Recurrent hip arthroplasty dislocation

Good outcome after cup augmentation in 20 patients followed for 2 years

A Philip Charlwood, Neville W Thompson, Neill S Thompson, David E Beverland and James R Nixon

Orthopaedic Outcomes Unit, Musgrave Park Hospital, Stockman's Lane, Belfast BT9 7JB, Northern Ireland.
neville.thompson@greenpark.n-i.nhs.uk
Submitted 01-10-23. Accepted 02-02-16

ABSTRACT – Recurrent posterior dislocation occurs after primary total hip arthroplasty at rates of up to 7%. Component revision is regarded as standard management, but this major surgery may be unsuitable for elderly patients. We have developed a congruent polyethylene acetabular posterior lip augmentation device (PLAD) with a stainless steel backing plate. This can be used when there is no gross malalignment, wear or loosening of the primary components.

We retrospectively compared 20 patients who had revision surgery with twenty patients who had been treated with the PLAD for recurrent posterior dislocation after primary Charnley total hip arthroplasty.

In the PLAD group, the mean operative time, intraoperative blood loss, time spent in the high-dependency unit (HDU), transfusion requirements and the duration of hospital stay were all less than that in the revision group. There was no difference in the Oxford Hip Score between the groups at latest review 2 years after surgery. None of the patients in either group had suffered another dislocation.

The reported incidence of recurrent dislocation after hip arthroplasty ranges from 0.8% to 7% (Yuan and Shih 1999). However, this incidence increases dramatically after revision arthroplasty and can be as high as 26% after multiple revision procedures (Grigoris et al. 1994). Numerous stabilizing techniques have been described, but none has shown uniform success (Goetz et al. 1998).

Component revision is often regarded as the best method. However, revision arthroplasty is technically challenging and not without complication. Furthermore, many of the patients are elderly with substantial co-morbidity and are thus unsuitable for extensive revision procedures.

We have developed a posterior lip augmentation device (PLAD) to provide a simple alternative. This consists of an ultra-high molecular weight polyethylene-bearing piece and a stainless steel backing plate, both of which are predrilled to accept 5 screws (Figure 1). The inner curvature of the polyethylene-bearing piece and the backing plate are also contoured to provide a congruent articulation with the head of the femoral prosthesis. A 22.225 mm, a 26 mm and a 28 mm device are available for use with the corresponding femoral head sizes.

In this study, we compared the perioperative parameters and clinical outcome for revision arthroplasty and cup augmentation.

Figure 1. The posterior lip augmentation device (PLAD).

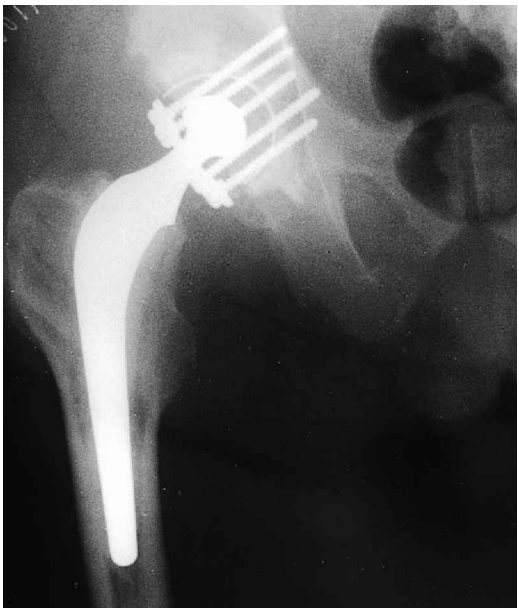

Figure 2. A posterior lip augmentation device on the right side.

Patients and methods

In our unit, the posterior approach is usually used during primary total hip arthroplasty. When inserting the PLAD, the previous posterior approach is reexplored to expose the prosthetic components. If there is no gross malalignment, wear or evidence of loosening, the device is sited to form a congruent addition to the posterior wall. The cup, cement and bony pelvis are then drilled to accept 5 cortical screws (Figure 2). Stability of the femoral head is determined and, if satisfactory, the wound is closed. All patients are mobilized on the day following surgery and allowed full weight bearing with the aid of crutches or a walking frame.

