

High-grade Spondylolisthesis

Sacral dome resection

**Single-stage posterior
reduction**

Kan Min, MD



In situ vs Reduction

In situ

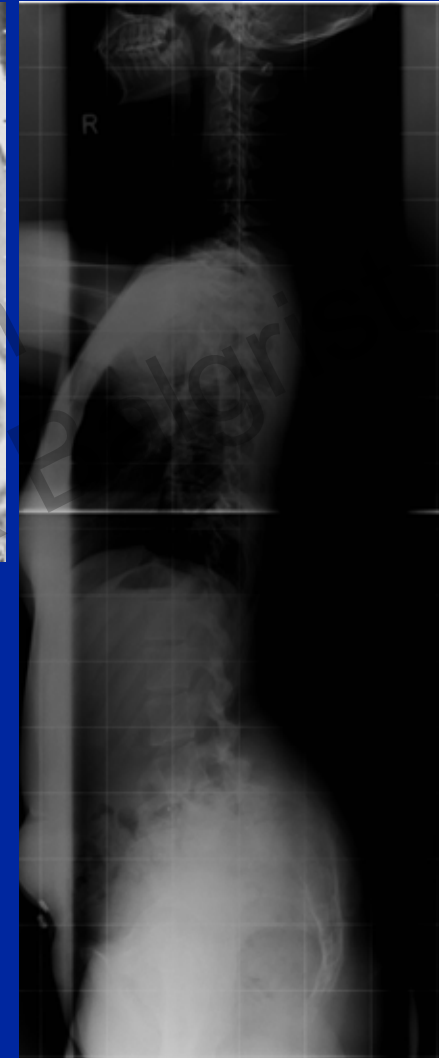
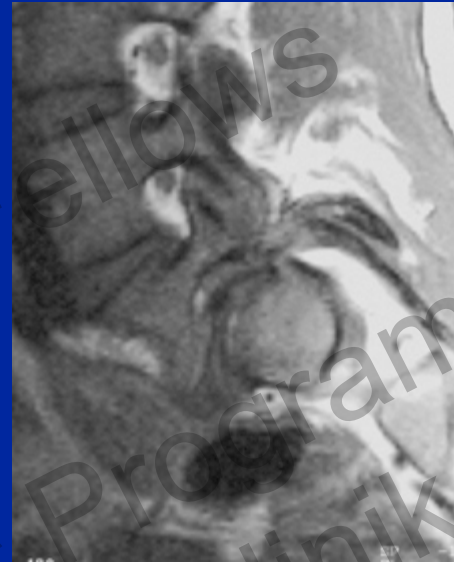
Persistent foramen stenosis

