Cementless total hip arthroplasty using an autograft of the femoral head for marked acetabular dysplasia: case series

T Yamaguchi, M Naito, I Asayama, K Shiramizu
Department of Orthopaedic Surgery, Fukuoka University School of Medicine, Fukuoka, Japan

ABSTRACT

Purpose. To assess the short-term outcome of cementless total hip arthroplasty involving an autograft of the femoral head in Japanese patients.

Methods. Cementless total hip arthroplasty with autogenous bone block grafting was performed on 18 hips in 15 patients with marked acetabular dysplasia. The resected femoral head was used as a graft for the superior-lateral region of the true acetabulum. Clinical outcome was correlated with the placement of the acetabular component, as revealed in radiographs.

Results. The 13 women and 2 men had a mean age of 60.2 years (range, 37.0–73.0 years) at primary surgery and a mean follow-up duration of 3.3 years (range, 2.0–5.3 years). According to the classification of Crowe, 4 hips were in group I, 3 were in group II, one in group III, and 10 in group IV. The mean Harris Hip Score preoperatively was 45.7 (range, 19–69) and that at follow-up was 82.5 (range, 44–100). All 15 cases showed a good clinical outcome. There were no major intra-operative complications in this series. The grafted bones united in all patients. Two patients need surgical revision because the lateral insertion of the acetabular component resulted in loosening of it.

Conclusion. Medial insertion of the acetabular component provides satisfactory short-term outcomes. Lateral insertion of the acetabular component during total hip arthroplasty should be avoided in patients with marked acetabular dysplasia.

Key words: acetabular dysplasia; arthroplasty, bone transplantation; replacement, hip; treatment outcome

INTRODUCTION

Total hip arthroplasty (THA) using a bone autograft is frequently required in the treatment of developmental dysplasia of the hip. In almost all cases, bone is
transplanted at the superior-lateral region of the acetabulum. Some surgeons have recommended the medial insertion of the acetabular component; the true acetabulum is reamed so that the exposed living bone would have a 70% or greater contact area with the acetabular components. In this retrospective study, we assessed the short-term outcome of cementless THA with autogenous bone block grafting in patients with marked acetabular dysplasia. We also investigated the correlation between clinical outcome and the placement of the acetabular component, and examined changes to the grafted bone by studying radiographs.

**METHODS**

Between 1993 and 2000, a total of 60 THA procedures using acetabular bone grafting were performed at the Department of Orthopaedic Surgery, Fukuoka University School of Medicine among 55 patients with dysplasia of the hip. In all, we performed bone block grafting in 18 joints of 15 patients—2 men and 13 women, whose mean age at surgery was 60.2 years (range, 37.0–73.0 years). According to the classification system of Crowe et al., 4 hips were in group I (hips have <50% subluxation), 3 hips were in group II (hips have 50%–75% subluxation), one hip was in group III (hips have 75%–100% subluxation), and 10 hips were in group IV (hips have >100% subluxation).

Taking a posterolateral approach, we used the resected femoral head as a graft for the superior-lateral region of the true acetabulum. The autograft was fixed using 2 or 3 screws. Before inserting the acetabular component, we reamed the true acetabulum so that the exposed living bone would have a 70% or greater contact area with the acetabular component. Each procedure was performed by the same surgeon.

The patients were followed up for a mean duration of 3.3 years (range, 2.0–5.3 years). Clinical results were assessed in terms of the Harris Hip Score (HHS). We also used standard anteroposterior hip radiographs

<table>
<thead>
<tr>
<th>Crowe group</th>
<th>No. of hips</th>
<th>Preoperative</th>
<th>Final follow-up</th>
</tr>
</thead>
<tbody>
<tr>
<td>I</td>
<td>4</td>
<td>49.5 (37-69)</td>
<td>82.2 (47-100)</td>
</tr>
<tr>
<td>II</td>
<td>3</td>
<td>53.0 (44-62)</td>
<td>83.0 (78-88)</td>
</tr>
<tr>
<td>III</td>
<td>1</td>
<td>33.0</td>
<td>84.0</td>
</tr>
<tr>
<td>IV</td>
<td>10</td>
<td>47.6 (19-58)</td>
<td>81.0 (44-95)</td>
</tr>
</tbody>
</table>

