

overall rate of revision for glenoid component related problems was 11/195 (5.6%) compared to 8/108 (7.4%) for painful glenoid arthritis. **Conclusion:** The data from this study indicate there is marked long term pain relief and improvement in motion with shoulder arthroplasty for rheumatoid arthritis. Among patients with an intact rotator cuff, total shoulder arthroplasty appears to be the preferred procedure for pain relief, improvement in abduction, and lower risk of revision surgery.

16 COMPARISON OF CONFORMING AND NON-CONFORMING RETRIEVED GLENOID COMPONENTS

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Introduction: Glenoid component loosening remains the primary long-term failure mode for TSA. Little is known about in vivo wear patterns manifested on retrieved polyethylene glenoid components, the design and clinical factors that affect wear performance, and the relation to loosening. The purpose of the study was (1) to report the findings from the retrieved prosthetic glenoid components after TSA, (2) to compare the conforming and non-conforming glenoid designs with clinical, radiographic, and biomechanical wear analysis. **Methods:** From 1979 to 2005, 65 glenoid components were retrieved during revision TSA at a single hospital. The clinical information was obtained from medical records including patient demographics, medical comorbidities, shoulder history, clinical assessment (pain, range of motion), intra-operative findings, implant information, and post-operative complications. The most recent plain shoulder radiographs (AP and axillary) prior to removal of the glenoid were carefully examined and scored. The extent and amount of radiolucency was measured with digital calipers. The glenoid loosening classification was determined for each glenoid (Torchia et al, JSES 1997). The polyethylene bearing surfaces of the components were examined microscopically for evidence of burnishing, abrasion, scratching, pitting, delamination, focal wear, surface deformation, embedded third body debris, and fracture. The surface was divided into anterior, posterior, superior, and inferior quadrants and given a subjective damage score of 0-3 for each damage mode in each quadrant. **Results:** Sixty-five glenoids were retrieved from 59 patients with an average age of 61.4 years (SD 11.46). The mean length of glenoid implantation was 4.01 years (range, 0.1 to 19.2 years). The average forward elevation was 65.31 degrees (range, 0 to 160 degrees) and external rotation was 15.84 degrees (range, -40 to 60 degrees). The primary diagnosis for the initial surgery was 49% osteoarthritis, 20% post-traumatic osteoarthritis, 17% inflammatory arthritis, and 14% osteonecrosis. The revision diagnosis was 81.5% aseptic glenoid loosening and 14.8% septic loosening. Additional pathology determined at the time of revision surgery include 51.9% glenoid osseous defect, 42.5% humeral head subluxation or dislocation, 44% rotator cuff tendinopathy, and 26% deltoid atrophy. There were five identifiable manufacturers (37 Biomet, 14 Neer II, 5 Custom HSS, 4 DePuy, and 1 Howmedica) and 4 unknown glenoid implants. Sixty-one glenoid were cemented and four required screw fixation. The articulation of the glenoid implants was non-conforming in 31 (47.7%) and conforming in 34 (52.3%). In 75% of the cases, the glenoid was removed, and the TSA was converted to a hemiarthroplasty. Scratching was the most common damage mode with an average score of 9.6 out of 12; pitting was second most with an average score of 5.8. Both modes were most common on the inferior aspect of the glenoid component. Edge deformation was evident in 31 of the 65 glenoids (47.7%). Abrasion on the edge of the glenoid consistent with impingement between the edge of the glenoid component and the humerus was evident in 17 of 65 glenoids (26.1%). The abraded area was found on the anterior side in 82.3% (14 of 17). The 4 glenoids with metal backing fixed with

screws all had embedded metallic particulate debris. A focal wear damage pattern was evident in 7 glenoids, all with nonconforming designs. The mean damage grade was 27.59 (SD 11.74) for the conforming glenoids and 28.69 (SD 8.21) for the non-conforming glenoids ($P>0.05$). Edge deformation was evident in 52.9% of conforming glenoids and only 25.8% of non-conforming glenoids. The plain radiographs revealed that the non-conforming glenoids had stability score of 2.44 (SD 0.77) and lucency scores of 4.58 (SD 0.77) compared to non-conforming glenoids stability score of 1.55 (SD 1.18) and lucency score of 3.50 (SD 1.87) ($P<0.05$). Radiolucent lines of the conforming glenoids were greater in zones 1, 2, and 4 compared to the non-conforming glenoids, but the difference was only statistically significant in zone 2 ($P<0.05$). **Discussion:** The present study is the largest series of retrieved glenoid implants after TSA. The cause of glenoid loosening appears to be multifactorial, and there are a number of patient-related factors and prosthetic-related factors that contribute to glenoid failure. Conforming glenoids more likely to show edge deformation compared to non-conforming glenoids. The radiographic analysis demonstrates that conforming glenoids have a greater degree of radiolucency and glenoid loosening compared to non-conforming glenoids.

17 TOTAL SHOULDER ARTHROPLASTY WITH METAL-BACKED, BONE IN-GROWTH GLENOID COMPONENTS

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Background: Loosening of a cemented glenoid component is an important cause of failure in total shoulder arthroplasty. A metal-backed, bone in-growth glenoid component has been designed as an alternative. The purpose of this study is to examine the results of this type of total shoulder arthroplasty. **Methods:** One hundred and twenty-four total shoulder arthroplasties with metal-backed, bone in-growth glenoid components were performed between 1989 and 1994. All patients had a minimum radiographic and clinical follow-up of two years or until the time of revision surgery. Mean clinical follow up was 9.4 years; mean radiographic follow-up was 6.9 years. Degenerative joint disease was present in 71% of patients, rheumatoid arthritis in 14.5%, and other diagnoses in the remaining. The glenoid component was bone-grafted in 14 shoulders; rotator cuff tears were present in 24 shoulders. **Results:** Clinical data included pain ratings that decreased from an average of 4.5 preoperatively, to 2.0 postoperatively. Range of motion in active elevation increased from 102 degrees preoperatively, to 133 degrees postoperatively. Range of motion in external rotation increased from 30 degrees preoperatively, to 56 degrees postoperatively. All clinical data was significant ($p=0.0001$). Three major issues arose. Subluxation occurred in 38, radiographic change was present in 62 shoulders (glenoid loosening in 47 (35%), humeral loosening in 20 (15%), polyethylene wear with metal wear of the glenoid component in 28 (21%). Revision procedures were required in 40 shoulders (27%). There were no identifiable patient, disease, or surgical characteristics associated with failure, either clinically or radiographically. Kaplan-Meier survival estimates were performed for the endpoint of revision and/or radiographic failure. The one year survival estimate was 93.5% (standard error 0.022). The five year survival estimate was 79.8% (standard error 0.037). The ten-year survival estimate was 48.2% (standard error 0.052). **Conclusions:** A higher rate of failure of total shoulder arthroplasties performed with a metal-backed, bone in-growth glenoid component raises concern for its use in shoulder arthroplasty, other than for special situations.