



PROXIMAL HOOKS IN GROWING ROD SYSTEMS: CAN THEY PREVENT PROXIMAL JUNCTIONAL FAILURES?

Tiziana Greggi, Elena Maredi, Francesco Lolli, Mario Di Silvestre, **Konstantinos Martikos**, Francesco Vommaro, Andrea Baioni, Stefano Giacomini, Alfredo Cioni

Rizzoli Orthopaedic Institute – Bologna Italy
Spinal Deformity Surgery Department



7TH INTERNATIONAL CONGRESS
ON EARLY ONSET SCOLIOSIS AND
GROWING SPINE

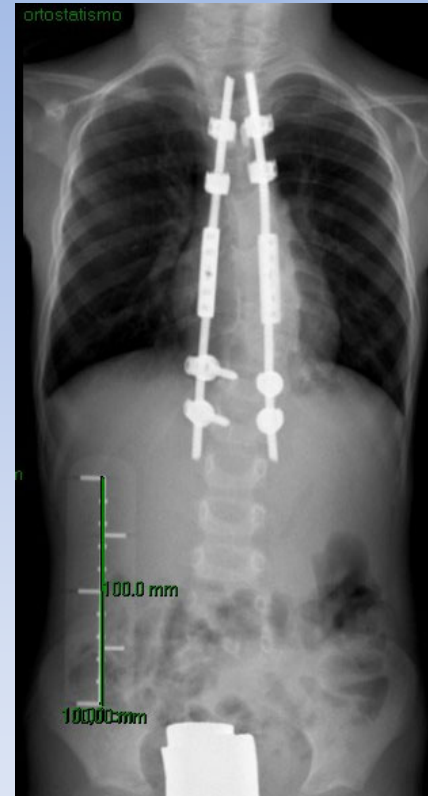
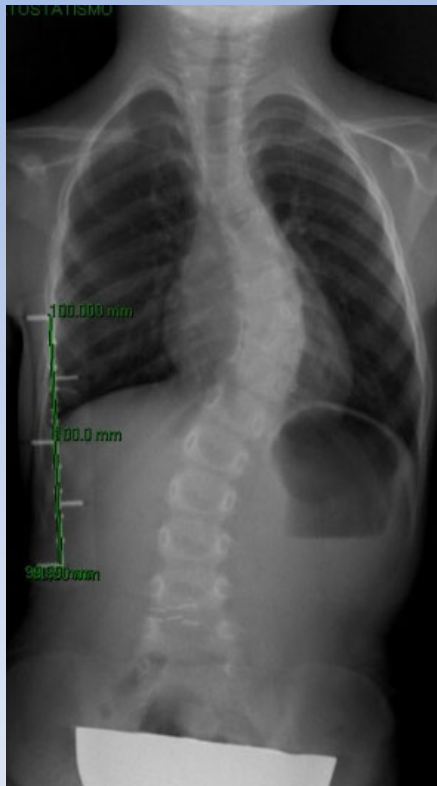
NOVEMBER 21–22, 2013

Rancho Bernardo Inn
San Diego, CA



BACKGROUND

- **Dual growing rod** systems are routinely used for the treatment of EOS. However,
- **Complications** incidence is still high, specially in terms of proximal anchors mobilization (20%).



Complications of growing-rod treatment for early onset scoliosis: analysis of one hundred and forty patients.

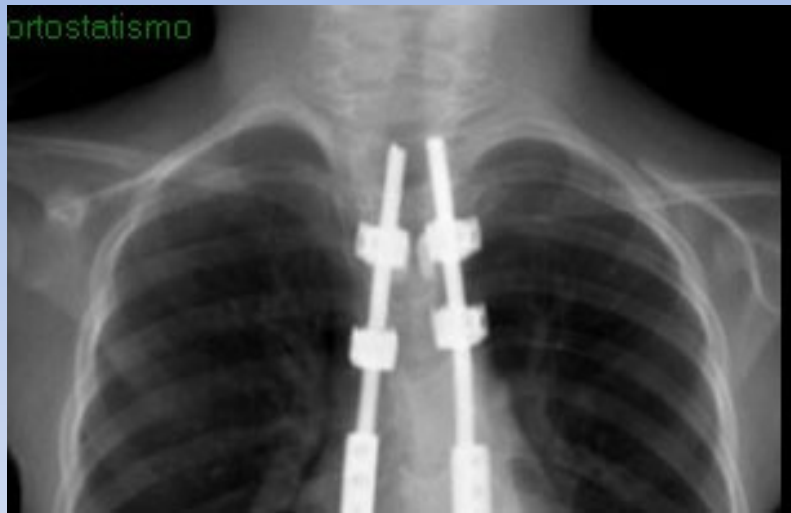
Bess S, Akbarnia BA, Thompson GH, Sponseller PD, Shah SA, El Sebaie H, Boachie-Adjei O, Karlin LI, Canale S, Poe-Kochert C, Skaggs DL. J Bone Joint Surg Am. 2010 Nov 3;92(15):2533-43. doi: 10.2106/JBJS.I.01471. Epub 2010 Oct 1.

