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Polyethylene Liner Exchange of the Harris-Galante Porous I and II Acetabular Components Without Cement

Results and Complications

Paul F. Lachiewicz, MD and Elizabeth S. Soileau, BSN, RN

Abstract: This study reviewed the long-term efficacy of the locking mechanism of the Harris-Galante porous (HGP) I and II acetabular components and the results and complications of polyethylene liner exchange *without cement*. There were 400 HGP-I components with a mean follow-up of 10 years (range, 2-19 years) and 78 HGP-II components with 8 years of mean follow-up (range, 2-13 years). There has been only 1 liner dislodgement (0.2%). Thirty-five hips (34 patients) have undergone liner exchange without cement. The index acetabular component was implanted as a primary procedure in 19 hips and a revision in 16 hips. No exchanged liner has dislodged at a mean follow-up time of 5.1 years (range, 2-11 years). However, there have been 7 patients (20%) with recurrent dislocation and all required reoperation. Dislocation was significantly lower when an elevated rim liner was used.
Key words: polyethylene liner exchange, dislodgement, acetabular component.

Polyethylene liner dissociation from cementless acetabular components has been widely reported [1-6]. The Harris-Galante porous I titanium fiber metal-coated acetabular component (HGP-I) has been shown to have excellent bone ingrowth and long-term survival [7-9]. However, the polyethylene liner locking mechanism has been considered "primitive" compared with present-day components. The metal shell thickness of the HGP-I acetabular component was 4.7 mm, and the polyethylene liner was held in place with 3 sets of titanium alloy "tines" (Fig. 1). Although the early results of this component were very good, surgeons were dissatisfied with the 4.5- and 5.1-mm screws, which were somewhat difficult to implant. The Harris-Galante porous II acetabular component (HGP-II) had a shell thickness of 5.6 mm to accommodate the hex head 6.5-mm screws. The polyethylene liner was held in place by 4 or 5 sets of tines (fabricated of commercially pure titanium), based on the size of the component. The results of the HGP-II component are also excellent at 8 to 11 years of follow-up [10].

Dissociation of the polyethylene liner from cementless acetabular components was reported in 28 cases by Louwerse and Heyligers [4]. Of 28 cases with liner dissociation, 13 had a Harris-Galante acetabular component that had been in situ for a mean of 27 months. Della Valle et al [3] reported liner dislodgement in 17 HGP-II and 1 HGP-I acetabular components, which had been in situ for a mean of 7 years. Broken tines were seen in 6 cases, and there were multiple mechanisms of failure including polyethylene wear, fatigue fracture of tines, and fracture of the polyethylene rim.

From the Department of Orthopaedics, University of North Carolina at Chapel Hill, Chapel Hill, North Carolina.
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Reprint requests: Paul F. Lachiewicz, MD, Department of Orthopaedics, University of North Carolina at Chapel Hill, 3151 Bioinformatics Bldg, CB 7055, Chapel Hill, NC 27599-7055.

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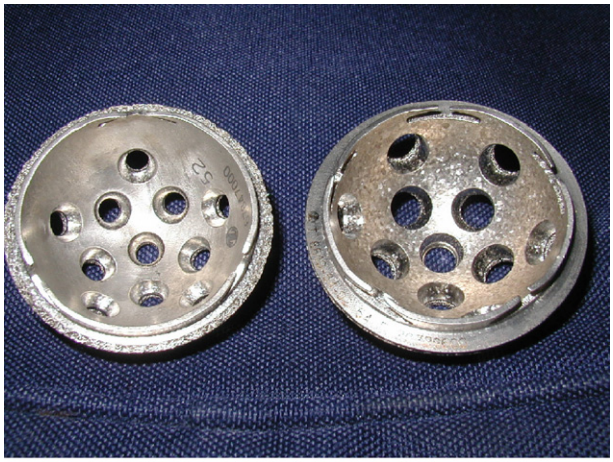

Fig. 1. Left, HGP-I acetabular component with 3 sets of tines. Right, HGP-II acetabular component with 5 sets of tines.

These authors expressed concern about repeat dislodgement if a new liner was placed into these acetabular shells. They recommended revising a well-fixed shell or cementing a liner into the existing shell. It was also recommended to downsize the modular femoral head to 22 mm to provide for a thicker polyethylene liner. However, there were no data reported on the results or complications of reoperation in these 18 patients.

One purpose of the present study was to determine the prevalence of polyethylene liner dislodgement in HGP-I and HGP-II acetabular components implanted by the author. In addition, this study was performed to test the hypothesis that, in the short term, there would be adequate fixation of the polyethylene liner in these acetabular components when revision including liner exchange *without cement* was performed. The mechanical complications after polyethylene liner exchange were also investigated.

Materials and Methods

This is a retrospective study of 429 HGP-I and 87 HGP-II (both Zimmer, Warsaw, Ind) implanted by one surgeon at one hospital. Demographic, clinical, and radiographic data were prospectively stored in the surgeon's total hip database. Patients (38 hips) had died with less than 2 years of follow-up (identified by ancestry.com), but none had a problem with the total hip arthroplasty. All patients who had a reoperation that included a polyethylene liner exchange without cement were identified. Demographic variables, such as patient age and sex, preoperative diagnosis, and time the shell was in situ were extracted from the database. The operative records, radiographs, follow-up time, and complications after liner exchange were then reviewed.

The technique for polyethylene liner exchange involved the posterior approach, with exposure of the entire rim of the acetabular component and checking the integrity of the tines. The tines were bent in slightly using a needle holder and a new polyethylene liner was tapped into place. The polyethylene liner was checked for "lever-out" and rotational stability with a clamp. Repair of the posterior capsule and external rotators was performed in all cases. Postoperatively, the patients were not given any immobilization, except for one patient who was placed into a hip spica cast for a femoral shaft fracture.

The inner diameter of the polyethylene liner exchanged remained the same, 28 mm, in 21 hips; was downsized from 28 to 26 or 22 mm in 12 hips; and was upsized from 28 to 32 mm in 2 hips (Table 1). The objective was to provide for a minimum of 8-mm polyethylene thickness. The femoral head used in the existing or new femoral component was nonskirted in 18 hips and had a skirt in 17 hips. The objective with the use of these femoral heads was to equalize leg lengths. The new polyethylene liner was selected at the discretion of the surgeon and had an elevated rim in 20 hips and a standard rim in 15 hips.

Standardized anteroposterior pelvis radiographs centered over the pubis were evaluated before and after liner exchange to measure the acetabular component abduction angle, and the anteversion angle was measured using the method of Ackland et al [11]. Sequential postoperative radiographs were evaluated to determine if the acetabular component tines were intact, bent, or broken. Pelvic osteolysis was measured using the method of Maloney et al [12]. Radiolucent lines of the acetabular component were described using the method of DeLee and Charnley [13].

The authors reviewed mechanical complications (dislocation, liner dislodgement, and loosening) after liner exchange without cement fixation. Statistical analysis of factors related to postoperative dislocation (head size, cup abduction and anteversion angles, and type of liner implanted) included paired student t test and Fisher exact test, with significance set at the $P < .05$ level.

Results

For the purpose of determining the prevalence of spontaneous polyethylene liner dislodgement,