Pseudarthrosis

Slip progression

Sagittal imbalance

Persistent cosmetic deformity



Traveling Fellows
Scientific Program
Uniklinik Balgrist
Mai, 15 2014



In situ vs Reduction

Reduction

Reconstruct Segmental lordosis

Wide foramen decompression

Spino-pelvic alignment

Improves the sagittal profile

Improves fusion

Reduction place the L5 nerve root at risk



Shortening Sacral Osteotomy Posterior Approach

Foramen decompression

Sacral dome resection + disc removal

facilitates decompression

allows reduction of L5 to S1

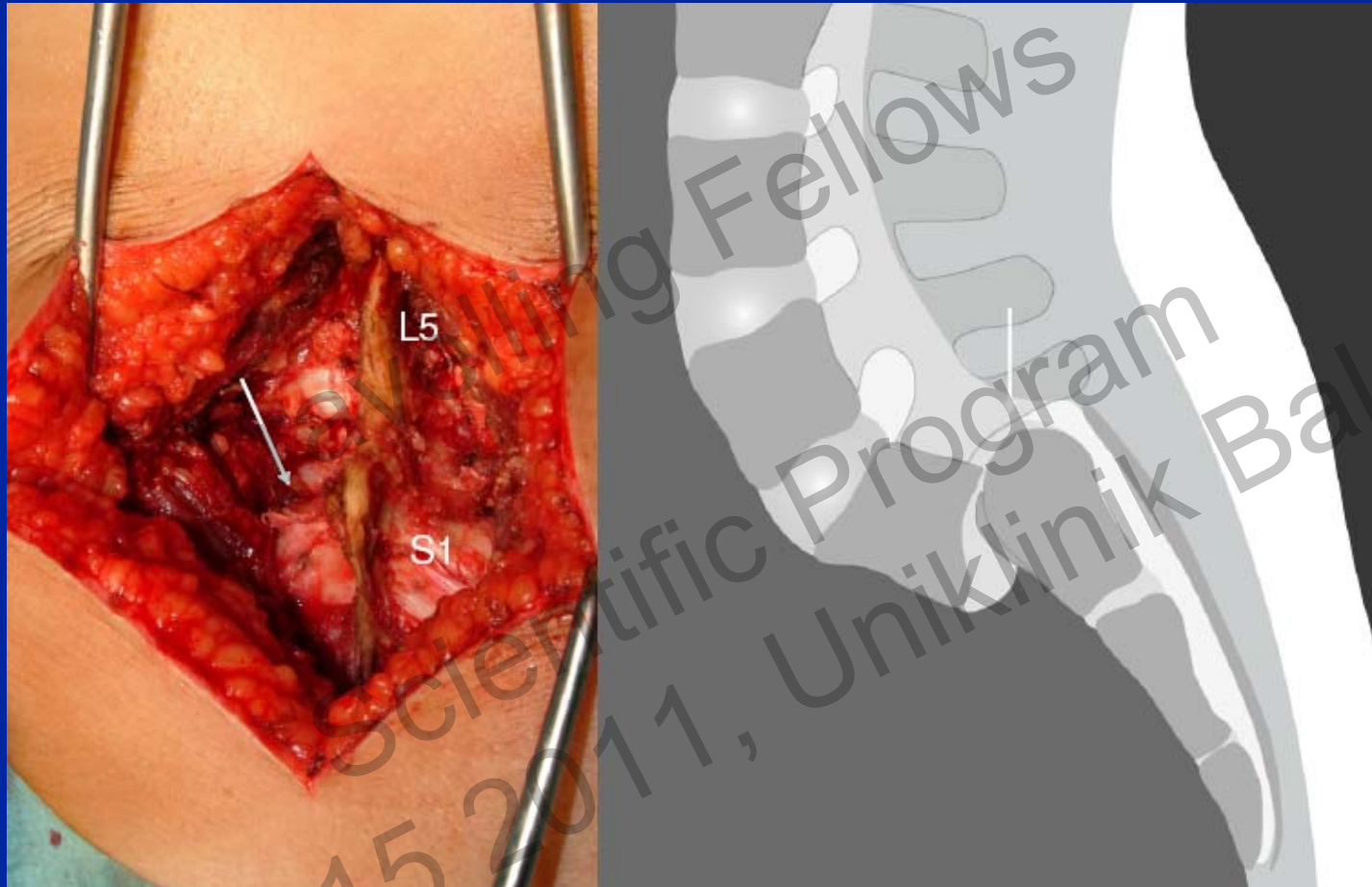
avoids lengthening during reduction

creates bony surface for fusion

Reduction with pedicle screws

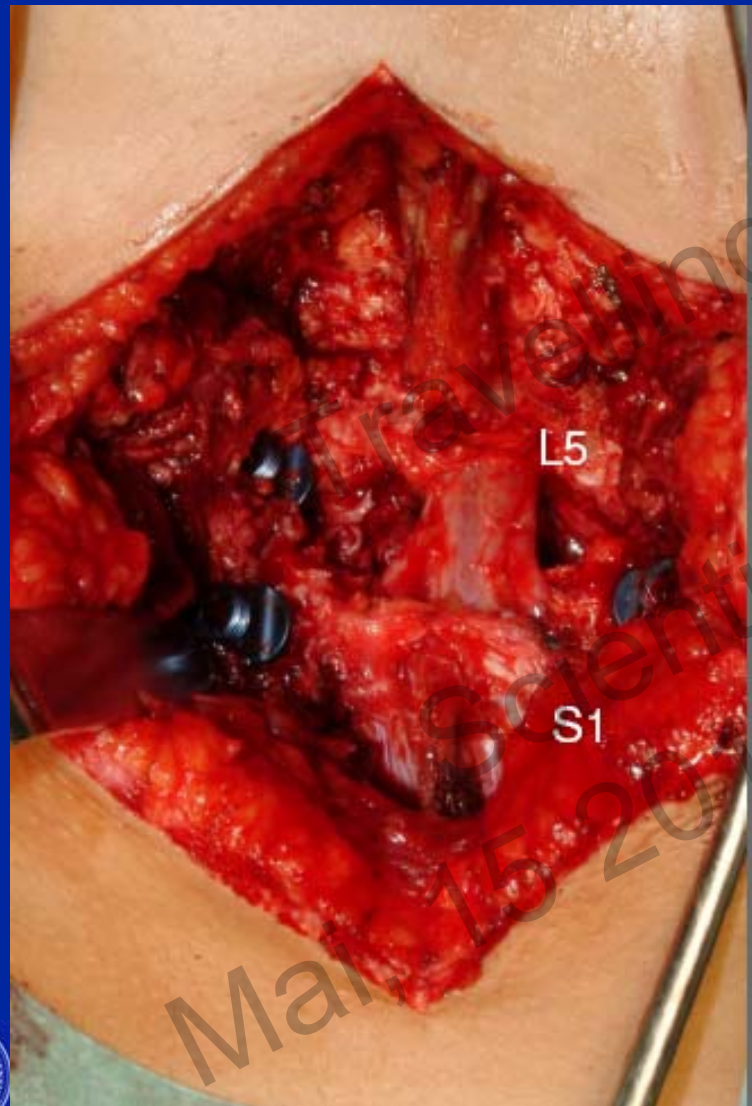


1. Posterior Exposure Decompression L4-S1



Laminectomy L5, Exposure of dura sac
and NR L5 & S1 both sides

2. Pedicle screws L4 - S1



Bicortical S1 screws

Divergent bicortical alar screws if necessary



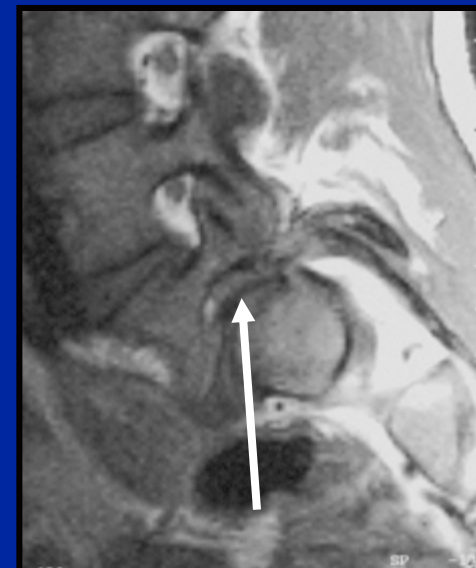
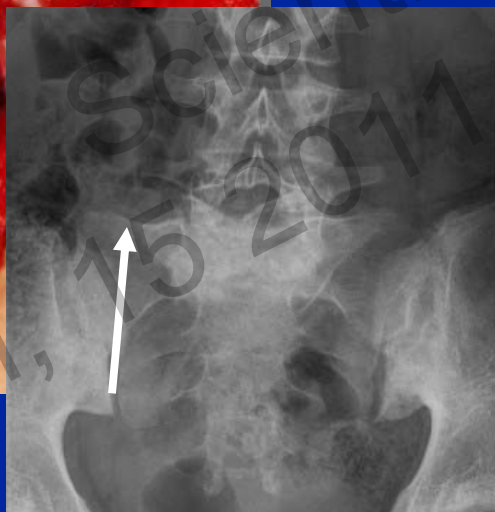
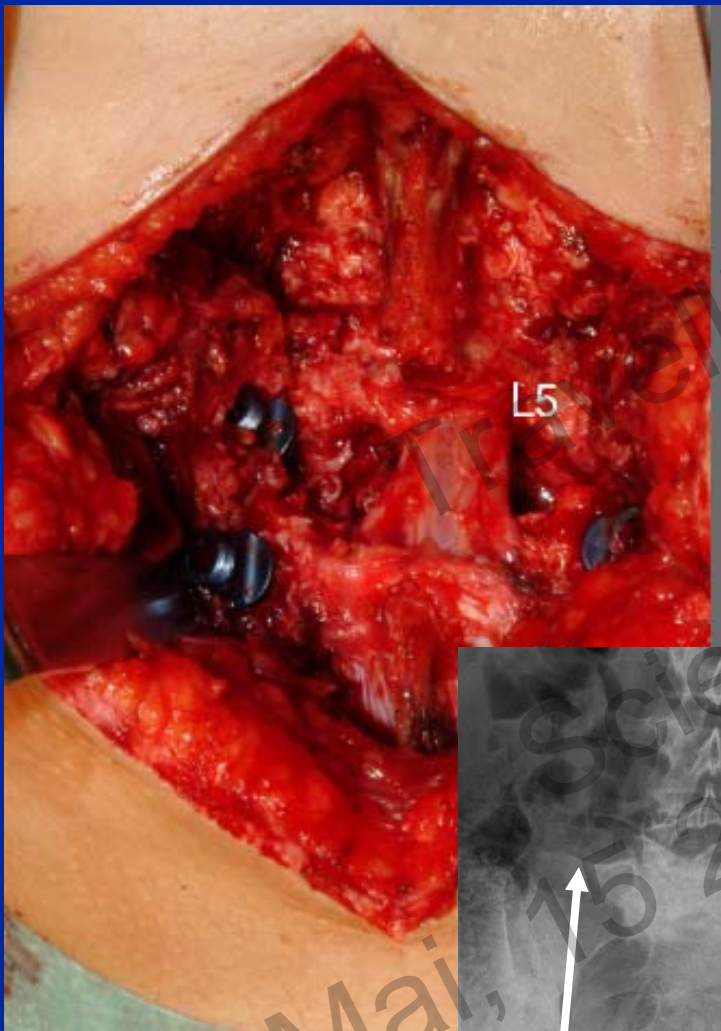
3. Foramen Decompression L5/S1

