Penetration Of The Head Of A Femoral Prosthesis Through The Metal Shell Of A Harris-Galante Type-I Acetabular Component: An Unusual Complication

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Citation

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Abstract

CASE HISTORY

A 33-year old male underwent bilateral total hip replacements for ankylosing spondylitis at a hospital in Pakistan. The right hip arthroplasty was carried out in 1995 and the left in 1996. Porous coated uncemented Harris-Galante Type –1 acetabular and femoral prostheses were used. The right hip dislocated on the 3rd post-operative day and the polyethylene liner was replaced. The patient made an uneventful recovery thereafter. The left hip arthroplasty was uncomplicated. The patient moved to the UK in the 1999.

5-years following the right hip primary arthroplasty, the patient presented with increasing pain in the right hip and inability to weight bear. The pain had gradually increased over a period of 2-3 weeks and affected his mobility. Clinical examination revealed a shortened and stiff right leg with no hip movement at all. A plain radiograph of the right hip [fig.1] showed protrusion of the femoral head from the acetabular shell associated with periprosthetic osteolysis and implant loosening.

Figure 1

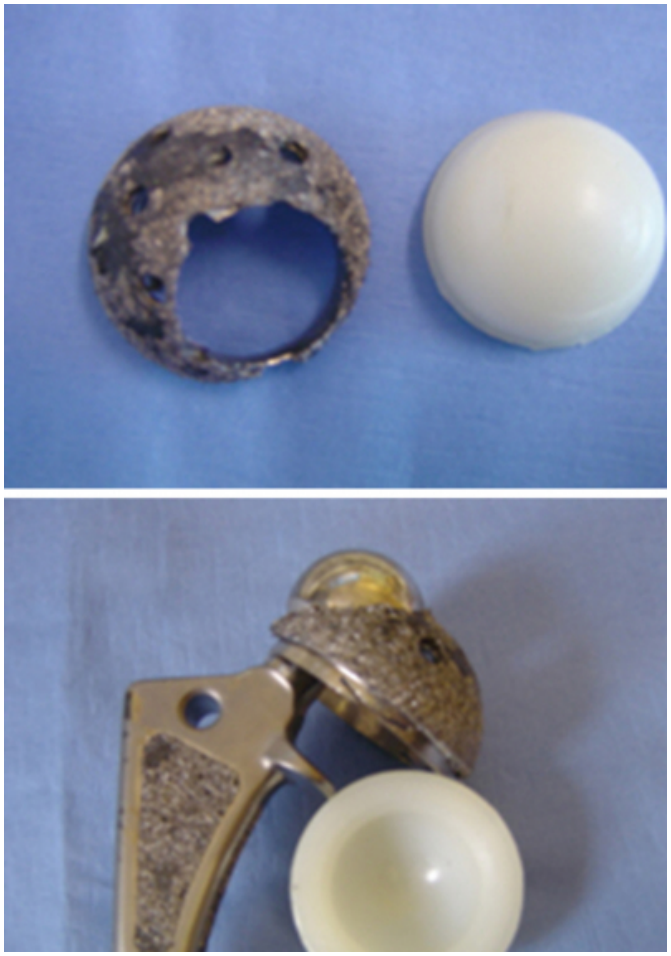
Figure 1: The head of the femoral prosthesis has penetrated through the metal-shell and the acetabular floor. Peri-prosthetic osteolysis and loosening of the implants is evident.

Extensive bone loss was seen in the acetabulum particularly superiorly and medially but no broken tines were seen. Examination and fluoroscopy under general anaesthesia confirmed penetration of the femoral head through the acetabular shell. Attempts at closed reduction were unsuccessful.

Revision arthroplasty of the right hip was then carried out via the previous scar and an antero-lateral approach. The prosthetic femoral head was found to have penetrated the metal acetabular shell through a 28mm diameter hole [Fig. 2A & 2B].

Figure 2

Figure 2A & 2B: The hole in the acetabular metal shell and penetration of the femoral head is illustrated. The liner shows indentation marks on the rim but is structurally intact.



