

Time to Positivity as a Prognostic Marker in Periprosthetic Joint Infection: A Retrospective Cohort Study

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Introduction

Time to positivity (TTP) in microbiological cultures has emerged as a potential surrogate marker for bacterial burden and virulence. While TTP is routinely available in modern microbiology workflows, its prognostic value in periprosthetic joint infection (PJI) remains understudied. This multicenter study aimed to evaluate the association between TTP and clinical outcomes following two-stage exchange arthroplasty in chronic PJI of the hip and knee.

Methods

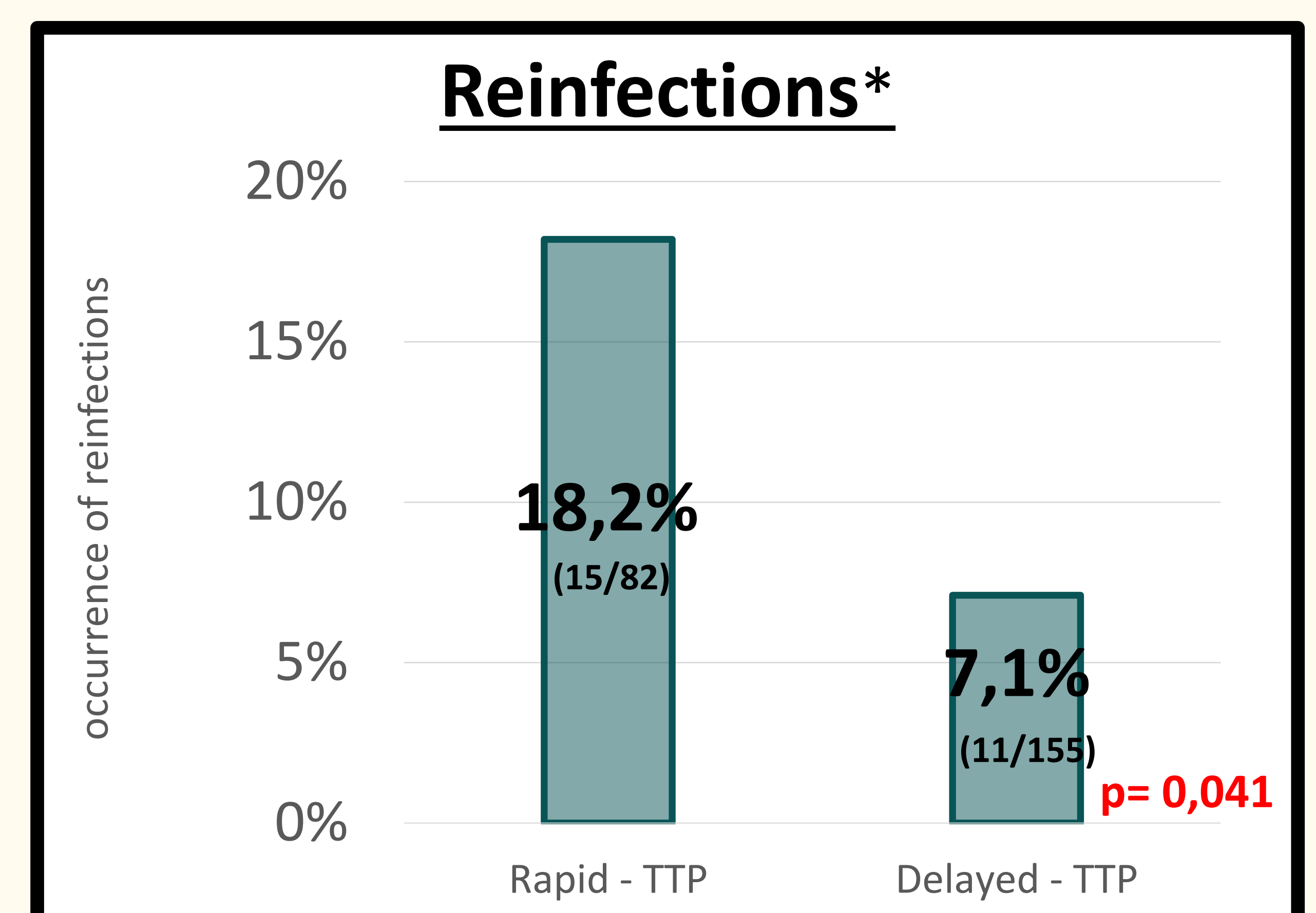
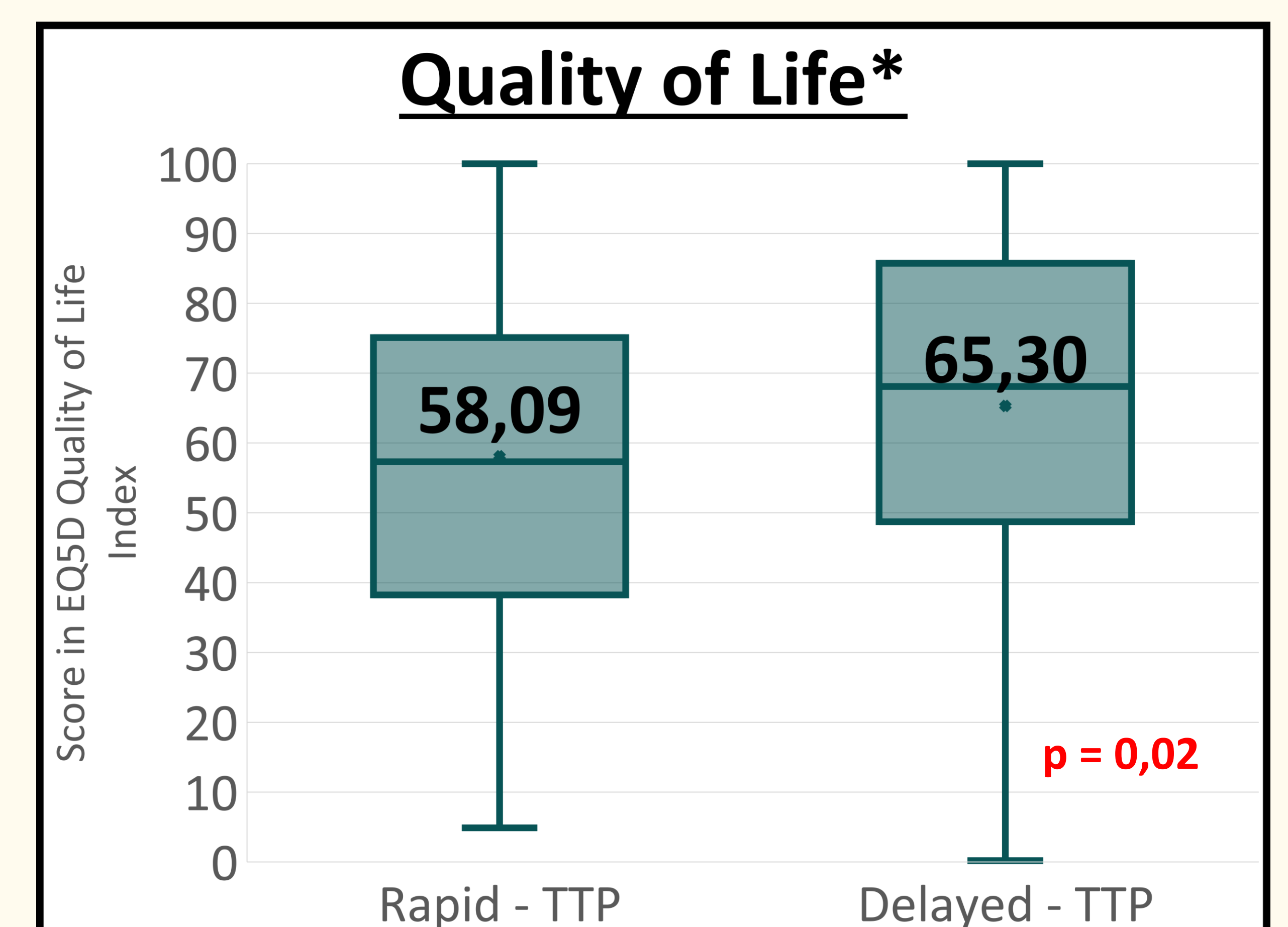
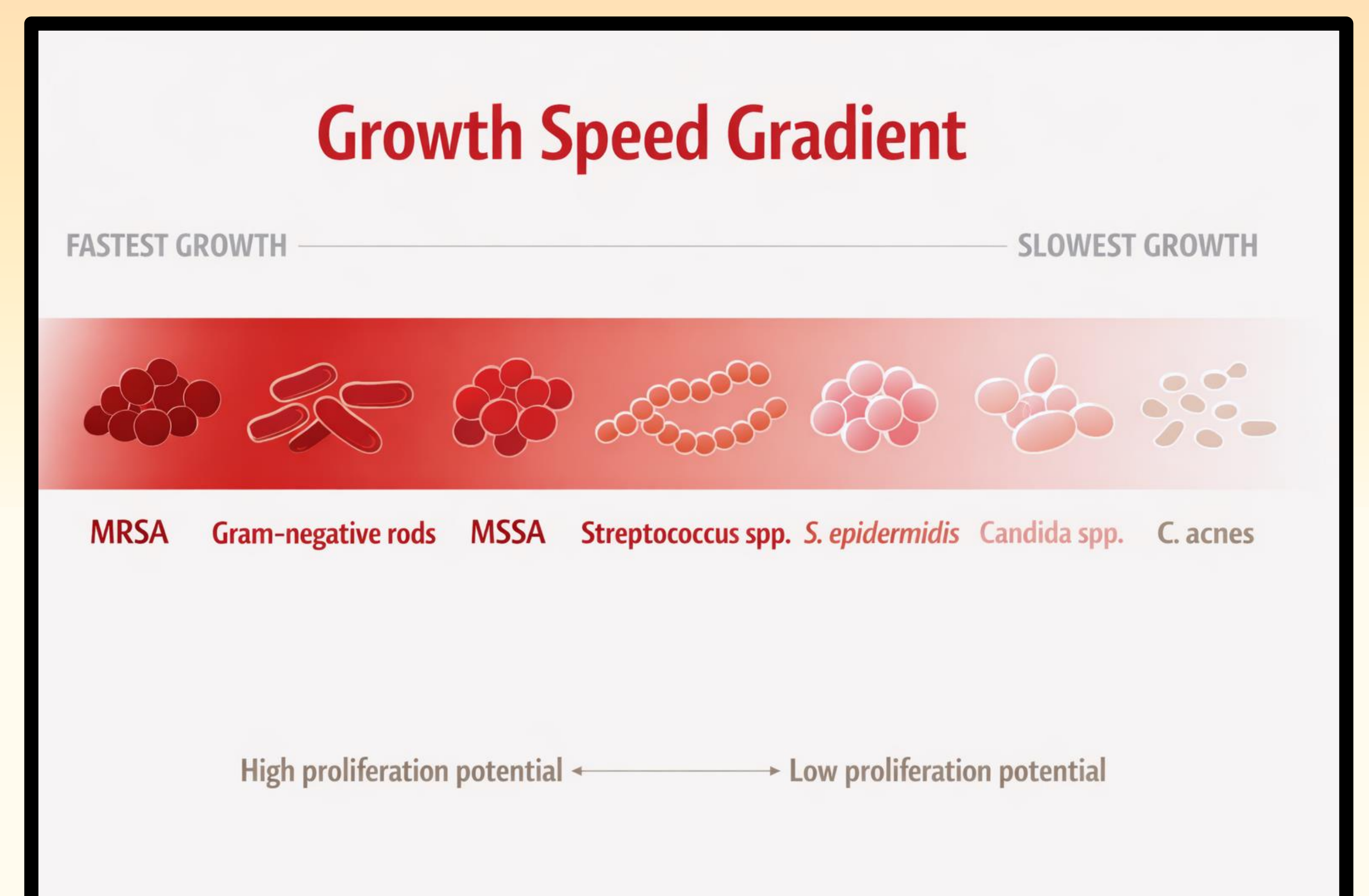