Release of L5 NR in foramen

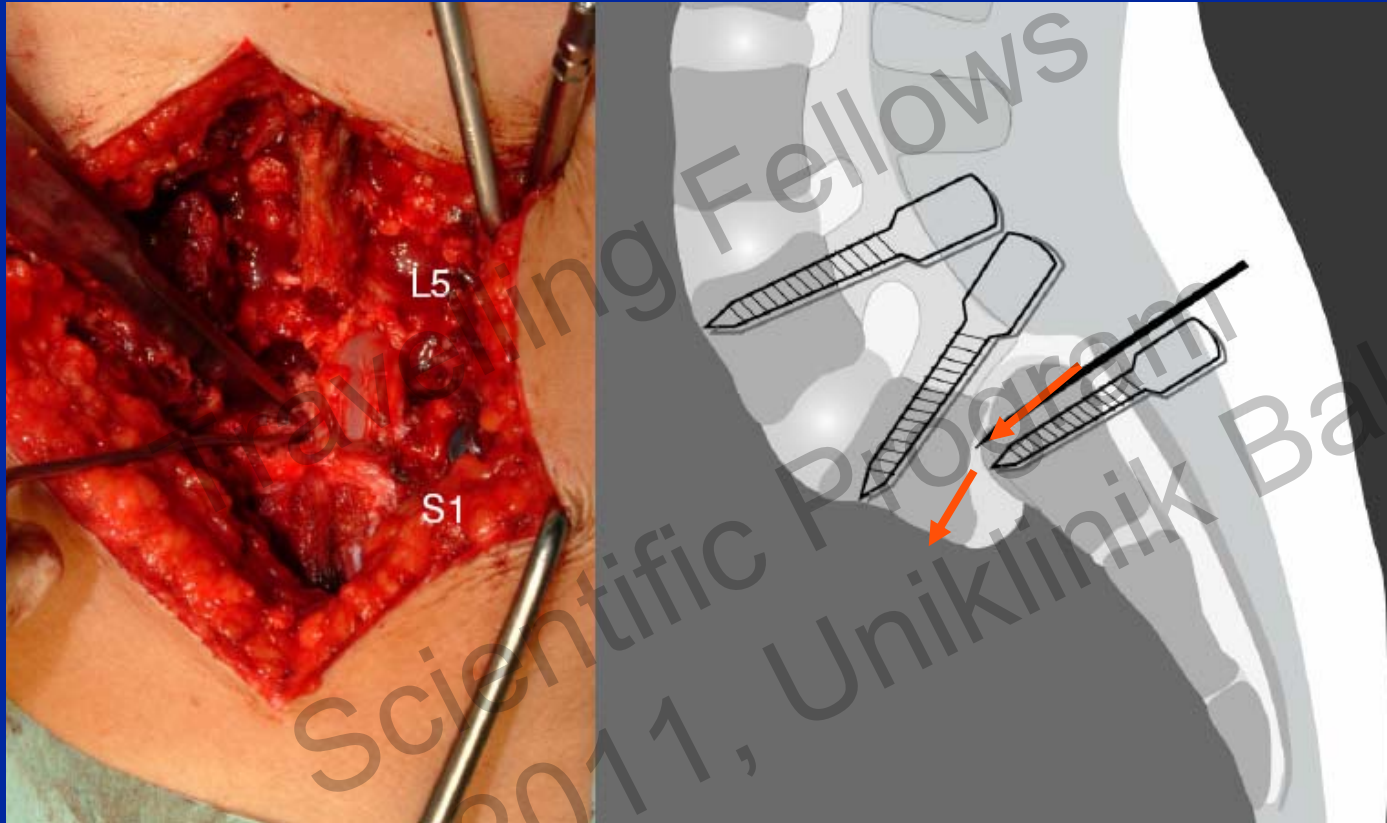
Wide exposure of foramen L5/S1

May need removal of part of Ala to release L5

Careful removal of lateral annulus below existing L5 NR



4. Sacral Osteotomy Discectomy L5/S1



Ordinary osteotome

Remove disc and bone fragments completely

Remove trapezoid lower lip of L5 if necessary

G.N. 27.07.90

616320

Standard
LIH 1
◇ 5
□

29.08.07
13.26
/1



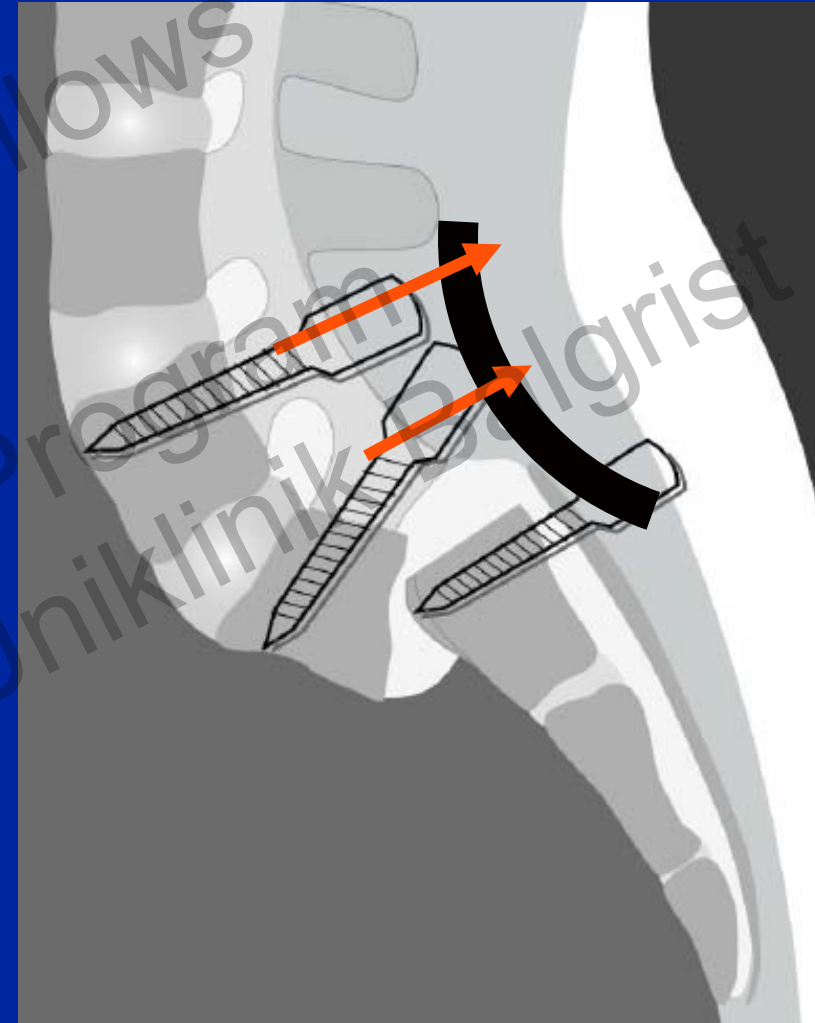
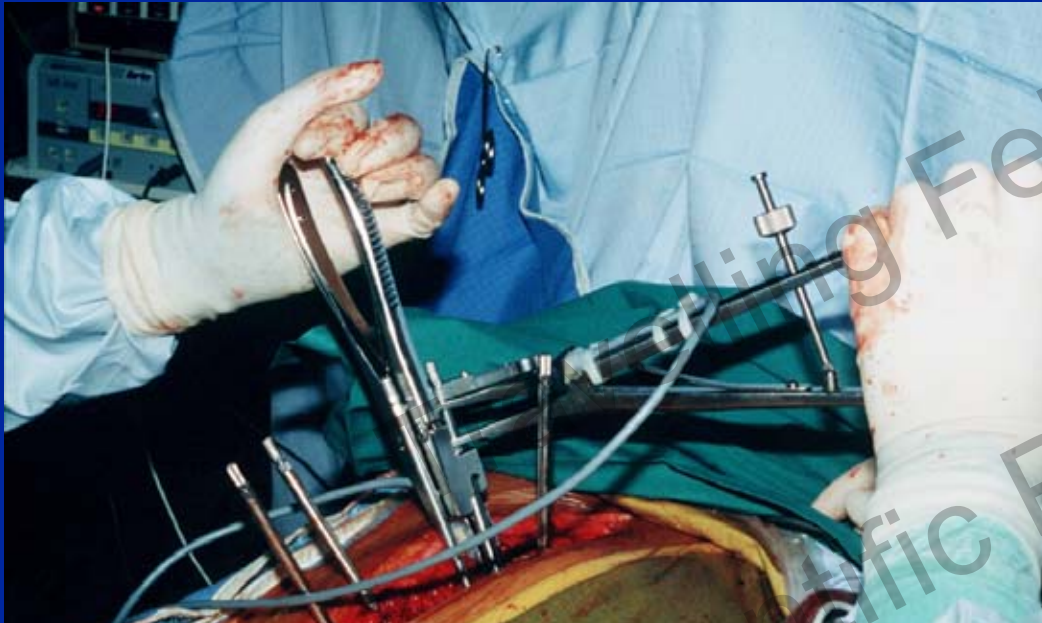
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Balgrist

