

# Recurrent Prosthetic Joint Infection is Associated with Infecting Bacteria and Polymicrobial Infection

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## INTRODUCTION:

Some patients require multiple antibiotic-impregnated spacers for prosthetic joint infection (PJI). Differences in infectious etiology may be associated with the risk of recurrent infection. We compared microbiology data obtained from intraoperative cultures of patients who successfully cleared a PJI for two years or more following insertion of a single spacer with those who failed to clear their infection and required more than one spacer.

## METHODS:

A retrospective chart review was performed on ninety-six patients (39 hip, 50 knee, 7 shoulder) who had a resection and placement of an antibiotic spacer between 2009-2020 to treat a PJI meeting Musculoskeletal Infection Society (MSIS) criteria and with a minimum 2-year follow-up after the resection. Sixty-seven (70%) received a single spacer prior to infection-free re-implantation ("single-spacer" group). Twenty-nine (30%) experienced repeat infection managed operatively with a second antibiotic spacer within 2 years of their original resection ("failed-spacer" group). Intraoperative culture results from the initial arthroplasty resection and spacer implantation were compared between failed-spacer and single-spacer patients. Statistical significance was determined using Fisher's Exact test.

## RESULTS:

Sixty-eight unique bacterial strains were isolated from the single-spacer group, and 38 unique bacterial strains were isolated from the failed-spacer group. The most common isolates are listed in table 1. Notably, coagulase-negative staphylococcus was significantly more common among single-spacer than failed-spacer isolates (32.4% vs. 2.6%,  $p < 0.001$ ). Methicillin-sensitive Staphylococcus aureus was the most common isolate among failed-spacers (26.3% vs. 19.1% single-spacers,  $p = 0.27$ ), and failed-spacer infections were significantly more likely to harbor a strain of methicillin-resistant Staphylococcus aureus than single-spacers (18.4% vs. 4.4%,  $p = 0.024$ ). Antibiotic spacer failure was associated with an 8.1-fold greater odds of polymicrobial infection—defined as  $\geq 1$  bacterial species isolated from intraoperative cultures—than single-spacers (28% vs. 4.5%,  $p = 0.003$ )

## DISCUSSION AND CONCLUSION:

The odds of revision failure necessitating repeat antibiotic spacer implantation are significantly increased among patients who were infected with MRSA, and decreased among those infected with CoNS. The greatest predictor of reinfection requiring repeat spacers was a polymicrobial infection. These findings reinforce prior literature reports of the poor prognosis of staphylococcus aureus PJI. Furthermore, this work highlights the significance of polymicrobial infections as a potential target for future evidence-based interventions in order to decrease risk of revision arthroplasty failure following PJI.

Isolated Organism	Single-spacer, n (%)	Failed-spacer, n (%)
Coagulase negative Staphylococcus	22 (32.4)	1 (2.6)
Corynebacterium Striatum	1 (1.5)	2 (5.3)
Enterococcus Faecalis	4 (5.9)	4 (10.5)
Group B Streptococcus	5 (7.4)	1 (2.6)
MRSA	3 (4.4)	7 (18.4)
MSSA	13 (19.1)	10 (26.3)
Pseudomonas Aeruginosa	3 (4.4)	3 (7.9)
Staphylococcus Lugdunensis	4 (5.9)	1 (2.6)
Streptococcus Mitis	3 (4.4)	0 (0)
VRE Enterococcus Faecium	1 (1.5)	2 (5.3)

\*common = present in cultures from >1 patient across all 96 subjects.