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Viewpoint

Contemporary Prosthetic Joint Infection Management: Is There a Role for Suppressive Antibiotic Therapy?

Nemandra A. Sandiford, MD [a, b], Daniel O. Kendoff, MD, PhD [c, *]

[a] Consultant Orthopaedic Surgeon, Southland Teaching Hospital, Invercargill, New Zealand
[b] University of Otago, Dunedin, New Zealand
[c] Chefarzt Zentrum für Orthopädie und Unfallchirurgie, Helios kliniken Berlin-Buch, Berlin, Germany

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Deep infection after hip and knee replacement surgery remains one of the major challenges facing orthopedic surgeons in the 21st century. Infection is responsible for 14.8% of revision total hip arthroplasty procedures and 25.2% of all revision knee arthroplasty procedures [1]. Infection also remains a major cause of re-revision [2]. As the population ages, the number of comorbidities increase, and the number of total hip and knee procedures increase, the number of cases of prosthetic joint infection (PJI) are likely to increase [3]. The economic cost of managing PJI is significant [4]. More importantly the physiological and psychological cost to the patient is immeasurable.

The optimal management for PJI is undecided. A significant emphasis has been placed on surgical approaches including debridement and implant retention and one- and two-stage revision in contemporary literature [5,6]. A group exists for who surgical treatment is unsuitable, however. This includes patients who refuse surgical treatment, those who are medically too frail, and those in whom multiple attempts at surgical treatment has failed. In this subset of patients, nonoperative treatment has to be considered. There is a relative paucity of data available on the outcomes of the management of PJI with prolonged suppressive antibiotic therapy (PSAT) [7]. This article presents a brief but comprehensive review of the role of PSAT in the management of PJI.

Tsukayama et al. [8] reported a 77% rate of failure using PSAT with 38% of patients experiencing side effects of the antibiotics used at a mean 37.6-month follow-up. Johnson and Bannister [9] experienced poor results using PSAT as first-line therapy. Only 2 of 25 (8%) infected primary knee arthroplasties had resolution of pain and drainage after a mean 1.3-year duration of antibiotic therapy. Goulet et al. [10] reported a failure rate of 36.8% using long-term antibiotic suppression, and Mahmoud et al. suggested that PSAT has never been associated with good infection control rates [11].

Contemporary results vary with regard to the results of suppressive therapy. Sandiford et al. found that 83% of patients treated with PSAT were infection free at mean 2-year follow-up [7]. These encouraging results were attributed to modern approaches to management such as having a multidisciplinary team (MDT) approach. The importance of MDTs has been highlighted in the literature [7]. Rao et al. [12] reported encouraging results at a mean 5-year follow-up after rapid, accurate detection of the infecting species followed by surgical management after which PSAT therapy was commenced, with functioning prostheses in 86.2%.

The presence of megaprostheses and infection with *Staphylococcus aureus* have also been reported to be associated with failure of PSAT. Wouthuyzen-Bakker et al. [13] reported reduction in survivorship of 40% and 33%, respectively, when these factors were present. This has been recently questioned. It is possible that early detection, early aggressive surgery, and dedicated microbiology support both in the hospital and community have potentially contributed to this observed difference in results. The results of this study suggest that PJI even associated with megaprostheses and virulent bacteria can be successfully managed with PSAT [7].

A higher number of previous surgeries on the joint can also influence the outcome of PJI surgery. This is multifactorial, resulting from reduced bone stock, soft-tissue loss, repeated exposure opportunities, and the selection of harder-to-treat, resistant organisms.

Previous studies have highlighted poorer outcomes with immunocompromised patients in PJI surgery, specifically rheumatoid arthritis [9,14]. Recent evidence suggests that PSAT therapy is less successful for management of total knee arthroplasty–associated PJI [7], in keeping with reports by other authors.

Several authors have reported antibiotic side effects with the use of long-term antibiotic suppression therapy. These have been frequent but minor. Wouthuyzen-Bakker et al. [13] found that 43%

* Corresponding author. Helios-Klinikum Berlin Buch, Berlin, Germany. Tel: +49 177 89 60038.
E-mail address: Daniel.kendoff@helios-gesundheit.de

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of patients required a change of antibiotic therapy due to side effects but no serious adverse events. As noted previously, Tsukayama et al. [8] described 38% of their cohort having side effects that led to a change in therapy but no serious adverse events. This shows that patients have to be carefully selected for this management option.

Previous studies have suggested higher rates of failure with *Staph. aureus* infection [15]. This can pose a challenge to the surgeon as it is one of the most frequent organisms isolated in PJI [16]. Contemporary results have demonstrated no difference in infection-eradication rates between those with *Staph. aureus* infection and infection with other organisms [17].

In conclusion, the available literature suggests that PSAT therapy when coordinated and planned by a dedicated MDT can be successful in the management of complex and medically frail patients presenting with PJI. In this setting, success rates can be higher than previously reported in the literature, even in patients with megaprostheses and those with virulent organisms such as *Staph. aureus*. PSAT can be well-tolerated with minimal side effects or serious adverse events in a selected patient group.

Conflicts of interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this article.

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