Ultrasonic Bone Scalpel Does Not Reduce Blood Loss in Adolescent Idiopathic Scoliosis: Randomized Control Trial

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Background

- Inferior facetectomies during posterior spinal fusion (PSF) are often performed with an osteotome.
- The ultrasonic bone scalpel (USBS) can cut bone while preserving soft tissue.
- Its effects on blood loss have not been rigorously evaluated during posterior spinal fusion (PSF).

- **Purpose:** To compare blood loss between the USBS and osteotome in patients with adolescent idiopathic scoliosis (AIS) undergoing PSF.

Methods

- An a priori power analysis determined that 62 subjects were needed to power the study to 90%.
- Patients scheduled to undergo PSF for AIS were consecutively approached for informed consent into the study.
- Subjects were assigned in a 1:1 ratio using a stratified randomization scheme to the USBS or osteotome group.
- Perioperative cell salvage reports were used to collect estimated blood loss values.

Results

- 65/85 (77%) of patients approached for participation in the study consented.
- Of the final 62 patients, 10 (16%) were male and 52 (84%) were female.
  - 9/10 Males Randomized to USBS
  - 22/52 Females Randomized to USBS
- 1 year follow up was obtained for 57/62 patients (92%).
- Blood loss per level fused averaged 39 and 47 mL in the USBS and osteotome groups, respectively (mean difference: USBS – osteotome: -8mL/level, 95% CI: -16.4 to 0.3 mL/level, p = 0.0575).


<table>
<thead>
<tr>
<th>Randomization</th>
<th>Complication Type</th>
<th>Treatment</th>
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</thead>
<tbody>
<tr>
<td>USBS</td>
<td>Implant Failure / Pseudarthrosis</td>
<td>Revision surgery</td>
</tr>
<tr>
<td>USBS</td>
<td>Superficial Infection</td>
<td>I&amp;D</td>
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<tr>
<td>Osteotome</td>
<td>Acetaminophen Overdose</td>
<td>Re-Admission for Care</td>
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<tr>
<td>Osteotome</td>
<td>Seroma</td>
<td>I&amp;D</td>
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<tr>
<td>Osteotome</td>
<td>Lateral Femoral Cutaneous Nerve Dysfunction</td>
<td>Physical Therapy</td>
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<td>Osteotome</td>
<td>Shoulder Pain &gt; 3 Months</td>
<td>Medical Treatment</td>
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<tr>
<td>Osteotome</td>
<td>Distal Junctional Kyphosis</td>
<td>Revision surgery</td>
</tr>
</tbody>
</table>

Conclusions

- There was no clinically significant difference in total blood loss, blood loss per level fused, or complications between the two groups.

Limitations

- Accuracy of blood loss measurements.
- Sex distribution as potential confounder.
- Operative time / EBL were lower than most AIS publications
  - Results may not be reproducible at lower-volume centers.

Grant

- This study was funded with a grant from the Scoliosis Research Society.