

Fusion from lumbar spine to the sacrum: analysis and treatment of mechanical complications. A report of 135 cases.

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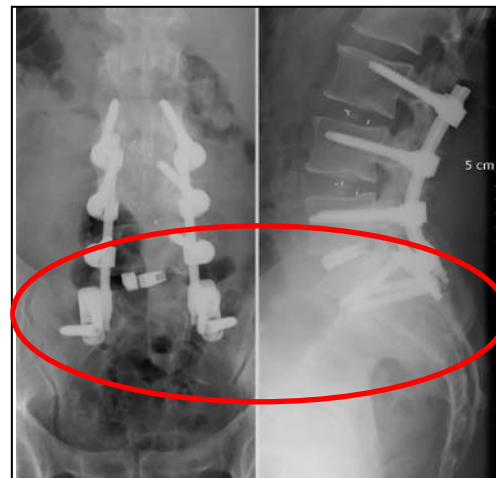
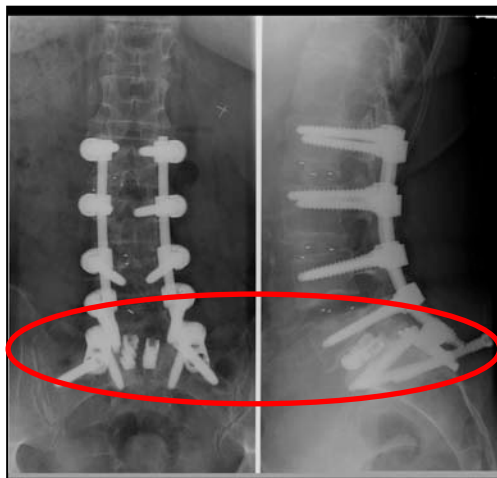
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SPINEWEEK 2012 **RAI AMSTERDAM** 28 MAY - 1 JUNE





Retrospective review of patients who underwent **lumbosacral fusion** (mean 2- years follow-up)
Monocentric continue series.



SPINEWEEK 2012 RAI AMSTERDAM 28 MAY - 1 JUNE



Materials (1)

- **135 patients** (62 males, sex ratio 0,45), mean age 57 years (16 – 78).
- Operated between January 2007 and December 2010 (average of 2 years).

- Indications:

*90 Low Back Pain due to DDD (including SPL), 26 Degenerative Scoliosis,
11 Isthmic Spondylolisthesis, 8 Posterior Wedge Osteotomy for kyphotic deformity.*

- Posterior Instrumentations:

SHORT CONSTRUCTS: 59 cases (L5-S1: 1, L4-sacrum: 29, L3-sacrum: 29)

MEDIUM CONSTRUCTS: 72 cases (L2-sacrum: 29, L1-sacrum: 21, Thoracic spine - sacrum **below the apex**: 22)

LONG CONSTRUCTS: 4 cases (Thoracic spine - sacrum **above the apex**).



Materials (2)

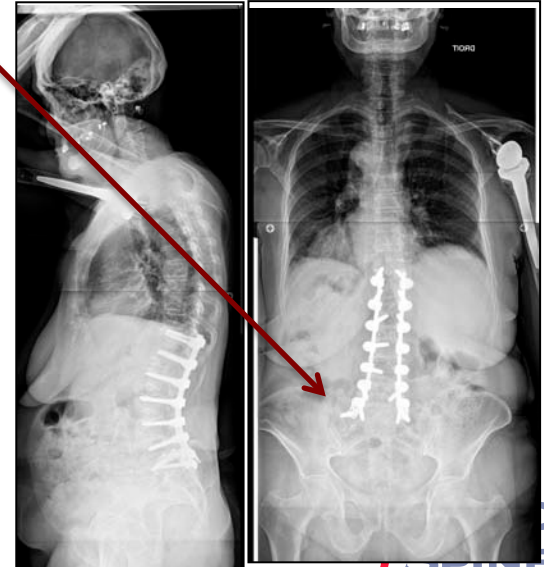
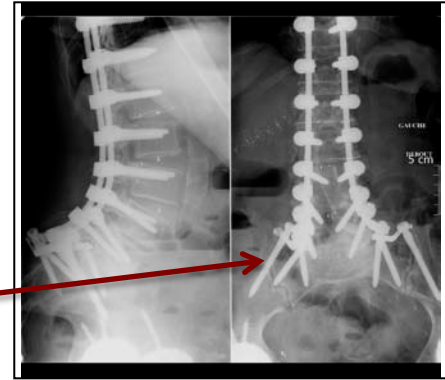


