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ORIGINAL ARTICLE

Radiographic comparison of finned, cementless central pegged glenoid component and conventional cemented pegged glenoid component in total shoulder arthroplasty: a prospective randomized study

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Background: Radiographic lucency of the glenoid component remains a problem after cement fixation in primary total shoulder arthroplasty. Glenoid component design likely contributes to rates of glenoid lucency. The purpose of this study was to prospectively compare radiographic lucency between a finned, cementless central pegged glenoid component (CL component) and a conventional cemented pegged glenoid component (P component) on immediate postoperative and minimum 2-year follow-up radiographs.

Methods: Fifty-four patients undergoing total shoulder arthroplasty were prospectively randomized to receive an all-polyethylene CL component or a conventional all-polyethylene P component. Three raters graded glenoid lucency and bone interdigitation on immediate postoperative and latest follow-up radiographs. Patients who had undergone revision surgery or had died before evaluation were excluded. Minimum 2-year follow-up was required for inclusion of radiographic evaluation.

Results: Fifty patients met inclusion criteria; 42 patients (84%; 20 CL and 22 P) were available for follow-up with the original glenoid implant in place. The mean follow-up duration was 35 months (24-64 months). There were no significant differences in glenoid radiolucency between CL (1/20 [5%]) and P (2/22 [9%]) components at last follow-up ($P = .999$). Five patients (25%) in the CL group had bone interdigitation. No instances of aseptic glenoid loosening occurred.

This study, TOH 102, was approved by the Texas Orthopedic Hospital Institutional Review Board.

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Conclusion: There were no significant differences in the rate of glenoid lucency between the 2 groups at immediate or an average 35-month follow-up. Both techniques appear to be viable options for initial glenoid component fixation, with CL components allowing possible osseointegration, imparting potential long-term stability.
Level of evidence: Level II; Randomized Controlled Trial; Treatment Study

Keywords: Cementless central pegged; pegged glenoid; radiolucency; total shoulder arthroplasty; CortiLoc; aseptic loosening, finned peg

Glenoid component loosening is the most common cause of failure after total shoulder arthroplasty (TSA).[2,4,5,8,9,14,17,18,22] Radiolucency around the glenoid component has been correlated with loosening and failure of the prosthesis.[12,25] Radiographic lucency has been reported to range from 0% to 5% on immediate postoperative radiographs, up to 15% at 2-year follow-up, and as high as 79% at 7-year follow-up using conventional pegged components.[11,18] Overall, radiolucency has been estimated to occur at an average rate of 7% and 1% per year for symptomatic and asymptomatic patients, respectively, after TSA.[19]

Although modern cementing techniques have improved glenoid fixation, glenoid design significantly contributes to rates of glenoid lucency.[11,12,15,16,21,24,25,32] Furthermore, techniques for glenoid preparation have evolved, with evidence suggesting less aggressive glenoid reaming that preserves more subchondral bone may be important for glenoid implant longevity.[23,28]

A glenoid component with a finned, cementless central peg was first introduced by Wirth et al in a canine model because of continued concerns about glenoid component loosening.[30] Retrospective studies using a similar component have reported variable rates of radiographic lucency ranging from 0% to 31% at minimum 2-year follow-up and up to 25% at minimum 5-year follow-up.[1,7,14,20,29] However, there have been no prospective randomized studies comparing a conventional cemented pegged glenoid component (P component) with a finned, cementless central pegged component (CL component).

The purpose of this study was to prospectively compare radiographic lucency between a CL component and a P component on immediate postoperative and minimum 2-year follow-up radiographs. The authors hypothesized that there would be no difference in radiographic lucency between groups on immediate postoperative radiographs and at last follow-up.

Materials and methods

There were 54 patients who were prospectively enrolled from January 2012 to October 2012. All cases were performed at a single, high-volume shoulder arthroplasty center by a single surgeon (T.B.E.). All patients signed informed consent before entering the study and were enrolled in a prospectively collected shoulder arthroplasty registry. Patients with an intact rotator cuff and primary glenohumeral osteoarthritis, inflammatory arthritis, or instability arthropathy electing to undergo primary TSA were eligible for study enrollment. Patients were excluded if they had a history of skeletal dysplasia or prior shoulder infection.

A power analysis conducted before the study determined that 20 patients per group would be required to identify an average difference of 1 lucency grade between the CL and P glenoid components with a power of 80%.

The design of the glenoid component was randomly selected immediately before surgery. Randomization was performed using a random numbers table (odd = CL, even = P) with the glenoid component type sealed in an envelope. Twenty-eight shoulders were randomized to receive a polyethylene CL component, and 26 shoulders were randomized to receive a polyethylene P component.

The Aequalis Ascend Flex (Wright Medical, Memphis, TN, USA) shoulder arthroplasty system was used for all patients during the study period. The TSA technique used during the study period is well described, and a standardized postoperative rehabilitation protocol was followed.[13] A subscapularis tenotomy was used, with transtendinous and transosseous repair performed at the end of the procedure.

The polyethylene CL component has 3 peripheral pegs and a larger finned central peg (Fig. 1). The polyethylene P component consists of 4 pegs of the same size with 1 central peg and 3 peripheral pegs (Fig. 2). Both glenoid components have the same size options—small, medium, large, and extra-large. Humeral head diameters were matched with their respective glenoid components with sizes ranging from 38 to 50 mm. Radii of curvatures were obtained from the manufacturing technique guide.

Glenoid reaming was completed using previously described methods.[23,28] Preparation of the glenoid was completed with a powered, concentric and convex-shaped reamer. The reamer matched the size of the chosen glenoid component (small, medium, large, or extra-large). Minimal reaming was performed to preserve

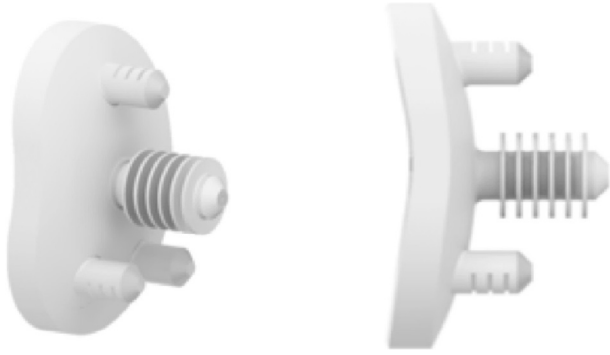

Figure 1 Finned, cementless central pegged glenoid component. By permission of Wright Medical Group, Inc. All rights reserved.