Pseudomonas Prosthetic Joint Infections: Is There a Role for Monotherapy?

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INTRODUCTION:

Pseudomonas species are a less common but devastating pathogen family in prosthetic joint infections (PJI). Despite advancements in management, *Pseudomonas* PJI remains particularly difficult to treat due to fewer antibiotic options and robust biofilm formation. The purpose of this study was to better evaluate outcomes after *Pseudomonas* PJI treatment.

METHODS:

All hip or knee PJIs, at a single institution, with positive *Pseudomonas* culture were analyzed. Fifty-one patients (29 hips and 22 knees) meeting inclusion criteria were identified. The primary outcome of interest was infection clearance at 1-year after surgical treatment, defined as reassuring aspirate without ongoing antibiotic treatment or death within one year postoperatively. Monomicrobial and polymicrobial infections were evaluated separately.

RESULTS:

Among monomicrobial PJIs, ten (50.0%) patients were clear of infection at one year postoperatively. Patients treated with 2-stage exchange (n=11) had a 1-year clearance rate of 54.5% compared to 60.0% with DAIR (n=5) and 25.0% with resection or amputation (n=4). Two of six patients treated with fluoroquinolone monotherapy met 1-year infection clearance, despite fluoroquinolone sensitivity, compared to four of five patients meeting 1-year clearance when treated with combined intravenous and oral therapy for at least 6 weeks. Resistance to anti-pseudomonal agents was infrequent (20%, n=4/20), and three of ten mono- and polymicrobial PJI patients with recurrent *Pseudomonas* PJI developed resistance to anti-pseudomonal therapy. Polymicrobial infections were the most common presentation (54.9%) of *Pseudomonas* positive PJI with a mortality rate of 46.4% (n=13/28) at a median follow-up of 4.2 years [IQR: 3.4-5.7].

DISCUSSION AND CONCLUSION:

Despite surgical and antibiotic treatment regimens consistent with traditional treatment algorithms, our data portrays poor clearance rate of *Pseudomonas* PJI with relatively poor outcomes in patients treated with oral or intravenous monotherapy. *Pseudomonas* infections are difficult to eradicate and likely require deviations from classical therapeutic protocols to improve treatment success.

Table 3. PJI Culture and Antibiotic Data

		Clearance at 1 year		
	Overall	Re-infection in 1 year	Clear of Infection at 1 year	p
N	20	10	10	
# of *Pseudomonas* Positive Cultures, median [IQR]	4.00 [1.75, 4.00]	4.00 [3.25, 6.25]	4.00 [1.25, 4.00]	0.299
Antibiotic Susceptibility, N (%)				
Pan-Sensitive *Pseudomonas*	16 (80.0)	10 (100.0)	6 (60.0)	0.087
Fluoroquinolone Resistance	3 (15.0)	0 (0.0)	3 (30.0)	0.211
3rd/4th Gen Cephalosporin Resistance	2 (11.1)	0 (0.0)	2 (22.2)	0.471
Aminoglycoside Resistance	2 (11.8)	0 (0.0)	2 (25.0)	0.206
Carbapenem Resistance	1 (5.9)	0 (0.0)	1 (12.5)	0.471
Antibiotic Regimen, N (%)				0.288
combo-concomitant*	5 (26.3)	1 (11.1)	4 (40.0)	
IV-to-PO tail**	4 (21.1)	1 (11.1)	3 (30.0)	
mono-IV***	4 (21.1)	3 (33.3)	1 (10.0)	
mono-PO****	6 (31.6)	4 (44.4)	2 (20.0)	
Total Antibiotic Duration in Weeks, median [IQR]	7.00 [6.00, 12.00]	6.00 [6.00, 12.00]	8.50 [6.00, 11.50]	0.604
IV Antibiotic Type, N (%)				0.674
3rd/4th gen cephalosporin	10 (76.9)	5 (100.0)	5 (62.5)	
3rd/4th gen cephalosporin + aminoglycoside	2 (15.4)	0 (0.0)	2 (25.0)	
carbapenems/monobactams	1 (7.7)	0 (0.0)	1 (12.5)	
Suppressive Antibiotic Treatment (>1 year), N (%)	1 (5.0)	1 (10.0)	0 (0.0)	1.000

*combo-concomitant = IV cefepime + PO ciprofloxacin, dual IV cefepime + aminoglycoside;

**IV-to-PO tail = IV cefepime transition to post-IV tail with PO ciprofloxacin

***mono-IV = IV cefepime, IV meropenem

****mono-PO = PO ciprofloxacin