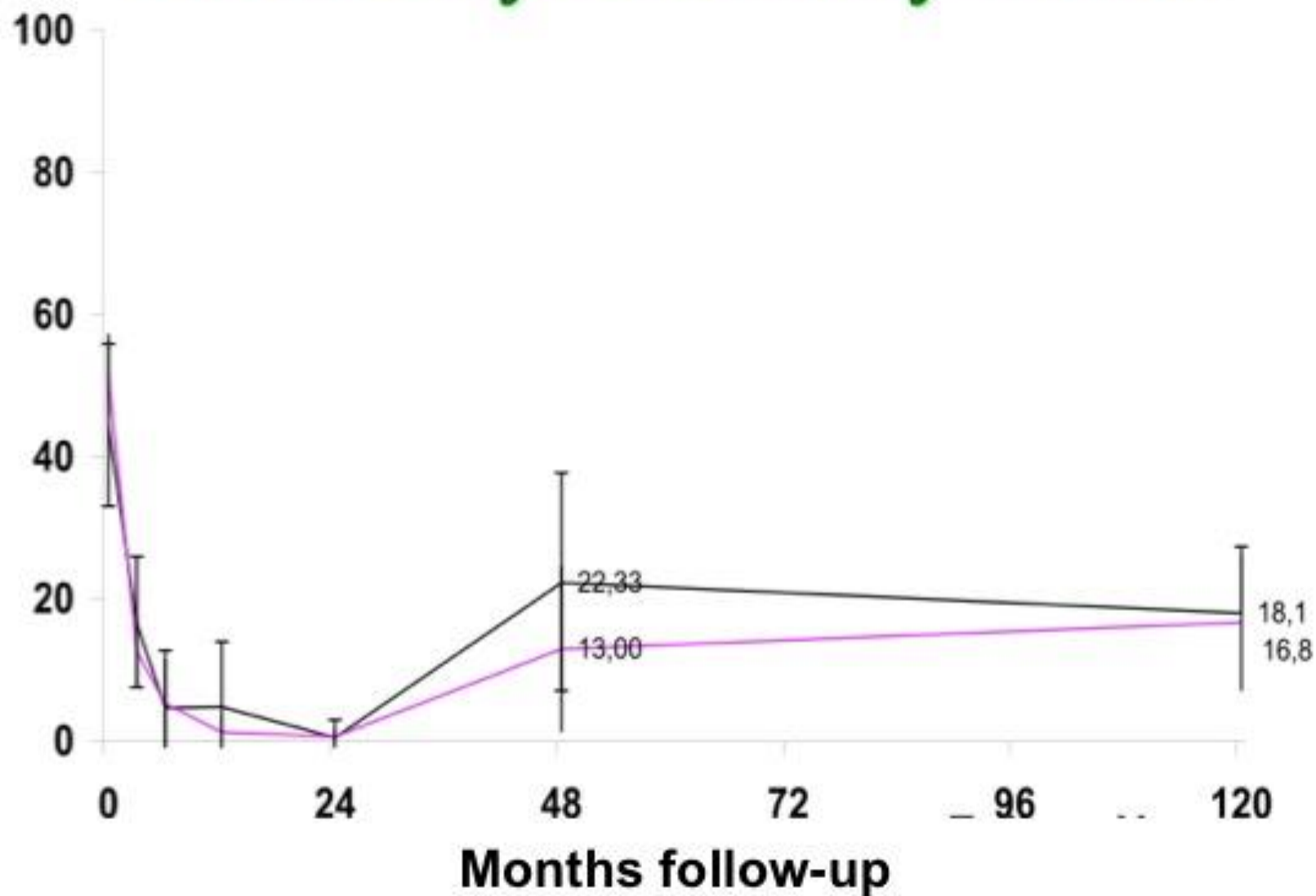
Clinical:

- VAS
- Oswestry Disability Index (ODI)
- General health (SF-36)

