J Shoulder Elbow Surg (2015) 24, 1534-1543

ELSEVIER

Journal of Shoulder and Elbow Surgery

www.elsevier.com/locate/ymse

Metal-backed glenoid implant with polyethylene insert is not a viable long-term therapeutic option

Pascal Boileau, MD[a,*], Grégory Moineau, MD[a], Nicolas Morin-Salvo, MD[a], Cyrille Avidor, MD[a], Arnaud Godenèche, MD[b], Christophe Lévigne, MD[c], Mohamed Baba, MD[a], Gilles Walch, MD[b]

[a]*Hôpital de l'Archet 2, Université Nice Sophia Antipolis, Nice, France*
[b]*Centre Medical Santy, Lyon, France*
[c]*Clinique du Parc, Lyon, France*

Background: The aims of this study were to determine the survival of anatomic total shoulder arthroplasty with uncemented metal-backed (MB) glenoid components with a polyethylene (PE) insert in primary osteoarthritis, to assess the reasons for revision surgery, and to identify patients and diagnostic factors that influence failure rates.

Methods: Between 1994 and 1999, 165 patients (mean age, 68 years) with primary osteoarthritis were treated with anatomic total shoulder arthroplasty using an uncemented MB/PE glenoid component. Outcomes were assessed both clinically and radiologically with a minimum of 2 years of follow-up. A prosthetic survival curve was constructed with the end point defined as either partial or complete revision, using 100% confidence intervals.

Results: Survival rate free of revision was 46% (100% confidence interval, 32%-54%) at 12 years. At a mean follow-up of 8.5 years (range, 2-16 years), revision was required in 61 patients (37%); 80% of shoulders undergoing revision (49 of 61) had evidence of PE wear. Glenoid loosening (because of osteolysis secondary to wear debris), soft tissue deficiency, and prosthetic instability were the most common modes of failure. Younger patients and biconcave glenoids (with posterior humeral subluxation) have a negative effect on implant survival. Proximal humerus osteolysis was significantly more frequent in shoulders with PE wear. Exchange of the PE insert (with conservation of the MB tray) was possible in only 3% of the revised shoulders.

Conclusion: Uncemented MB glenoid resurfacing is not a viable long-term therapeutic option because of accelerated PE wear leading to early revision surgery. Conservation of the MB tray with reinsertion of a new PE insert is rarely possible because of glenoid bone loss, implant loosening, soft tissue deficiency, and prosthetic instability. Younger patients and biconcave glenoids have a negative effect on implant survival.

Institutional Review Board approval was not required for this study. It is a retrospective study of patients whose surgery followed validated techniques. No unnecessary invasive examination was performed. All patients consented to participate in this review and agreed that their anonymized data could be used for scientific purposes.

*Reprint requests: Pascal Boileau, MD, Hôpital de l'Archet 2, Université Nice Sophia Antipolis, 151, route de St Antoine de Ginestière, F-06200 Nice, France.

E-mail address: boileau.p@chu-nice.fr (P. Boileau).

http://dx.doi.org/10.1016/j.jse.2015.02.012

Level of evidence: Level IV, Case Series, Treatment Study.

Keywords: Total shoulder arthroplasty; uncemented glenoid; glenoid survival; revision

Total shoulder arthroplasty (TSA) has proved to be a beneficial treatment for patients with primary glenohumeral osteoarthritis (OA) presenting with shoulder stiffness and pain. However, long-term fixation of the glenoid component remains an unsolved problem, and loosening of cemented polyethylene (PE) glenoid components represents an important cause of failure in TSA.[17,22,24] The rate of glenoid lucent lines after cemented all-PE implants in anatomic TSA has been reported to be up to 90%. To improve glenoid fixation and to reduce glenoid lucent lines, uncemented fixation with porous coated or tissue-ingrowth components has been developed with the aim of achieving more stable fixation to the bone and a corresponding increase in implant survival.[1,7-9,15,17,23] Despite the body of proof indicating that uncemented glenoid implants are at risk for failure and revision, uncemented metal-backed (MB) glenoid components are still commonly used in TSA.[1,5-9,13-15,19,20,23,25-27]

Moreover, with the recent success of reverse prostheses, there is currently renewed interest in the development of "universal" uncemented glenoid MB implants. These implants could be used for both anatomic (with a PE insert) and reverse (with a metallic sphere) shoulder arthroplasty. The MB glenoid tray would allow the surgeon to more easily convert failed TSA into reverse shoulder arthroplasty (RSA) without having to revise the glenoid component. In theory, exchange of the PE insert for a metallic sphere (with conservation of the MB tray) would make the revision procedure easier and faster.