Types of Sacral Fixations:

S1 screw

Sacral plate with iliac screw

S1 sacral plate + sacral wing



Systematic radiographic analysis

Immediate post operative X-ray (J3)

X-ray « full spine » after 3 months, 1 year and 2 years.

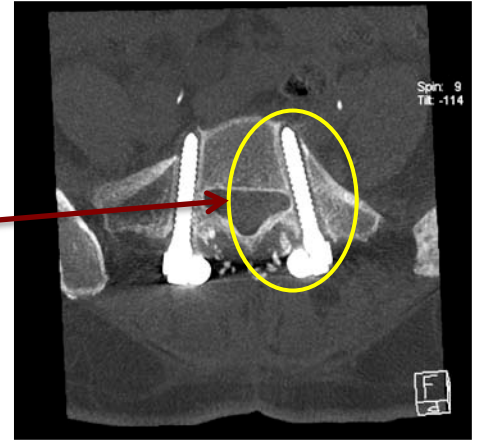


Methods

In case of unexplained post operative pain

We performed a CT-Scan (thin sections):

Cortex perforation,
Screw loosening,
Ectopic screws



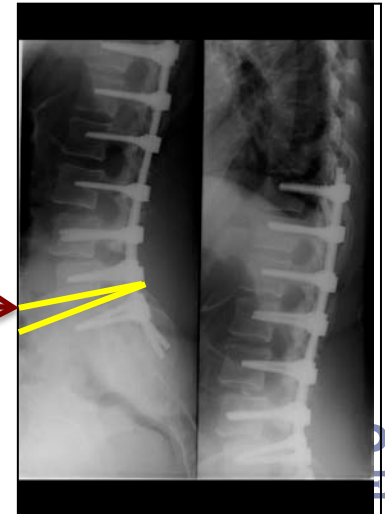
Analyzing of bony bridges, stability of sacral construct, pseudarthrosis.

Complications were related to

Etiology

Sagittal balance

Height and Angulation of L5 S1 disc



Results

22 patients have had a mechanical complication at latest follow-up **(16%)**

17 pseudarthrosis at L5-S1 level (with sagittal imbalance in 2 cases)

5 impingements between alar screw and intra pelvic sciatic nerve

no intracanal disruption, no vascular trauma, no fracture.



Pseudarthrosis at L5-S1 level

CT Scan:

loosening of screws S2/ S1/ L5
No solid bony bridge

DDD: 9 cases/ 90 (6 long constructs > L1 S)

