Real-Component Low-Friction Spacers for Two-Stage Exchange Show Decreased Bacterial Colonization Compared to Cement Molds and Static Spacers

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INTRODUCTION: Patients undergoing two-stage exchange arthroplasty for chronic periprosthetic joint infection (PJI) with the use of metal femur and all-polyethylene tibia low friction spacers may benefit from improved knee function with these spacers and some patients ultimately elect to defer reimplantation. While real-component low-friction spacers have shown similar reinfection rates following reimplantation, concerns remain regarding the implantation of real components following resection arthroplasty in the setting of PJI due the potential of biofilm formation on the components. However, bacterial colonization of real-component low-friction spacers has not been compared to traditional spacer types such as antibiotic, articulating cement spacers or static antibiotic spacers. This study sought to compare sonication fluid cultures (SFC) from explanted real-component low-friction, articulating cement, and static spacers to determine whether real-component, low-friction spacers have a higher risk for bacterial colonization.

METHODS: A retrospective single-center study was performed that included all patients who completed two-stage exchange arthroplasty for treatment of Musculoskeletal Infection Society (MSIS) defined hip or knee PJI from 01/2016 to 02/2022. All explanted spacer components were sent for SFC. Medical records were reviewed to collect demographic variables, laboratory values, culture results, and clinical outcome data. The primary end point was positive SFC. Repeat debridement within 90 days was a secondary end point. Statistical analysis was performed using Fisher's exact test with statistical significance defined as $p<0.05$.

RESULTS:

A total of 121 patients (57 hips, 64 knees) underwent a 2-stage revision for PJI. Sixty (49.6%) patients received an articulating cement spacer, 35 (28.9%) received a real-component low-friction spacer, and 26 (21.5%) received a static spacer. No positive SFCs were identified with real-component low-friction spacers compared to 18.3% with articulating cement spacers and 11.5% with static spacers ($p=0.01$). No patients who received a real-component low-friction spacer required repeat debridement within 90 days while 11.8% with articulating cement spacers and 4.5% with static spacer required repeat debridement ($p=0.14$). Articulating cement and static spacers had significantly higher rates of positive SFC with any number of colony-forming units (CFU). No other statistically significant differences in rates of positive sonication/tissue cultures or need for repeat debridement within 90 days were identified (Table 1).

DISCUSSION AND CONCLUSION: Multiple types of spacers may be used in the treatment of PJI with two-stage exchange arthroplasty. Real-component, low-friction spacers provide functional benefits to the patient and facilitate second-stage surgery without compromising the treatment of PJI. The results of this study suggest that low-friction spacers may be used in both hip and knee PJI without an increased risk of repeat debridement when compared to static and articulating cement spacers. Despite the use of real components, low-friction spacers showed decreased bacterial colonization compared to other spacer types supporting the use of low-friction spacers following resection total knee arthroplasty (TKA) and total hip arthroplasty (THA) for the treatment of PJI.

	n*	Positive Sonicate (Any CFU)	Positive Sonicate (>5 CFU)	Positive Tissue Culture	Repeat Debridement within 90 days
Hip					
Articulating Cement	33 (28)	6 (18.2%)	1 (3.0%)	1 (3.0%)	2 (7.1%)
Low Friction	12 (11)	0 (0%)	0 (0%)	2 (16.7%)	0 (0%)
Static	12 (10)	1 (8.3%)	1 (8.3%)	1 (8.3%)	0 (0%)
p-value (Fischer exact)		0.31	0.67	0.20	1.0
Knee					
Articulating Cement	27 (23)	5 (18.5%)	1 (3.7%)	0 (0%)	4 (17.4%)
Low Friction	23 (17)	0 (0%)	0 (0%)	1 (4.3%)	0 (0%)
Static	14 (12)	2 (14.3%)	1 (7.1%)	0 (0%)	1 (8.3%)
p-value (Fischer exact)		0.08	0.69	0.58	0.18
Combined					
Articulating Cement	60 (51)	11 (18.3%)	2 (3.3%)	1 (1.7%)	6 (11.8%)
Low Friction	35 (28)	0 (0%)	0 (0%)	3 (8.6%)	0 (0%)
Static	26 (22)	3 (11.5%)	2 (7.7%)	1 (3.8%)	1 (4.5%)
p-value (Fischer exact)		**0.01**	0.25	0.18	0.14

**Number in parenthesis indicates how many patients had at least 90 days follow up and were included in the repeat debridement analysis*