

Safety of Pedicle Screws for Pediatric Patients Younger than 10 Years Old



Rady
Children's
Hospital
San Diego

**Takahito Fujimori MD, Burt Yaszay MD,
Carrie E. Bartley BA, Tracey P. Bastrom MA,
Peter O. Newton MD**



San Diego – Orthopaedics



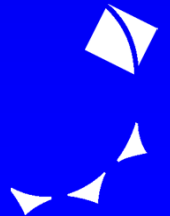
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- **DePuy Spine: Royalties, Consultant, Research support, IP (tether)**
- **EOS Biospace: Research**
- **OREF, POSNA, SRS, CSF: Research support**



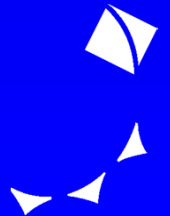
Purpose

- **Evaluate the safety and complication rates associated with the usage of pedicle screws for children younger than 10 years old**
- **Not to determine accuracy of placement**



Methods

- **Single institution – Rady Childrens Hospital**
- **2003 to 2011**
- **99 consecutive patients ≤ 10 years-old**
- **Pedicle screws +/- iliac screws**



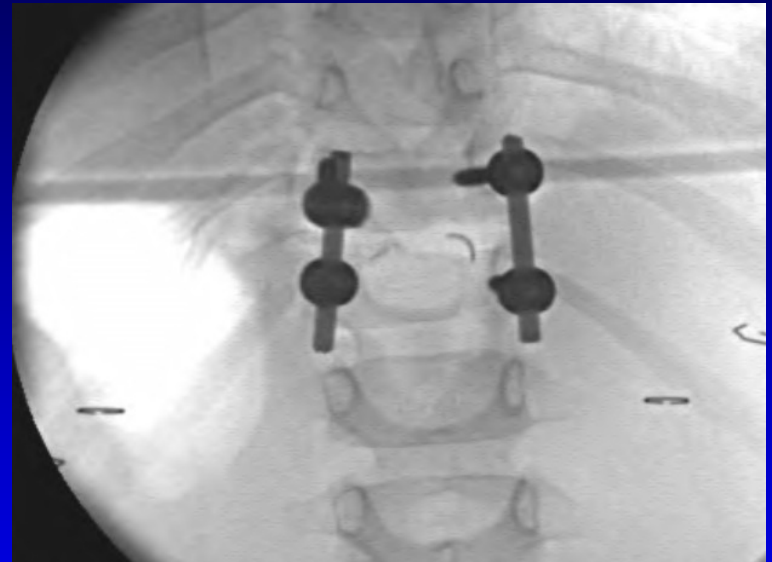
Methods

- **Group 1: Age 0 – 5**
- **Group 2: Age 5 – 10**
- **Comparison Group: Age 10 – 15**
(234 consecutive patients from
2006 to 2009)