- 4 TLIF, 1 PLIF,
- 4 without cage

Reoperation with ALIF +/- posterior implant exchange

Degenerative Scoliosis: 6 cases/ 26

- No cage at L5 S1 level

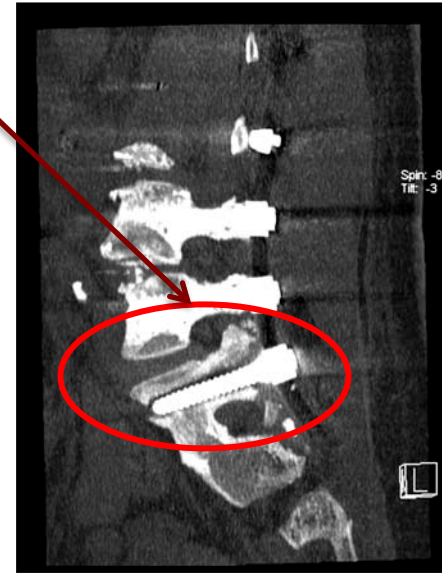
Reoperation with ALIF

in 1 case posterior procedure
Iliac fixation + extension of construct

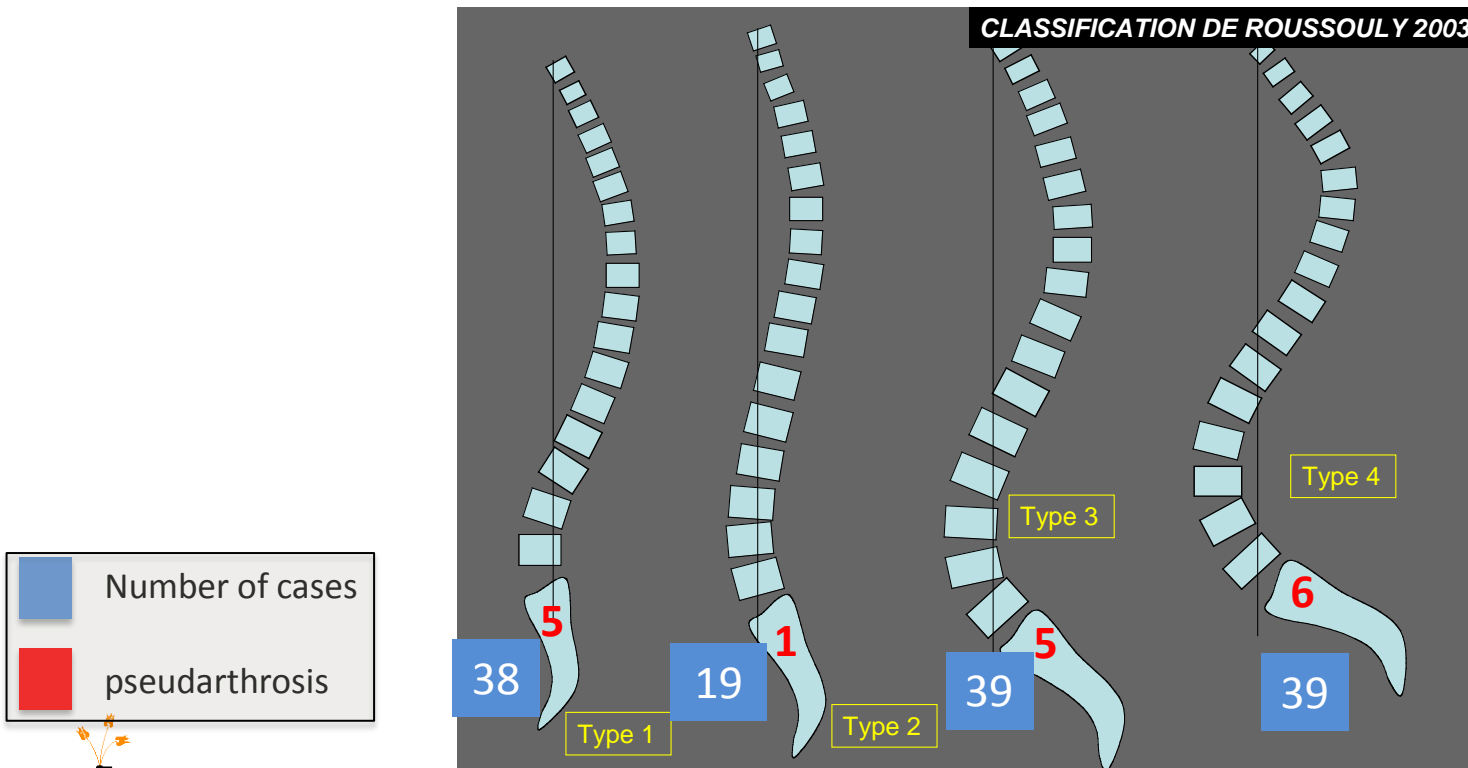
Isthmic Spondylolisthesis: 2 cases/ 11

- No cage at L5 S1 level

Reoperation with ALIF



No relationship between morphotype and pseudarthrosis



Pseudarthrosis in long adult spinal deformity instrumentation and fusion to the sacrum: prevalence and risk factor analysis of 144 cases.

[Kim YJ](#), [Bridwell KH](#), [Lenke LG](#), [Rhim S](#), [Cheh G](#)
[Spine \(Phila Pa 1976\)](#). 2006 Sep 15;31(20):2329-36.

Prevalence 24%

Thoracolumbar kyphosis, Coxarthrosis, **Sagittal imbalance**, Age > 55 at the time of surgery, No iliac fixation
increase the risk of L5-S1 nonunion

Biomechanical comparison of lumbosacral fixation techniques in a calf spine model.

[Lebwohl NH](#), [Cunningham BW](#), [Dmitriev A](#), [Shimamoto N](#), [Gooch L](#), [Devlin V](#), [Boachie-Adjei O](#), [Wagner TA](#).
[Spine \(Phila Pa 1976\)](#). 2002 Nov 1;27(21):2312-20.

Two points of sacral fixation is a safer alternative
For major deformities iliac screws are recommended

Loosening of sacral screw fixation under in vitro fatigue loading.