Complications incidence in the treatment of early onset scoliosis with growing implants.

Greggi T, Lolli F, Di Silvestre M, Martikos K, Vommario F, **Maredi** E, Giacomini S, Baioni A, Cioni A. Stud Health Technol. Inform. 2012;176:334-7.

BACKGROUND

- ... the risk of a complication increases during the treatment period
- ... high rate of complications – young age of first implant



Sub-fascial placement of the rods likely reduces wound complications
A dual-rod construct likely dissipates the amount of mechanical stress when compared to a single rod construct

Complications of growing-rod treatment for early onset scoliosis: analysis of one hundred and forty patients.

Bess S, Akbarnia BA, Thompson GH, Sponseller PD, Shah SA, El Sebaie H, Boachie-Adjei O, Karlin LI, Canale S, Poe-Kochert C, Skaggs DL.
J Bone Joint Surg Am. 2010 Nov 3;92(15):2533-43. doi: 10.2106/JBJS.I.01471. Epub 2010 Oct 1.

Complications incidence in the treatment of early onset scoliosis with growing implants.

Greggi T, Lolli F, Di Silvestre M, Martikos K, Vommario F, **Maredi** E, Giacomini S, Baioni A, Cioni A.
Stud Health Technol. Inform. 2012;176:334-7.

AIM OF THE STUDY



... to compare the use of hooks (“claw construct”) and pedicle screws as proximal anchors in terms of preventing proximal junctional failures.



MATERIALS AND METHOD

- Retrospective study
- Patients treated from 2006 to 2012
- Growing rods (not magnetic constructs)

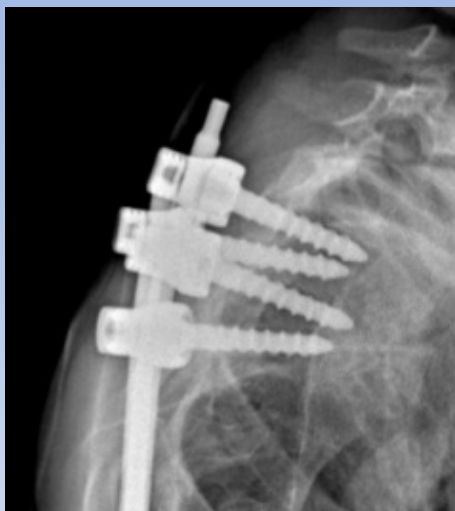
21 children

- Mean age: **7,6** y (min 5 max 11)
- 14 F e 7 M
- Mean FU 4.8 years (min 1 – max 6)
- Pedicle screws as distal anchors in all cases
- Post-operative brace was always applied

Etiology:

idiopathic scoliosis (9 cases), kyphosis in Morquio disease (1) and in Pott disease (1), congenital scoliosis (3), scoliosis in Escobar syndrome (1), in NF1 (2), in arthrogryposis (1), in Prader Willi (1), in trisomy 8 (1), in myopathy (1).

MATERIALS AND METHOD



SCREWS

7 dual rod constructs
with screws



HOOKS

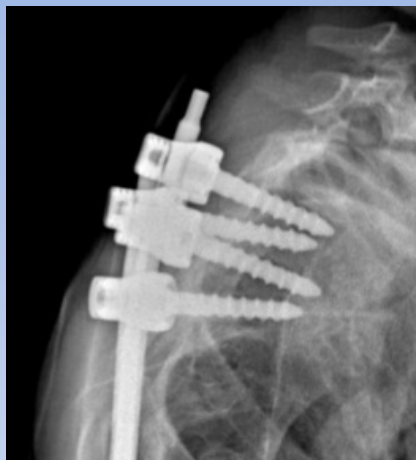
14 hooks
(claw construct)