We retrospectively reviewed the charts and radiographs of 40 patients treated in our unit for recurrent posterior dislocation following primary Charnley total hip replacement. In all cases a posterior approach had been used at the time of primary surgery.

20 patients (17 women) of average age 77 (53–90) years had had a revision of both components for recurrent posterior dislocation. The other 20 patients (16 women), average age 75 (54–89) years, had been treated with a PLAD (DePuy, Leeds). The average number of dislocations in both the revision and PLAD groups was 3 (2–4 in the revision group; 2–6 in the PLAD group). The decision to revise the components or insert a PLAD was based on preoperative radiographic assessment and intraoperative evaluation of the components by the operating surgeon. A PLAD was inserted only when the components were considered in a satisfactory position.

All patients had been clinically and radiologically assessed at 6 weeks, 6 months, 1 and 2 years after surgery. The Oxford Hip Score questionnaire (Dawson et al. 1996) was used to evaluate the patient's functional outcome and was recorded preoperatively and at each review.

We used the Mann-Whitney test to compare each individual parameter in the two groups.

Results

Duration of surgery, intraoperative blood loss, number of blood transfusion units, duration of stay in the high-dependency unit and hospital stay were less in the PLAD group (Table).

Early complications were similar in both groups. 2 patients in each group developed a lower respira-

Treatment data, mean (range)

	PLAD	Revision
Duration of surgery (min)	59 (45–80)	171 (90–240)
Intraoperative blood loss (L)	0.3 (0.15–0.6)	1.8 (0.8–3.5)
Blood transfusion (unit)	0.7 (0–2)	4 (2–7)
Stay in high-dependency unit (h)	15 (0–24)	22 (14–48)
Hospital stay (day)	7 (5–8)	11 (7–19)

$p < 0.0001$ for all comparisons

tory tract infection and 1 patient in each group had a deep venous thrombosis. 2 patients in the revision group developed minor wound complications (hematoma, superficial infection) and 1 patient suffered a myocardial infarct. This patient had a previous history of ischemic heart disease and was considered a high risk patient. The complications were treated successfully and a satisfactory outcome was achieved in all cases.

The Oxford Hip Score (best 12, worst 60) was essentially the same at all stages in each group. In the PLAD group, the mean scores before surgery, at 6 weeks, 6 months, 1 year and 2 years were 30, 21, 22, 24 and 24, respectively. In the revision group, corresponding scores were 31, 20, 20, 22 and 24 points.

At 2 years after surgery, no further dislocations had occurred in either group. Radiographic examination showed no evidence of component loosening or failure in either group.

Discussion

Many risk factors have been proposed as causing recurrent dislocation, such as femoral component head size, component malorientation, impingement, surgical approach, age, sex, neuromuscular dysfunction, postoperative confusion and a history of alcohol abuse (Turner 1994, Paterno et al. 1997, Hedlundh et al. 1999, Nicholl et al. 1999, Woolson and Rahimtoola 1999). Furthermore, revision arthroplasty for recurrent dislocation is also associated with a high incidence of subsequent dislocation (Fraser and Wroblewski 1981, Woo and Morrey 1982).

Ideally, if the cause of the recurrent dislocation is apparent, this should be treated, but if no such cause is detected, one option is to augment the acetabulum. Acetabular augmentation was first described by Olerud and Karlström (1985) who used a wedge cut from another acetabular component to augment the existing socket. The reported success of the procedure varies and most series have included only a few patients (Gungor and Hallin 1990, Bradbury and Mulligan 1994, Nicholl et al. 1999).

The PLAD differs from previous augments since it is a bimodular device and the inner curvature of both components is machine-contoured (Figure 1). The metal backing plate gives mechanical strength and stability while the contoured inner curve forms a congruent articulation with the femoral head. The main disadvantage of this device is that it cannot be used to augment metal-backed cementless acetabular components.

