



## Treatment of recurrent dislocation associated with impingement after revision total hip arthroplasty

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The authors report a case of total hip replacement in which, following several revision operations ending up in a Girdlestone arthroplasty, a patient presented recurrent episodes of posterior dislocation of his total hip prosthesis after revision using an antiprotrusio cage. The main causes for dislocation were anterior impingement of the neck against the anterior wall of the antiprotrusio cage and slackness of the periarticular musculature, due to shortening and reduced femoral offset. In order to avoid further major reconstruction and minimise the risk of infection recurrence, a limited revision operation was performed to address the factors responsible for the instability: the anterior wall of the antiprotrusio cage was removed and an extension module was added to the femoral component. Good stability of the arthroplasty was achieved with this limited procedure.

### CASE REPORT

A 62-year-old patient had undergone primary total hip arthroplasty on the left side 12 years previously, following which he presented several episodes of dislocation, some of which were treated with open reduction. Eight years later, he developed deep infection, and a Girdlestone resection was performed. A draining sinus finally subsided with local treatment. A revision endoprosthesis was implanted after complete healing of the infection. A Burch-Schneider anti-protrusio cage (Sulzer Orthopaedics, Winterthur, Switzerland) with a

cemented polyethylene cup was used for reconstruction of a large acetabular defect (fig 1). A PFM femoral revision stem (Sulzer Orthopaedics, Winterthur, Switzerland) with a 28-mm diameter ceramic head was implanted because of loss of the proximal femoral segment including the greater trochanter.

Over a few weeks after operation, the patient presented several episodes of posterior dislocation in the sitting position; closed reduction was possible without general anaesthesia. Infection did not recur.

### Clinical Findings

The patient presented limb shortening of about 10 cm, one year after his last surgery. Loss of muscular tension resulted in reduced active adduction

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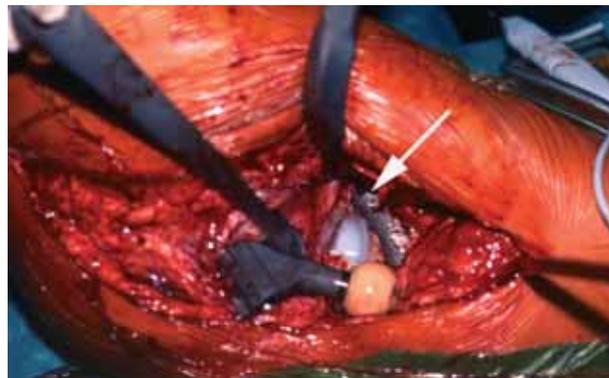
**Fig. 1.** — Preoperative anteroposterior radiograph showing a well-fixed femoral revision stem and horizontal placement of the acetabular cup and polyethylene insert. The acetabular revision implant (Burch-Schneider anti-protrusion cage) is illustrated below.



and abduction of the left hip. Clinical testing however showed that the gluteus medius, gluteus maximus and iliopsoas muscles were active. Impingement was suspected since a knocking phenomenon was elicited around 80° of hip flexion.

Radiographs of the hip (fig 1) showed no signs of cup or stem loosening. The revision stem was well fixed distally. Using Pradhan's method (2), the position of the polyethylene cup cemented in the acetabular anti-protrusion cage was calculated: it was found to have an inclination of 19° and an anteversion of 11°. Horizontal femoral offset was 2.3 cm and vertical offset 1.8 cm (fig 1).

Fluoroscopic examination revealed laxity of the left hip joint: the femoral head could be pulled 2.5 cm distally before any perceptible resistance of the soft tissues was detected. The antetorsion of the stem measured on a film with Rippstein's view (3) was 8°. Prosthetic impingement at 80° flexion and subluxation at 90° flexion could be demonstrated with fluoroscopy. The proximal part of the femoral stem abutted on the anterior edge of the acetabular reinforcement ring.



