Clin Orthop Relat Res (2016) 474:265–266 / DOI 10.1007/s11999-015-4543-z

Clinical Orthopaedics and Related Research®
A Publication of The Association of Bone and Joint Surgeons®

Published online: 2 September 2015

CORR Insights

CORR Insights®: Does Preoperative Antimicrobial Prophylaxis Influence the Diagnostic Potential of Periprosthetic Tissues in Hip or Knee Infections?

Thomas Ilchmann MD, PhD

Where Are We Now?

Prosthetic joint infection (PJI) often is initially treated as aseptic loosening, but this misdiagnosis can result in early failure, additional revision procedures, and unnecessary damage to soft-tissue and bone. Additionally, the number of revisions performed is a risk factor for the emergence of antibiotic resistance, making future antimicrobial treatments more difficult [1].

Researchers are currently investigating better ways to ensure that the diagnosis of PJI is not missed. Recent tests have shown promise in proving the absence of bacteria in preoperative joint aspirates [3]. But in case of infection, they cannot identify the causative bacteria, which is crucial for planning of the treatment. For an established PJI caused by an unknown microorganism, two-stage exchange remains the standard treatment option in order to give an appropriate therapy before reimplantation [4]. However, there is increasing evidence that one-stage exchange can be a reliable and safe procedure even in these cases, provided that there is a low probability of infection with difficult-to-treat pathogens [2].

Bedenčič and colleagues showed that timely antibiotic prophylaxis does not impair the identification of the causative microorganism in cases with suspected PJI. The authors suggested that prophylaxis should not be postponed in order to minimize the risk of a new infection. However, this strategy may prevent the identification of difficult-to-detect bacteria. In the present study, two cases caused by *Propionibacterium acnes* and one case caused by Corynebacterium species were detected before, but not after, a single prophylactic dose of cefazolin. Therefore, even if antibiotic prophylaxis did not appear to harm the yield of positive cultures in this small trial, a larger study may reveal a diagnostic problem.

Where Do We Need To Go?

We need more information on the efficacy of various methods for the

This CORR Insights® *is a commentary on the article* "Does Preoperative Antimicrobial Prophylaxis Influence the Diagnostic Potential of Periprosthetic Tissues in Hip or Knee Infections?" *by Bedenčič and colleagues available at:* DOI: 10.1007/s11999-015-4486-4.

The author certifies that he, or any members of her immediate family, have no funding or commercial associations (consultancies, stock ownership, equity interest, patent/licensing arrangements, etc.) that might pose a conflict of interest in connection with the submitted article.

All ICMJE Conflict of Interest Forms for authors and *Clinical Orthopaedics and Related Research*® editors and board members are on file with the publication and can be viewed on request.

The opinions expressed are those of the writers and do not reflect the opinion or policy of *CORR*® or The Association of Bone and Joint Surgeons®.

This *CORR* Insights® comment refers to the article available at DOI: 10.1007/s11999-015-4486-4.

T. Ilchmann MD, PhD (✉)
Hirslanden Clinic Birshof,
Reinacherstrasse 28, 4142 Münchenstein,
Switzerland
e-mail: thomas.ilchmann@hirslanden.ch

CORR Insights

diagnosis of PJI. New techniques such as sonication, molecular biological approaches, and alpha-defensin [3] should be further evaluated. Our approaches both to organism identification and antibiotic susceptibility need to be improved.

Bedenčič and colleagues stimulate a necessary debate about our current diagnostic routines and whether they can affect perioperative risks by postponing antibiotic prophylaxis and therapy. For revisions for aseptic loosening, postponing prophylaxis does not seem to be justified. However, we still need a simple and reliable diagnostic algorithm to ensure that infection was not the cause for loosening. Determining alpha-defensin is likely the most promising test for that purpose.

In complex situations like revisions for PJI with unknown causative bacteria or after failed treatment of PJI, application of antibiotics could impair our ability to identify difficult-to-detect pathogens. Microbiological tests of several tissue samples remain the gold standard in detecting these pathogens. Ideally, new diagnostic tools can reliably provide this information even for patients with ongoing antibiotic therapy or for patients who are immunocompromised.

Improving our diagnostic tools, the techniques of revision surgery, and in my opinion, aiming for a higher percentage of one-stage revisions will have an impact on the cure rate as well as eventual functional recovery. The overarching goal should be to treat each patient with the least-invasive approach that does not compromise the likelihood that the infection will be eradicated.

How Do We Get There?

We need better and larger studies comparing established and newer diagnostic tools for PJI. Alpha-defensin is promising to detect absence of infection, but larger trials with complete clinical and infectiological data are necessary to determine whether it can even replace microbiological tests for screening. We need prospective cohort studies consisting of large patient populations with standardized diagnostic, treatment, and outcome protocols for rare and demanding PJI. These protocols will help us determine which tests (or combination of tests) can properly diagnose PJI, as well as identify the causative bacteria and its potential susceptibility.

Regarding the evaluation of different surgical treatment options, randomized trials would provide optimal results. However, these are difficult to perform, owing to the difficulties involved with creating homogeneous (or even comparable) patient populations with respect to demography, implant characteristics, soft-tissue conditions, and microbiological findings.

References

1. Achermann Y, Eigenmann K, Ledergerber B, Derksen L, Rafeiner P, Clauss M, Nuesch R, Zellweger C, Vogt M, Zimmerli W. Factors associated with rifampin resistance in staphylococcal periprosthetic joint infections (PJI): A matched case-control study. *Infection*. 2013;41:431–437.
2. Choi HR, Kwon YM, Freiberg AA, Nelson SB, Malchau H. Periprosthetic joint infection with negative culture results: Clinical characteristics and treatment outcome. *J Arthroplasty*. 2013;28:899–903.
3. Deirmengian C, Kardos K, Kilmartin P, Gulati S, Citrano P, Booth RE, Jr. The Alpha-defensin test for periprosthetic joint infection responds to a wide spectrum of organisms. *Clin Orthop Relat Res*. 2015;473:2229–2235.
4. Parvizi J, Gehrke T, Chen AF. Proceedings of the international consensus on periprosthetic joint infection. *Bone Joint J*. 2013;95-B:1450–1452.