Allograft versus Autograft for Posterior Atlantoaxial Fusion with Screw-rod System: A Prospective Comparative Study

Da-Geng Huang, Xin-Liang Zhang, Xiao-Dong Wang, Ding-Jun Hao, Bao-Rong He, Tuan-Jiang Liu, Qi-Ning Wu, Hua Guo

Department of Spine Surgery

Honghui Hospital, Xi’an Jiaotong University Health Science Center
Background

- Autograft bone is used very often in posterior atlantoaxial fusion and has been reported to get excellent fusion rates with modern atlantoaxial fixation constructs.
- However, donor-site morbidity is a problem need to face.
- Some authors have reported using allograft bone instead of autograft bone to avoid donor-site complications in posterior atlantoaxial fusion and getting good results as well.
Background

• However, most of the authors confirmed fusion based on no movement on dynamic radiographs, which is not reliable.

• There is no prospective comparative study to compare the effectiveness of allograft and autograft in atlantoaxial fusion routinely using computed tomography (CT) image yet.
• **Purpose:** To compare the effectiveness of allograft and autograft in atlantoaxial fusion, and to evaluate the feasibility of using allograft for atlantoaxial fusion.

• **Study Design:** A prospective comparative study.

• **Patient Sample:** Forty-one consecutive patients who underwent atlantoaxial fusion in our spine centre.

• **Outcome Measures:** Fusion was determined based on the presence of bridging bone on CT image.
Materials and methods

• Patients: forty-one consecutive patients who needed atlantoaxial fusion.

• Grouping: allograft group, using the mixed material of morcellized allograft and local autograft for fusion; autograft group, using morcellized iliac crest autograft for fusion.

• Fixation: screw-rod system.

• Evaluation: CT and dynamic radiographs.
<table>
<thead>
<tr>
<th></th>
<th>Allograft group</th>
<th>Autograft group</th>
<th>$p$</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of cases</td>
<td>24</td>
<td>17</td>
<td>—</td>
</tr>
<tr>
<td>Mean age (years)</td>
<td>43.6 ± 12.0</td>
<td>41.1 ± 14.1</td>
<td>$p &gt; 0.05$</td>
</tr>
<tr>
<td>Sex (male/female)</td>
<td>14 / 10</td>
<td>10 / 7</td>
<td>$p &gt; 0.05$</td>
</tr>
<tr>
<td>Fusion rate*</td>
<td>8.3%</td>
<td>88.2%</td>
<td>$p &lt; 0.05$</td>
</tr>
<tr>
<td>Stability rate$†$</td>
<td>100%</td>
<td>100%</td>
<td>—</td>
</tr>
<tr>
<td>Perioperative complication rate</td>
<td>4.2%</td>
<td>11.8%</td>
<td>$p &gt; 0.05$</td>
</tr>
<tr>
<td>Blood loss (ml)</td>
<td>170.8 ± 60.6</td>
<td>235.3 ± 46.0</td>
<td>$p &lt; 0.05$</td>
</tr>
<tr>
<td>Operation time (min)</td>
<td>123.3 ± 18.3</td>
<td>142.4 ± 23.6</td>
<td>$p &lt; 0.05$</td>
</tr>
</tbody>
</table>

* Evaluated by CT images.  
† Evaluated by dynamic radiographs.
Imaging results of a 42-year-old male in allograft group.
Imaging results of a 25-year-old male in autograft group.
Conclusions

- Allograft is not reliable for posterior atlantoaxial fusion even with the rigid internal fixation of modern constructs.
- Autograft is still the golden standard for atlantoaxial fusion despite of the donor-site morbidity.
- The confirmation of fusion should be based on the presence of bridging bone on CT image.
Thank you for your attention!
Disclosure

All the authors have nothing to disclose.