Original article

Wroblewski wedge augmentation for recurrent posterior dislocation of the Charnley total hip replacement

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We analysed 68 cases of acetabular augmentation using the Wroblewski wedge for recurrent posterior dislocation of Charnley total hip replacements inserted through a posterior approach. The follow-up was done by postal questionnaire in living patients or by thorough search of case notes in the dead. All hips were followed up either until death or a minimum of 2 years. The average follow-up for the surviving successful group was 35.3 months. Out of 68 hips, 52 (76 %) had no further dislocation at a mean follow-up of 35.3 months (range, 24–95 months). An additional 4 hips became stable after one closed reduction for a re-dislocation. After a second augmentation, 5 more hips were stabilised. Wroblewski wedge augmentation is a simple and effective procedure and should be considered before embarking on major revisions in recurrent posterior dislocations in the elderly with no obvious cause for instability.

Key words: Hip replacement – Dislocation – Acetabular wedge augmentation

Recurrent dislocation following total hip replacement (THR) remains a major, but infrequent, complication. The incidence varies in the literature between 0.5% and 9%.¹ The incidence is greater in hips that have had previous surgery.² Various treatment methods have been described including: revision hip arthroplasty (cup or total revision); constrained acetabular cup arthroplasty; acetabular augmentation; trochanteric re-attachment or advancement; lengthening of femoral neck; removal of any impingement; long-term bracing; capsulorrhaphy; excision arthroplasty; and fascia lata plasty.^{3–7} Olerud and Karlson⁸ first described acetabular cup re-inforcement by fixing an additional section of the cup in 6 patients.

The purpose of this study was to assess the efficacy of this particular design (Wroblewski acetabular stabilizing wedge; De Puy, UK) in treating recurrent posterior dislocation of the 22 mm Charnley prosthesis inserted through a posterior approach.

Patients and Methods

A total of 69 unstable hips in 69 patients were treated with a Wroblewski wedge acetabular augmentation device between 1990 and 1996 for the treatment of posterior dislocation of Charnley total hip prosthesis that was inserted through a posterior approach. Only one case was lost to follow-up as the patient emigrated. Thus, 68 cases were followed up for a minimum of 2 years or until death.

There were 54 women and 14 men. The involved side was right in 29 cases and left in 39 cases. The average age at the time of this stabilizing operation was 79 years (range, 74–86 years). Surgeons with variable experience performed the procedures. The indication for the original arthroplasty was 53 primary total hip replacements (49 osteo-arthritis, 1 rheumatoid arthritis, 2 fracture to neck of femur, 1 post-acetabular fracture arthritis) and 15 revision arthroplasties (7 conversion of Austin Moore to THR, 6

Table 1 Hips with identified risk factors for dislocation

No.	Notes
15	Revision arthroplasty
2	Previous surgeries in the hip
5	Severe dementia
4	Postoperative (arthroplasty) strokes leaving the hip with weak muscles
3	Dislocation presenting with severe medical illness and died within 3 months
5	Impingement noted at the time of exploration (2 osteophytes, 1 cement extrusion, 1 neck impinging on the anterior rim, 1 torn flange of the Ogee cup posteriorly)
1	Greater trochanter fracture fibrous union
5	Cups were observed as 'not anteverted enough'
1	Femur prosthesis was found to be in mild retroversion

revision THR for aseptic loosening, 2 revision THR for recurrent dislocation) as summarized in Table 1.

Out of the 53 primary arthroplasties, 2 hips were replaced originally elsewhere and in 7 cases it was not recorded in the case notes where the original arthroplasty was performed. This region has a large population of the elderly people. Between 1989 and 1995, about 4700 hip arthroplasties were performed in the local hospitals. The average number of

documented dislocations in the available case notes, prior to the augmentation surgery, was 4 (range, 1–12). There were 5 cases with a recorded history suggestive of bothersome subluxations in addition to the dislocation. No hip received surgery for subluxation alone. This augmentation procedure was performed after a satisfactory trial of non-operative treatment including closed reduction and bracing.

The first dislocation occurred within 6 months after the initial arthroplasty in 36 hips, between 6 months and 2 years in 12 hips, and more than 2 years in 20 hips. The average time to first dislocation was 25 months. On average, the stabilization procedure was done 42 months after the THR. Of these, 34 hips were stabilised within 6 months of the first dislocation, 18 hips between 6 months and 2 years, and 16 hips more than 2 years.

The surgical approach was through part of the previous posterior approach. Only three of the cups were noted to have posterior rim damage. The wedge was positioned over the sector where the head was dislocating and fixed with screws either supplied with the wedge (28 cases) or AO 4.5 mm cortical screws (34 cases); 6 cases were not recorded. In fixing, 64 cases had two screws, 3 cases had three screws and 1 wedge was fixed with four screws. The hip was put through normal range of movement and, if necessary, the wedge was sculptured to avoid any impingement. Generally,

Figure 1 Flow chart showing a summary of the results.

Figure 2 Photograph of a broken wedge and a bent screw, probably due to impingement, removed at the time of exploration. This hip became stable after a second augmentation procedure.

the patients were mobilized and full-weight bearing after 48 h. However, 12 cases had a knee splint during mobilization to prevent excessive hip flexion.

Follow-up was done by clinical notes, radiographs and a postal questionnaire for pain, instability, and walking ability. Eighteen patients (26%) were dead at the time of final follow-up. The average time between the surgery and death was 20.3 months. The average follow-up for the surviving successful group was 35.3 months (range, 2.4–95 months).