In 2015, at least 2 questions remain to be answered: (1) Is an uncemented MB glenoid component with a PE insert an acceptable option for TSA in the long term? (2) Does the uncemented MB glenoid allow an easier revision surgery in case of failure with conservation of the MB tray and simple exchange of the worn PE? To try to answer these questions, we conducted a continuous retrospective multicenter cohort study of patients, with a single etiology (primary OA), treated with the same unconstrained anatomic TSA with uncemented bone-ingrowth MB glenoid components. The aims of this study were to determine the survival rate of this type of implant, to assess the reasons for revision surgery, and to identify patients and diagnostic factors that influence failure rates. We hypothesized that (1) glenoid resurfacing with an MB implant with PE insert would not be acceptable in the long term because of accelerated PE wear and glenoid loosening and (2) the MB tray could not be conserved in case of revision because of glenoid bone loss and implant loosening.

Materials and methods

Study design

The inclusion criteria were as follows: (1) TSA for the treatment of primary OA implanted by a senior shoulder surgeon; (2) glenoid resurfacing with use of the same uncemented MB glenoid component; and (3) minimum clinical and radiologic follow-up of 2 years. The exclusion criteria included the following: (1) TSA for all others causes; (2) glenoid resurfacing with use of a cemented full-PE glenoid component; and (3) follow-up of <2 years. Between 1994 and 1999, 178 TSAs with the same uncemented MB glenoid component were implanted for the treatment of primary OA in 5 orthopedic centers; 13 patients died or were lost to follow-up, leaving 165 TSAs in 158 patients (115 women and 43 men). At the time of shoulder arthroplasty, the mean age of the patients was 68 years (range, 35-89 years). Seven patients had surgery on both sides. The dominant arm was operated on in 105 cases (64%). The presence of primary OA was confirmed in all patients on true anteroposterior (AP), axillary, and lateral radiographs. Preoperative computed tomography (CT) arthrography was performed in 150 patients (90%) and preoperative magnetic resonance imaging in 5 patients (3%) to evaluate glenoid bone stock, presence of a rotator cuff tear, and fatty infiltration of the rotator cuff muscles. According to the Walch classification,[29] the glenoid morphology was identified as type A in 72 cases (44%), type B in 75 cases (45%), and type C in 8 cases (5%). According to the Goutallier classification,[16] the global fatty degeneration index evaluated on CT arthrography was <1 for 45 shoulders (27%) and ≥ 1 in 105 patients (64%).

Operative technique and implants

Surgeons used the same surgical technique and the same implant in the different centers. A deltopectoral approach was used in all patients. The subscapularis tendon and anterior capsule were divided at the medial edge of the lesser tuberosity in 154 cases (93%) (i.e., simple tenotomy); the tendon and capsule were detached with a fleck osteotomy of the lesser tuberosity in 11 cases (7%). The long head of the biceps was tenodesed in 86 cases (52%). There were 15 partial (9%) and 11 full-thickness (7%) tears of the supraspinatus. The humeral implant was cemented in all except 2 cases. The same anatomic, unconstrained, modular, and adaptable humeral component was used in all patients (Aequalis shoulder prosthesis; Tornier Inc., Houston, TX, USA).[2,3] The same uncemented, bone-ingrowth MB glenoid implant was used in all cases (Aequalis MB glenoid prosthesis; Tornier). The thickness of the glenoid component was 7 mm (3 mm for the metal tray and 4 mm for the PE insert). Two expansion screws (with 3 petals for each) achieved the initial