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Safety and Efficacy of Intraoperative Vectored Traction with Gardner-Wells (GW) Tongs for Pediatric Spine Deformity Surgery - A Series of 1000 Cases

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Safety and Efficacy of Intraoperative Vectored Traction with Gardner-Wells (GW) Tongs for Pediatric Spine Deformity Surgery - A Series of 1000 Cases.

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Background

Prone positioning during spinal deformity surgery has risks of facial and ocular complications as high as 14.6% (Bithal et al., 2020). Pediatric patients may also experience postoperative vision loss (POVL) at rates comparable to adults. We previously reported that 15 pounds of 45° vectored traction using Gardner-Wells tongs minimizes facial contact pressure during long-duration spinal surgery, by lifting the head from the face cushion (Koreckij et al., 2011). However, to our knowledge, there have been no clinical studies that quantify the complication rate and effectiveness of vectored traction with GW tongs during pediatric spinal deformity surgery in the prone position. We hypothesized that the pressure related complication rate for patients with vectored traction with GW tongs is very low and that there may be particular benefit for patients undergoing longer surgical times.

Methods

This was an IRB approved, level 4 analysis of 1000 consecutive patients undergoing pediatric spinal deformity surgery at a single hospital between 2008 and 2023. Operative notes confirmed these surgeries utilized GW tongs with vectored traction. Chart Search function using keywords “abrasion,” “facial,” “sore,” “swelling,” “ulcer,” “cellulitis,” “abscess,” “infection,” and “blindness” were used to identify potential known complications associated with prone posterior spine surgery. Surgical time was recorded for those patients with facial complications and were compared to a random cohort of equal size of those patients without a complication (t-test, $\alpha = 0.05$).

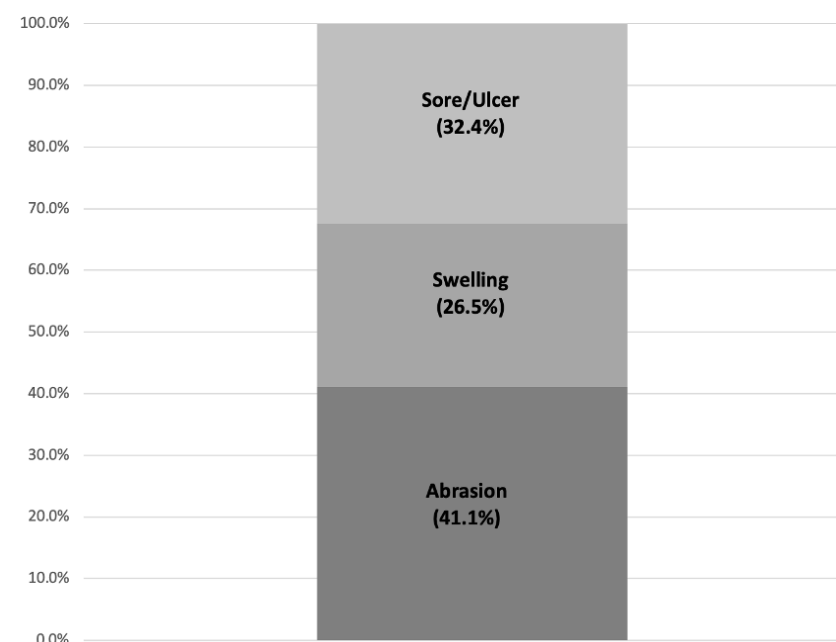
Results

Of the initial cohort reviewed (n = 1,196), 1,000 consecutive operative cases met inclusion criteria. All cases used GW tongs, typically with 15 pounds traction vectored at about 45°. There were 34 (3.4%) cases with pressure related complications: 14 facial abrasions (41.2%), 11 pressure sores/ulcers (32.3%), and 9 instances of postoperative facial swelling (26.5%). There were no cases of POVL. Patients with a pressure complication had a longer mean length of surgery (by 99 minutes) compared to those that did not have a complication (401 vs. 303 minutes; 95% CI: 31.6-165.8; $p < 0.005$).



Figure 2. 45° 15 pounds vectored traction with Gardner-Wells tongs in an adolescent undergoing posterior spine deformity surgery. Smaller children and those younger than age 10 years may only need 10 pounds of traction.

Figure 1. Proportion of GW Tongs Complications, by Type



Conclusions

Use of vectored traction with GW tongs is safe and effective at reducing pressure related complications of prone positioning during long duration pediatric spinal deformity surgery. This technique is associated with an exceptionally low complication rate compared to prone positioning alone that is reported in the literature. We recommend the use of vectored traction with GW tongs, particularly in long duration surgery.