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5: Single Stage Reduction



Fix the rod to S1

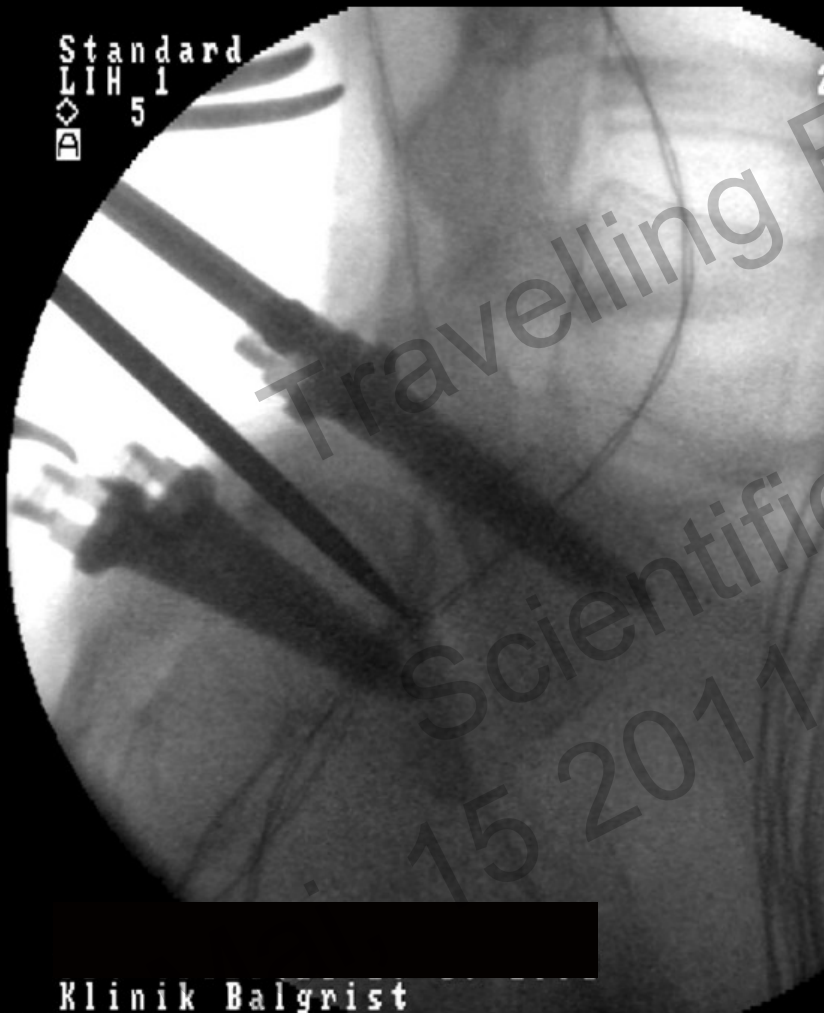
Reduce L4 & L5 screws to rod

Avoid lengthening L5-S1



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Standard
LIH 1
5
A



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Standard
LIH 1
8
A



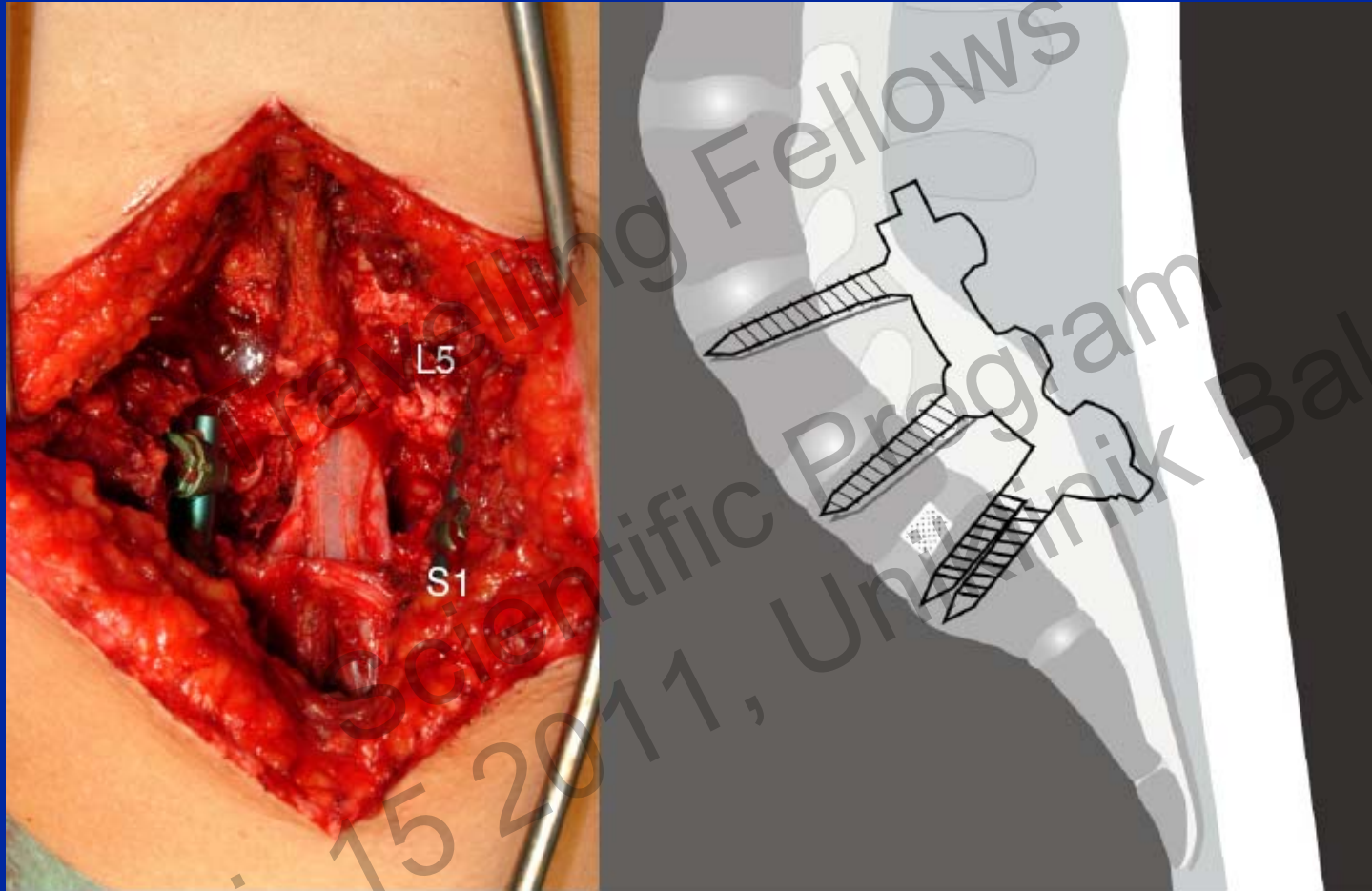
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6. Fusion

Interbody (PLIF) L5/S1, intertransverse L4-S1



Mai, 15 2011, 15:00



G.N. 27.07.90



29.08.07

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Balgrist

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1 y po

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B.J. 17.05.94



624923



850450



09.01.08

Balgrist

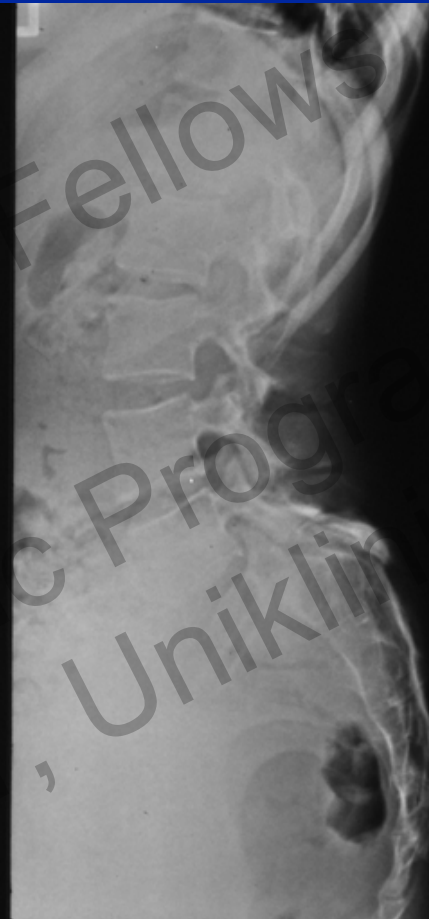
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17 y, Slip 100%, SA 30°



