The Management of Synchronous Periprosthetic Hip and Knee Joint Infection: High Rates of Reinfection and Reoperation

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INTRODUCTION:

The rising number of patients who previously underwent multiple hip and knee replacements predicts an increase in historically rare cases of synchronous periprosthetic joint infection (PJI) or concurrent PJI in multiple joints. Our study aimed to evaluate rates of re-infection, re-operation, and mortality following surgical management of synchronous PJI.

METHODS: A total of 40 patients presenting with concomitant PJI in more than one hip or knee, within a 90-day period, between 2000 and 2024 were retrospectively identified (bilateral knee arthroplasty (n=35) and ipsilateral knee and hip arthroplasty (n=5)). Re-infection was defined as treatment failure secondary to infection based on MSIS criteria. Re-operation included any unplanned aseptic or septic procedure following initial surgical management. A multivariate regression analysis was performed to evaluate risk factors associated with re-infection and re-operation while controlling for various patient and surgical characteristics. Mean follow up was 3.6 years (range: 0.2-12.0).

RESULTS:

Reinfection (n=17; 42.5%), and unplanned re-operation (n=15; 37.5%) rates were high. Re-operations included 2 (13.3%) aseptic revisions and 13 (86.7%) septic revisions for re-infection. Two patients died at final follow-up (5%) both within 1-year of surgical intervention. Most patients underwent either debridement, antibiotics, and implant retention (DAIR) of both affected joints (n=28; 70%) or simultaneous bilateral 2-stage revision arthroplasty (n=9, 23%). Four patients (10%) had discordant culture organisms in the two affected joints at the time of surgery. Higher comorbidity burden was a risk factor for reinfection (HR=1.6; *p*=0.048) and re-operation (HR:2.3; *p*=0.03). Additional host factors including BMI, infecting organism, and previous revision history were not associated with re-infection or re-operation (all *p*-values >0.05).

DISCUSSION AND CONCLUSION: In the largest series to date, patients with synchronous PJIs had high rates of re-operation and re-infection, however the rate of mortality was lower than previously reported. Higher comorbidity burden was associated with reinfection. This high-risk population should be counseled on the risks of treatment failure.

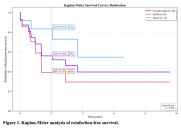

Figure 1. Kaplan-Meier analysis of reinfection-free survival.

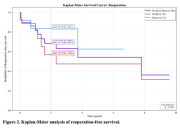

Figure 2. Kaplan-Meier analysis of reoperation-free survival.

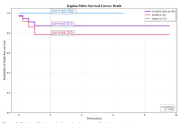

Figure 3. Kaplan-Meier analysis evaluating mortality between cohorts.

Table 1. Patient Demographics

Variable	Synchronous PJI (n=40)
Age	64.5 ± 7.7
Sex (F/M)	26/14
ASA	
1	0 (0%)
2	14 (35.0%)
3	15 (37.5%)
4	0 (0%)
BMI	32.4 ± 6.7
Smoking Status	
Never	11 (27.5%)
Former	2 (5.0%)
Current	27 (67.5%)
CCI	3.8 ± 1.7
Follow-Up	3.6 ± 3.1
Joint Involved	
Bilateral Knees	35 (87.5%)
Ipsilateral Knee and Hip	5 (12.5%)
Treatment	
I&D/I&D	28 (70)
2-Stage/2-Stage	9 (22.5)
I&D/2-Stage	1 (2.5)
1-Stage/2-Stage	1 (2.5)
Hip Disarticulation	1 (2.5)
Time Between Index and Synchronous PJI	6.0 ± 5.8
Septic On Presentation	5 (12.5%)
Positive Blood Cultures	7 (17.5%)
Labs	
WBC	10.02 ± 4.23
CRP	155.59 ± 122.86
ESR	62.73 ± 40.20
Aspiration WBC	87,270.71 ± 125,038.10
Aspiration PMNs	82.75 ± 16.58
Purulence Noted Intra-Op	29 (72.5%)
Previous History of Infection	10 (25.0%)
On Immunosuppression	9 (22.5%)
Chronic Suppression	19 (47.5%)

Table 2. Rates of Reinfection, Re-Operation, and Mortality Among Included Patients.

Re-Infection	17 (42.5%)
Re-Operation	
Unplanned	15 (37.5%)
Staged Treatment	8 (20%)
Mortality	2 (5.0%)

Table 3. Cox Proportional Hazards Model Evaluating Risk Factors for Re-Infection and Re-Operation

Variable	Hazard ratio (95% CI)	*p*-value
Re-Infection		
BMI	0.97 (0.89-1.05)	0.117
Previous History of Revision	1.74 (0.41-7.32)	0.422
Current Smoker	0.86 (0.31-23.56)	0.961
Liver Disease	0.21 (0.02-2.12)	0.285
Diabetes	1.18 (0.09-15.24)	0.980
Charlson Comorbidity Score (CCI)	**1.63 (1.00-2.63)**	**0.048**
Immunosuppressed	2.37 (0.45-14.42)	0.289
Staphylococcal infection	0.68 (0.18-2.68)	0.574
DAIR (vs Spacer)	3.86 (0.72-12.88)	0.131
Acute hematogenous infection (vs. Acute postoperative)	0.45 (0.01-33.76)	0.719
Chronic infection (vs. Acute postoperative)	0.12 (0.00-32.35)	0.388
Re-Operation		
BMI	0.83 (0.66-1.03)	0.085
Previous History of Revision	0.32 (0.00-3.31)	0.380
Current Smoker	0.05 (0.01-89.08)	0.941
Liver Disease	0.10 (0.00-3.06)	0.218
Diabetes	5.12 (0.05-5.08)	0.269
Charlson Comorbidity Score (CCI)	**2.30 (1.08-4.69)**	**0.031**
Immunosuppressed	2.45 (0.26-22.80)	0.435
Staphylococcal infection	0.19 (0.02-1.08)	0.135
DAIR (vs Spacer)	1.20 (0.18-20.40)	0.104
Acute hematogenous infection (vs. Acute postoperative)	0.48 (0.00-75.71)	0.777
Chronic infection (vs. Acute postoperative)	0.47 (0.00-237.89)	0.905