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Technique for arthroscopic assisted revision hip arthroplasty

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Abstract We describe a new technique in which the arthroscope is used to assist the preparation of the cement mantle for cemented revision hip arthroplasty. We present two case reports demonstrating the method and its rationale.

Résumé Nous décrivons une nouvelle technique où l'arthroscope est utilisé pour aider la préparation du manchon cimenté dans les reprises d'arthroplastie de la hanche. Nous présentons deux observations qui décrivent la méthode et son raisonnement.

Introduction

Cement-within-cement revision of the femoral component is occasionally used in revision hip arthroplasty provided the existing cement mantle is stable, intact and there is room for recementation of a new implant [2, 7]. This technique is used to revise a failed femoral component, or to aid in the exposure of an isolated acetabular revision when a monoblock femoral component is removed and recemented into the intact cement mantle [3]. We report the use of the arthroscope for the assessment of the integrity of the cement mantle, to assess the removal of the previously inserted distal cement centralizer, and to assist in the preparation of the cement mantle for recementation.

Case reports

Case 1

A 35-year-old woman presented with a sudden onset of left thigh and groin pain with no preceding event. Two years earlier she had

undergone a hybrid total hip arthroplasty via a posterior approach for severe pain associated with rheumatoid arthritis. A mat finished MS30 (Sulzer, Winterthur, Switzerland) of the smallest size (size 6) femoral component had been inserted using simplex cement. A Fitek (Sulzer) uncemented acetabular component was used. Postoperative course of recovery had been uneventful prior to the onset of pain at 2 years post-arthroplasty. Her rheumatoid arthritis was well controlled with medical therapy. Examination revealed an antalgic gait with pain at the extremes of motion and reproduction of the pain with the push-pull test and the Stinchfield test [1]. Radiographs revealed loosening at the femoral component/cement interface with fracture of the distal centralizer, a varus alignment of the implant and no evidence of loosening of the acetabular component. Hematological investigations including erythrocyte sedimentation rate and C-reactive protein revealed no abnormalities. Arthroscopic assisted revision hip arthroplasty was undertaken using a posterior approach with the insertion of a polished finish MS30 (Sulzer) femoral component and retaining the Fitek (Sulzer) cup.

Case 2

An 85-year-old woman presented acutely with a 5-day history of increasing pain in the left groin and thigh following minor trauma. Eleven years earlier she had undergone a cemented Exeter (Howmedica, Rutherford, N.J., USA) cemented femoral and acetabular total hip arthroplasty for osteoarthritis of the hip. Her postoperative course had been uneventful until this acute presentation. Examination revealed an antalgic gait, limited hip mobility, 1 cm femoral shortening and a positive push-pull and Stinchfield tests. Radiographs revealed a well-fixed femoral component but loosening of the bone cement interface of the acetabular component and migration. Hematological investigations revealed no abnormalities. Arthroscopic assisted revision hip arthroplasty was undertaken via a modified Hardinge approach with the insertion of an uncemented cup and modular femoral component.

Operative procedure

Arthrotomy was undertaken to expose the loose arthroplasty. The femoral component in the first case was loose and could be removed by hand. The femoral component in the second case required the removal of fibrous tissue and cement from the greater trochanter before the femoral component could be removed. In each case the bone cement interface was stable and intact but despite the illumination of the cavity with a disposable light source and irrigation, the distal cement centralizer and the cement mantle were not well visualized.

A 4 mm arthroscope was used to irrigate and simultaneously visualize the cement mantle medulla (Fig. 1). The arthroscope al-

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Fig. 1 *Case 1.* Arthroscopic image of the distal cement medulla. A triangular cement centralizer is shown

lowed excellent visualization of the cement mantle and confirmed the absence of cracks or defects in both cases. The distal centralizer was readily identified at the apex of the femoral canal. (Fig. 2).

A high-speed burr was used to roughen the cement mantle and to remove the corrosion and biological film from the interface. The burr was used to abrade the metal and methylmethaculate distal centralizer in case 1. Despite the thin medullary cavity it was possible to visualize the cement mantle and centralizer throughout the procedure. The cement debris was removed by the irrigation without obscuring the visualization of the cement mantle. A new femoral component was inserted into the intact existing cement mantle that had been roughened and dried to allow interdigitation of the new cement. The new cement was inserted in the liquid phase to prevent lamination.

Discussion

Removal and reinsertion of cemented femoral components during revision total hip replacement was developed in order to avoid damage to host bone during the removal of well-fixed cement, improving acetabular exposure and to decrease operative time [7]. Laboratory testing of cement-in-cement femoral component revision has shown a minimal loss in shear strength provided the existing cement mantle was intact, dry and roughened to allow the new cement to interdigitate [6]. Clinically cement-in-cement femoral component revisions have shown excellent 5-year results comparable to cemented femoral component revisions [5].

Ultrasonic tools have been used to atraumatically prepare or remove the existing mantle to accept a new prosthesis [4]. As an alternative, arthroscopic assisted revision was developed to ensure that the existing mantle was suitable to accept a new prosthesis. Arthroscopic visualization of the mantle will confirm its integrity and allows burring of the cement surface to remove corrosion, biological film, increase the canal size and aids the removal the centralizer and distal plug. If the existing

Fig. 2a, b *Case 2.* a) Arthroscopic image of a cement medulla with corrosion deposition at the component-cement interface. b) Visualization is maintained during preparation of the cement mantle with a high speed burr

cement mantle is found to be damaged or deficient it should be removed and this can be expedited by arthroscopic visualization.

Arthroscopic assisted revision hip arthroplasty can expedite the surgery, avoid the complications of host bone damage, and decrease the need for an osteotomy to remove well-fixed cement. We believe the improved assessment of the cement mantle before and after its preparation for recementation will ensure adequate femoral component fixation. We recommend this technique when a cement-in-cement femoral revision is indicated. When it is necessary to remove the entire femoral cement mantle we favor the use of alternative techniques such as an extended trochanteric osteotomy.

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