

# The Incidence, Risk Factors and Microbial Profile of Infected Endoprosthetic Reconstructions

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## INTRODUCTION

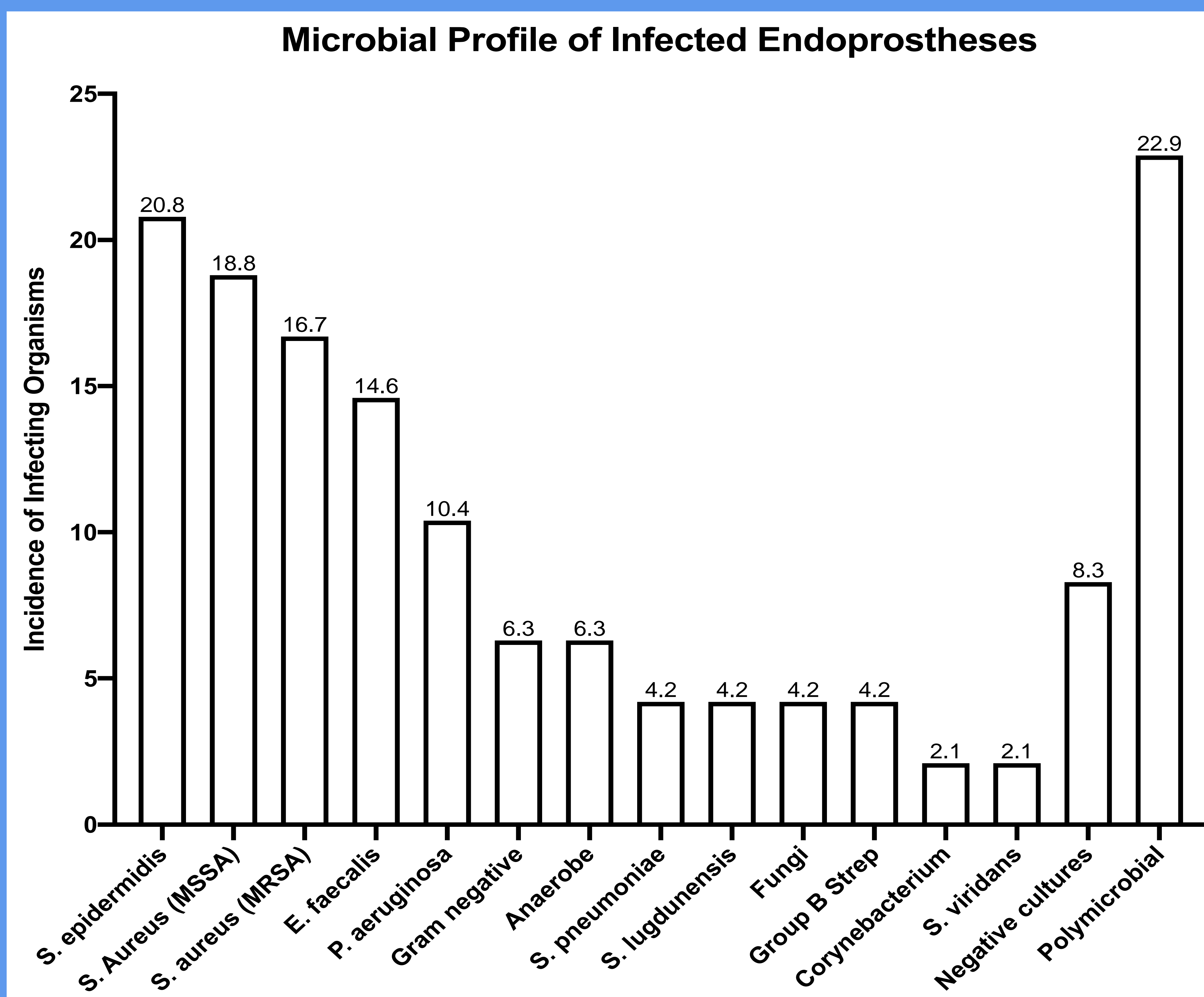
Periprosthetic infection is one of the most feared complication following endoprosthetic reconstruction and results in revision surgeries, amputation or even death. Understanding the risk factors for and microbial profile of these infections is crucial to the development of effective prevention and treatment strategies. The objective of this study was to utilize a large database of endoprostheses to describe the incidence of and risk factors for infection and to characterize the microbial profile of such infections in order to help guide management.

