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ORIGINAL ARTICLE

Short-term radiographic results of a cemented polyethylene keeled glenoid component with varying backside radiuses of curvature

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Background: This study analyzed the radiographic results of a cemented all-polyethylene keeled glenoid component available in different sizes and multiple backside radiuses of curvature.
Methods: The study group consisted of 118 cases (114 patients). There were 63 women and 51 men. Mean age at the time of arthroplasty was 68 years (range, 51-85 years). True anterior-posterior radiographs obtained postoperatively and at the final follow-up were analyzed for implant seating and the occurrence of radiolucent lines. Glenoid morphology and fatty infiltration of the rotator cuff muscles were examined using computed tomography scans. Mean follow-up was 38 months (range, 24-70 months).
Results: The mean radiolucent line score after surgery was 0.54 points (range, 0-3 points), and 90% had no or only 1 radiolucent line. At the final follow-up, the mean score was 1.06 points (range, 0-3 points), and 74% had no or only 1 radiolucent line. The score increased significantly over time ($P < .001$). No component was at risk for loosening. No correlation was found between patient age, sex, hand dominance, glenoid morphology, or fatty infiltration of the rotator cuff muscles and the occurrence of radiolucent lines.
Conclusion: In the short-term, the glenoid component analyzed in this study showed promising radiographic results, with a low number of radiolucent lines without failure. However, the mean radiolucent line score increased significantly over time, and long-term observations are necessary to confirm a possible advantage compared with older component designs.
Level of evidence: Level IV; Case Series; Treatment Study

Keywords: Glenoid; shoulder replacement; arthroplasty; polyethylene; keeled component; shoulder arthroplasty

Total shoulder replacement is a useful treatment option for glenohumeral osteoarthritis.[11,24] In several studies, the success of this operation in pain relief, patient satisfaction, and clinical outcome has been well documented.[20,27,36] However, component loosening remains a major concern, especially on

The Centre Orthopédique Santy Institutional Review Board approved this study (Study 2016-20).

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the glenoid side.[26,37] Many uncemented anatomic glenoid components have shown high failure and revision rates and were abandoned.[7,16,22,29] Cemented polyethylene glenoid components are the gold standard, because low rates of failure and revision have been reported in the midterm.[6,13,23] Some studies have shown radiographic loosening of the components is becoming more and more evident with increasing follow-up.[26,34] The reported radiographic loosening rates of cemented keeled glenoid components with a follow-up of >10 year ranges between 30% and 70%.[4,26,34]

Most glenoid implants and reamers are available in different sizes, but the backside radius of curvature is always the same. During preparation, this may lead to over-reaming the glenoid—and subsequent removal of the subchondral bone layer—in an attempt to overcome incongruent seating of the component. This is problematic, because aggressive reaming with removal of the subchondral bone layer of the native glenoid is associated with high rates of radiographic failure.[33]

To preserve the subchondral bone, a new implant and reaming system have been developed with multiple backside radiuses of curvature. The availability of components and reamers with these options should theoretically allow for better implant seating with minimal reaming. This study analyzed the results of a consecutive series of patients with glenohumeral osteoarthritis treated with total shoulder arthroplasty and this new all-polyethylene cemented keeled glenoid component. A keeled component was chosen because we have used this implant concept in recent decades and tried to improve the design of the implant to have fewer radiolucent lines and failures. Our hypothesis was that radiographic radiolucent lines occur less regularly than in other studies with a single radius of curvature for reamers and components backside.

Materials and methods

Between June 2012 and December 2014, a consecutive series of 130 total shoulder arthroplasties was performed in 126 patients at 1 institution. The same cemented keeled glenoid component with the various options for different backside radiuses of curvature was used (Wright Medical, Memphis, TN, USA) in all operations. Patients were included in a prospective recorded database, although data analysis was done in a retrospective fashion. Inclusion criteria included (1) patients treated with the same anatomic total shoulder replacement and cemented keeled glenoid component, (2) the diagnosis of primary osteoarthritis, (3) a minimum follow-up of 2 years, and (4) complete radiographic data. Exclusion criteria were (1) patients with rotator cuff tears, (2) previous surgery on the affected shoulders, or (3) previous infections or other diseases on the affected shoulder.

Radiographic protocol

Anterior-posterior radiographs in neutral, internal, and external rotations and axillary radiographs were obtained before surgery, immediately after surgery, and at the final follow-up. Anterior-posterior radiographs in neutral rotation were analyzed by 2 independent examiners (P.R. and M.S.) for the occurrence of radiolucent lines, tilt, or subsidence of the glenoid component, as previously described (Fig. 1). The method according to Molé et al[19] was used to classify the amount and distribution of radiolucent lines around the glenoid components (Fig. 2). In this scoring method, the component is divided in 6 different zones, and the occurrence of radiolucent lines in each zone is documented. A radiolucent line of <1 mm results in 1 point, a line between 1 and 2 mm is 2 points

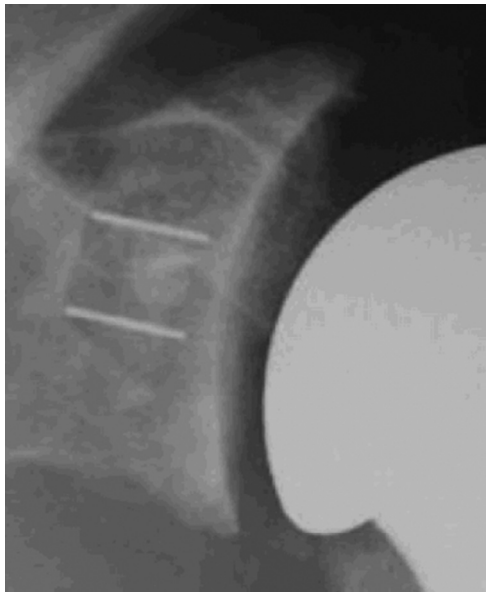

Figure 1 An anterior-posterior radiograph 3 years after surgery shows a cemented keeled glenoid component without radiolucent lines.

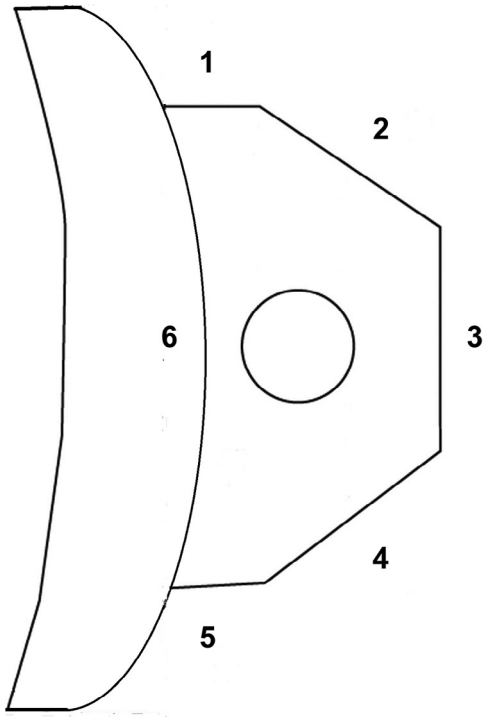

Figure 2 Diagram shows the different zones where radiolucent lines were measured.