Problems reported with acetabular augmentation include dislocation due to neck impingement on the added segment (Gie et al. 1989) and screw breakage (Williamson et al. 1989). We feel that these complications can be minimized by correct placement of the PLAD to avert femoral neck impingement on the augment and by using 5 cortical screws. Although none of our patients in this study has had any more episodes of dislocation or shown metal failure up till now, we have found a few cases of further dislocation and screw breakage. However, we have had no cases of acetabular loosening associated with PLAD insertion even in those patients with broken screws.

We found that the insertion of a PLAD, as compared to revision arthroplasty, is associated with a reduced operating time, lower intraoperative blood loss, reduced transfusion requirements, a shorter time spent in high-dependency care and a reduction in the overall length of hospital stay. These findings are not surprising.

We conclude that the PLAD is an alternative solution. During the past 2 years since surgery, none of the patients in the PLAD group has sustained another dislocation and they have had a functional outcome similar to that of patients who had revision surgery. However, the follow-up time was short.

No funds have been received to support this study.

Bradbury N, Mulligan G F. Acetabular augmentation for dislocation of the prosthetic hip. A 3 (1-6)-year follow-up of 16 patients. Acta Orthop Scand 1994; 65 (4): 424-5.

Dawson J, Fitzpatrick R, Murray D, Carr A. The problems of 'noise' in monitoring patient-based outcomes: generic, disease-specific and site-specific instruments for total hip replacement. J Health Serv Res Policy 1996; 1 (4): 224-31.

Fraser G A, Wroblewski B M. Revision of the Charnley low-friction arthroplasty for recurrent or irreducible dislocation. J Bone Joint Surg (Br) 1981; 63 (4): 552-5.

Gie G A, Scott T D, Ling R S. Cup augmentation for recurrent hip replacement dislocation. J Bone Joint Surg (Br) 1989; 71: 338.

Goetz D D, Capello W N, Callaghan J J, Brown T D, Johnston R C. Salvage of a recurrently dislocating total hip prosthesis with the use of a constrained acetabular component. J Bone Joint Surg (Am) 1998; 80 (4): 502-9.

Grigoris P, Grecula M J, Amstutz H C. Tripolar hip replacement for recurrent prosthetic dislocation. Clin Orthop 1994; 304: 148-55.

Gungor T, Hallin G. Cup re-enforcement for recurrent dislocation after hip replacement. J Bone Joint Surg (Br) 1990; 72 (3): 525.

Hedlundh U, Karlsson M, Ringsberg K, Besjakov J, Fredin H. Muscular and neurologic function in patients with recurrent dislocation after total hip arthroplasty. J Arthroplasty 1999; 14 (3): 319-25.

Nicholl J E, Koka S R, Bintcliffe I W L, Addison A K. Acetabular augmentation for the treatment of unstable total hip arthroplasties. Ann R Coll Surg Engl 1999; 81 (2): 127-32.

Olerud S, Karlström G. Recurrent dislocation after total hip replacement. Treatment by fixing an additional sector to the acetabular component. J Bone Joint Surg (Br) 1985; 67 (3): 402-5.

Paterno S A, Lachiewicz P F, Kelley S S. The influence of patient-related factors and the position of the acetabular component on the rate of dislocation after total hip replacement. J Bone Joint Surg (Am) 1997; 79 (8): 1202-10.

Turner R S. Postoperative total hip prosthetic femoral head dislocations. Incidence, aetiologic factors and management. Clin Orthop 1994; 301: 196-204.

Williamson J B, Galasko C S B, Rowley D I. Failure of acetabular augmentation for recurrent dislocation after hip arthroplasty. Report of 3 cases. Acta Orthop Scand 1989; 60 (6): 676-7.

Woo R Y, Morrey B F. Dislocations after total hip arthoplasty. J Bone Joint Surg (Am) 1982; 64(9): 1295-306.

Woolson S T, Rahimtoola Z A. Risk factors for dislocation during the first three months after primary total hip replacement. J Arthroplasty 1999; 14 (6): 662-8.

Yuan L J, Shih C H. Dislocation after total hip arthroplasty. Arch Orthop Trauma Surg 1999; 119 (5-6): 263-6.