12.02.96



Balgrist Z



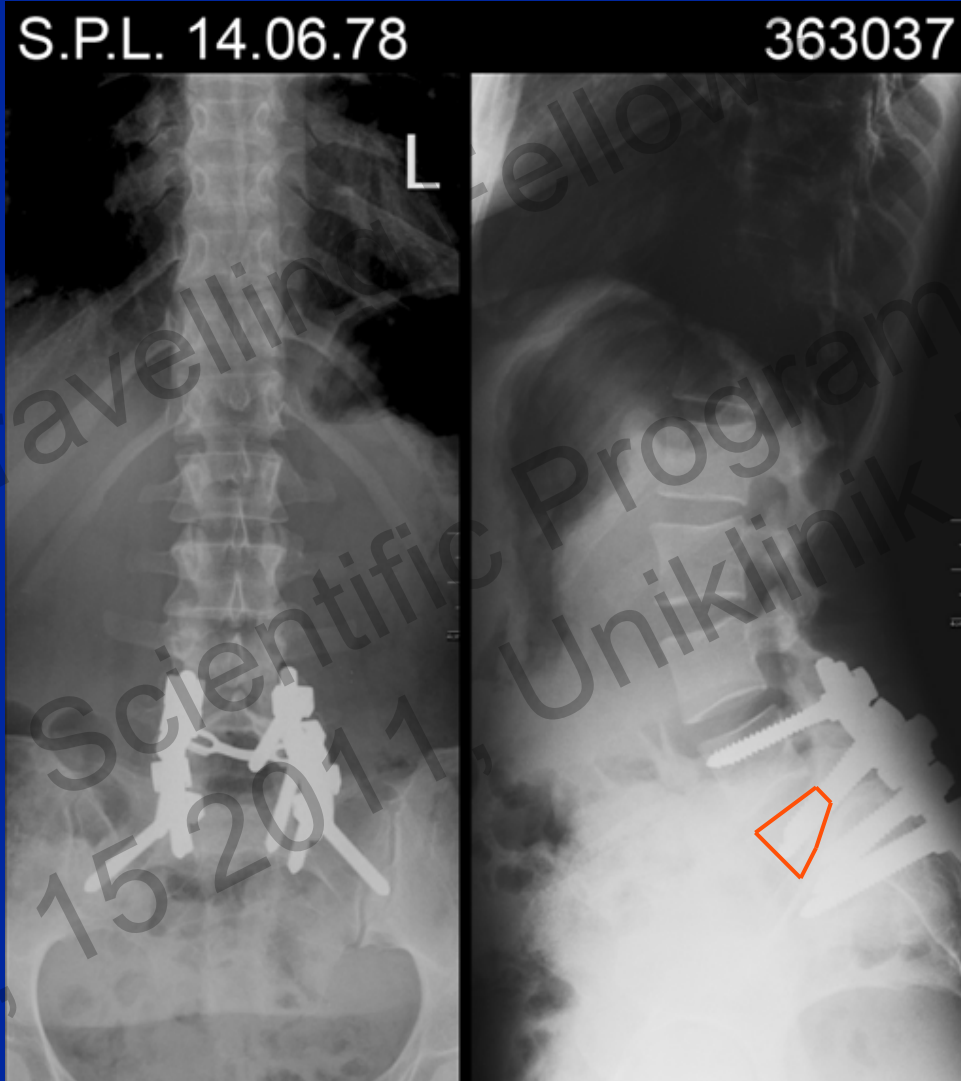
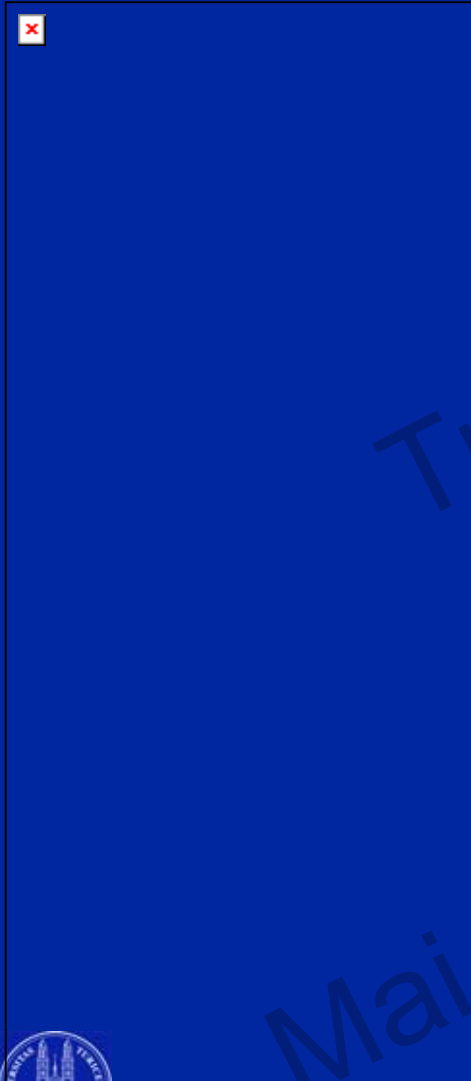
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balgrist

Mal, 15.2014



Sacral dome osteotomy, Single stage posterior reduction

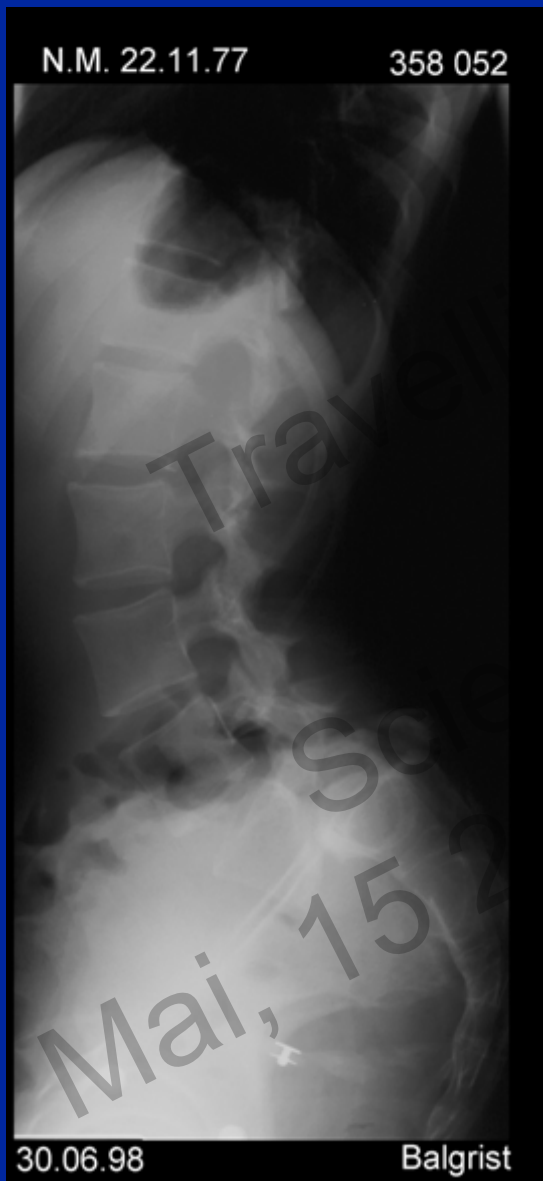


14.12.07 1 1 y po Balgrist

11 y po



11 y, 80% slip, SA 20°, L5 radicular symptoms



Sacral dome osteotomy

Single stage posterior reduction





1998

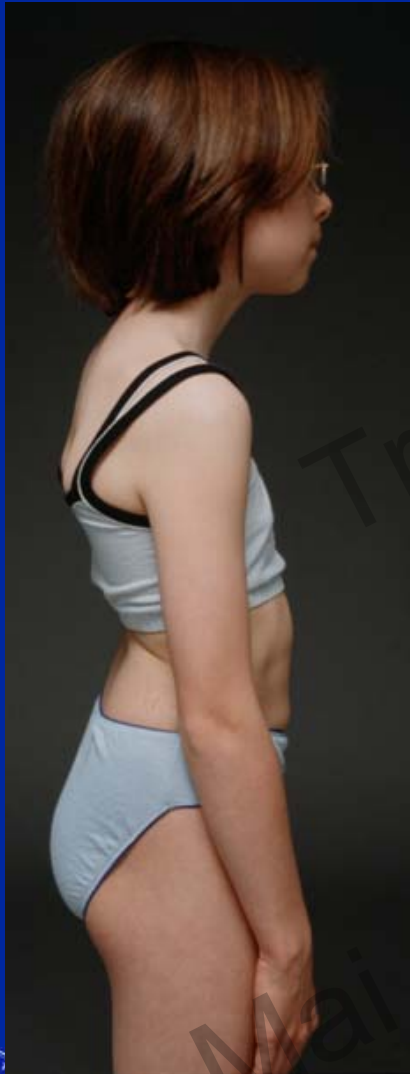


2007

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Mai, 15 2017
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12 y, 80% slip, 20° slip angle



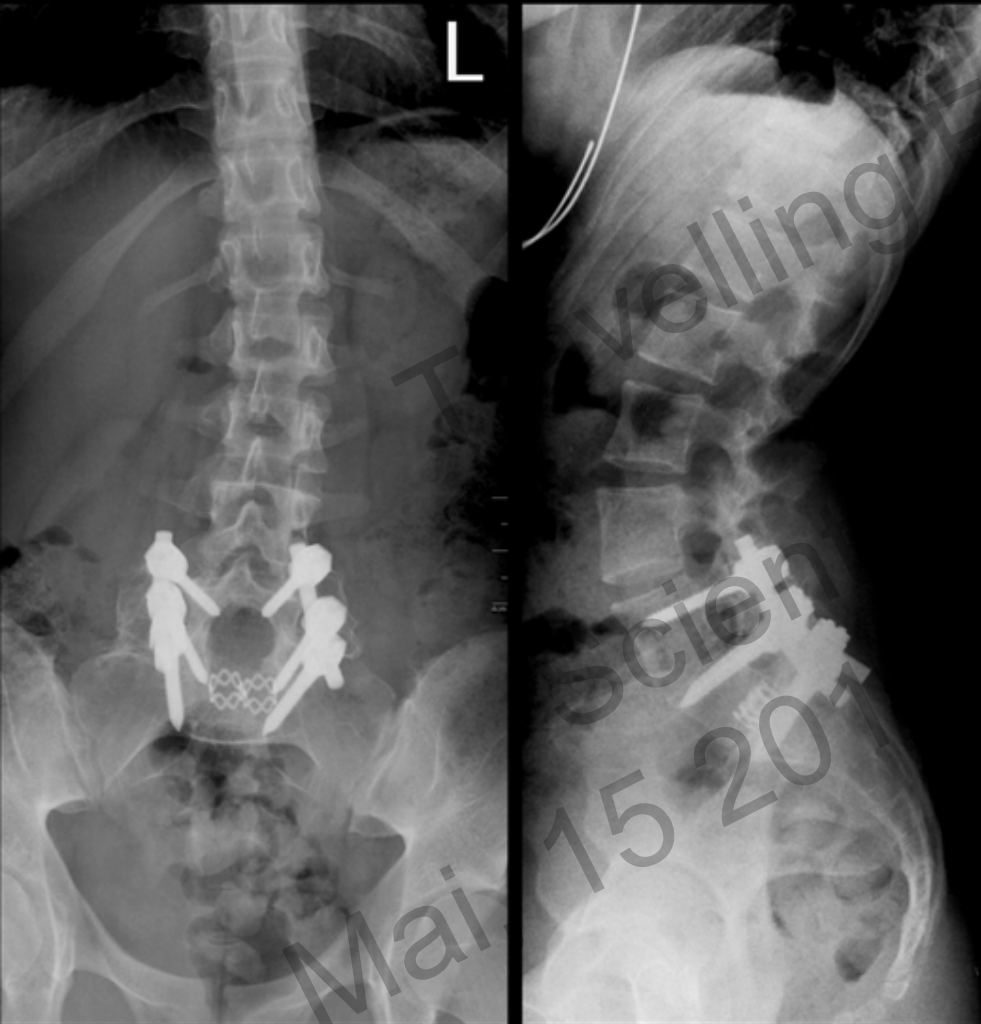
High-grade dysplastic
Dome shaped sacrum
Canal stenosis
Cauda equina compress.