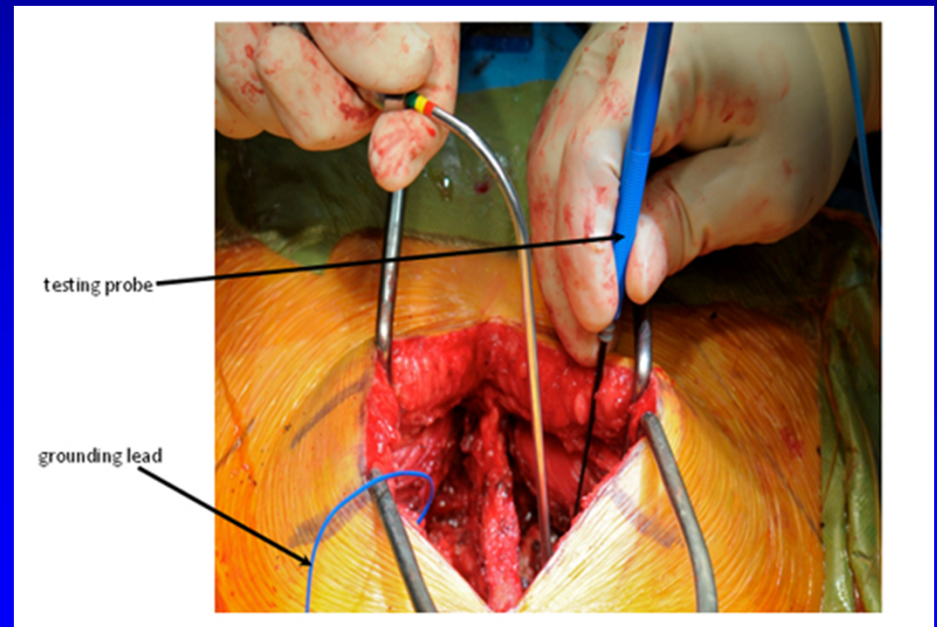
Screw Position

- Primarily placed freehand
- Checked with fluoroscopy
- Triggered EMG stimulation
- Questioned screws removed and probed for breach



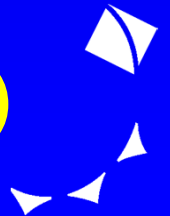
Intra-operative pedicle screw adjustments

- Operative report review
- Neuro Monitoring report review



Results

- **0-5 year old group: 176 Screws (31 patients)**
- **5-10 year old group: 659 Screws (68 patients)**
- **10-15 year old group: 4219 Screws (234 patients)**
- **Follow-up: 3.1 yrs (3 mo – 9 yrs)**



Patients with PS associated Complication

- 0 – 5 Year Old Group: 3.2%
- 5 – 10 Year Old Group: 2.9%
- 10 – 15 Year Old Group: 1.7%



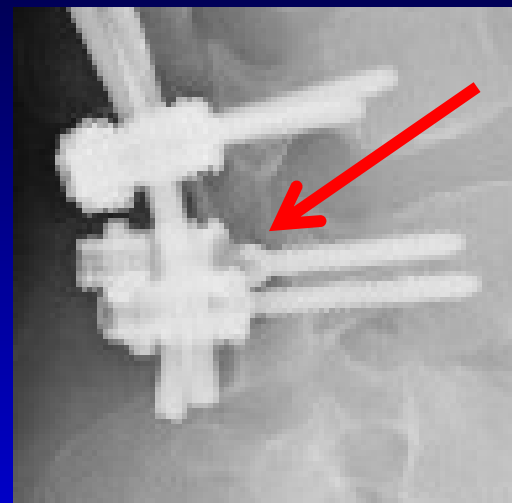
Pedicle Screw Complications

- 0-5 year old group: 1 (0.6%)
- 5-10 year old group: 2 (0.3%)
- 10-15 year old group: 4 (0.1%)



0 – 5 Year Old Group

- 4 y/o female
- Kyphoscoliosis
- VCR/Shilla
- Broken 3.5 mm screw
3 years post op
- Revised when rods too short



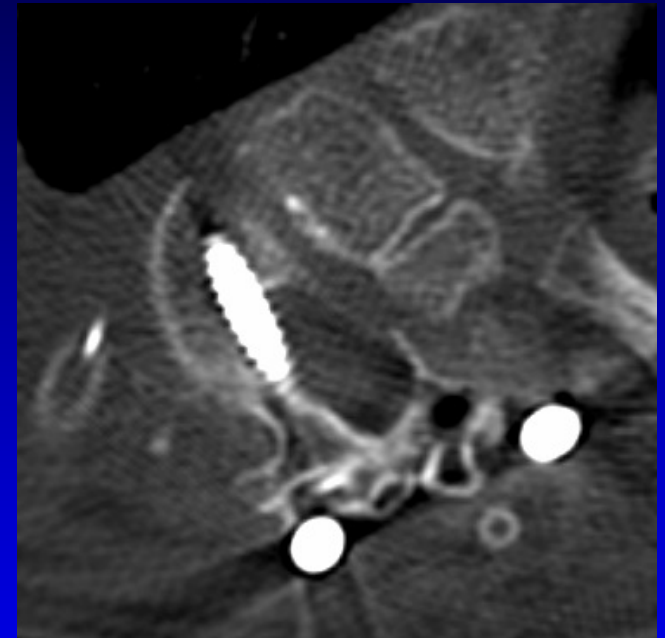
5 – 10 Year Old Group

- 8 y/o, congenital scoli
- VCR
- Intraop loss of fixation
- Salvaged with addition of sublaminar cable



