Contemporary Results of Debridement and Implant Retention in Knee Periprosthetic Joint Infection: Results of 239 Patients

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Background

- Periprosthetic joint infection (PJI) is the leading cause of reoperation for total knee arthroplasty (TKA) [1].
- Debridement, antibiotics, and implant retention (DAIR) is a common treatment for acute PJI and occasionally used to treat recurrent PJI for cases with unresectable components [2].

Purpose

- The primary purpose of this study is to identify risk factors for reinfection and evaluate the outcomes of DAIR.
- The secondary purpose is to compare outcomes of a "primary DAIR" for PJI, and a "reinfection DAIR"; performed after an exchange arthroplasty or prior DAIR.

Methods

- Retrospective cohort study of patients who underwent DAIR for PJI at a single institution from 1/2017 – 11/2025 with 40 different orthopedic surgeons.
- Exclusion Criteria - Unicompartmental knee arthroplasty, insufficient follow-up, those who underwent "double DAIR" procedures, and those who were unable to obtain intravenous lines for antibiotics postoperatively.
- Subgroup analysis was performed on DAIR patients who had prior history of treatment for knee PJI (two-stage exchange arthroplasty or prior DAIR) and compared to patients who had no PJI treatment history.
- Reinfection rates at 30-days, 90-days, 1-year, 2-years, and 3-years were recorded

Results

- 239 patients identified, significant differences in infection type, McPherson host grade, extremity grade, and presence of sinus tracts between Primary DAIR and Reinfection DAIR groups (Table 1).

Table 1. Patient Characteristics

	Primary DAIR (N = 189)	Reinfection DAIR (N = 50)	*P*-Value
Age (years)	68.8 ± 10.7	68.6 ± 9.6	0.893
BMI	32.3 ± 6.8	32.4 ± 8.1	0.941
Women	82 (43.4%)	23 (46.0%)	0.741
Smoking Status			
Never	109 (57.7%)	27 (54.0%)	NS
Former	65 (34.4%)	20 (40.0%)	NS
Current	14 (7.4%)	3 (6.0%)	NS
Medical Comorbidities			
ASA	2.9 ± 0.6	3.1 ± 0.5	NS
CCI	3.7 ± 3.4	5.2 ± 4.5	**0.048**
ECI	5.8 ± 4.0	8.2 ± 5.3	**0.009**
Infection Type			
1 (acute)	65 (34.4%)	4 (8.0%)	***P* < 0.001**
2 (acute hematogenous)	87 (46.0%)	9 (18.0%)	***P* < 0.001**
3 (chronic)	37 (19.6%)	37 (74.0%)	***P* < 0.001**
Host Grade			
A	50 (26.5%)	7 (14.0%)	0.066
B	108 (57.1%)	27 (54.0%)	0.690
C	31 (16.4%)	16 (32.0%)	**0.014**
Extremity Grade			
1	125 (66.1%)	3 (6.0%)	***P* < 0.001**
2	50 (31.7%)	31 (62.0%)	***P* < 0.001**
3	4 (2.1%)	16 (32.0%)	***P* < 0.001**
Presence of Sinus Tract	37 (19.6%)	19 (38.0%)	**0.006**

Results

- There were significantly more revision components in the Reinfection DAIR group (Table 2).

Table 2. Surgical Characteristics

	Primary DAIR (N = 189)	Reinfection DAIR (N = 50)	*P*-Value
Knee Prosthesis in Place			
Primary Components	158 (83.6%)	9 (18.0%)	***P* < 0.001**
CCK	12 (6.3%)	19 (38.0%)	***P* < 0.001**
Hinged Components	6 (3.2%)	14 (28.0%)	***P* < 0.001**
DFR	13 (6.9%)	8 (16.0%)	**0.043**

- There were more infections caused by gram negative micro-organisms; including Pseudomonas aeruginosa and a higher number of identified microorganisms in the Reinfection DAIR group.