Sacral dome osteotomy, single stage posterior reduction, fusion L4-S1



S.L. 19.12.89 545925



04.05.07 5 y po

Balgrist

S.L.19.12.89 545925



04.05.07 Balgrist



5 y

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16 y, 80% slip, 25° SA, 45° scoliosis posterior reduction L4-S1

B.N. 04.02.86

547986



05.04.02

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B.N. 04.02.86

547986



14.06.02

Balgrist



B.N. 04.02.86

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Mai, 15 2017



Patient data

Retrospective case series

16 consecutive patients 1996-2008

Follow-up: Average 7.1 y (2 to 12 y)

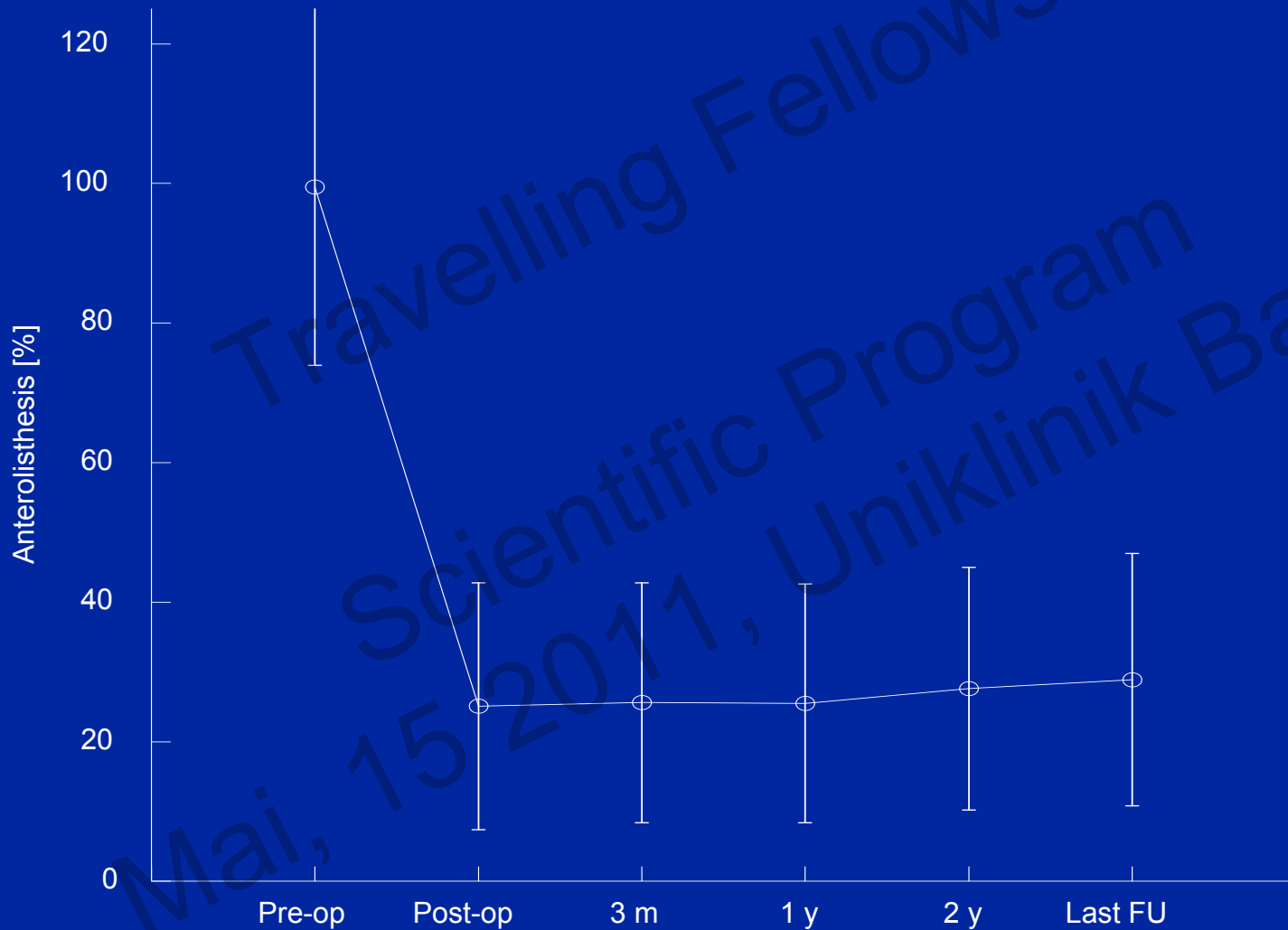
Average age 19.5 y (12 – 28 y)

Average L5 slip 99% (60 – 120%)

6 patients spondyloptosis ($\geq 100\%$)