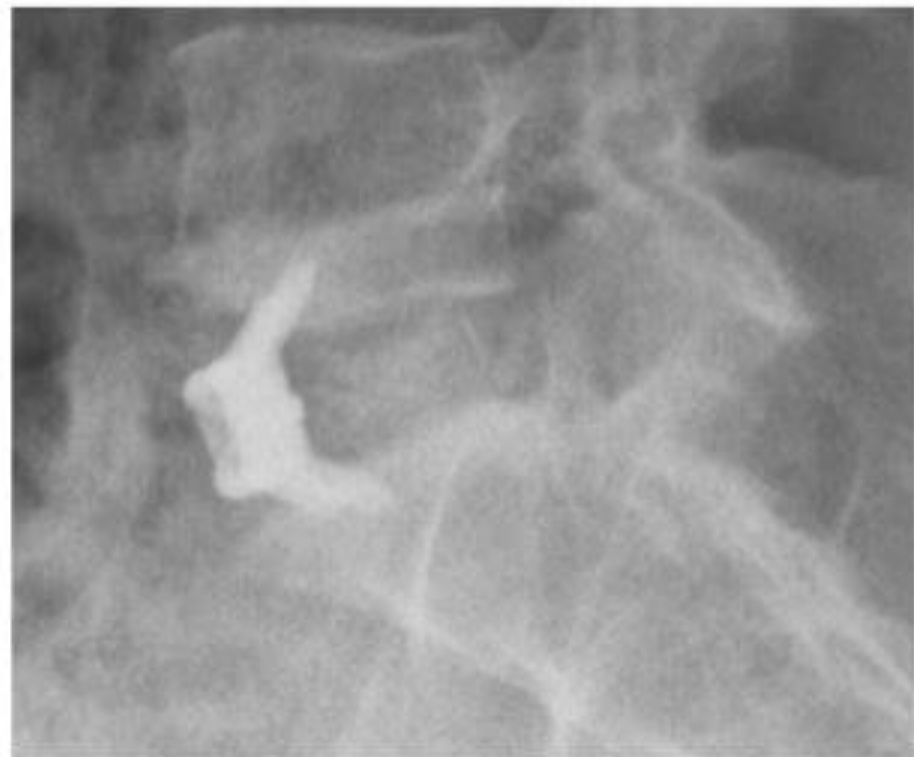
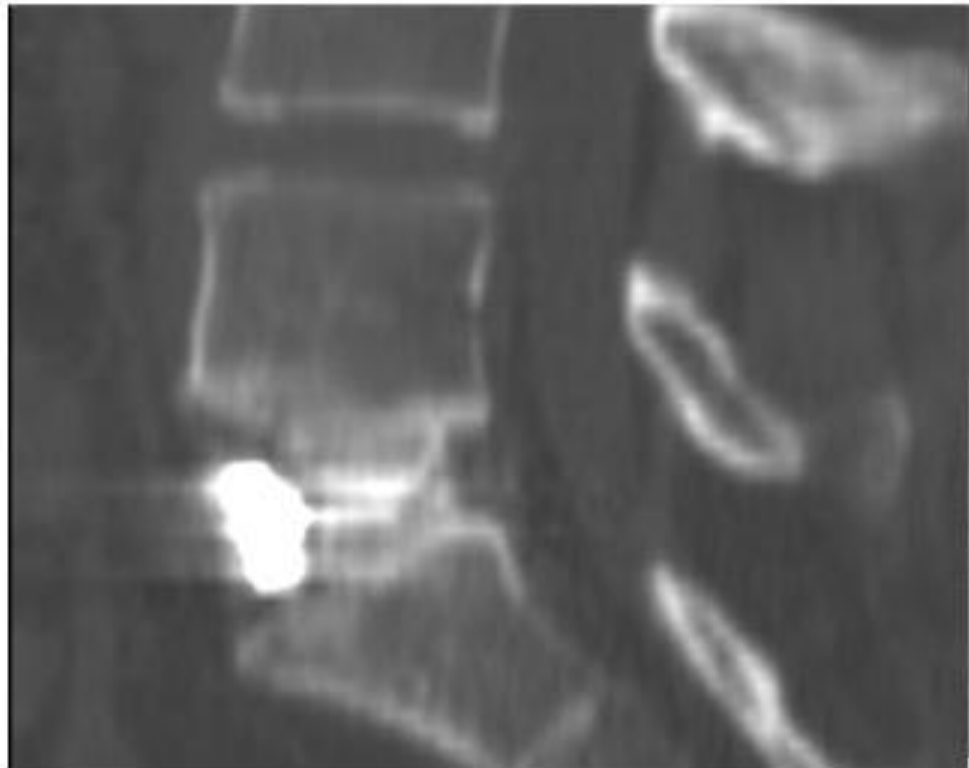
Radiological

- 0.6 Tesla Fonar Upright™ MRI.

Oswestry Disability Index



Stand alone ALIF?



ALIF with plate: fusion outside the cage??



Conclusion ALIF

- Removes painfull disc
- Very low morbidity to the spine
 - Muscle / innervation
 - Neural structures
- Great fusion environment
 - Iliac crest autograft + femoral ring allograft or cage
- Very good long term results
 - Limited adjacent segment degeneration

But....

- Approach related issues
- Needs supplemental
 - Posterior screws or
 - Anterior plate