Amphotericin B-Impregnated Antibiotic Spacers a Double-Edged Sword? High Fungal Infection Eradication Rate and Associated AKI in Renal Patients

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INTRODUCTION:

Patients with periprosthetic joint infections (PJI) involving fungus have a higher failure rate as these pathogens are often more difficult to diagnose and treat. Institutional protocol dictated adding Amphotericin B to our antibiotic-spacers (AmpB-AbxSpcr) in all patients diagnosed with fungal infection as well as patients who have suffered from chronic infections that have not responded to previous antibiotic spacers.

METHODS: Institutional joint reconstruction registry was screened for the study period between 2019-2023 identifying patients aged≥18 years who underwent explant of total hip arthroplasty(THA) or total knee arthroplasty(TKA) and received stage1 AmpB-AbxSpcr with positive fungal culture results. Patients with incomplete medical records or ≤6 months of clinical follow-up were excluded.

RESULTS:

Eighteen patients (avg age:64.6±11.5years; avg follow-up:20±13.9months) were identified (56%-KneePJI;44%-HipPJI) meeting inclusion criteria. Thirteen (72%) patients had 1 previous history of PJI and 2(11%) had 2 previous PJI. Spacer explant and definitive revisions were performed for 12(67%) patients. Four (22%) spacers required recharge due to: 2 persistent infection, 1 periprosthetic dislocation, 1 periprosthetic fracture. The fungal infection eradication rate after definitive revision or spacer recharge was 15/18(83%). Acute Kidney Injury (AKI) was observed in 5(28%) patients, with 3/4(75%) of patients with previous history of Chronic Kidney Disease (CKD) or End Stage Renal Disease (ESRD) having a higher susceptibility to AKI compared to 2/14(14%) without.

DISCUSSION AND CONCLUSION: Combining the use of AmpB-AbxSpcr and antifungal regimen achieved a fungal infection eradication rate of 83% in a challenging cohort of patients predominantly with 1-2 previous histories of PJI. Despite the inherent challenges in treating patients with prior history of PJI, including the high-risk of re-infection, this study demonstrates the efficacy of the AmpB-AbxSpcr in reducing the recurrence of infections. The incidence of AKI in 28% of patients and specifically the high rate found in patients with CKD or ESRD raises important clinical considerations when utilizing AmpB-AbxSpcr. AmpB-AbxSpcr is effective in eradicating fungal infections in patients with culture-proven fungal PJIs. However, there is considerable risk of AKI, especially in patients with pre-existing renal conditions, necessitating close follow-up and monitoring in this demographic.

Table. Amphotericin B Impregnated Cement Outcomes Data

	Overall (n=18)
Implant Utilized with Amphotericin B Impregnated Cement, n(%)	
Modular PFR	1 (6%)
Prostalac	7 (39%)
Articulating Knee Spacer	1 (6%)
Static Knee Spacer	8 (44%)
DFR with Polyethylene Swap (acute)	1 (6%)
Intraoperative Fungal Culture Results, n(%)	
Aspergillus niger	4 (22%)
Candida albicans	6 (33%)
Candida albicans/Aspergillus nidulans	1 (6%)
Candida parapsilosis	5 (28%)
Penicillium	1 (6%)
Trichoderma	1 (6%)
Postoperative Anti-Fungal Duration, weeks (mean ± SD)	8.6 ± 6.5
Postoperative Anti-Fungal Regimen, n(%)	
PO Fluconazole	5 (28%)
PO Voriconazole	1 (6%)
IV Caspofungin	4 (22%)
IV Fluconazole	2 (11%)
IV Micafungin	2 (11%)
Unknown	4 (22%)
Length of Hospital Stay, Days (mean ± SD)	7.3 ± 5.3
Disposition, n(%)	
Home	8 (44%)
Sub-Acute Rehab	10 (56%)
Placed on Chronic Antibiotic Suppression, n(%)	3 (17%)
Required Spacer Recharge, n(%)	4 (22%)
Reason for Spacer Recharge, n(%)	
Dislocation	1 (6%)
Persistent infection requiring Spacer Recharge	2 (11%)
Periprosthetic Fracture	1 (6%)
Time to Spacer Recharge, months (mean ± SD)	2.9 ± 2.5
Spacer Explant and Definitive Revision, n(%)	12 (67%)
Time to Definitive Revision, months (mean ± SD)	4.5 ± 1.7
PFR	1 (6%)
THA	6 (33%)
DFR	1 (6%)
TKA	4 (22%)
Infection Eradication Rate, n(%)	15 (83%)
(After Definitive Revision or Spacer Recharge)	
Time to Re-Infection After Definitive Revision (n=3) , months (mean ± SD)	7.7 ± 1.9
AKI following Spacer, n(%)	5 (28%)
Hypokalemia following Spacer, n(%)	3 (17%)
Hypomagnesemia following Spacer, n(%)	4 (22%)
Subgroup of patients WITH history of CKD or ESRD (n=4):	
AKI following Spacer	3 (75%)
Hypokalemia following Spacer	0 (0%)
Hypomagnesemia following Spacer	1 (25%)
Subgroup of patients WITHOUT history of CKD or ESRD (n=14):	
AKI following Spacer	2 (14%)
Hypokalemia following Spacer	3 (21%)
Hypomagnesemia following Spacer	3 (21%)
Clinical Follow-up, months (mean ± SD)	20.0 ± 13.9