Contemporary Success and Failure After Treatment of Periprosthetic Total Hip Infection: An Institutional Experience

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INTRODUCTION: Numerous investigations have evaluated the results of particular surgical interventions for the treatment of periprosthetic joint infection (PJI) after total hip arthroplasty (THA). Nonetheless, in this report encompassing procedures performed for near a decade at a single institution, we ascertained success/failure rates after the most common surgical interventions for PJI treatment after THA. We sought to answer: (1) What is the overall success rate; (2) how successful are particular surgical modalities; and what are the rates of (3) amputation and (4) mortality at latest follow-up?

METHODS: We conducted a retrospective chart review of 251 consecutive patients (hips, n= 251) who underwent unilateral revision hip arthroplasty for PJI at a single institution. Out of this cohort, 20 (8%) patients were excluded because the index arthroplasty was a hemiarthroplasty. A total of 231 revision total hip arthroplasties (rTHA) with PJI diagnosis performed between 01/10/2012 and 12/20/2019 were analyzed. Demographics and patient characteristics were noted (Table 1). Surgical and infection characteristics such as type of index arthroplasty (primary vs. revision), index arthroplasty indication, infection type (i.e., chronic), and infecting organisms were recorded (Table 2). At latest follow-up, success (tiers I or II) or failure (tier III) were assessed for each case according to the Musculoskeletal Infection Society (MSIS) Outcome Reporting Tool and these results were compared between the different surgical (i.e., single-stage) treatment modalities. Postoperative amputations and deaths were also noted. Mean follow-up was 699 days (1.9 years) (range, 10 to 3,504 days).

RESULTS: Overall, the mean age and body mass index (BMI) of patients at rTHA was 64.7 years (range, 20 to 94) and 32.2 kg/m2 (range, 18.8 to 68.4), respectively (Table 1). The majority of hips treated for PJI were primaries (n=143), most were chronic (>3 months after THA) infections (n=152), and the most common infecting organism was Staphylococcus aureus which was present in 45 culture positive cases (Table 2). At latest follow-up, according to the MSIS outcome reporting tool, 71.4% (165/231) and 28.6% (66/231) of hips were categorized as success or failure, respectively. Debridement-Antibiotics-Implant-Retention (DAIR) was the least successful (37.5%, 15/40) treatment modality ($p<0.0001$). Nevertheless, 79.5% (136/171) of explantations with spacer implantation and with the aim of a 2-stage exchange arthroplasty were successful ($p<0.0001$) (Table 3). There were no amputations, and the total mortality rate was 17.7% (41/231). However, there were no significant differences on this regard between the different treatment groups ($p=0.106$).

DISCUSSION AND CONCLUSION: Roughly, 3 out of 4 cases were successfully managed according to the MSIS outcome reporting tool. DAIR was the least successful treatment modality as approximately 2 out of 3 cases resulted in failure. Overall mortality rate was around 18%. These humbling results call for improvement of strategies, particularly when performing a DAIR to treat hip PJI.

Table 1. Demographics and patient characteristics.

Variable	Level	Entire Cohort	N
Age Mean in years (range)		64.7 (20 to 94)	231
Sex, N (%)	Men	129 (55.8)	231
	Women	102 (44.2)	
BMI, Mean in Kg/m^2 (range)		32.2 (18.8 to 68.4)	231
Charlson Comorbidity Index Mean (range)		3.3 (0 to 11)	231
Smoking, N (%)	Yes	38 (16.9)	225
	No	187 (83.1)	
History of IV Drug Abuse, N (%)	Yes	3 (1.7)	174
	No	171 (98.3)	
Alcohol Consumption, N (%)	Yes	96 (47.1)	204
	No	108 (52.9)	
Antibiotic Allergy or Intolerance, N (%)	Yes	91 (40.6)	224
	No	133 (59.4)	
Length of follow-up, Mean in days (range)		699.3 (10 to 3,504)	231

BMI: Body mass index. ASA: American Society of Anesthesiologists physical status classification system. IV: Intravenous.

Table 2. Surgical and infection characteristics.

Surgical and Infection Variables		Entire Cohort	N
Type of index arthroplasty (The implant treated for infection), N (%)	Primary	143 (61.9)	231
	Revision	88 (38.1)	
Indication for index arthroplasty (Indication for the implant that was treated for infection), N (%)	Avascular Necrosis	6 (2.6)	231
	Fracture	12 (5.2)	
	Osteoarthritis	58 (25.1)	
	Prosthetic Joint Infection	30 (13.0)	
	Rheumatoid Arthritis	2 (0.9)	
	Other	37 (16.0)	
	Unknown	86 (37.2)	
Type of Infection, N (%)	Early (<3 months after arthroplasty)	63 (28.5)	221
	Chronic (>3 months after arthroplasty)	152 (68.8)	
	Late-acute (hematogenous)	6 (2.7)	
Culture Results, N (%)	Negative	54 (23.4)	231
	Positive	177 (76.6)	
Single-organism or Polymicrobial Infection, N (%)	Single-organism	134 (75.7)	177
	Polymicrobial	43 (24.3)	
Presence of Infecting Organisms in Culture Positive Cases (In decreasing order. Please note that percentages do not total 100% because some cases had polymicrobial infections), N (%)	*Staphylococcus aureus*	45 (25.4)	177
	Propionibacterium acnes	36 (20.3)	
	Staphylococcus epidermidis	31 (17.5)	
	Staphylococcus lugdunensis	7 (3.9)	
	Other Organisms	96 (54.2)	

DAIR: Debridement-Antibiotics-Implant Retention.

Table 3. Success or failure of the different surgical treatment modalities according to the MSIS outcome reporting tool.

Results	Success (Tiers I or II) (n=165)	Failure (Tier III) (n=66)	P value
Single-stage Exchange Arthroplasty, N (%)	8 (66.7)	4 (33.3)	<0.0001
DAIR, N (%)	15 (37.5)*	25 (62.5)*	
Explantation WITH Spacer Implantation With the Aim of a 2-Stage Exchange, N (%)	136 (79.5)*	35 (20.5)*	
Explantation WITHOUT Spacer Implantation With the Aim of a 2-Stage Exchange, N (%)	1 (100)	0 (0)	
Girdlestone, N (%)	3 (100)	0 (0)	
Partial revision (explantation of only cup or stem), N (%)	2 (50)	2 (50)	

MSIS: Musculoskeletal Infection Society. DAIR: Debridement-Antibiotics-Implant Retention.
* Statistically significant value: adjusted residual is +/- 1.96 or more (or less if negative).