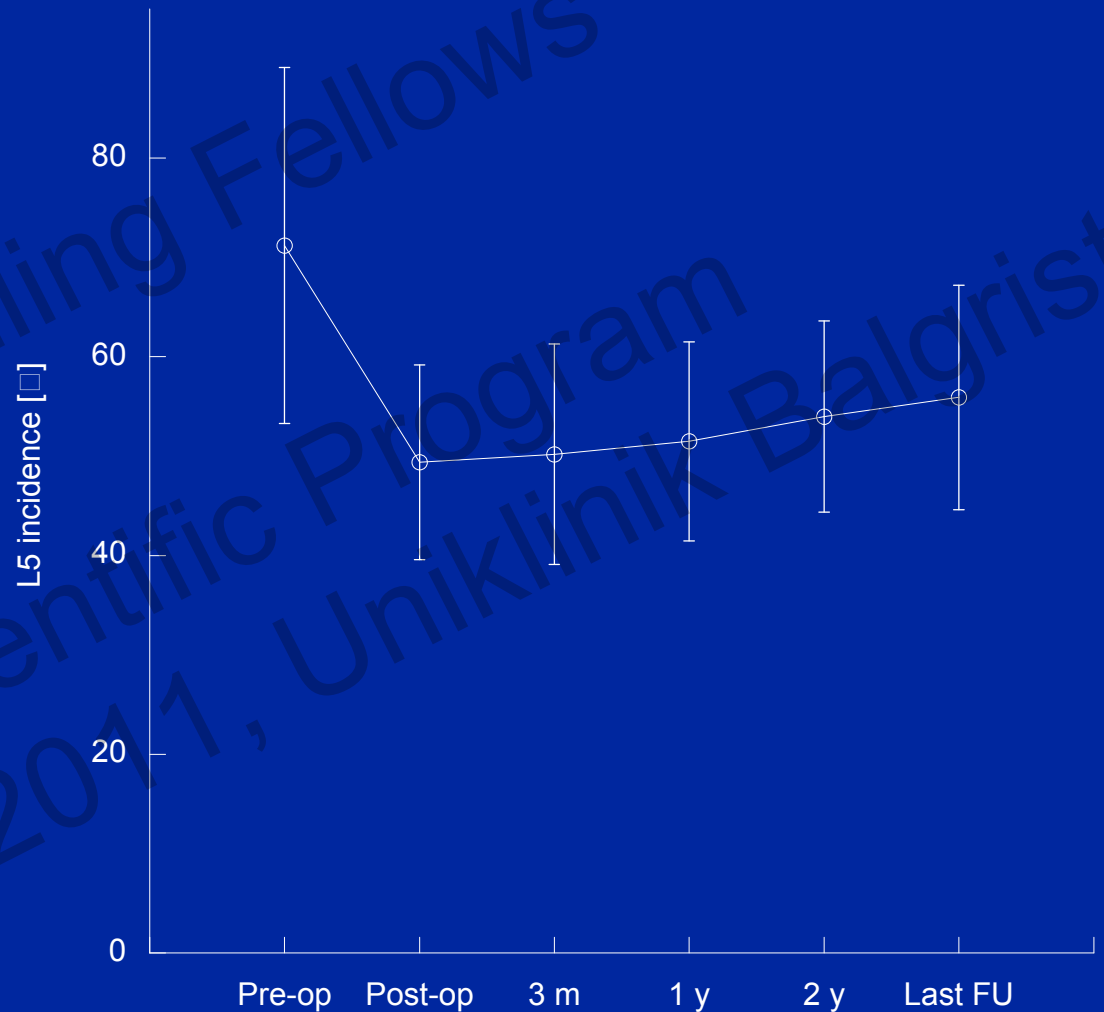
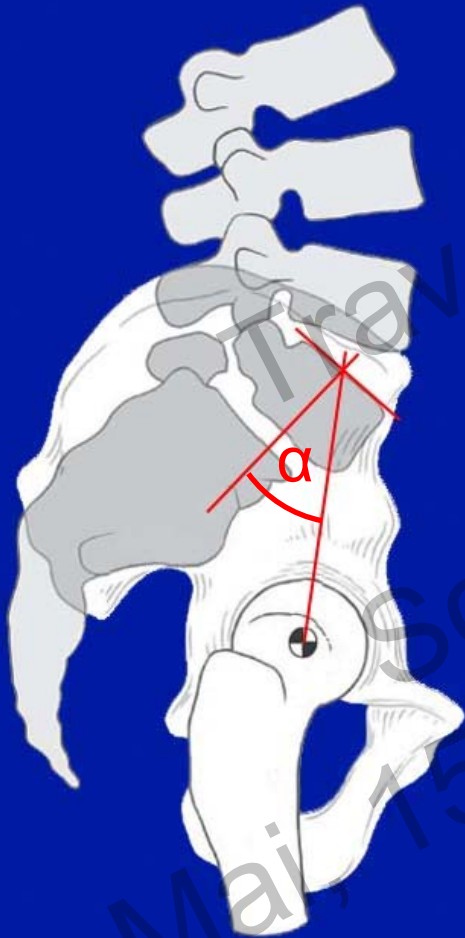


Results: Slip in %



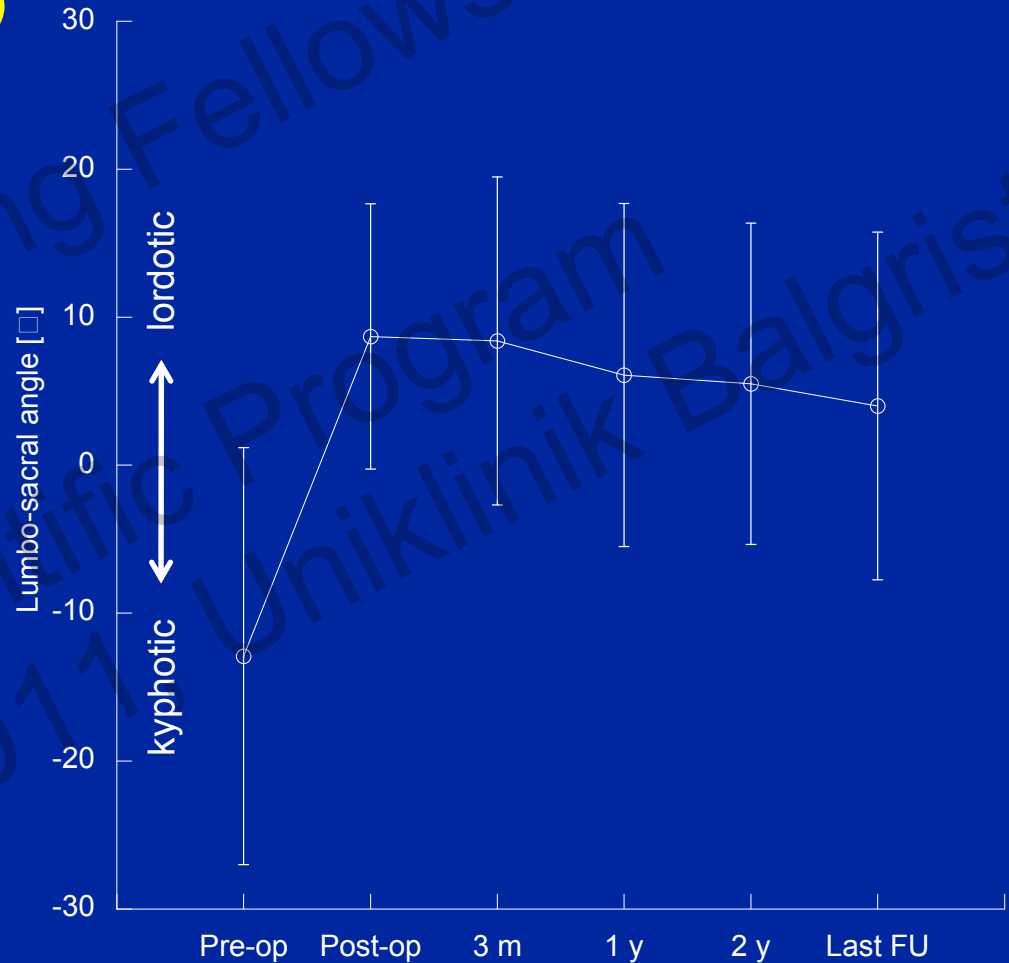
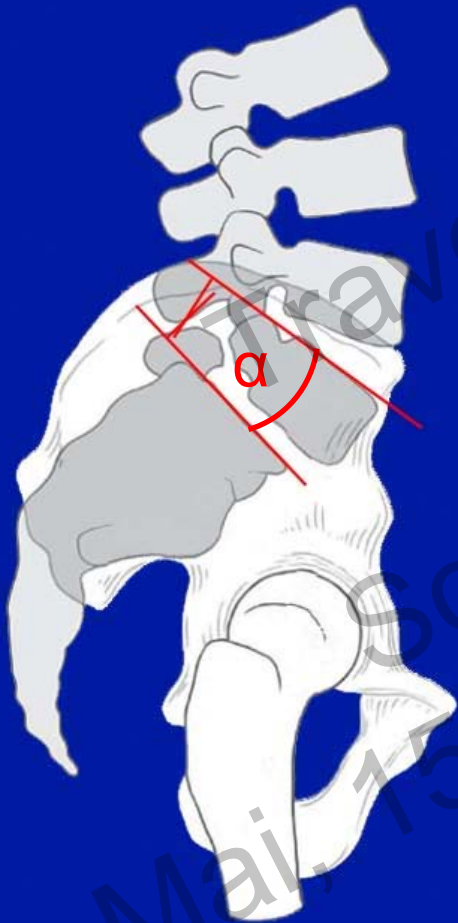
Results: L5 incidence