## Objectives

1. To determine the incidence of and risk factors for infection following endoprosthetic reconstruction.
2. To determine the microbial profile of infected endoprostheses to ultimately develop effective prevention and treatment strategies.

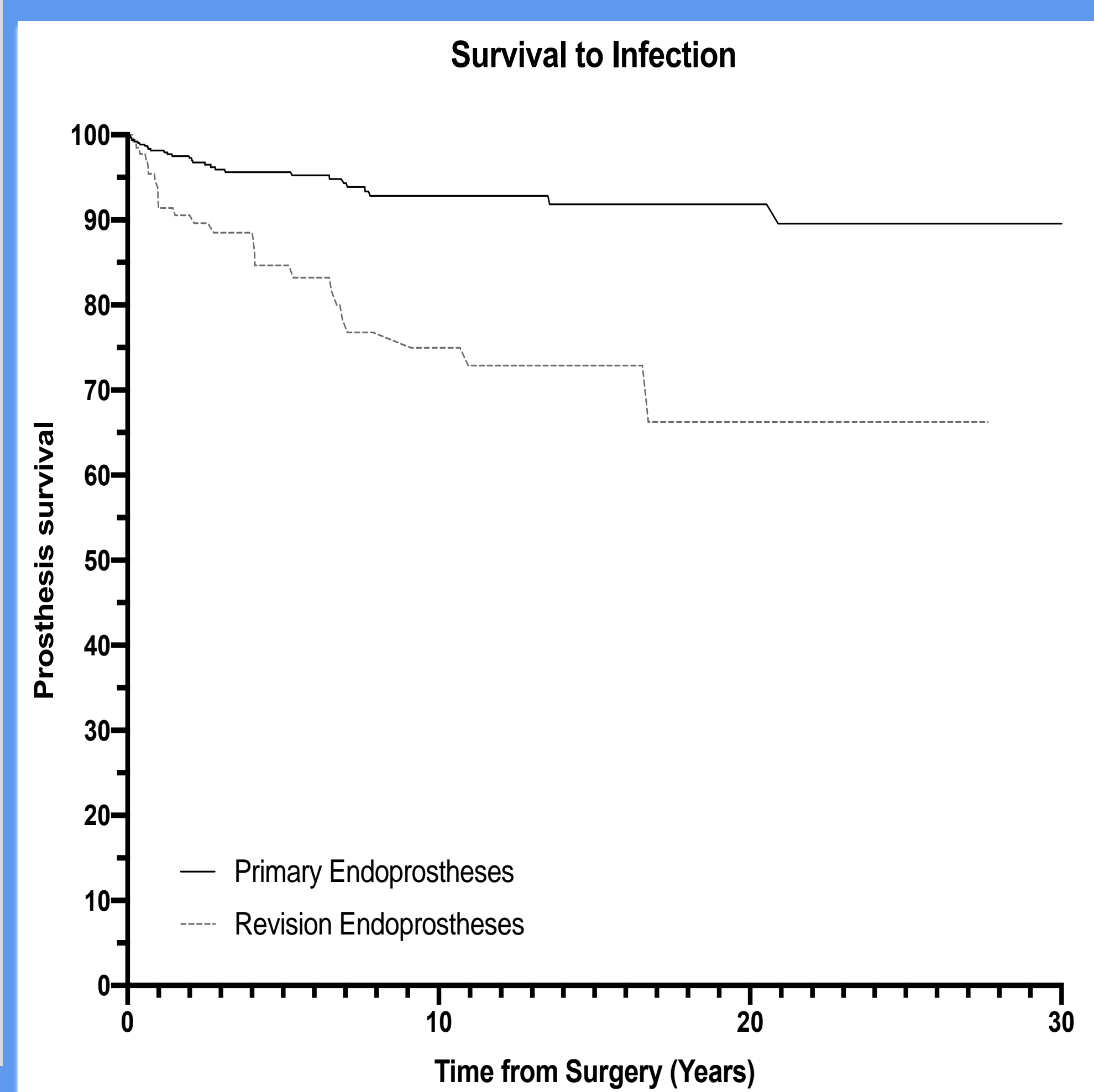
## METHODS

A retrospective review of 813 endoprosthetic reconstructions from January 1, 1980 to December 31, 2019 at a single institution was performed. Demographic, oncologic, procedural and outcome data was collected and analyzed. The primary outcome of interest was infection resulting in revision surgery or amputation. Prostheses that became infection were compared with uninfected prostheses in order to identify risk factors. Cultured organism(s) were analyzed and stratified by anatomic location.



**Figure 1:** Microbial profile of infected endoprostheses showing that most infections were polymicrobial in nature. *S. aureus*, *S. epidermidis* and *E. faecalis* were the most common monomicrobial infections. Culture data for 6 infected endoprosthetic reconstructions were not available. Gram negative organisms included *Enterobacter cloacae*, *Citrobacter koseri* and *Stenotrophomonas maltophilia*. Anaerobic organisms included *Propionibacterium acnes*, *Actinomyces neuui* and *Finegoldia magna*. Fungi included *Candida albicans* and *Rhodotorula mucilaginosa*.

**Figure 2:** Kaplan-Meier curve showing prostheses survival to infection for primary and revision endoprostheses



**Table 1:** Risk Factors for Polymicrobial Infections (Culture data not available for 6 infected endoprosthetic reconstructions)

	MONOMICROBIAL INFECTIONS (n = 37)	POLYMICROBIAL INFECTIONS (n = 11)	P-VALUE
