A study on d’ Aubingue procedure (Joint Preserving Procedure) for Unilateral Gaint cell tumour of distal femur

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ABSTRACT

To analyse the outcome of pedicle patellar implantation in treating the defect of the knee joint after the excision of unicondylar giant cell tumor of distal femur. The ideal form of treatment for lesions that arise near major joints remains unclear. Although extended curettage with adjuvant and local reconstruction is the standard treatment of uncomplicated giant cell tumors, it carries high recurrence rates in aggressive or recurrent GCT. The geometry of patella has lead to its use for condylar reconstruction following resection for giant cell tumor around knee. 10 patients with unicondylar GCT were treated with resection and reconstruction of the defect using d’ Aubingue procedure our institute and followed up for a mean period of 4.6 years (range from 2.5yrs to 8yrs). After a mean follow up of 4.5 years there was no recurrence and the mean range of flexion was 87° without any instability and pain. All patients are currently free from disease, and none have had metastases. For selected patients with GCT (unicondylar distal femur), d’ Aubingue procedure is the better option because of their age, joint restoration and desired level of activity.

Keywords: Giant cell tumors, d’ Aubingue procedure, unicondylar distal femur, joint preserving procedure.

Introduction:

Giant cell tumor of the bone (GCT) is one of the most common primary bone tumors in young adults (Campanacci et al 1987). Local extensions, regional and systemic tumor implantation and malignant transformation with widespread metastases are among the reported manifestations of these neoplasms that are indicative of their aggressive and unpredictable nature. The ideal form of treatment for lesions that arise near major joints remains unclear. Although extended curettage with adjuvant and local reconstruction is the standard treatment of uncomplicated giant cell tumors, it carries high recurrence rates in aggressive or recurrent GCT. There has been a great deal of development in the surgical management of the aggressive, recurrent or peri-articular giant cell tumor towards limb salvage. In these situations, wide resection of the tumor has been accepted as the standard treatment. But it has always been a challenge to reconstruct the resected gap, especially across joints (Int Orthop 2007).

The options for reconstruction after resection include the use of a custom tumor endoprosthesis, an osteoarticular allograft or an allograft-endoprosthesis composite, or an arthrodesis with intercalary bone grafting.

Endoprosthetic replacement after resection of the tumour provides an early improvement in function (Lewis MM 1986). However, the use of custom-made constrained tumour endoprostheses in this situation is limited by the exorbitant cost and high functional demands of the patients.

Allograft-endoprostheses composites are an alternative to endoprosthetic reconstruction. But the high incidence of complications such as fracture, deformity and infection, makes the outcome unpredictable (Harrington et al 1986).

The ideal reconstruction should have biological affinity, resistance to infection, sufficient biomechanical strength and durability. It is really a great challenging to provide long-lasting survival and function of the limb after reconstruction with biological solutions using living bone, which will be best
and cheaper option. The geometry of patella has lead to its use for condylar reconstruction following resection for giant cell tumor around knee.

**Materials and methods:**

10 patients with unicompartmental GCT were treated with resection and reconstruction of the defect using d’Aubingue procedure our institute and followed up for a mean period of 4.6 years (range from 2.5 yrs to 8 yrs). Average age at presentation was 17.8 years (range 16-22). All patients had plain x-rays, CT scan and MRI to check integrity of articular cartilage. Lateral condyle involvement was found in 4 and medial in 6 patients. Femoral condyle was removed "en bloc" with the tumor. The patella was isolated with a slip of quadriceps attached to its proximal superior-medial pole and rotated to place it horizontally in the zone of resection. Patella with intact Vastus lateralis was fixed in continuity and in level with the rest of the femoral condyle.

Rest of the bone defect between Patella and Femoral shaft where filled with fibula and Iliac bone graft. The patients were allowed non weight-bearing walking using walker support as soon as the pain subsided. Patients were followed up every 6 weeks with radiographs to assess the bone integration and quality of the regenerate. Any complications encountered were identified at the earliest stage and treated aggressively. Post operatively up to 6 weeks the limb was protected with POP slab. Non weight bearing was continued till satisfactory consolidation was seen in X ray and gradually knee bending exercises where commenced.

**Results:**

After a mean follow up of 4.5 years there was no recurrence and the mean range of flexion was 87° without any instability and pain. All patients are currently free from disease, and none have had metastases. Grafts consolidated at a mean of 4.5 months. All joints were fairly stable and no AVN changes reported even with the maximum 8 yrs follow up cases. 70% had movement of more than 90 degrees without pain. 3 patients had excellent outcome with ability to return back to work and ROM of 90 or more. 3 had fair and 4 good outcome with reduced ROM but pain free.

The average delay before NWB walking was 5 days, 3 months before partial weight bearing with a walker and 10 months (range 8.6-10.4) for unaided full weight bearing. The mean period of follow-up for the patients was 4.5 months (range 2.5 - 8 yrs).

There were reoperations for 1 screw back out (implant removal) and 1 wound gapping (needed rotational flap cover). 1 patient had arthritic changes at 5 years follow up. 50% of patient had extensor mechanism problems with the lag of more than 30 degrees occurred.

**Conclusion:**

For selected patients with GCT (unicompartmental distal femur), d’Aubingue procedure is the better option because of their stable, durable, cost effective and predictable reconstruction.

**Reference:**

APPENDIX

Table 1: Patients chart

<table>
<thead>
<tr>
<th>No</th>
<th>Age</th>
<th>Gender</th>
<th>Follow up (yrs)</th>
<th>Extensor lag</th>
<th>ROM complication</th>
<th>Functional outcome</th>
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<tbody>
<tr>
<td>1</td>
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<td>M</td>
<td>2.5</td>
<td>30</td>
<td>10-100</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>18</td>
<td>M</td>
<td>3</td>
<td>40</td>
<td>15-90</td>
<td>Screw back out</td>
</tr>
<tr>
<td>3</td>
<td>22</td>
<td>F</td>
<td>3.5</td>
<td>55</td>
<td>0-70</td>
<td>Infection</td>
</tr>
<tr>
<td>4</td>
<td>17</td>
<td>F</td>
<td>3</td>
<td>30</td>
<td>10-100</td>
<td>0</td>
</tr>
<tr>
<td>5</td>
<td>18</td>
<td>F</td>
<td>4</td>
<td>35</td>
<td>0-90</td>
<td>0</td>
</tr>
<tr>
<td>6</td>
<td>18</td>
<td>F</td>
<td>6</td>
<td>40</td>
<td>0-60</td>
<td>Wound gapping</td>
</tr>
<tr>
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<td>16</td>
<td>M</td>
<td>5</td>
<td>50</td>
<td>5-90</td>
<td>0</td>
</tr>
<tr>
<td>8</td>
<td>20</td>
<td>F</td>
<td>8</td>
<td>30</td>
<td>10-100</td>
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</tr>
<tr>
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<td>17</td>
<td>M</td>
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<tr>
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<td>16</td>
<td>F</td>
<td>5</td>
<td>30</td>
<td>0-80</td>
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</tr>
</tbody>
</table>

Fig 1a: Complete en bloc tumor resection

Fig 1b: Isolated patella with muscle pedicle

Fig 1c: Articular reconstruction using patella

Fig 1d: Fibula shaft graft with screws
Fig 2a: 3months post operative

Fig 2b: 6months post operative

Fig 2c: 6yrs post operative

Fig 2d: 8yrs post operative

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Fig 3a: 8 yrs post op - extension

Fig 3b: 8 yrs post op - 30 degree extensor lag

Fig 3c: 8 yrs post op - flexion 110 degree

Fig 3d: 8 yrs post op - full weight bearing