[Lu WW](#), [Zhu Q](#), [Holmes AD](#), [Luk KD](#), [Zhong S](#), [Leong JC](#).
[J Orthop Res](#). 2000 Sep;18(5):808-14.

During the initial phases of bone fusion, implant loading must be reduced to obtain solid fusion
A cage at L5 S1 level significantly reduces sacral screws loads

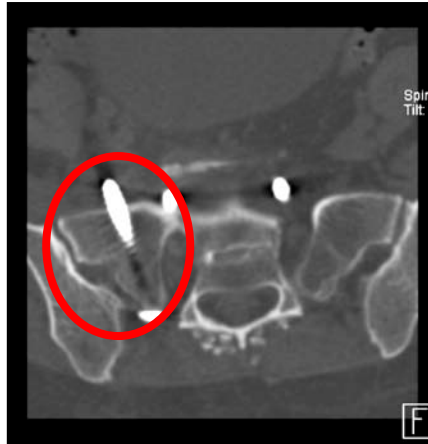


Screw impingement

5 cases (3,7%), always at alar screw level.

(*Clinical presentation:* postoperative sciatica sometimes delayed (0 to 1 year post op))

Reoperation for removal of screw, or sacral plate



An anatomic study of the S2 iliac technique for lumbopelvic screw placement.

[O'Brien JR](#), [Yu WD](#), [Bhatnagar R](#), [Sponseller P](#), [Kebaish KM](#).

[Spine](#) 2009 May 20;34(12)

Intra-articular screw (sacroiliac): 60%, No vascular injury

Three-dimensional image-guided placement of S2 alar screws to adjunct or salvage lumbosacral fixation.

[Nottmeier EW](#), [Pirris SM](#), [Balseiro S](#), [Fenton D](#).

[Spine J.](#) 2010 Jul;10(7):595-601

Entry point of S2 screw: cephalad and lateral to S2 dorsal foramen



Conclusion

Sacral fixation S1 - S2 is reliable **but 16% of mechanical complications**

Pseudarthrosis L5 S1

Deformities, long constructs, disc height at L5 S1 level



Iliac anchorage

In all cases



Systematic cage at L5 S1 level (ALIF at best)

Alar ectopic screws and impingement

Lateral and ascending screwing

