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ORIGINAL ARTICLE

Results of the Evora dual-mobility socket after a minimum follow-up of five years

Résultat à cinq ans de la cupule à double mobilité Evora

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KEYWORDS
Dual mobility;
Total hip arthroplasty;
Socket;
Tripolar-unconstrained cup

Summary
Purpose of the study. — Dislocation is a well-known complication of total hip arthroplasty. The risk can be reduced to one or two cases per thousand using a dual-mobility cup. The survival rate achieved with the Bousquet implant is 95% at 10 years. The complications with this implant are early mobilization and inguinal pain. An overly-large cup and insufficient primary and secondary fixation can be implicated. The design of the original implant was later modified to limit these early complications. The purpose of this study was to check the validity of these design changes.
Patients and methods. — The chromium—cobalt moulded cementless cup was used. The outer surface of this cup presents large geometric striations and is coated with hydroxyapatite. The cup has the shape of a 180° half sphere and a posterior wall prolongation measuring 6.5 mm. Three mechanisms were used for the primary fixation: an asymmetrical growth ring, four anchorage stems and a superior screw. Two hundred cementless cups were implanted in 194 patients. The femoral piece was a Charnley stainless-steel implant ($n = 139$), a titanium SEM implant ($n = 59$) or another implant ($n = 12$). Cement was used for femoral fixation in 193 implantations. The series included 97 women and 103 men with osteoarthritis ($n = 180$), necrosis ($n = 16$) and surgery for fracture and primary arthroplasty ($n = 9$). The Harris and Postel—Merle-d'Aubigné scores were noted. Eight radiographic criteria were analyzed to assess the position of the cup and the radiological course of the interface.

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Results. — The mean follow-up was six years and the minimum was five years. The mean age at surgery was 70 years (range, 32 to 91). At last follow-up, 17 patients had died, eight were lost to follow-up and five were bedridden. Three patients underwent revision surgery. Thus, this analysis included 170 prostheses followed for more than five years (mean, six years; range, five to seven years). The Harris score improved from 48 to 92 and the Postel—Merle-d'Aubigné score from 2/5/4 to 5.8/5.9/5.5 (range, 4 to 6/5 to 6/1 to 6). None of the patients complained of anterior pain during active hip flexion in supine position (related to ilio-psoas irritation). Cup inclination was 46° on average (range, 62 to 22°). Medialization, lateralization or ascension greater than 10 mm from the center of rotation was not observed on the postoperative films. At the last follow-up, no measurable mobilization or migration could be identified on plain X-rays. Radiolucent lines, condensations and bony defects around the cup, when visible postoperatively, were not found on the last follow-up X-rays. There were two cemented femoral pieces that developed a radiolucent line in the nonspecific metaphyseal area. There were no cases of granuloma and no cam effect. Three patients underwent revision for femoral loosening, fracture of the femur below the prosthesis and hematogenous infection. There were no cases of dislocation.
Discussion. — Changing the design of the implant to modify its volume, material and primary fixation has eliminated the early mobilizations and inguinal pain described for the original Bousquet cup. These options have not had any deleterious effect on prosthesis stability. The question of long-term wear remains an important problem and requires optimization: a neck as thin as possible, optimized surfacing, elimination of laser marks, extraction leads and head skirts.

MOTS CLÉS
Prothèse totale de hanche ;
Double mobilité ;
Cupule

Résumé La double mobilité a été proposée par G. Bousquet au début des années 1980. L'intérêt de ce type d'implant dans le traitement préventif et curatif de l'instabilité prothétique a déjà été démontré. Les mobilisations précoces et des douleurs inguinales étaient des complications précoces, qui en limitaient les résultats. Les auteurs proposent une évolution avec une prothèse d'un volume inférieur, en chrome—cobalt, une fixation primaire assurée par un accroissement annulaire asymétrique, des picots d'ancrage et une fixation secondaire par hydroxyapatite avec repousse osseuse dans une surface macrogéométrique. Deux cents prothèses, chez 194 malades, ont été implantées dans le cadre d'une évaluation multicentrique continue, prospective, non randomisée. Elles ont été suivies avec un recul minimum de cinq ans. À la révision, 17 patients étaient décédés, huit étaient perdus de vue et cinq étaient grabataires. Trois malades ont été réopérés (un descellement fémoral, une fracture du fémur traumatique et une infection hématogène). Cent soixante-dix prothèses étaient analysables au-delà de cinq ans. Il n'y a pas eu de reprise pour cause acétabulaire, aucune douleur inguinale et aucune luxation. Les évolutions proposées apportent une solution aux complications précoces de la cupule originale de Bousquet, sans effet délétère sur la stabilité prothétique.

Introduction

Total hip arthroplasty (THA) dislocation remains a risk today, for which primary implants have been evaluated at 2.2% at one year, 3.8% at 10 years and 6% at 20 years [1]. It can occur following all surgical approaches [2]. After a dislocation episode, the risk of recurrence is evaluated at 33% [3]. Surgical treatment of recurring dislocation results in 20 to 40% failures [4]. Of 436 THA revisions, 14% are required for implant instability [5]. The dual-mobility principle is an invention dating from 1978 and attributed to Bousquet et al. [6]; it reduces this risk of dislocation to one or two out of 1000 [7]. The indication for a dual-mobility socket in treating recurring dislocation has proved its worth [8,9]. The original cup was in stainless steel, with the convex surface coated in alumina. Primary fixation came from an original geometric mechanism that was called a tripod and was made of two inferior studs and one superior screw.

The original implant survival was 95% at 10 years [10—13] and 90.8% at 10 years for a patient population under the age of 50 years [14]. Revisions in the first 10 years were related to cup mobilization in 1.1% of cases [12,15], resulting from an insufficient primary and/or secondary fixation. The porous alumina surface was not sufficiently porous to allow bone ingrowth (the alumina surface is inert and there is no physical and chemical liaison with the bone surface). Long-term fixation depends on the primary fixation obtained during surgery. This is ensured by the press-fit effect and the tripod effect. Insufficient bone quality or insufficient preparation may make these mechanisms deficient. Inguinal pain can be induced by impingement of the cup's anterior rim on the iliac psoas tendon [16,17] or perhaps by a micromobility in the cup. Changing the primary and secondary fixation principles and reducing the volume of the implant may allow for better control of these early complications.

Polyethylene wear is observed in three areas: the concave area, the convex area and the collar. The wear in