Five patients with painful hips were recalled for follow-up after the wedge augmentation. There was no evidence of any loosening. One of the X-rays showed a broken screw, but with no objective or subjective instability.

Results

Of the total 68 hips, 52 (76%) remained stable without any further episode of dislocation either at the time of final follow-up or until death (Fig. 1). One of the hips in this group was revised for aseptic loosening, 5.5 years after THR and 4 years after augmentation surgery. Interestingly, one lady had severe pain in the stabilised hip the day after she had total knee arthroplasty on the same side. X-ray revealed a bent screw. The hip was found to be unstable on EUA and re-augmentation was done after removing the bent screw and the broken wedge (Fig. 2). The hip has been asymptomatic at the final follow-up (37 months).

The re-dislocation rate was 23.5% (16 hips) after the augmentation procedures (Fig. 3). Re-dislocation occurred at an average of 11 months after the wedging surgery. Only one

hip dislocated after 17 months. Two hips dislocated after a severe fall. There were 3 hips with broken screws and 2 hips with broken wedges at the screw holes. Four hips became stable (follow-up 39 months) themselves after requiring closed manipulation for one episode. Seven hips underwent a second augmentation procedure out of which 5 became stable without any further dislocation (follow-up 21 months). Two hips presented as chronic dislocation in demented non-ambulatory patients and were accepted as such. Two hips were managed with excision arthroplasty for recurrent instability. One hip had a revision arthroplasty and became stable. The results are summarized in the flow chart (Fig. 1).

The total complication rate was 11.6% (8 patients) and 3 cases were complicated by chronic deep infection after the augmentation operation. One lady was on very high dose of oral steroid therapy. All these procedures were done in trauma theatres with no laminar flow system. Of these cases, one had excision arthroplasty and one was left with chronic sinus. The third patient died 4 months later.

Two hips had established infection even before the augmentation operation and they continued to be infected resulting in excision arthroplasty in one, the other patient died 6 months later with a stable hip. Two cases had superficial infection which settled with oral antibiotics. One patient had foot drop, which recovered completely in 4 weeks.

Figure 3 X-ray of a failed augmentation.

Time from wedging to failure in 68 elderly hip patients

Figure 4 Kaplan-Meier method graph to show the survival of the prosthesis after the augmentation procedure.

Statistical analysis

The Chi-squared test and Cox regression analysis were used for analysing the various possible factors that would have influenced the outcome. The Kaplan-Meier method was used to represent prosthesis survival in a graphical pattern (Fig. 4).

Discussion

Recurrent dislocation of total hip replacement is a difficult problem. The patient's life-style may be severely restricted due to the insecurity associated with hip instability. Various authors have observed that, in the majority of cases, it is multifactorial. Revision arthroplasty is a major undertaking with a higher rate of complications than the index arthroplasty.

Several authors reported a significant failure rate of augmentation procedure in a small series of patients.⁹⁻¹¹ In 1989, Watson *et al.*¹² published a preliminary report of an improved design by using a 5 hole, pre-drilled, polyethylene piece with a stainless steel backing plate and modular design for LPW cups. Their results have not been published to our knowledge. Recently, Nicholl *et al.*¹³ reported a success rate of 23 cases of 28 unstable hip arthroplasties treated with acetabular augmentation. Wroblewski¹⁴ described a stabiliser to the Charnley cup rim as a separate attachment to the standard socket and the method of fixation with two screws. Daly *et al.*,¹⁵ from the Mayo Clinic, highlighted the importance and difficulty of precise determination of the cause of instability and reported that complete stability could only be

achieved in 61% of cases with various surgical procedures including revisions in more than 70 cases. Pierchon *et al.*¹⁶ reviewed 38 THRs and found muscular imbalance rather than mal-position of the components was the major factor determining dislocation.

Recently, Goetz *et al.*⁷ reported 4% failure in 101 cases of constrained acetabular components inserted for various indications. Using similar implants, Anderson *et al.*¹⁷ reported only 71% success rate in preventing instability.

In our series, we have shown that this relatively simple procedure is effective in 52 out of the 68 cases (76%) in the first instance. This improved to 86% if we define the success as stable hips with the original hip prosthesis at the final follow-up (Fig. 4). These results are comparable to other series in which revision arthroplasty was the main line management.

Mal-orientation of the hip prosthesis and muscle weakness due to ageing may be two of the causes of early and late dislocation after THR. The theoretical risk of cup loosening secondary to impingement against the wedge is difficult to establish without much longer follow-up. Considering the average age of the patient at the time of this operation is 79 years, it may not be a major issue even if there is a small increased risk of loosening.

One can not over-emphasize the importance of taking care to avoid any instability of the components at the time of surgery. When faced with an unstable hip arthroplasty, a thorough search should be made to detect any cause. Educating the patient is an important part of the management after the first dislocation. When surgical treatment is indicated, the hip should be explored to detect any impingement, cup damage, excessive wear of the polyethylene or any loosening. If there is no definite indication for revising the components, we recommend that acetabular augmentation is the procedure of choice in the elderly age group. A mild mal-orientation of the components may be well stabilised by this procedure. This surgery should be done as an elective procedure by an experienced surgeon.

Conclusions

Acetabular augmentation is very useful for dealing with recurrent posterior dislocation of the 22 mm Charnley hip prosthesis in elderly patients. We recommend that it should be considered when no definite indication for revision arthroplasty is detected in this group of unstable hips.

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