CORRESPONDENCE

Periprosthetic Infection in Joint Replacement

Diagnosis and Treatment

by Dr. med. Christina Otto-Lambertz, Dr. med. Ayla Yagdiran, Franziska Wallscheid, Prof. Dr. med. Peer Eysel, and PD Dr. med. Dipl.-Chem. Norma Jung in issue 20/2017

Amendment Necessary

In their successful overview of the complicated topic of periprosthetic joint infections (PJI), I believe that procalcitonin is also worth mentioning along with the laboratory tests (1). As correctly pointed out, no single laboratory test can unambiguously be used to diagnose PJI; nonetheless, procalcitonin is of particular value, especially for people with inflammatory rheumatic diseases. This group, which is overrepresented in patients who receive joint replacements, often presents disease-specific increases in humoral inflammatory activity (C-reactive protein [CRP] and blood-lowering rate); furthermore, the immunomodulatory therapy given to this group makes them more susceptible to infections than the "classical" arthrosis patient. Especially in these patients, procalcitonin helps to distinguish between disorder-related and infection-related inflammatory activity.

Additionally, within the framework of PJI functional diagnostics, the rapid alpha-defensin test should be mentioned. Regardless of antibiotic pre-treatment, the alpha-defensin test diagnoses PJI with a sensitivity of 69%, and a specificity of 94%, according to current literature (2)—and does so within 10 minutes. Obviously, this rapid test does not replace microbiological pathogen detection, but it has become indispensable as a preoperative screening method before a total endoprosthetic replacement with presumed aseptic loosening, as well as during the operative care of periprosthetic fractures. In our department, it is now an obligatory part of the diagnostic algorithm in suspected cases of PJI.

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The author declares that no conflict of interest exists.

Data-based Assessment of the Maintenance of Sterility

An infection prevention measure that has yet to be introduced is to control the sterility maintenance of medical products. While sterilization processes in hospitals and the medical device industry are set to the highest quality level by regular validation, a comparable data-based monitoring routine has not yet been implemented for controlling the contamination of terminally sterilized products by airborne pathogens during storage and transport. This applies to all sterile goods with air-permeable packaging components—in other words, about 99% of sterile products.

Similar to the sterilization process, the relevant quality and exposure parameters during sterile storage, that is, the filtration efficiency of the packaging material against the airborne microorganisms, the airborne microbial load and the variable barometric pressure and temperature changes should be controlled , in order to calculate the probability of maintenance of sterility according to the sterility assurance level (SAL) of 1:1 000 000. The following example is given for clarification. If the atmospheric pressure rises from 990 to 1020 hPa within a few days due to a change in weather, about 7 mL ambient air will enter into gas-permeable sterile packaging that contains 250 mL of air. With an airborne microbial concentration of 200 colony forming units (CFU)/m³ (class II room, sterile storage area), a microbial stress of about 0.0014 CFU is present. Calculation of microbial entry into a package with a 99% filter capacity—a comparatively high value—results in 0.000014 CFU (1). This amount is significantly greater than the SAL and therefore compromises the quality requirement for sterility after only a few days of storage. A corresponding monitoring as part of the infection control program would therefore lead to risk reduction for joint replacement surgeries, which are highly sensitive to infection (2). Storage of sterile products in cabinets with an additional method of reducing airborne microbial load, for instance by plasma sterilization, is a more advanced, future-oriented option.

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Prof. Dunkelberg holds a patent related to the topic of the article discussed. He received consultant and speaking honoraria from Kimberly-Clark.

In Reply:

We would like to thank our colleagues both for their interest, positive feedback, and valuable additional information, as well as for their critical comments, on our article (1).

Dr. Birkenhauer points to the value of procalcitonin (PCT) determination as a possible laboratory test to differentiate between inflammatory activities due to disorders (and in particular, to rheumatism) or infection. This laboratory value has long been a topic of investigation for the surgical disciplines. Of note, procalcitonin values have highly divergent specificities and sensitivities in various examinations of patients who receive joint replacements. According to recommendations, procalcitonin should only be tested in combination with CRP, if at all (2, 3). However, neither various older studies nor a current study by Sousa et al. (2017) found differences between the preoperative procalcitonin values for septic versus aseptic loosening (4). Overall, the reliability of procalcitonin determination as an adequate marker for periprosthetic infection is not yet certain. Due to the lack of sufficient studies, the PCT assessment is not included in the current international guidelines and consensus recommendations. Further studies for this are necessary.

Professor Dunkelberg points out the difficulty of maintaining sterility in sterile goods that are stored in air-permeable packaging. There are high quality requirements for this in place in Germany; nevertheless, he is correct to refer to the necessary monitoring required to ensure sterility even after prolonged storage. Whether using cabinets with additional measures to reduce the airborne pathogen load (for instance, plasma sterilization) can also further reduce the contamination risk of sterile products remains the subject of future studies.

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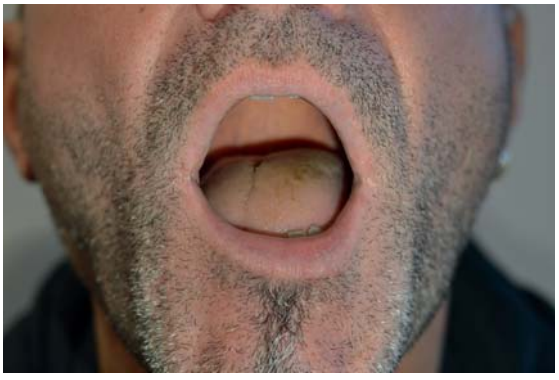
CLINICAL SNAPSHOT

Apparent Swelling of the Tongue



A 51-year-old man was referred after unsuccessful antibiotic treatment in another institution for a suspected tongue abscess. He complained of swelling of the left side of the tongue over the past 6 days, which had been preceded by a very severe headache. On physical examination, the tongue was thicker on the left, with displacement of the midline to the right, but without any typical signs of inflammation. On protrusion of the tongue, deviation to the left and left-sided fasciculations were seen. Alongside this evident hypoglossal nerve palsy, there were also ipsilateral palsies of the facial nerve (House-Brackmann grade 2) and the vagus nerve, the latter manifested by unilateral vocal fold immobility. CT angiography of the head revealed a dissection of the left internal carotid artery below the skull base. The patient was admitted and treated with anticoagulation (intravenous heparin at first, later switched to phenprocoumon by mouth). After discharge, the facial and vagus nerve palsies resolved, but the hypoglossal nerve palsy persisted. Cranial nerve involvement in carotid dissection is rare but led to the correct diagnosis in this case.

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