5 – 10 Year Old Group

- 7 y/o, Arthrogryposis
- VCR/Shilla
- Post op neuro deficit
- CT revealed bone impinging and medial screw breach w/o impingement
- Screw removed at revision



10 – 15 Year Old Group

- 14 y/o, NM, broken S1 screw @ 2yrs, asymptomatic
- 14 y/o, AIS, T8 screw plow during DVR, no sequela
- 12 y/o, Syndromic, intraop screw pullout, no sequela
- 13 y/o, Tumor, distal screw pullout @ 2 weeks, revised



Intraoperative Screw Adjustments (Removed or Redirected)

- 0-5 year old group: 1 (0.6%)
- 5-10 year old group: 9 (1.4%)
- 10-15 year old group: 50 (1.2%)

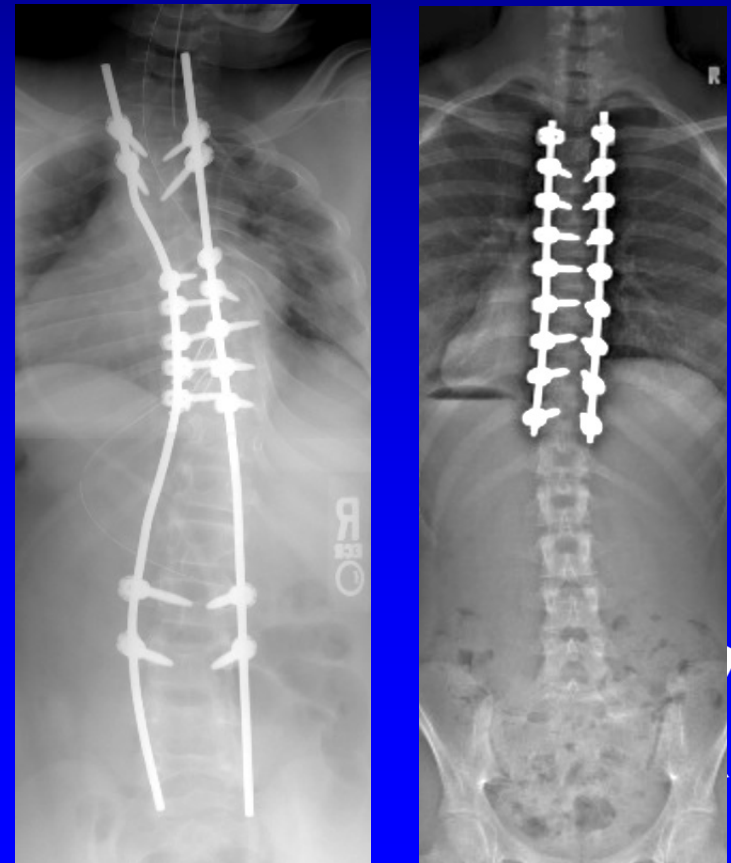
$p > 0.4$



Pedicle Screw Complication based on Construct Type (per screw)

- **Non-fusion
Construct: 0.8%**
- **Fusion Construct:
0.1%**

$p < 0.005$



Overall Surgery related Complications

- **Non-fusion Construct: 36.4%**
- **Fusion Construct: 8.3%**

$p < 0.001$



Revision Surgery Solely Related to Screw Complication – Very Rare

- **None in the 0-10 y/o groups
99 patients, 835 pedicle screws
(2 incidental screw revisions)**
- **1 patient: 10-15 y/o group
234 patients, 4219 pedicle screws**



Conclusion

- **Pedicle screws safe in children <10 years of age**
- **Slightly higher rate of complications primarily due to non-fusion constructs utilized more in the younger patients**

