

Short-Term Outcomes of Bio-TSA with Metal-Backed Convertible Glenoids

Aimee Bobko MD, Evan Vellios MD, Jennifer Estrada BA, Anthony Finocchiaro BS, Joshua Mathew BS, Joshua Dines MD, David Dines MD, Samuel Taylor MD, Russell Warren MD, Lawrence Gulotta MD

Sports Medicine and Shoulder Service, Hospital for Special Surgery, Weill Cornell Medical College

Background:

With the increasing incidence of primary shoulder arthroplasties being performed, there is an expected increase in future revision shoulder arthroplasties. The expected rise in revision arthroplasty has spurred the development of modern convertible, metal-backed glenoid (MBG) components which can allow for more efficient conversion to a glenosphere with less bone loss. Over the past decade, there has been advancements in the design of MBGs including hydroxyapatite coating, highly crosslinked Vitamin E augmented polyethylene, and locking screw technology. With these modern design changes, there is an increasing role for the utilization of the modern, convertible MBG. When considering cases of glenohumeral osteoarthritis with a significant glenoid deformity, RSA has become the increasing preferred treatment of choice. Metal augments or a Bio-RSA performed with bone grafting are current options for addressing glenoid defects. Patients of a young age with advanced glenoid deformity represent a challenge in terms of optimal treatment and outcomes. The purpose of this study is to compare the short-term functional outcome scores and demographic data of patients undergoing a Bio-TSA using a convertible second-generation uncemented metal-backed glenoid implant with humeral head autograft to those undergoing TSA with a traditional cemented all-polyethylene glenoid implant.

Methods:

We conducted a retrospective case-control study of 21 patients who underwent Bio-TSA using a convertible metal-backed glenoid implant and 24 shoulders who underwent TSA with a traditional cemented all-polyethylene glenoid implant over a 4-year period (January 2015 to April 2019) for severe glenohumeral arthritis with a minimum of 1 year follow-up. The Bio-TSA and control groups were matched for age at the time of surgery, medical comorbidities, and length of follow-up. Preoperative and postoperative patient reported outcome scores were measured using the American Shoulder and Elbow Surgeons (ASES) shoulder score, Shoulder Activity Scale (SAS) score, and Patient-Reported Outcomes Measurement Information System (PROMIS) Upper Extremity score instruments. A two-sample paired t-test was used to analyze the difference between baseline and current ASES, SAS, and PROMIS Upper Extremity scores in the cohort and control groups. Descriptive statistics were performed for demographic data.

Results:

Baseline ASES, SAS, and PROMIS Upper Extremity scores improved by an average value of 57.53 ($p < 0.0001$), 3.00 ($p < 0.005$), and 2.60 ($p < 0.03$) at an average of 2.75 years post-operatively in the Bio-TSA group compared to 53.28 ($p < 0.003$), 1.74 ($p < 0.02$), 4.82 ($p < 0.07$) in the control group. In the Bio-TSA group, average ASES, SAS, and PROMIS Upper Extremity scores at final follow-up were 97.2 ± 1.7 , 13.9 ± 1.7 , 56.6 ± 2.1 respectively. Average patient age at the time of surgery was 60.8 ± 3.0 years old (range 49-75) in the Bio-TSA group and 62.6 ± 2.4 years old (range 55-76) in the control group. 18 of the 21 (85.7%) patients were male in the Bio-TSA group compared to 11 of the 24 (45.8%) patients in the control group. In the Bio-TSA group, 4 (19.0%) patients had undergone a surgical procedure to the operative shoulder prior to TSA compared to 6 (25%) in the control group. 2 patients in the Bio-TSA group underwent revision to RSA, one for a traumatic rotator cuff tear and the other for dislodgement of the polyethylene. 13 (61.9%) shoulders had Walch B2 or B3 glenoids based on pre-operative computed tomography (CT) scan imaging in the Bio-TSA group compared to 6 (25%) in the control group.

Conclusion:

Bio-TSA using a convertible metal-backed glenoid component and humeral head autograft bone grafting leads to significantly improved functional outcome scores within short-term follow-up. Bio-TSA using a convertible metal-backed implant may be an effective option to optimize postoperative range of motion for the young patient with significant glenoid wear.

Level of Evidence: III, Case-Control Study



Figure 1. Postoperative Bio-TSA demonstrating incorporation of posterior humeral head autograft with a convertible metal-backed glenoid