Mean age	7.8	9.2
Cobb	55°	65°

RESULTS

Satisfying correction rate in both groups

No statistically significant difference



	PRE OP	POST OP
SCOLIOSIS	60.9°	36°
KYPHOSIS	52.1°	45°

mean correct. 40.9%

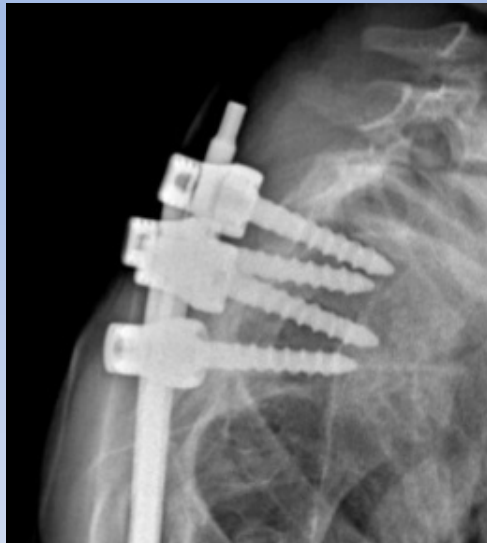


	PRE OP	POST OP
SCOLIOSIS	51.9°	24.2°
KYPHOSIS	51.3°	24°

mean correct. 53.4%

RESULTS

6 proximal failures in 6 patients
(28.6%)



SCREWS 5 cases
71.4%



HOOKS 1 case
7.1%

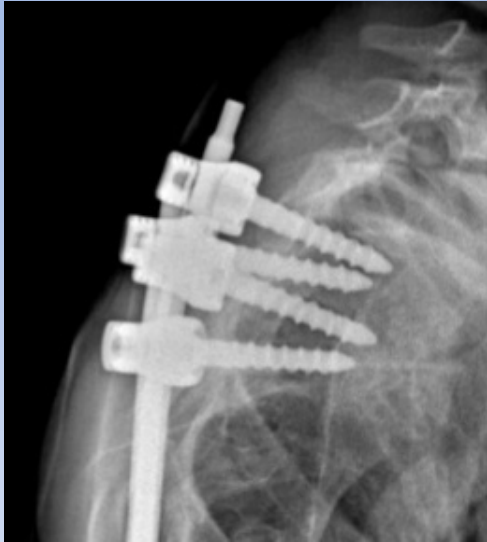
Etiology: 2 NF1, 2 idiopathic scoliosis, 1 trisomy 8.

Proximal implant failure occurred before first or second lengthening

Mean time of mechanical failure: 8 months

RESULTS

6 proximal failures in 6 patients
(28.6%)



SCREWS 5 cases
71.4%



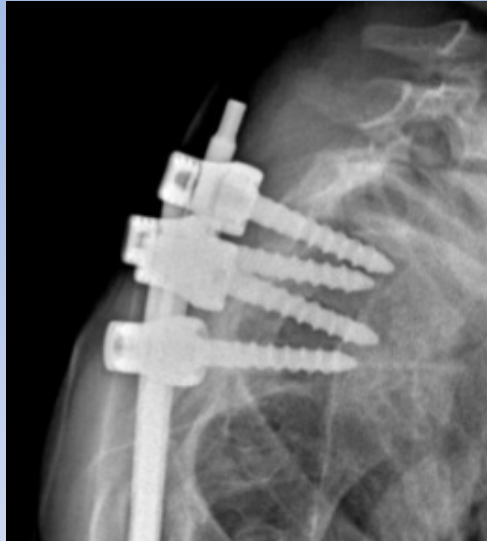
HOOKS 1 case
7.1%

End fusion:

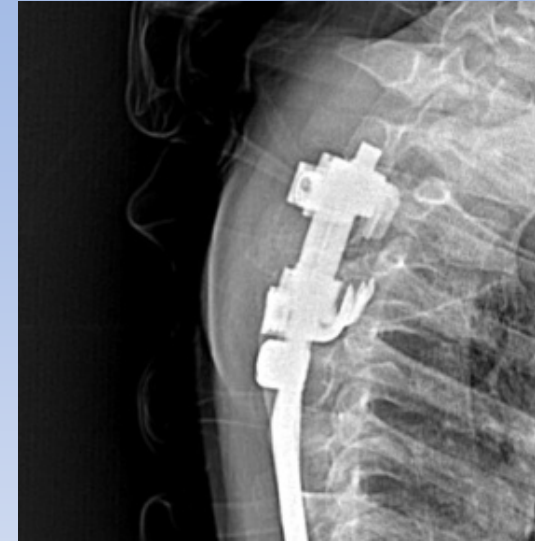
- Applied only in 50% of screw constructs
- Never applied in hook constructs

RESULTS

6 proximal failures in 6 patients
(28.6%)



SCREWS 5 cases
71.4%



HOOKS 1 case
7.1%

Proximal instrumentation failure was always symptomatic.

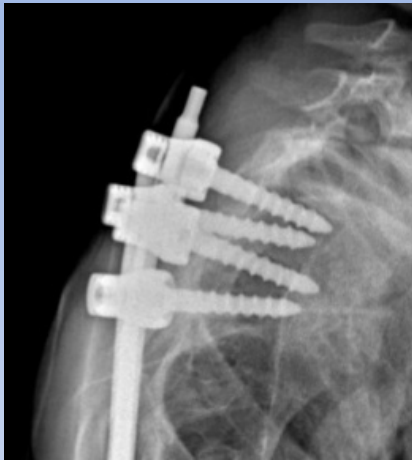
No neurological complications occurred.