Age at time of surgery (years) (Mean/Median)	40.9 (40.1)	52.5 (57.9)	0.028
Gender (M:F)	18:19	6:5	0.483
Wound Complications	18.9% (7)	81.8% (9)	< 0.0001
Chemotherapy	27.0% (10)	36.4% (4)	0.89
Radiation Therapy	5.4% (2)	27.3% (3)	0.158

## RESULTS

54 out of 813 (6.6%) endoprosthetic reconstructions resulted in infection. The incidence of infection was higher for revision implants (25/187, 13.4%) compared with primary implants (29/626, 4.6%). Age at the time of surgery was significantly higher in the infected group (42.9 +/- 19.6 years) versus the uninfected group (36.1 +/- 21.2 years, p = .014). No significant association was found between infection and perioperative chemotherapy (p = 0.39) or perioperative radiation therapy (p = 0.63). Culture data was unavailable for 6 infected endoprostheses. *S. aureus* and *S. epidermidis* were the most commonly cultured organisms with an incidence of 35.5% (17/48) and 20.8% (10/48), respectively. 22.9% (11/48) of cultures were polymicrobial and 8.3% (4/48) of cultures did not grow any organisms. 47.0% (8/17) of *S. aureus* infections were methicillin-resistant and 42.9% (3/7) of *Enterococcal* infections were vancomycin-resistant.

## Conclusion

Comprehensive knowledge of the risk factors for and the microbial profile of endoprosthetic infections is crucial to developing effective prevention and treatment strategies. This study demonstrates a relatively high incidence of polymicrobial and antibiotic-resistant infections. Continually maintaining an awareness of these rates is paramount when determining effective antibiotic regimens.