The soft tissues and the cancellous bone of the acetabulum and femur were heavily stained with blackish metallic debris. The liner had dissociated from the shell and impinged against the neck of the femoral prosthesis. Both acetabular and femoral prostheses were loose and were removed. Bovine bone-graft (Tutobone™, Wescott-Medical, UK) was used to reconstruct the acetabular defect by impaction grafting. A modular acetabular cup with a reinforcement ring (Octopus™, Depuy) and a HA-coated femoral stem were used. Four circlage bands were used to augment the femoral stem fixation because of a slight crack in the lesser trochanter extending into the proximal femoral shaft. Weight bearing was not permitted for 2-weeks with progressive increase thereafter. At 36 months following revision the patient and walks with a crutch, a shoe raise and a slight Trendelenberg gait. The movements in his right hip are - external rotation 45°, abduction 50° and, flexion 45°. The peri-prosthetic fracture has healed [Fig. 3] but his mobility is mainly reduced due to the other joints being painful and stiff.

Figure 3

Figure 3: This plain film taken a year post revision hip arthroplasty shows good position of the prostheses and reconstruction of the acetabulum.

DISCUSSION

Dislodgement of the acetabular polyethylene liner from its metal shell in modular acetabular hip prostheses is a well-known complication. Liner dislodgement in the Harris-Galante type-I and the type-II modular acetabular component has been attributed to an inadequate locking mechanism between the liner and the shell making the locking tines prone to fatigue fracture. Migration of the liner may occur with further polyethylene wear and metal-on-metal articulation. The wear particles generated as a result, induce osteolysis, leading to bone loss and finally loosening of the implants [1,2,3,4,5,6].

The case described is of particular interest because the head of the femoral prosthesis penetrated through the metal shell and the acetabular floor. This particular complication has not

been described in the literature. We believe mechanical failure to be the cause of liner dislodgement because broken tines were seen on the metal cup. As a result the head of the femoral prosthesis articulated with the metal shell creating a metal-on-metal articulation leading to erosion and subsequent penetration. This is supported by the presence of significant amount of metallosis and wear induced osteolysis seen in the hip joint. Significant bone loss was seen in the acetabulum, particularly in the acetabular floor. The femoral head showed increased wear and scratches. Indentation marks were seen on the rim of the liner indicating impingement from the femoral neck. The liner otherwise did not show any deformation.

Peters and Sullivan reviewed 30 failures of polyethylene liner fixation in the Harris-Galante acetabular components. The failures of fixation ranged from dissociated liners in structurally intact acetabular cups to frank mechanical failure of the metallic locking mechanisms. Mechanical failure was responsible for most locking mechanism failures: 16 out of 30 failures in polyethylene liner fixation showed broken tines, whereas 6 of the 30 showed distorted flanges. Although some of the mechanical failures presented radiologically, most were revealed intra-operatively at revisions. Of the 30 failures, 17 presented with detectable dissociated liners on radiographic examination, and only 5 of the 16 cases of broken tines were noted on plain radiographs. In this series 20.7% of acetabular components were revised due to failure of locking mechanism [4].

The absence of a radiographic marker in the polyethylene liner of the Harris-Galante cup makes radiological detection of liner dislodgement difficult. The presence of broken tines along with an eccentric articulation of the femoral head indicates liner dislocation but these features are not always seen on plain radiographs [1,4]. Early diagnosis of liner dislocation is important. Younger and more active patients with this type of prostheses may be prone to this complication. We recommend that patients with Harris-Galante cups or other modular designs should have long-term follow-up with regular clinical and radiological assessments. Modular acetabular components should have secure locking mechanisms and radiographic markers in the liner to make early detection of liner dislocation straightforward.

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References

1. Gonzalez della Valle A, Ruzo PS, Li S; et al. Dislodgement of polyethylene liners in the first and second-generation Harris-Galante acetabular components. A report of eighteen cases. J Bone Joint Surg Am. 2001 Apr; 83-A(4): 553-9
2. Mihalko W.M, Papademetriou T. Polyethylene liner dissociation with the Harris-Galante II acetabular component. Clin Orthop 2001 May;(386):166-172
3. Werle J, Goodman S, Schurman D; et al. Polyethylene liner dissociation in Harris-Galante acetabular components:a report of 7 cases. J Arthroplasty 2002 Jan;17(1): 78-81.
4. Peters CL, Sullivan CL. Locking mechanism failure in the Harris-Galante porous acetabular component associated with recurrent hip dislocation. J Arthroplasty 2002 Jun; 17(4): 507-15
5. Tradonsky S, Postak PD, Froimson AL; et al: A comparison of the dissociation strength of modular acetabular components. Clin Orthop 1993-(296): 154-60.
6. Williams VG 2nd , Whiteside LA, White SE; et al. Fixation of ultra-high-molecular-weight polyethylene liners to metal-backed acetabular cups. J Arthroplasty 1997 Jan; 12(1): 25-31

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