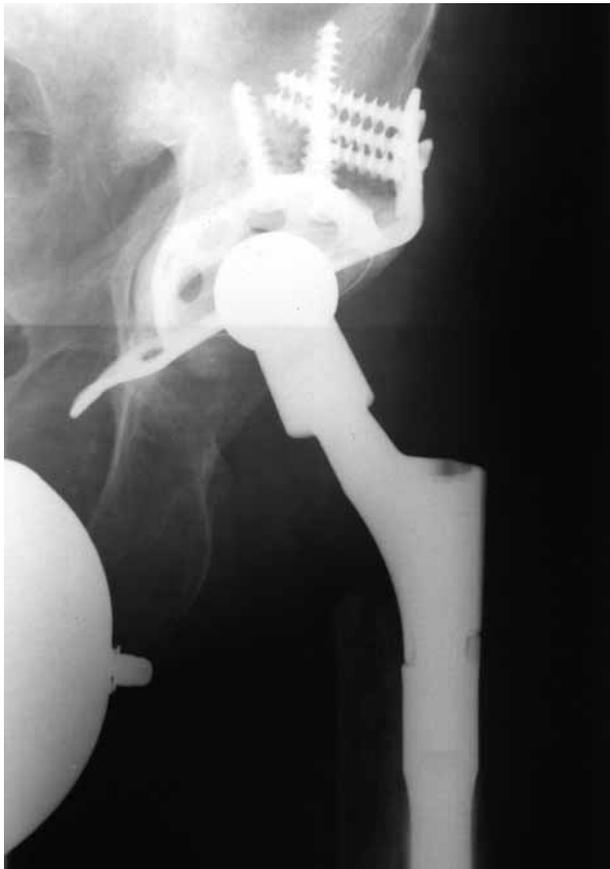
**Fig. 2.** — Intraoperative photograph showing impingement of the femoral neck on the anterior wall (arrow) of the anti-protrusion cage and prominent bone cement.

CT scanning confirmed malposition of the acetabular reinforcement cage, with bulging of its anterior wall and prominent cranial flap, as well as protrusion of the cement mantle.

The primary goal of the revision operation was to suppress the impingement while avoiding complete exchange of the acetabular component and/or femoral stem. Resection of the anterior wall of the reinforcement ring was planned.

#### *Intraoperative findings and procedure*

Upon opening of the joint, the cranial area of the ceramic head showed a black discoloration due to contact with the metallic anti-protrusion cage during the dislocations and consequent repositions. The polyethylene insert was found to be slightly anteverted; its anterior part did not show any signs of wear secondary to impingement of the prosthetic neck. The anti-protrusion cage was positioned in retroversion, with its anterior wall protruding anteriorly (fig 2); a free fragment of cement 1.5 × 1 × 1 cm, not noted on the preoperative films, was found inside the joint space. During intra-operative mobilisation of the hip, the femoral neck was noted to contact the bone cement and the anterior edge of the cage at 80° of flexion. With further flexion the femoral head subluxated and was levered out of the polyethylene socket at 90° flexion.



**Fig. 3.** — Postoperative anteroposterior radiograph showing the increased horizontal and vertical femoral offset provided by a neck extension module.

Given the patient's history of deep infection and the solid fixation of the anti-protrusion cage and polyethylene insert, complete exchange of the components was not considered, as it would have required a major revision operation with possibly severe damage to the bone stock.

Instead, the anterior bulging wall of the anti-protrusion cage and excess cement were removed with a Midas-Rex high-speed metal cutting burr (Medtronic GmbH, Düsseldorf, Germany). This procedure was carried out while carefully protecting the other implant components and the soft tissues. A neck extension module (Merete Medical GmbH, Berlin, Germany) was fixed onto the PFM femoral stem, providing adequate femoral offset, and improving muscular tension (5-XL-module

with an offset angle of  $7.5^\circ$  combined with a 28-mm metal head). Intra-operative testing demonstrated no impingement with flexion to more than  $110^\circ$  and the hip was stable, which made further procedures unnecessary. A further increase of the femoral offset on the above-mentioned neck extension module could not be realised without lengthening of the muscles. The gluteus medius was fixed to the vastus lateralis to restore adequate muscle tension. The postoperative horizontal femoral offset was about 4.9 cm and the vertical offset about 4.7 cm (fig 3). As an anti-dislocation safety measure, a Newport abduction orthosis was applied for a total of 6 weeks (setting :  $0-10-70^\circ$  extension/flexion). With a current follow-up of 18 months, there has been no further dislocation and no recurrence of infection.

## DISCUSSION

In the reported case, the femoral neck repeatedly impinged during everyday life movements on the anterior protruding wall of the anti-protrusion cage and the bone cement surrounding the polyethylene insert, which resulted in levering the prosthetic head out of the cup.

During the last revision operation, part of the anterior wall of the anti-protrusion cage with the underlying cement was removed with a fast-rotating, diamond-coated specific cutting burr to achieve a greater range of motion in flexion.

The limb shortening and the slackness of the soft tissues were improved by means of a neck extension module, increasing both vertical and horizontal femoral offset. Since these modules usually have a wider neck diameter for mechanical reasons, the ROM is significantly limited compared to a standard femoral neck (1). Therefore, the use of such extension modules is to be regarded as a trade off. However, considering the patient's history, complete exchange or removal of the stem did not seem advisable.

In conclusion, this case report emphasizes that in some specific cases, ultimate revision surgery should focus on the main cause of total hip dislocation, and its correction may avoid a risky major revision.

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