L5 incidence

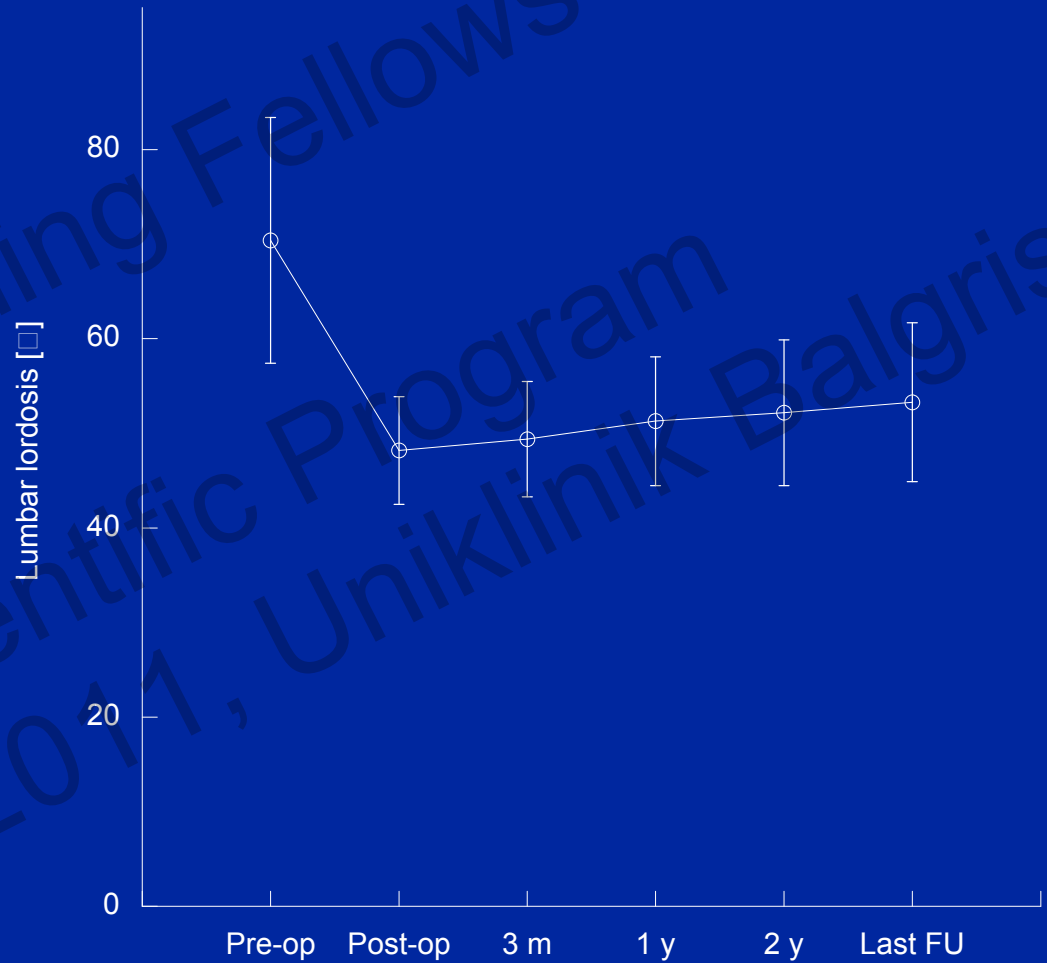
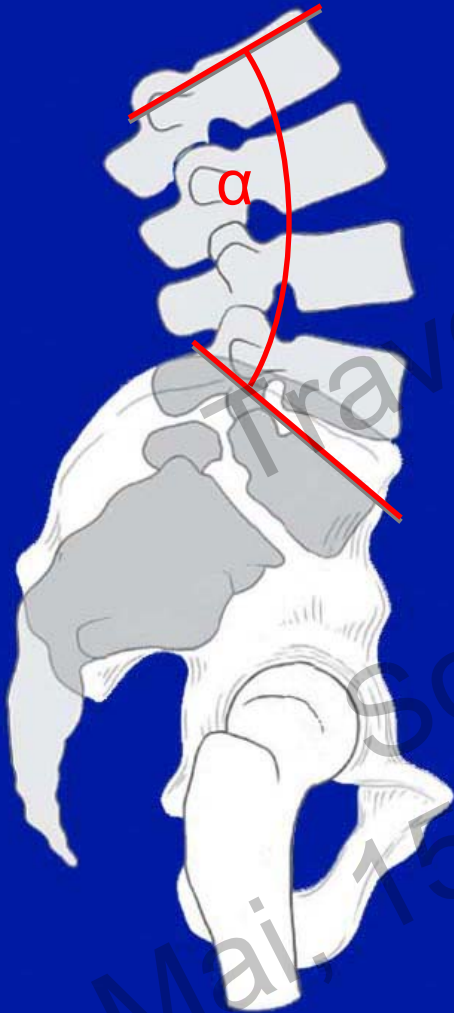


Results: lumbo-sacral angle

Lumbo-sacral angle (LSA)



Results: lumbar lordosis



Results

Fusion is achieved in all patients

No implant breakage

No significant progression during follow up

3 postop transient unilateral L5 root symptoms, no permanent foot weakness

Global outcome: Much better 14/15, 1 unchanged



Results

L5 slip 100% (70-125) to 25% (0-50)

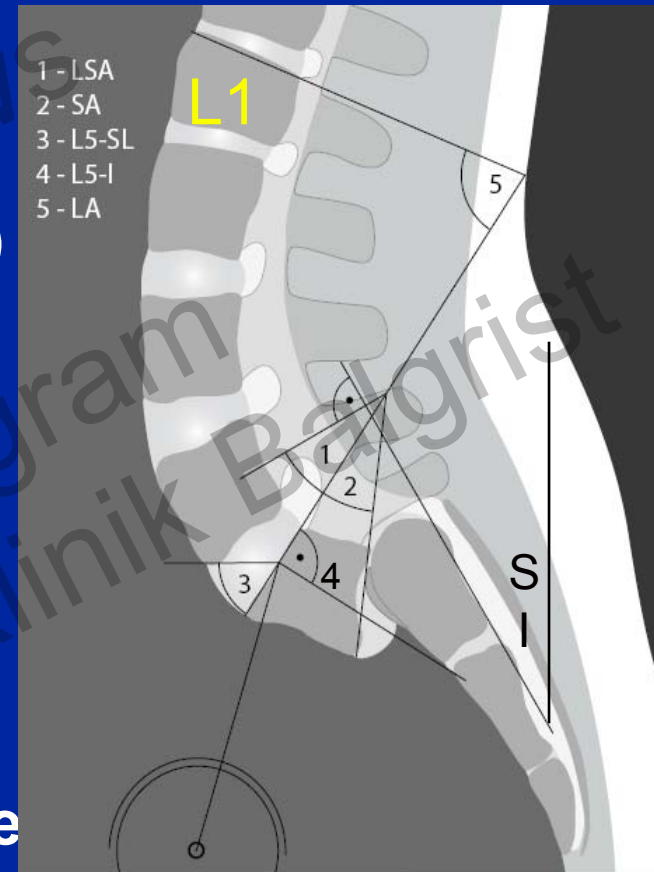
Slip angle -13° (-30 to 15) to 9° (-5 to 25)

Lordosis 70° (52-90) to 48° (40-61)

L5 slope 60° to 45°

L5 incidence 71° to 56°

Sacral inclination 47° (32-57) no change



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Case example

17 y, painful pseudarthrosis, severe deformity

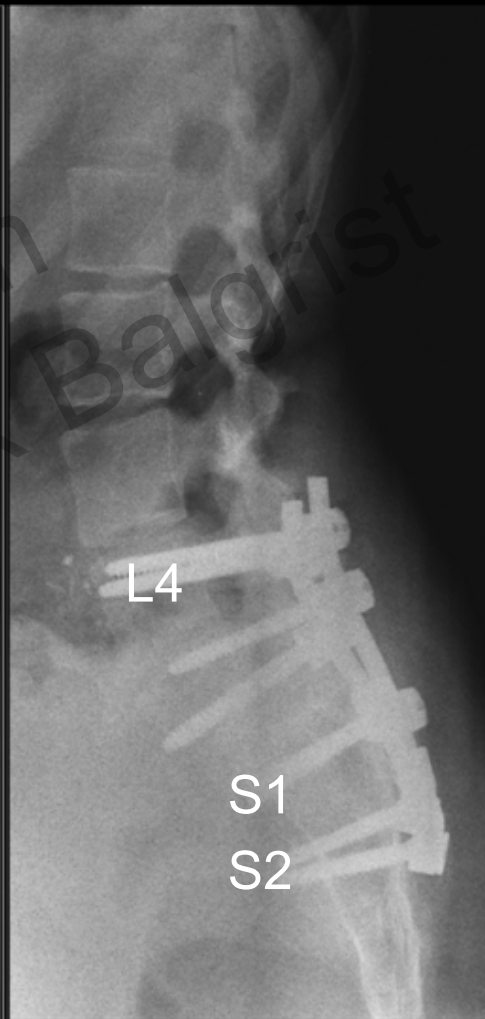


Partial S1 resection, reduction L4-S2



G.K.09.01.90

611801



02.11.07

Balgrist





Sacral dome resection

Single stage post reduction

Good deformity correction

Shortening osteotomy

Avoids lengthening during reduction of severe spondylolisthesis

Allows wide L5 root decompression

Intraoperation visualisation of tensionless L5 roots is utmost important

MEP of Tib ant and Ext hal long very sensitive to nerve root tension

