

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



Rady
Children's
Hospital
San Diego

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- **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)**



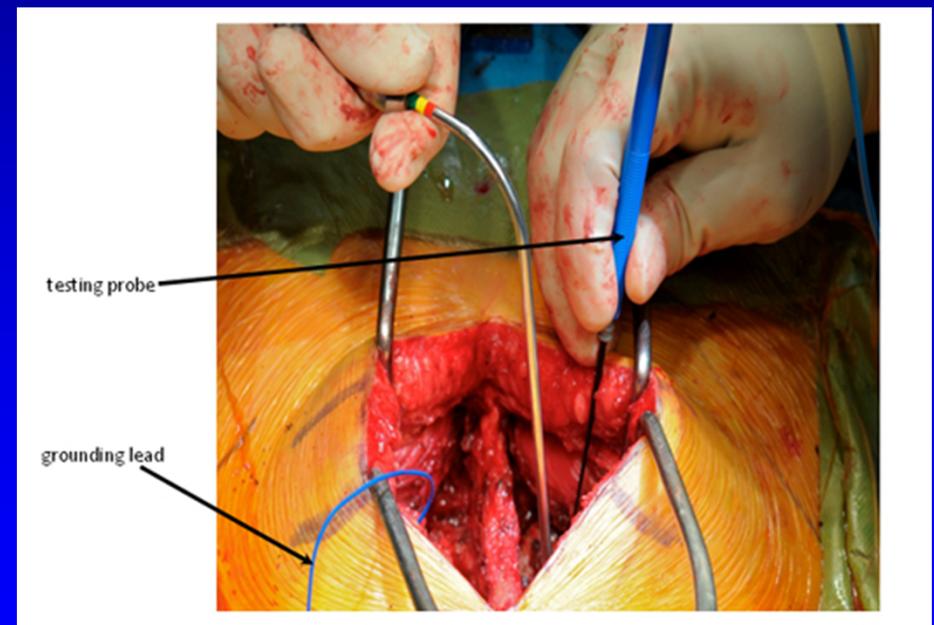
Screw Position

- **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%**



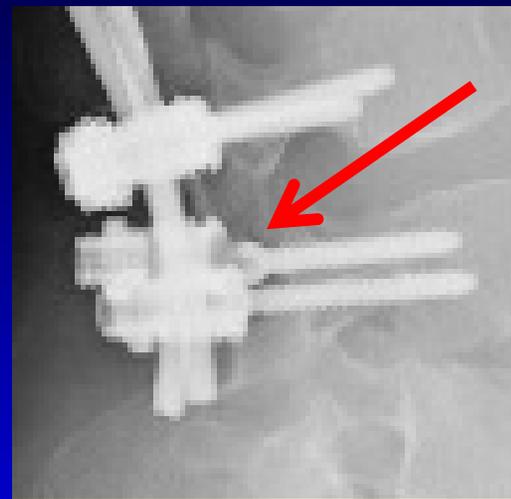
Pedicle Screw Complications

- **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**



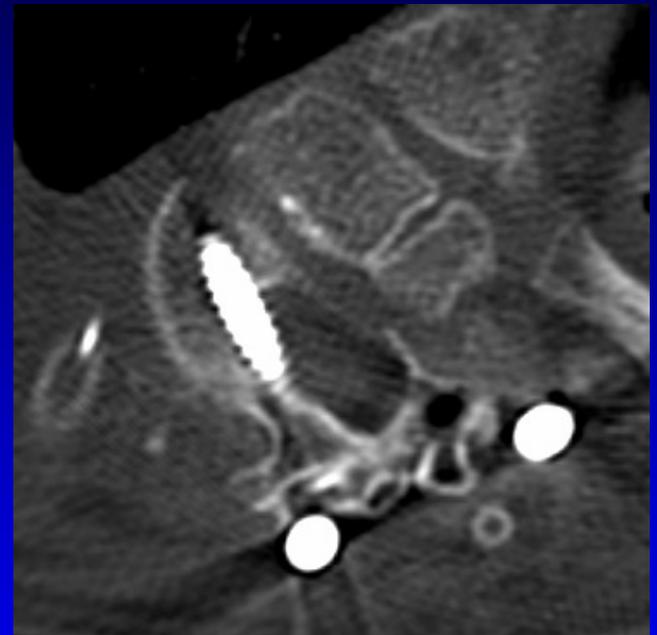
5 – 10 Year Old Group

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



5 – 10 Year Old Group

- **7 y/o, Arthrogyposis**
- **VCR/Shilla**
- **Post op neuro defecit**
- **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%)

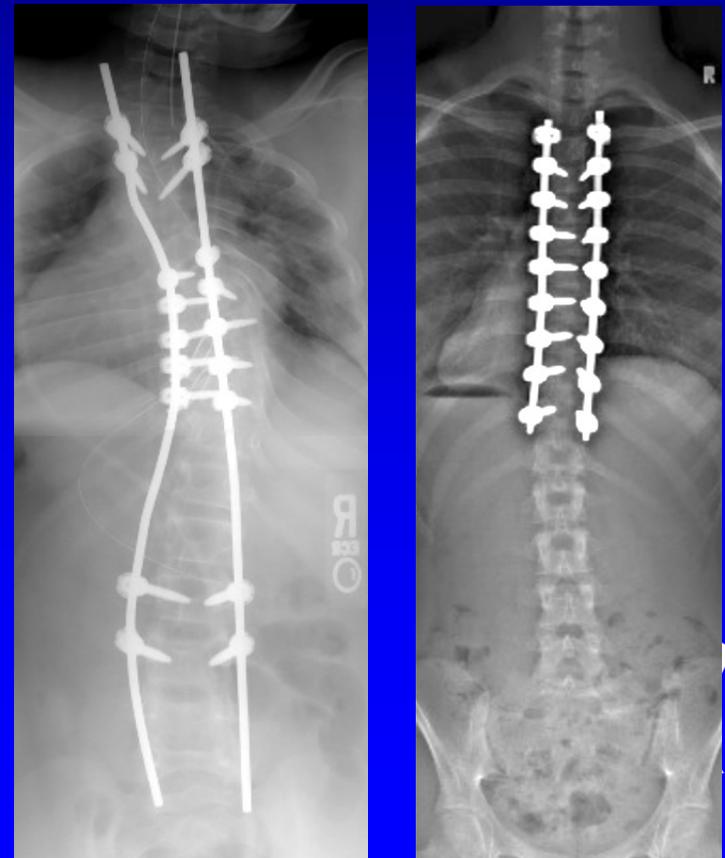
$p > 0.4$



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**

