

Comparison of Outcomes between Fungal and Non-Fungal Periprosthetic Joint Infections in Total Knee Arthroplasty: A Propensity Score-Matched Analysis

Hong Yeol Yang¹, Jong-Keun Seon¹, Jae-Hyeok Cheon, Chan Jin Park¹

¹Chonnam National University Hwasun Hospital

INTRODUCTION:

Periprosthetic joint infection (PJI) remains a serious complication of total knee arthroplasty (TKA) that increases patient morbidity and mortality and leads to a poor outcome despite continuous innovations and improvements in this surgery.

We reported on a large number of fungal PJIs treated with two-stage exchange knee arthroplasty combined with prolonged medical antifungal treatment at a single institution. The specific aims were to compare the clinical characteristics, patient-reported outcome measures (PROMs), and implant survivorship between fungal and non-fungal PJIs associated with TKA.

METHODS: We reviewed our institutional joint arthroplasty database and identified 41 patients diagnosed with fungal PJIs and treated with two-stage exchange arthroplasty after primary total knee arthroplasty (TKA) between 2001 and 2020 and compared them with those with non-fungal PJIs during the same period. After propensity score matching based on age, sex, body mass index, American Society of Anesthesiologists grade, and Charlson Comorbidity Index, 40 patients in each group were successfully matched. The surgical and antimicrobial treatment, patient demographic and clinical characteristics, recurrent infections, survival rates, and relevant risk factors that affected joint survivorship were analyzed. We defined treatment success as a well-functioning arthroplasty without any signs of a PJI and without antimicrobial suppression after a minimum follow up of two years from the time of reimplantation.

RESULTS:

The fungal PJI group demonstrated a significantly worse treatment success rate at the final follow up (65.0% versus 85.0%; $p < 0.001$). The mean prosthesis-free interval was longer in the fungal PJI group (6.7 weeks versus 4.1 weeks; $p = 0.020$). The rate of survivorship free from reinfection was worse in the fungal PJI group (83.4% at 1 year and 76.4% at 2 years) than in the non-fungal PJI group (97.4% at 1 year and 90.3% at 2 years), but the differences were not significant ($p = 0.270$; log-rank test). Cox proportional hazard regression analysis identified the duration of the prosthesis-free interval as a potential risk factor for failure (HR=1.128, $p = 0.043$).

DISCUSSION AND CONCLUSION:

The main findings of the present study were that fungal PJIs led to worse clinical outcomes than non-fungal PJIs. The treatment success rate was relatively lower in patients with fungal PJIs (65.0% of 40 cases) than in those with non-fungal PJIs (85.0% of 40 cases); although the difference between the two groups was not significant, the 2-year follow-up survival rate was better (7.0%) in the non-fungal PJI group. Fungal PJI treatment has been reported to be less successful; however, survivorship free from reinfection after two-stage revision arthroplasty for bacterial PJIs is reportedly approximately 90% at 10 years. Our findings suggest that the duration of the prosthesis-free interval between the two stages is a potential risk factor for failure.

In conclusion, fungal PJIs had a lower treatment success rate than non-fungal PJIs. This occurred despite two-stage revision arthroplasty and appropriate antifungal treatment. Fungal PJIs are more difficult to eradicate and thus may require a different and more aggressive treatment algorithm. The optimum fungal PJI treatment remains to be determined and is a subject for further research.

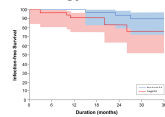


Table 1. Patient Characteristics

Characteristic	Fungal PJI (n=40)	Non-fungal PJI (n=40)
Age (mean ± SD)	68.5 ± 12.3	69.2 ± 11.8
Sex (Male/Female)	22/18	21/19
Body Mass Index (mean ± SD)	24.5 ± 3.2	24.8 ± 3.1
American Society of Anesthesiologists grade (I/II/III)	15/18/7	16/17/7
Charlson Comorbidity Index (mean ± SD)	3.2 ± 1.5	3.1 ± 1.4

Table 2. Comparison of Clinical Characteristics

Characteristic	Fungal PJI (n=40)	Non-fungal PJI (n=40)
Primary TKA	35 (87.5%)	36 (90.0%)
Revision TKA	5 (12.5%)	4 (10.0%)
Time to PJI (mean ± SD)	12.3 ± 8.5	11.8 ± 7.9
Time to treatment (mean ± SD)	4.1 ± 2.3	6.7 ± 3.2

Table 3. Comparison of Treatment Outcomes

Outcome	Fungal PJI (n=40)	Non-fungal PJI (n=40)
Treatment success rate	65.0%	85.0%
Mean prosthesis-free interval (weeks)	6.7	4.1
Survivorship free from reinfection at 1 year	83.4%	97.4%
Survivorship free from reinfection at 2 years	76.4%	90.3%

Table 4. Results of Cox Regression Analysis

Variable	Hazard Ratio (95% CI)	p-value
Duration of prosthesis-free interval	1.128 (1.043, 1.218)	0.043
Age	1.012 (0.998, 1.026)	0.001
Sex	1.054 (0.456, 2.438)	0.885
Body Mass Index	1.023 (0.987, 1.059)	0.001
American Society of Anesthesiologists grade	1.089 (0.989, 1.189)	0.001
Charlson Comorbidity Index	1.045 (0.989, 1.101)	0.001