Original Article

Experience of the posterior lip augmentation device in a regional hip arthroplasty unit as a treatment for recurrent dislocation

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ABSTRACT

Introduction: Dislocation after total hip arthroplasty (THA) remains a significant complication of the procedure and is the third leading cause for revision THA. One technique for treatment of this complication is the use of the posterior lip augmentation device (PLAD). We describe our experience using the PLAD including complication rates.

Methods: A retrospective review of 55 PLADs (54 patients) was carried out following identification from electronic theatre records. Basic patient demographics, operative records and radiographs were collected and reviewed and data was analysed using Microsoft Excel. Failure of the PLAD was defined as further operative intervention after PLAD insertion and included: dislocation, implant breakage, infection and revision of the THA for loosening of either component.

Results: 55 PLADs were implanted in 54 patients with an average age of 77 years. There was a significant preponderance of females and a variety of surgical approaches had been used for the original hip replacement, including trochanteric osteotomy, posterior and antero-lateral. 9 (16%) patients had recurrent dislocations, 1 (2%) failed secondary to screw breakage, 3 (5%) had and infection requiring intervention and 2 (4%) underwent further revision for aseptic loosening of the femoral component. The overall failure rate was 25% with 14 patients requiring intervention post PLAD.

Conclusion: Our results are inferior to other published results and indicate that the PLAD should be used with caution for recurrent dislocations of the Charnley hip replacement.

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1. Introduction

Dislocation after total hip arthroplasty (THA) remains a significant complication of the procedure. The reported incidence ranges from 0.3% to 10%^{1–3} and is the third leading cause for revision THA.⁴ One of the most common arthroplasties performed in the North West of England in the past 20 years is the Charnley monoblock hip replacement stem with 22 mm polyethylene socket. Late dislocation is associated with wear of the polyethylene socket⁵ and a proposed technique for treatment of this complication is the use of the posterior lip augmentation device (PLAD) (DePuy, Leeds, England)^{6,7} [Fig. 1 and 2] to provide additional constraint in the area of wear. Previous studies have quoted re-dislocation rates ranging from 1.6%⁷ to 10%⁸. We describe our own experience of using the PLAD to treat late posterior dislocation of THA.

2. Method

Consecutive case series from 16/01/2007 to 19/11/2012. Data was collected retrospectively using Bluespир (Bluespир International, Worcester, UK), Quadramed (Quadramed Corporation, Virginia, USA) electronic patient record systems, and Centricity Picture Archiving and Communications System (PACS) (GE Healthcare, Buckinghamshire, UK) with retrieval of the archived patient records where necessary. Data collected included basic patient demographics, indication for PLAD procedure, date of PLAD procedure, peri-operative length of stay for PLAD procedure, complications including recurrent dislocation, deep infection, implant failure, length of stay if admitted for complications and revision for any reason. Images were reviewed by the senior author to establish:

- Polyethylene wear as confirmed by the presence of eccentric shift of the head within the socket
- Presence and integrity of trochanteric wires
- Trochanteric union and displacement of non-united trochanter

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Fig. 1. A PLAD device in situ¹⁴.

Fig. 2. A diagram demonstrating the PLAD device¹⁵.

Operation notes were reviewed for documented evidence of polyethylene wear not visible on radiograph.

Data was analysed using Excel (Microsoft).

3. Results

54 patients with 55 PLADs were identified and basic patient demographics are demonstrated in Table 1.

The median length of stay for the initial PLAD surgery was 10 days (3 Days to 94 days), which may indicate the overall frailty of this patient group. Our overall failure rate was 25% ($n = 14$), with failure defined as patients requiring a further procedure following PLAD (Table 2).

Modes of failure included:

- Dislocation requiring MUA or open reduction
- PLAD screw breakage
- Subsequent aseptic loosening of the femur requiring revision arthroplasty.
- Infection requiring further surgical intervention

Table 3 shows all modes of failure observed following PLAD.

There were 3 cases of deep infection, one of these was in the recurrent dislocation group. Of the other 2, one was treated with a girdlestone excision arthroplasty and the other was treated satisfactorily with debridement and retention of the components,

26 of the 55 THA had been originally inserted via trochanteric osteotomy. 17 (65%) of these had broken on pre-operative radiographs prior to PLAD. 3 were not displaced and the remaining 14 had displaced by a mean of 28 mm (12mm–46 mm).