Unscheduled revision surgery performed in 3 cases (with associated lengthening).

In 3 cases performed during lengthening procedure.

RESULTS

Revision Surgery



3: substitution with hooks and proximal extension

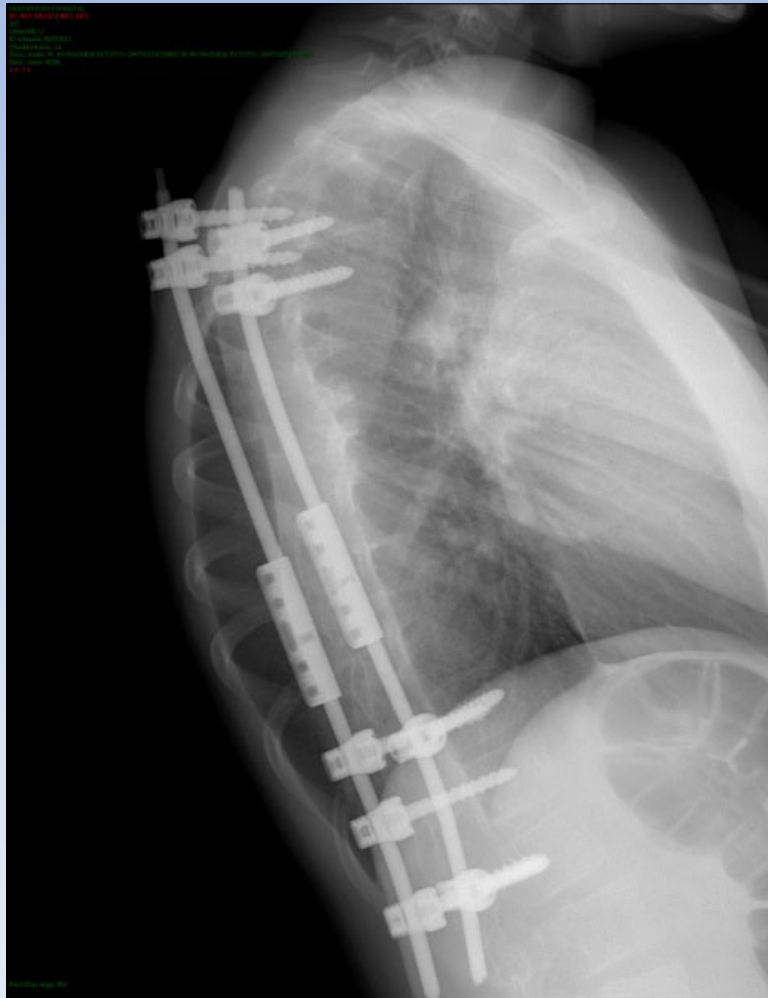
2: substitution with screws and proximal extension
(1 secondary revision in a NF1 patient)



1: substitution with hooks and proximal extension

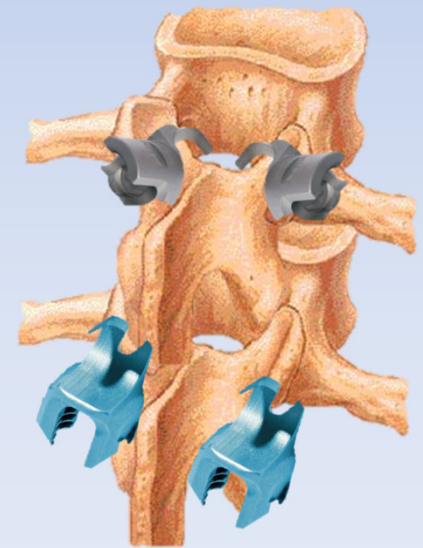
RESULTS

Scoliosis in NF1: 7 yy, screw pull-out, revision and extension



CONCLUSIONS

- Those results showed that hooks used as proximal anchors seem to have a protective role versus proximal junctional failures, if compared to pedicle screws (7.1% vs 71.4%; $p < 0.05$).



CONCLUSIONS

- Interspinous ligament integrity
(Cross link?!!)
- Importance of *proximal end fusion* in terms of construct stability:
 - Important in screw constructs
 - Not as important in hook constructs

Obviously, other parameters can play a role

- Etiology
- upper thoracic kyphosis
- sagittal balance
- ...





Thank you

Rizzoli Orthopaedic Institute – Bologna Italy
Spinal Deformity Surgery Department
Dr.ssa Tiziana Greggì
www.ior.it