Functional Composite Spacer (Antibiotic Cement Around a Hemiarthroplasty) for the Treatment of Shoulder Infections: Minimum 5 - Year Outcomes

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Introduction:

Prosthetic joint infection (PJI) remains a challenging complication following shoulder arthroplasty and an ideal treatment protocol has yet to be established. Two-stage revision is a common approach. Historically, the first stage entails placement of an all-cement antibiotic spacer. While prior studies have reported on cement spacers as definitive management, persistent pain and/or inadequate function often result in a request for a second stage procedure. The functional composite spacer consists of a humeral hemiarthroplasty implant with antibiotic cement coated around the stem alone to preserve the metallic humeral head-glenoid articulation. Functional composite spacers have demonstrated improvements in function and motion with high patient satisfaction at 25 months, but longer-term follow-up is needed to better understand the role it may play in the definitive management of shoulder infections. The purpose of this study is to evaluate outcomes at a minimum of 5 years in patients who initially planned to undergo two-stage revision but elected to retain the functional spacer.

Material & Methods:

A retrospective review of a single institution's shoulder surgery repository from 2007 to 2018 identified 30 patients who underwent placement of a functional composite spacer. Overall, 5 patients underwent second stage reimplantation and 12 patients did not have 5-year follow-up (6 lost to follow-up and 6 deceased). A total 13 patients were included who maintained a functional composite spacer and had minimum 5-year follow-up. Patient-reported outcome measures (ASES, SST, SANE, VAS Function and VAS Pain), satisfaction, range of motion, and radiographic estimation of glenoid wear were evaluated.

Results & Discussion:

Two of 13 patients (15%) required additional surgery: one secondary closure for early superficial wound dehiscence and one revision spacer for pain which cultured negative at revision. There were no re-infections. At an average of 7.9 ± 1.9 years post-operatively, patient satisfaction was high and significant improvements were noted for ASES ($p<0.001$), SST ($p=0.003$), SANE ($p=0.002$), VAS F ($p=0.004$), and VAS P ($p=0.007$) as well as range of motion including abduction ($p=0.005$) and elevation ($p=0.005$), as noted in Table 1. At an average radiographic follow-up of 5.7 ± 3.4 years, there was no significant change in humeral head medialization ($p=0.11$).

The results of this study demonstrate that patients who do not undergo an early revision and retain a functional composite spacer maintain good function and range of motion with minimal pain at mid-term follow-up. These satisfactory outcomes suggest the composite spacer may sufficiently serve as definitive management when appropriate, avoiding the associated cost and risk with additional second-stage surgery.

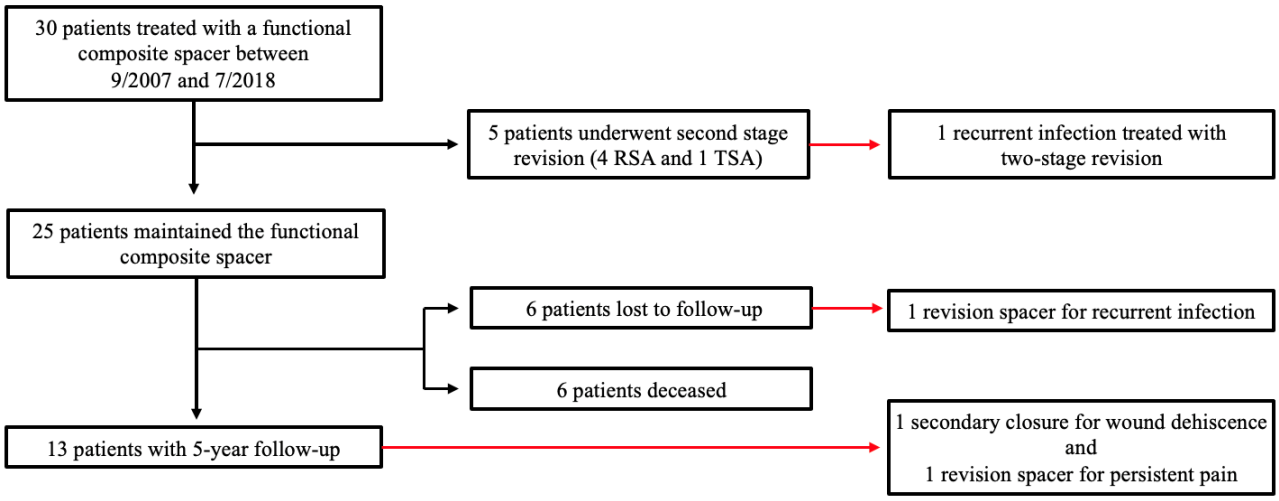

Figure 1. A Strengthening the Reporting of Observational Studies in Epidemiology (STROBE) flow diagram displaying number of and reason why patients were excluded as well as the respective number of re-operations and recurrent infections. RSA, Reverse Shoulder Arthroplasty; TSA, Total Shoulder Arthroplasty.

	Preoperative Mean ± SD	**Most Recent Follow-Up** Mean ± SD	***P***
ASES	30.7 ± 18.6	76.1 ± 25.6	**<0.001**
SST	3.2 ± 2.3	8.5 ± 3.0	**0.003**
SANE	23.1 ± 13.0	70.9 ± 33.5	**0.002**
VAS Function	2.6 ± 1.3	7.5 ± 2.8	**0.004**
VAS Pain	5.3 ± 2.5	0.9 ± 2.2	**0.003**
Range of Motion			
Abduction (˚)	46.2 ± 14.7	85.4 ± 20.3	**0.004**
Elevation (˚)	55.4 ± 25.6	121.3 ± 27.7	**0.003**
External Rotation (˚)	13.8 ± 24.6	47.5 ± 16.3	**0.004**
Internal Rotation*	2.8 ± 1.0	4.5 ± 2.5	0.049

ASES, American Shoulder and Elbow Surgeons; SST, Simple Shoulder Test; SANE, Single Assessment Numeric Evaluation; VAS, Visual Analog Scale; SD, Standard Deviation. *IR was scored on a 10-point scale using the following conversions: buttock/greater trochanter = 2, sacrum–L4 = 4, L1–L3 = 6, T8–T12 = 8, T1–T7 = 10.

Table 1. Comparison of outcomes from pre-operative status to most recent follow-up status (average 7.9 ± 1.9 years follow-up).