E. coli Periprosthetic Joint Infections: Poor Infection Clearance at One Year

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BACKGROUND

- *Escherichia Coli* (*E. coli*) is a gram-negative rod that can cause devastating periprosthetic joint infections (PJIs) following total hip and knee replacements (THA/TKA).
- DAIRs, 2-stage revisions, and Arthrodeses/Resection Arthroplasties are all surgical treatment options for *E. coli* PJIs, but minimal outcomes literature exists.

PURPOSE

- **Investigate the outcomes of *E. coli* PJI in patients with THA or TKA.**
- **We hypothesized that DAIR has inferior outcomes compared to other treatment modalities for THA/TKA *E. coli* PJI.**

METHODS

- Retrospective review of Duke's EMR from 2009-2020 identified 21 patients that met MSIS criteria for *E. coli* hip/ knee PJI.
- Primary outcome: 1-year infection clearance – infection eradication sans antibiotics or further surgeries for 1 year after completion of standard postop antibiotics.
- Minimum follow-up: 1 year.
- Descriptive statistics were used to compare patients with/without the primary outcome.

RESULTS

- The final analysis included 21 patients (mean age 66.6 yrs, 47.6% male, 23.8% non-Caucasian, 38.1% knees).
- There were 11 acute, 8 acute hematogenous, and 2 chronic PJIs.
- Several patients had recent gastrointestinal/urinary tract surgery (14.3%), recurrent urinary tract infections (9.5%), or ≥1 *E. coli* urine culture ≤1 mo pre-PJI (14.3%).

	Overall	Not Clear at 1 Yr	Clear at 1 Yr	p-value
Months from Most Recent Surgery, median [IQR]	1 [0.58, 9]	0.72 [0.53, 2.00]	11.50 [7.00, 94.00]	**0.014**
Symptom Acuity, n (%)				0.103
Acute	5 (23.8)	4 (28.6)	1 (14.3)	
Acute hematogenous	14 (66.7)	10 (71.4)	4 (57.1)	
Chronic	2 (9.5)	0 (0.0)	2 (28.6)	
Index PJI Procedure, n (%)				**0.001**
2-stage	3 (14.3)	0 (0.0)	3 (42.9)	
DAIR	14 (66.7)	13 (92.9)	1 (14.3)	
Arthrodesis/Resection Arthroplasty	4 (19.0)	1 (7.1)	3 (42.9)	

TABLE 1. PJI Characteristics

- Surgical treatments included DAIR (66.7%), 2-stage revision (14.3%), Girdlestone/Resection Arthroplasty (14.3%), and fusion (4.8%), with 7.1%, 100%, 66.7%, and 100% 1-year infection clearance, respectively, and 33.3% 1-year infection clearance overall (p=.001).
- Of patients who received DAIR, 100% had symptoms for ≤ 1 mo and 42.9% had symptoms for ≤ 8 d.
- Common reasons for treatment failure were reinfection requiring surgery (57.1%) and chronic antibiotics (38.1%).
- Patients clear at 1 year had a significantly longer mean time from most recent surgery to index PJI surgery (48.7 vs 7mo) and more acute hematogenous than acute or chronic infections (54.6% vs 27.3% vs 18.2%).
- Patients who were not clear at 1 year had significantly more acute infections (80% vs 20% acute hematogenous).
- The *E. coli* PJI persisted in 23.8% of patients.
- Outcomes at final follow-up included Girdlestone/Resection Arthroplasty (28.6%), original prosthetic (28.6%), new prosthetic (19%), above knee amputation (9.5%), destination spacer (9.5%), and arthrodesis (4.8%).

	Overall	2-stage	DAIR	Arthrodesis/ Resection*	p-value
1-year Infection Clearance, n (%)	7 (33.3)	3 (100.0)	1 (7.1)	3 (75.0)	**0.001**
Treatment Failure at Last Follow-up, n (%)	14 (66.7)	1 (33.3)	12 (85.7)	1 (25.0)	**0.029**
Reinfection Requiring Surgery, n (%)	12 (57.1)	1 (33.3)	10 (71.4)	1 (25.0)	0.279
Infection Controlled on Chronic Antibiotics**, n (%)	8 (38.1)	0 (0.0)	8 (57.1)	0 (0.0)	**0.049**
Death <1 yr, n (%)	1 (4.8)	0 (0.0)	1 (7.1)	0 (0.0)	1.000
Death at Last Follow-up, n (%)	10 (47.6)	1 (33.3)	8 (57.1)	1 (25.0)	0.455
90-day All-Cause Readmission, n (%)	10 (47.6)	0 (0.0)	9 (64.3)	1 (25.0)	0.099
90-day Orthopaedic Readmissions, n (%)	8 (38.1)	0 (0.0)	6 (42.9)	2 (50.0)	0.528
All-Cause Return to Operating Room, n (%)	15 (71.4)	3 (100.0)	11 (78.6)	1 (25.0)	0.068
Recurrent/Persistent *E. coli* PJI, n (%)	5 (23.8)	1 (33.3)	4 (28.6)	0 (0.0)	0.589
Recurrent/Persistent PJI, n (%)	10 (47.6)	1 (33.3)	9 (64.3)	0 (0.0)	0.076

TABLE 2. Outcomes

CONCLUSION

- *E. coli* PJI 1-year infection clearance is poor, with DAIR being the most common yet least effective surgical treatment.
- This may be due to the persistence of *E. coli* biofilms, which may be better removed with prosthetic-extracting surgeries.
- This may support the use of 2-stage revisions or Arthrodesis/Resection Arthroplasty over DAIRs, when feasible, in patients with *E. coli* PJI.

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