TITLE: Outcomes of pyrolytic carbon humeral resurfacing hemiarthroplasty compared to best in class total shoulder arthroplasty in young patients with osteoarthritis: analysis from the Australian Orthopaedic Association National Joint Replacement Registry.

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Abstract

Aim: The aim of this study was to compare the survivorship and reasons for revision between pyrocarbon resurfacing and the best performing anatomic total shoulder arthroplasty prosthesis using data from the Australian Orthopaedic Association National Joint replacement registry.

Background: The treatment of shoulder osteoarthritis in the young patient remains challenging. The higher functional demands and higher expectations of the young patient cohort are often coupled with increased failure and revision rates. Pyrocarbon hemi-resurfacing and pyrocarbon hemi-arthroplasty is an emerging class of arthroplasty that demonstrates superior survivorship compared to metal hemiarthroplasty and resurfacing. However, it is unknown whether it is a superior option when compared to total shoulder arthroplasty in young patients.

Methods: The study population included all primary shoulder arthroplasty procedures undertaken for osteoarthritis (OA) in patients aged < 65years and reported to the registry between September 2004 and December 2022. Revision rates and reasons for revision were compared between pyrolytic carbon (pyrocarbon) humeral resurfacing arthroplasty (PHRA) and the top five performing anatomic total shoulder replacment (ATSR) prosthesis using an all polyethelene cemented glenoid. Kaplan-Meier estimates of survivorship were used to report the time to revision. Age- and sex-adjusted hazard ratios (HRs) were calculated from Cox proportional hazards models to compare revision rates between groups. All tests were 2-tailed at a 5% level of significance. Statistical analysis was performed using SAS software (version 9.4; SAS Institute, Cary, NC, USA).

Results: During the study period 1952 anatomic total shoulder replacement prostheses and 403 pyrocarbon hemi-resurfacing prostheses were analysed. The mean age in the PHRA group was 52.5, and 58.6 in the ATSR group. During the study period, the number of PHRA implants that underwent revision was 20 (4.96%). The number of ATSR that underwent revision was 123 (6.3%). For the diagnosis of OA under the age of 65, the CPR at 10 years was 7.7 (95% CI, 4.7 – 12.4) for PHRA, and 9.0 (95% CI, 7.4 – 11) for ATSR (Table 3). In the PHRA group the main reasons for revision were implant breakage (35%), pain (15%), Instability/Dislocation (15%), Loosening (10%), Infection (10%). In the ATSR group the main reasons for revision were loosening (33.9%), rotator cuff insufficiency (18.2%), Instability/Dislocation (14.9%), Infection (9.1%).

Conclusion: Pyrocarbon humeral resurfacing arthroplasty has a comparable survivorship in younger patients compared to best in class anatomic total shoulder arthroplasty.

Figure 1: Cumulative Percent Revision of Primary Shoulder Replacement in Patients Aged less than 65 Years by Group (Primary Diagnosis OA)

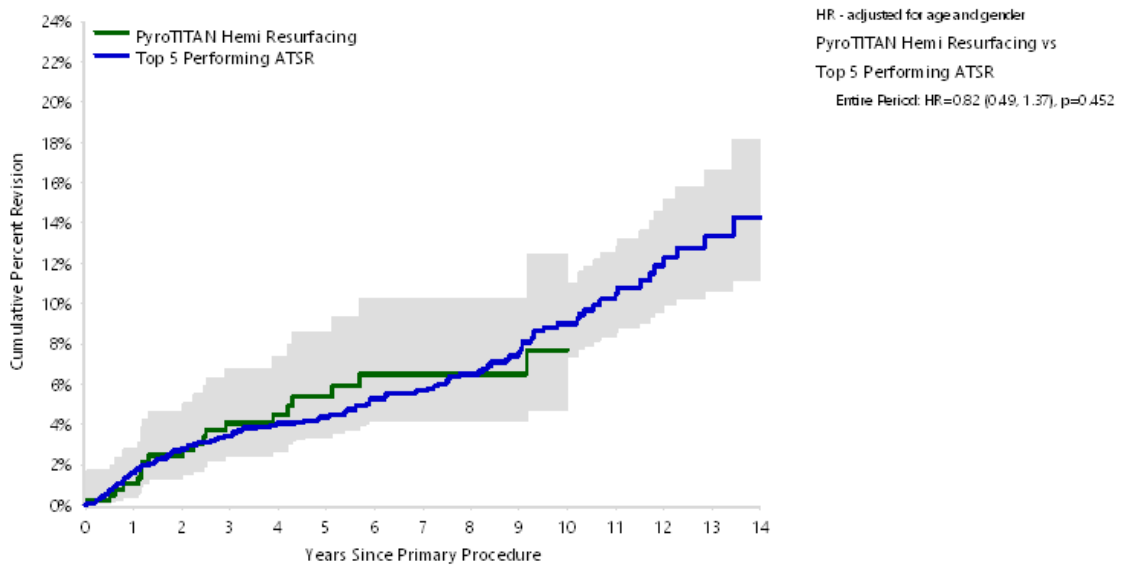

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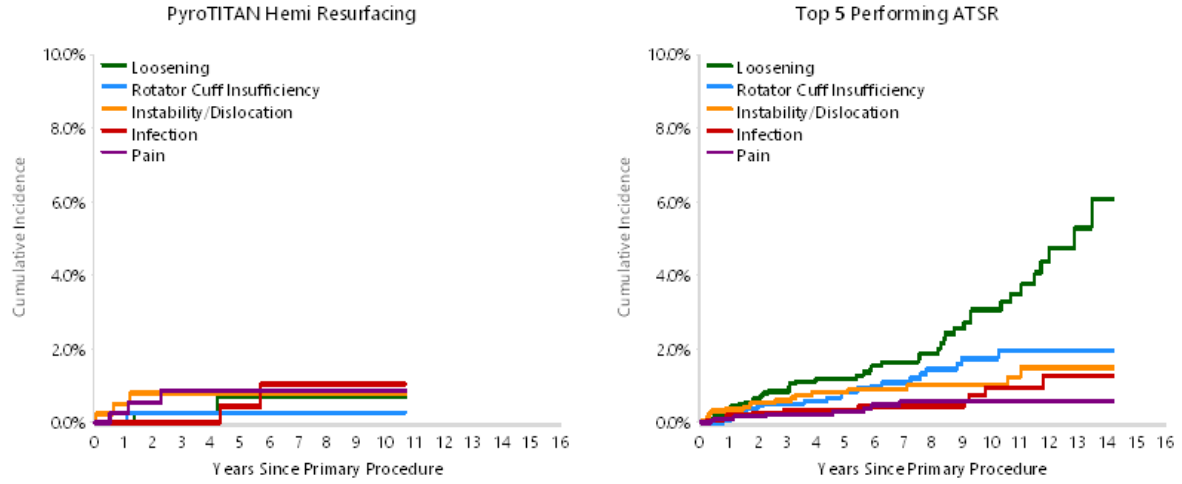
Figure 2: Cumulative Incidence Revision Diagnosis of Primary Shoulder Replacement in Patients Aged less than 65 Years by Group (Primary Diagnosis OA)



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