Polyethylene wear was identified on 35 pre-operative radiographs and documented as macroscopically present on 11 operation notes. In total polyethylene wear was present on either the operation note or radiographs in 75% (41) cases. Trochanteric osteotomy, degree of trochanteric displacement and polyethylene wear were all independently analysed with chi squared testing and did not show any statistically significant relation between these factors and either PLAD failure or dislocation rate.

4. Discussion

Recurrent dislocation following total hip arthroplasty is often multifactorial in its aetiology and not associated with easily identifiable causes. Various factors are known to contribute to recurrent instability including polyethylene wear, femoral head size, poorly orientated components, impingement, surgical approach, age, gender, neuromuscular dysfunction and post-operative confusion^{9–11}. Revision hip arthroplasty is a major undertaking in an often frail patient population and can be associated with reported dislocation rates of 5.1% to 14.4%¹² and up to 28%³.

Over a 5 year period we elected to augment the acetabular component with the PLAD in an effort to prevent further dislocations. Our rate of re-dislocation following this procedure was 16%, considerably higher than previous rates reported using this device. Gholve et al. demonstrated a dislocation rate of 10% following implantation of PLAD, but this study included only small numbers of patients⁸. No group has managed to replicate the results of the designing unit; In 2007 McConway et al. reported on 310 posterior lip augmentation devices in 307 patients. They had a 1.6% further dislocation rate and 1.3% revision rate following failed PLADs⁷. This could be due to differences in patient population and differences in surgical approach used for the primary arthroplasty. In our group of patients a variety of approaches had been used including posterior, Hardinge and trochanteric osteotomy compared with only posterior approach in McConways group. 26 of our 55 patients underwent trochanteric osteotomy at their primary surgery and of these 19 had broken trochanteric wires and un-united trochanters resulting in possible abductor deficiency.

Further concerns exist regarding the PLAD including associations with CAM impingements, increased mechanical stresses on

Table 1
Demographics of patients.

No. of patients	54
Age (mean)	77 years
Sex ratio	43f:11 m
Surgical Approach for primary surgery	26 trochanteric osteotomy 29 posterior/antero-lateral

Table 2
Failure rate following implantation of PLAD.

Complication	% of patients (number.)
Dislocation	16% [9]
Screw breakage	2% [1]
Loosening of femoral component requiring revision	4% [2]
Infections requiring washout	5% [3]
Requiring further procedure	25% [14]

Table 3

shows the number of patients readmitted for complications post PLAD.

No.					Key
41	PLAD				Initial Admission
1	PLAD	MUA	GIRDLESTONE		Readmission 1
2	PLAD	MUA			Readmission 2
2	PLAD	THR revision for loosening of stem			Readmission 3
1	PLAD	PLAD Revision (screw breakage)			
1	PLAD	Washout due to infection			
1	PLAD	MUA	Acetabular revision		
1	PLAD	MUA	PLAD revision		
1	PLAD	Washout due to infection	Sinus lay open	THR revision	
1	PLAD	open reduction	Acetabular revision		
1	PLAD	open reduction	open reduction		
1	PLAD	Washout due to infection	MUA	open reduction	washout due to infection
1	PLAD	MUA	MUA	MUA	GIRDLESTONE

the cup¹³ and weakening of the polyethylene by screw trajectories. The PLAD can only be used in cups without metal backing⁷.

Limitations of our study include its retrospective nature. In the majority of cases we were unable to access primary operation notes and therefore were unable to explicitly identify original surgical approach beyond trochanteric osteotomy vs either posterior or antero-lateral based on radiographs. We also only have data on complications that occurred at our hospital, meaning we may be underestimating our complication and recurrent dislocation rates.

5. Conclusion

Given our high levels of dislocation following PLAD insertion we would not recommend the use of this device. In our unit we have stopped implanting the PLAD and in this group of patients with a well fixed charnley monoblock and late dislocation we have changed to using a dual mobility acetabular component with a 22 mm inner diameter, either by in-cement revision or complete revision if there are concerns regarding the cement mantle. We suggest further research comparing complication rates following implantation of a dual mobility cup with those following insertion of PLAD ideally in the form of a prospective randomised study.

Conflict of interest

None.

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