We conducted a retrospective cohort study including patients treated for chronic PJI between 2019 and 2023. Inclusion criteria comprised a confirmed PJI according to EBJIS criteria, at least one positive intraoperative culture, and a minimum clinical follow-up of 12 months. TTP was defined as the interval (in hours) from inoculation of periprosthetic samples to automated detection of microbial growth. Clinical variables included infecting organism, CRP levels, reinfection rates, and patient-reported outcome measures (PROMs). Patients were stratified into TTP groups: <24h (rapid), 24–48h (intermediate), and >48h (delayed).

Results

A total of 246 patients were analyzed (156 hip, 90 knee PJIs). Rapid TTP (<24h) was strongly associated with high-virulence pathogens, such as *Staphylococcus aureus* and gram-negative rods ($p < 0.001$), and correlated with higher reinfection rates (18.2% vs. 7.1% for TTP >48h; $p = 0.02$). These patients also had significantly lower PROMs one year after reimplantation. In contrast, patients with delayed TTP (>48h) predominantly harbored low-virulence organisms and exhibited better functional and infection-free outcomes.

Conclusion

TTP offers a practical and early prognostic marker for pathogen virulence and treatment outcomes in PJI. Its integration into clinical risk stratification may support individualized decision-making, particularly regarding antibiotic duration and surgical planning.



*Mean follow-up: 17.8 ± 3.2 months