HK20: In patients with a periprosthetic joint infection (PJI) of one joint, is there a role for aspiration of other joints that have prostheses in place?

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Response/Recommendation:
We recommend that when a patient develops a periprosthetic joint infection **(**PJI) in one joint, all other artificial joints should be examined clinically, and if clinical suspicion for PJI exists, then other joints should be aspirated.

Level of Evidence: Limited (few retrospective studies)

Delegate Vote:

Rationale:

The number of joint arthroplasties implanted and the population with more than one joint in place is constantly increasing. Subsequently, the risk of having another prosthetic joint in place when a PJI occurs is continuously elevated. In the literature, the occurrence rate of metachronous/synchronous infection varies from 6.3 to 20% [1–3]. The issue of having a PJI in more than one joint was initially evaluated and highlighted by Murray et al. [4]. Managing those patients is extremely challenging since a possible second infection can complicate an already tough situation. Another burden is that no established guidelines exist on how to evaluate and treat these patients, who notably can be severely affected by higher mortality and reoperation rates[5]. Few studies exist about optimal management and workouts in patients who have more than one arthroplasty who develop a second PJI on another joint.

We attempted to answer the question by identifying all studies dealing with patients who have multiple arthroplasties in place and suffer from an initial PJI. Those patients can be at risk for developing another infection, which may be either synchronous (at the same time) or metachronous (at a later stage). We performed an extensive review of the literature utilizing specific search terms in three different databases (PubMed, Scopus, and Cochrane). Using the Covidence database for systematic reviews, we scanned all the available manuscripts and finally ended up with 11 relevant studies (**Figure 1**). Data extraction was performed using an Excel spreadsheet.

As aforementioned, the first to describe this problem was Murray et al. back in 1991[4]. Luessenhop et al. were the first to attempt to identify risk factors for another subsequent prosthetic infection and identified rheumatoid arthritis and major non-prosthetic infection (sepsis) as those[3]. Jafari et al. demonstrated a substantially increased risk of a second PJI (20%), underscoring the potential for hematogenous spread between prosthetic joints, with the risk being elevated in immunocompromised patients having chronic or delayed PJI[2]. Haverstock et al. showed a decreased prevalence of multiple PJIs of 6.3%, emphasizing that better management of the initial PJI could lower the risk of another joint being infected and, therefore maybe lower the necessity for aspiration[6]. On the contrary, a study of the same period highlighted the importance of a multidisciplinary approach to those patients[7]. They proposed that those patients should be clinically evaluated, and a low threshold for aspiration should exist, especially when radiographic findings suggestive of infection (periosteal reaction) or bacteremia exist. The presence of

bacteremia as a predisposing factor for developing another PJI was also identified by Abblitt et al. [8].

In the last five years, more studies have strived to delve into this subject and highlight the role of aspiration and optimal management of this specific population. Thiesen et al. directly investigated the need for all artificial joints to be aspirated routinely in the setting of synchronous PJIs[9]. They recommended aspirating all prosthetic joints when a PJI is present, especially when a history of neoplasia, immune-modulating therapy, and the presence of systemic inflammatory responses or sepsis coexist. Interestingly, even taking into account a suspicious clinical presentation and a history of neoplasia, eight of 26 synchronous PJI cases in their cohort would have gone undetected unless aspirated. Similarly, Komnos et al. also focused on what should be done with the other prosthetic joints in the establishment of a PJI[10]. This study addressed the potential role of aspiration in women and patients who have an initial PJI with methicillin-resistant *Staphylococcus aureus* (MRSA) and patients who have rheumatoid arthritis and bacteremia. Other risk factors recognized by Lee et al. include systemic inflammatory response and multiple previous surgeries[11]. Gausden et al. examined patients who have synchronous infections, noting the high risks associated with them, including major mortality and reoperation rates[5]. They suggest careful monitoring and possibly proactive measures such as aspiration in patients who have bacteremia and multiple arthroplasties, as well as immunocompromised patients.

There are two recent studies that dealt with the question of whether ipsilateral prosthetic joints are at elevated risk for subsequent PJI conflicting results[12,13]. Akkaya et al. showed that the ipsilateral metachronous PJI group had a shorter stem-to-stem distance, shorter empty native bone distance, and a higher risk of cement restrictor failure, suggesting those as high-risk factors increasing the likelihood of subsequent PJI in the neighboring joint [12]. According to this study, proximity is a concern, and preventive measures, including possibly preemptive aspiration, should be considered in tightly spaced joint arthroplasties. However, on the contrary, another study demonstrated that an infected ipsilateral joint does not substantially increase the risk of infection in another joint within the same extremity compared to contralateral joint infections[13]. Therefore, aspiration of other joints might not be necessary unless there are additional risk factors such as the use of immunosuppressants.

Potential limitations of this review consist of the high heterogeneity of the included studies, the fact that all available studies until now are retrospective studies and different protocols regarding the management of these patients exist in various institutions. Another issue is that not all studies evaluate the role of aspiration and that although most of them refer mainly to hip and knee arthroplasties, there are sporadic references and the inclusion of a few shoulder and elbow arthroplasties.

Interpretation of available data shows that diagnosing early a second prosthetic joint infection is extremely challenging, and aspiration can be one of the most important pillars. Although aspiration is widely accepted as a successful and relatively reliable means of diagnosing PJI, considerations against its utilization still exist. These mainly consist of the fact that it can be a traumatic experience for the patient, especially in the hip, that they also carry a risk of causing PJI themselves, and widespread use of anticoagulants can complicate it with severe bleeding. Nevertheless, in the development of a PJI in patients who have multiple prosthetic joints, investigation of other prosthetic joints should always be performed, starting with a thorough clinical evaluation. If symptoms are present, further investigation is needed. The most reliable method seems to be the aspiration of the other joints, especially when risk factors such as

immunosuppression, sepsis, bacteremia, rheumatoid arthritis, women patients, and MRSA as the isolated pathogen coexist.

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Figure 1. Flowchart of the review

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