

## Postoperative complications following total shoulder arthroplasty in multiple myeloma patients with prior bone marrow transplantation

Tera A. Scott, MS<sup>1</sup>, Randall R. Rainwater, BS<sup>1</sup>, Simon C. Mears, MD, PhD<sup>2</sup>, Benjamin M. Stronach, MD<sup>2</sup>, Jeffrey B. Stambough, MD<sup>2</sup>, C. Lowry Barnes, MD<sup>2</sup>, J. Ryan Hill, MD<sup>2</sup>

<sup>1</sup>University of Arkansas for Medical Sciences, College of Medicine, Little Rock, AR, <sup>2</sup>University of Arkansas for Medical Sciences, Department of Orthopaedic Surgery, Little Rock, AR

[Tscott2@uams.edu](mailto:Tscott2@uams.edu)

**Disclosures:** Tera A. Scott (N), Randall R. Rainwater (N), Simon C. Mears (N), Benjamin M. Stronach (N), Jeffrey B. Stambough (N), C. Lowry Barnes (N), J. Ryan Hill (N)

**INTRODUCTION:** Bone marrow transplant (BMT) has markedly improved the life expectancy of many patients newly diagnosed with multiple myeloma (MM). However, BMT often requires higher doses of corticosteroids and aggressive chemotherapy, which may lead to systemic effects such as immunosuppression, osteonecrosis, and increased fracture risk. Side effects of these treatments, pre-existing osteolytic myeloma lesions, and the advanced age of many MM patients may result in the need for total shoulder arthroplasty (TSA).

**METHODS:** A large national insurance database was queried for patient demographics, time to intervention, postoperative complications, and overall healthcare reimbursements among MM patients with or without a history of BMT who underwent TSA. Incidence of 1) prosthetic joint infection (PJI), joint effusion, periprosthetic fracture, prosthetic instability, steroid injection, general surgical complications, and pathological fracture; 2) subsequent medical visits, emergency room visits, and revision TSA events; and 3) thromboembolic events within 90 days of TSA were identified. Statistical analyses were performed using a Welch two-sample t-test to compare continuous variables such as age, Elixhauser Comorbidity Index (ECI), and reimbursement. Chi-squared analyses were used to compare the proportions of females and the incidence of time-specific postoperative complications between cohorts, with statistical significance set at  $\alpha=0.05$ .

**RESULTS:** Multiple myeloma patients with a history of BMT underwent TSA at a significantly younger age (64.5 vs. 71.1 years,  $p<0.001$ ), had significantly higher comorbidities as measured by ECI (11.3 vs. 9.4,  $p=0.002$ ) (**Table 1**), and experienced significantly higher rates of joint effusion (13.8% vs. 3.45%,  $p=0.003$ ), general surgical complications (36.9% vs. 19.0%,  $p=0.022$ ), and venous thromboembolism (13.8% vs. 3.45%,  $p<0.001$ ) (**Table 2**). There were no differences in PJI, periprosthetic fracture, or prosthetic instability between groups. Healthcare reimbursement values for the care of MM patients with history of BMT were significantly higher at 30 days (\$5,480 vs. \$2,833,  $p=0.011$ ), 60 days (\$10,219 vs. \$5,362,  $p=0.007$ ), and 90 days (\$15,512 vs. \$7,586,  $p=0.004$ ) following TSA (**Table 1**).

**DISCUSSION:** Based on this survey of a large national insurance database, a history of BMT in MM patients was associated with higher risk of postoperative complications, most notably VTE, and higher overall healthcare reimbursement values within the 90-day global period following TSA. This underscores the need for tailored perioperative management strategies that address both the medical and orthopaedic challenges faced by this population, including consideration of more aggressive pharmacologic VTE prophylaxis, in order to optimize the overall value provided by TSA.

**SIGNIFICANCE/ CLINICAL RELEVANCE:** This study defines the impact of BMT on TSA outcomes in MM patients, addressing a critical gap and providing clinically actionable data to guide risk stratification, patient counseling, and perioperative care.

	BMT (n=65)	No BMT (n=899)	p-value
<b>Demographics</b>			
Proportion Female, %	49.2	50.3	0.97
Age at TSA, y (mean, SD)	64.5 ± 12	71.1 ± 8.4	< 0.0001
Elixhauser Comorbidity Index	11.3 ± 4.8	9.4 ± 4.1	0.002
Time Between MM Diagnosis and TSA, y (mean, SD)	4.3 ± 2.8	4.2 ± 3.3	0.38
Time Between BMT and TSA, y (mean, SD)	2.3 ± 1.7	-	-
<b>Average Overall Healthcare Reimbursement (\$)</b>			
30 d	5,480	2,833	0.011
60 d	10,219	5,362	0.007
90 d	15,512	7,586	0.004

**Table 1:** Demographic information and average overall healthcare reimbursements between MM patients who received BMT and those who did not prior to undergoing TSA. BMT, bone marrow transplant; TSA, total shoulder arthroplasty; MM, multiple myeloma; SD, standard deviation.

Postoperative Event	BMT	No BMT	OR	95% CI	p-value
<b>Surgical Complications</b>					
Prosthetic Joint Infection	0	1.78	-	-	0.41
Joint Effusion	13.8	3.45	3.75	1.59, 8.81	0.003
Periprosthetic Fracture	1.54	0.78	1.48	0.18, 12.4	1
Prosthetic Instability	0	1.22	-	-	0.61
Steroid Injection	9.23	12.5	1.39	0.59, 3.33	0.57
General Surgical Complication	36.9	19.0	2.75	1.20, 6.31	0.02
Pathological Fracture	16.9	10.7	1.27	0.59, 2.73	0.69
<b>Medical Visits</b>					
TSA Revision	4.62	2.22	1.59	0.45, 5.68	0.73
Medical Visits	47.7	33.8	2.44	0.32, 18.7	0.60
Emergency Room Visit	6.15	2.67	1.81	0.59, 5.59	0.48
<b>Thromboembolic Complications</b>					
Venous Thromboembolism	13.8	3.45	4.50	2.04, 9.91	< 0.001
Deep Vein Thrombosis	4.62	2.45	1.93	0.56, 6.62	0.51
Pulmonary Embolism	9.23	1.67	5.99	2.24, 16.0	< 0.001

**Table 2:** Incidence rates (%) of postoperative outcomes within 90 days of TSA calculated as number of patients with complication divided by total number of patients in respective cohort. Odds ratio (OR) is defined as likelihood of event to occur in the BMT population compared to the no BMT population, confidence interval (CI) of 2.5%, 97.5%. BMT, bone marrow transplant; TSA, total shoulder arthroplasty.