**Figure 1** Course of treatment of a 65-year-old woman: (a) preoperative radiograph, the hip was classified as group IV; (b) postoperative radiograph; and (c) final follow-up radiograph.
Figure 2  Course of treatment of a 52-year-old woman: (a) preoperative radiograph; the patient had undergone a shelf plasty; (b) after primary total hip arthroplasty, lateral insertion of the acetabular component resulted in loosening of the acetabular component; (c) the acetabular component was placed using the medial protrusio technique; and (d) final follow-up radiograph.
to investigate the presence or absence of fusion of the grafted bone, loosening of the acetabular component, loosening of the stem, and the distance from the Kohler line to the cup.

RESULTS

The mean preoperative HHS was 45.7 (range, 19–69) and that at follow-up was 82.5 (range, 44–100) [Table]. All 15 patients showed a good clinical outcome. There were no major intra-operative complications in this series. Examination of X-rays revealed that the mean distance from the Kohler line to the medial margin of the acetabular component was 6.1 mm. The grafted bones united in all patients. There were no cases of a loosened acetabular component or stem.

The HHS increased postoperatively by less than 20 points in only one patient—a 65-year-old woman whose preoperative HHS was 27, and whose hip was classified as group IV. She had had cardiac infarction, showed a limited range of motion (ranges of motion of the right and left hips were 20° and 15° of flexion, 10° and 5° of internal and external rotation), had difficulty functioning in daily life, and used a wheel chair. At 20 months after surgery, she was able to walk using a T-cane. Her postoperative HHS, although improved for daily living activities, was 44 (Fig. 1).

Two patients required surgical revision. One patient, a 52-year-old woman at the time of primary THA, had undergone a shelf plasty at the age of 16 years because of infection of the left hip joint. Her preoperative HHS was 19 and her hip was classified as group IV. The patient was in severe pain preoperatively and unable to walk. After the primary THA, lateral insertion of the acetabular component resulted in loosening of the acetabular component. Following the THA revision, the HHS for pain increased markedly to 67 (Fig. 2). The second patient also needed acetabular revision for loosening due to the lateral insertion of the acetabular component. In both patients, lateral insertion of the acetabular component (of 8 and 15 mm) from the Kohler line had resulted in loosening of the cup.

An example of a patient with very satisfactory
clinical outcome was a 55-year-old woman whose hip was classified as group IV. Preoperatively, she experienced pain when walking and had an HHS of 55. The acetabular component was placed using the medial protrusio technique recommended by Hess and Umber. The HHS increased to 88 postoperatively and, accordingly, the patient experienced a reduction in pain (Fig. 3).

DISCUSSION

In this study, we regarded a satisfactory postoperative result from THA as one in which the acetabular component was inserted near the Kohler line. We aimed to surgically alter the contact area to 30% or less between the grafted bone and the surface of the acetabular component. Our findings indicate that the medial insertion of the acetabular component allows for such positioning and provides satisfactory short-term outcomes. Iida et al. reported that the lateral placement of the acetabular component is one of the risk factors for loosening. In our series, 2 patients required revision because of lateral insertion of the acetabular component.

Bobak et al. found that changes in the graft-host interface were progressive up to a mean of 3 years 7 months, which suggested that 4 years is probably the minimum time needed to determine the outcome of autograft fixation. Although the mean follow-up duration was 3.3 years in our series, we intend to continue the follow-up of the patients.

In conclusion, lateral insertion of the acetabular component in THA should be avoided in patients with marked acetabular dysplasia.

REFERENCES