

Paper Abstracts

94. A Simple and Effective Method for Directing the Sagittal Placement of Thoracic Pedicle Screws without Intraoperative Imaging

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Summary: Our study describes a simple free-hand technique for the application of thoracic pedicle screws without the use of intraoperative navigation in patients with adolescent idiopathic scoliosis. Based on a prospective consecutive series of 66 patients representing 510 pedicle screws, our technique was found to be safe and accurate with no intra- or post-operative neurological complications.

Introduction: This study addressed a simple and novel free-hand technique of directing the sagittal inclination of thoracic pedicle screws, without the use of intraoperative monitoring, in AIS patients. The safety and accuracy of this technique was evaluated in a consecutive series of 510 pedicle screws placed by this method.

Methods: A prospective radiographic and clinical study was conducted. Thoracic pedicle screw insertion from T1-T12 was performed in 66 consecutive AIS patients who underwent PSF. Intraoperatively, a right-angle, "Langenbach" retractor was utilized to define the sagittal direction of insertion. After surgery, the positions of the screws were evaluated using lateral radiographs. Screw location was described as the position of the screw tip with reference to three vertebral body zones (A, B, & C). Additionally, the screws were categorized as acceptable when they engaged the pedicle in the lateral view, and unacceptable if they perforated the pedicle or violated the superior or inferior disc spaces. Furthermore, pedicle screw application into Zones A & B were regarded as ideal. Intra- and postoperative complications were also assessed in every patient.

Results: There were 15 males (22.7%) and 51 females (77.3%), with a mean age of 15.0 years. There was a sum of 510 pedicle screws inserted from T1-T12, with a mean of 7.7 screws inserted per patient. 501 screws (98.2%) were located in Zones A or B, and only 9 screws in zone C (1.8%), and 1 screw perforated the superior end-plate. whereas screw insertion into Zone C entailed 1.8% (n=9 screws). None of the patients had intra- or postoperative neurological sequelae.

Conclusion: We report a simple, free-hand technique of directing the sagittal inclination of pedicle screws, without the use of intraoperative radiographic monitoring. Our technique was found to be safe and accurate in AIS patients.

Significance: The authors' simple, free-hand technique of directing the sagittal inclination of pedicle screws, without the use of intraoperative radiographic monitoring, is a safe and effective method.

95. Comparison of Traction Radiographs Taken Under General Anesthesia with Conventional Flexibility Graphies in AIS Patients: Which is Better?

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Summary: Traction X-ray taken under general anesthesia (TrUGA) is the best modality to predict the postoperative correction rate provided by pedicle screw constructs.

Introduction: The purpose of this study was to compare the correction rates with TrUGA to conventional flexibility radiographs in different curve types and curve magnitudes.

Methods: Between 1999-2008; preoperative standing AP, side-bending (SB), supine traction (Tr), fulcrum (F), TrUGA and postoperative AP graphies were obtained for 623 consecutive patients with adolescent idiopathic scoliosis who had surgical treatment. Proximal thoracic (PT), main thoracic (MT) and thoracolumbar/lumbar (TL/L) curves in all patients were measured by using all the x-ray methods and correction rates were compared between each method and for postoperative results. All patients had pedicle screw constructs for surgical treatment.

Results: The average age was 15.4 years and the male to female ratio was 76 to 547. TrUGA demonstrated greater curve correction than SB and Tr X-rays for all PT curves. Flexibility rates for MT (345 patients) were 68% with TrUGA, 61% with F, 58% with B and 52% for Tr ($p > 0.05$). TrUGA demonstrated greater correction for MT more than 65° (106 patients) (50% versus 34%, 26% and 29% for F, Tr and SB respectively, $p < 0.05$). For TL/L curves of $< 65^\circ$ (447 patients); SB graphies showed higher curve correction with the flexibility rate of 76% when compared to flexibility rate with TrUGA (72%). For TL/L curves $> 65^\circ$ (176 patients), TrUGA showed greater flexibility than others with flexibility rate of 60% versus 50%, 44% and 42% for SB, Tr and F ($p < 0.05$). Postoperative correction rate for PT, MT and TL/L curves $< 65^\circ$ were 61%, 80% and 76% respectively. Postoperative correction was 63% for MT and 77% for TL/L in curves $> 65^\circ$. Anterior release would be necessary when less than 30% flexibility criterion was taken into account, in 73 of 106 patients with MT curves of $> 65^\circ$, but anterior surgery in 69% of patients was eliminated when the same criterion was applied by using TrUGA.

Conclusion: TrUGA is superior to SB, F and Tr in determination of flexibility of PT and MT, especially for MT $> 65^\circ$ in magnitude. For TL/L curves, it demonstrates similar correction rates with SB in curves $< 65^\circ$ and but more than SB for curves $> 65^\circ$ degrees in magnitude. TrUGA is also the best modality to predict the postoperative correction rate provided by PS constructs.

Significance: -