Table 3. Infecting Microorganism and Postoperative Antibiotics

	Primary DAIR (N = 189)	Reinfection DAIR (N = 50)	*P*-Value
Infecting Microorganism			
MSSA	54 (28.6%)	16 (32.0%)	0.636
MRSA	12 (6.3%)	5 (10.0%)	0.372
CoNS	20 (10.6%)	6 (12.0%)	0.775
Other Staph Species	14 (7.4%)	0	**0.046**
Streptococcus Species	22 (11.6%)	1 (2.0%)	0.055
Pseudomonas	6 (3.2%)	9 (18.0%)	***P* < 0.001**
Other	32 (16.9%)	7 (14.0%)	0.618
Culture Negative	30 (15.9%)	3 (6.0%)	0.104
Gram Positive	131 (69.3%)	34 (68.0%)	0.858
Gram Negative	38 (20.1%)	18 (36.0%)	**0.018**
Mixed Gram Negative and Gram Positive	10 (5.3%)	6 (12.0%)	0.091
Fungal	4 (2.1%)	2 (4.0%)	0.608
Number of Identified Microorganisms (range)	1.0 (0 – 4)	1.3 (0 – 4)	**0.019**
Monomicrobial	167 (88.4%)	39 (78.0%)	0.059
>2 Microorganisms	22 (11.6%)	11 (22.0%)	0.059
Postoperative Antibiotics (%)			
IV Vancomycin	43 (22.8%)	8 (16.0%)	0.300
IV Rocephin	46 (24.3%)	6 (12.0%)	0.060
IV Ancef	43 (22.8%)	10 (20.0%)	0.677
IV Daptomycin	30 (15.9%)	11 (22.0%)	0.307
Other	33 (17.5%)	17 (34.0%)	**0.011**
Antibiotic Duration (weeks)	6.1 ± 1.4	6.2 ± 1.2	0.583

- There were no significant differences in postoperative reinfection at any timepoint between groups (Table 4).
- There were more amputations in the Reinfection DAIR group (22.0% versus 4.8%, $p < 0.001$).
- The overall reinfection rate at 3-years postop was 59.0%.

Table 4. Reinfection and Unfortunate Outcomes After DAIR

	Primary DAIR (N = 189)	Reinfection DAIR (N = 50)	Overall (N = 239)	*P*-Value
Reinfection Timepoint				
30-day	14/189 (7.4%)	5/49 (10.2%)	19/238 (8.0%)	0.520
90-day	35/185 (18.9%)	10/48 (20.8%)	45/233 (19.3%)	0.765
1-year	59/169 (34.9%)	17/46 (37.0%)	76/215 (35.3%)	0.797
2-year	74/157 (47.1%)	22/36 (61.1%)	96/193 (49.7%)	0.130
3-year	74/133 (55.6%)	24/33 (72.7%)	98/166 (59.0%)	0.074
Unfortunate Outcomes				
Amputation	9 (4.8%)	11 (22.0%)	20 (8.4%)	***P* < 0.001**
Died Within 90 Days of DAIR	1 (0.5%)	1 (2.0%)	2 (0.8%)	0.375
Died Within 1 Year of DAIR	13 (6.9%)	7 (14.0%)	20 (8.4%)	0.106

Results

- Overall, risk factors for reinfection at 2-years included the presence of ≥2 microorganisms on cultures and performing DAIR for chronic PJI (Table 5).

Table 5. Risk Factors for Reinfection 2-Years After Reimplantation

Risk Factor	OR (95% CI)	*P*-Value
Chronic Infection	2.0 (1.05-3.97)	**0.037**
Was number of identified microorganisms > 2	2.7 (1.08-6.60)	**0.033**
Age	1.0 (0.95-1.01)	0.145
Gender	0.9 (1.01-1.21)	0.618

Conclusions

- Our study found that the overall reinfection rate of TKA DAIR is 49.7% at 2-years and the reinfection rate similar regardless of whether the patient has a prior history of treatment for PJI, however there is a higher risk of amputation in this group.
- Risk factors for reinfection included the presence of ≥2 microorganisms on cultures and chronic infections.

References

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