Second-Site Periprosthetic Joint Infection After Subsequent Primary Hip or Knee Arthroplasty

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Introduction

Periprosthetic joint infections (PJI) can arise anytime in the lifetime of a patient. Therefore, patients who have multiple prosthetic joints are at risk for developing multiple PJIs. Polyarticular PJI can be classified as either synchronous or metachronous. Synchronous PJIs present simultaneously in two or more joints. Metachronous PJIs (MPJI) occur in two or more joints after a disease-free period. Incidence of MPJI varies in the literature from 8-20%.[1]

Known risk factors associated with MPJI include Rheumatoid Arthritis, sepsis or SIRS, infection with MRSA, ≥3 revision arthroplasties, longer length of stay in the hospital, and an index TKA PJI.[2]

Only a few studies specifically investigate MPJI in subsequent primary arthroplasties. These studies suggest that patients who have a history of treated PJI are at an increased risk of developing a MPJI in a second arthroplasty site.[3-5]

Aims and Objectives

The objective of our study is to determine (1) MPJI prevalence, (2) demographic and medical comorbidity risk factors, (3) characteristics of index PJI, (4) microbiology profiles, and (5) clinical outcomes associated with MPJI after a subsequent primary arthroplasty

Methods

We identified 1,654 patients who were treated for either a hip or knee PJI between 2013-2022 at our institution. We identified 77 patients who subsequently underwent a primary THA or TKA after completing treatment for an initial PJI. We identified patients who developed a second-site PJI following a subsequent arthroplasty. The rate of second-site PJI was calculated, and risk factors were assessed by comparing characteristics of patients who had only a single PJI (SPJI) with those who developed a MPJI.

A retrospective review of the electronic medical record was conducted for each participant. Medical comorbidities and basic demographic information was collected for each patient at the time of their index PJI surgery. Orthopaedic-specific information was also collected at the time of index PJI. Prosthesis-related events such as periprosthetic fracture or aseptic revision were also recorded. Additionally, data regarding major non-prosthetic, culture-positive infections that occurred within 6 months of the index PJI was collected.

Characteristics of the index PJI were obtained from the medical record. Microbiology data was obtained from intraoperative cultures at the time of index PJI surgery. Outcomes of PJI included clinical eradication, non-eradication (permanent spacer, chronic antibiotics) or failure (fusion, Girdlestone, or amputation).

Results

Table 1a. Characteristics of index PJI	Single PJI (n=68)	Metachronous PJI (n=9)	P value
Sex, M/F (%)	30/38 (44.1/55.9)	3/6 (33.3)/(66.7)	0.539[1]
Age, y (SD)	65.4 (9.0)	66.1 (12.9)	0.557[2]
BMI (SD)	33.3 (7.6)	30.4 (6.0)	0.222[2]
> 1 prosthesis at initial infection, n (%)	14 (20.6)	4 (44.4)	0.112[1]
Revision surgery before PJI, n (%)	17 (25.0)	3 (33.3)	0.592[1]
Time to PJI, wk (SD)	104.1 (143.4)	27.5 (48.6)	0.003[2]*
Acute PJI (<1 mo), n (%)	18 (26.5)	3 (33.3)	0.664[1]
Acute-delayed PJI, n (%)	21 (30.9)	4 (44.4)	0.414[1]
Delayed PJI (>12 mo), n (%)	29 (42.6)	2 (22.2)	0.240[1]
Recurrent index PJI, n (%)	15 (22.1)	4 (44.4)	0.143[1]
Two-stage resection arthroplasty, n (%)	49 (72.1)	8 (88.9)	0.279[1]
>1 treatment method	14 (20.6)	4 (44.4)	0.112[1]
Bacteremia, n (%)	9 (13.2)	1 (11.1)	0.859[1]
ASA Status (I/ II/ III/ IV)	(0/ 19/ 44/ 5)	(0/ 2/ 7/ 0)	0.921[2]
Table 1b. Comparison of medical comorbidities			
Hypertension, n (%)	54 (79.4)	7 (77.8)	0.910[1]
Type 2 diabetes mellitus, n (%)	19 (27.9)	1 (11.1)	0.279[1]
Chronic kidney disease, n (%)	8 (11.8)	2 (22.2)	0.380[1]
Existing ASCVD, n (%)	23 (33.8)	2 (22.2)	0.485[1]
Heart failure, n (%)	6 (8.8)	1 (11.1)	0.822[1]
Atrial fibrillation, n (%)	10 (14.7)	1 (11.1)	0.772[1]
COPD, n (%)	7 (10.3)	0 (0)	0.313[1]
Asthma, n (%)	13 (19.1)	0 (0)	0.150[1]
Cirrhosis, n (%)	3 (4.4)	1 (11.1)	0.395[1]
History of DVT or PE, n (%)	14 (20.6)	1 (11.1)	0.500[1]
Depression or anxiety, n (%)	35 (51.5)	4 (44.4)	0.692[1]
Malignancy, n (%)	15 (22.1)	4 (44.4)	0.143[1]
Thyroid disease, n (%)	15 (22.1)	2 (22.2)	0.991[1]
Rheumatoid arthritis, n (%)	6 (8.8)	1 (11.1)	0.822[1]
Use of immune modifying drugs, n (%)	11 (16.2)	2 (22.2)	0.649[1]
Current tobacco use, n (%)	10 (14.7)	1 (11.1)	0.772[1]

Table 1. Comparison between single PJI and metachronous PJI groups at index PJI. Chi-square testing[1]. T-test[2]. Asterisks indicate statistical significance ($P < .05$).

Acknowledgements

Special thanks to my OUWB classmate, Devin Young and Beaumont orthopedic surgery fellow, Dr. Andrew Steffensmeier. Additional thanks to our principle investigators, Dr. Robert Runner and Dr. Mark Karadsheh.

Conclusions

We found that **11.7% (9/77)** of patients with a prior history of treated PJI developed a second-site PJI after a subsequent primary THA or TKA. Patients who developed a second-site infection after a subsequent primary arthroplasty had, on average, a relatively acute presentation of their initial PJI (mean 27.5 weeks). This is important information for treating orthopedic surgeons to know and council patients on when planning for arthroplasty after being treated for a PJI prior.

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