Opinion
Volume 12:2, 2023

Journal of
Micro Biology and Diagnosis

ISSN: 2161-0703 Open Access

Microbiological Advances in the Diagnosis of Prosthetic Joint Infections

Lgnacio Sancho*

Department of Microbiology, Iuliu Hatieganu University of Medicine and Pharmacy, 400000 Cluj-Napoca, Romania

Introduction

Despite the correct implementation of diagnostic culture techniques, such as tissue sample processing in a bead mill, prolonged incubation time, or sonication of removed implants, a significant number of prosthetic joint infections are culture-negative and/or misinterpreted as aseptic failures. Misinterpretation can lead to unnecessary surgery and antimicrobial treatment. Non-culture techniques' diagnostic value in synovial fluid, periprosthetic tissues, and sonication fluid has been studied. To assist microbiologists, various feasible improvements, such as real-time technology, automated systems, and commercial kits, are now available. In this review, we describe non-culture techniques based on nucleic acid amplification and sequencing [1].

Description

Joint replacement surgery is widely regarded as the best option for restoring damaged joints, reducing pain, improving joint function, and improving quality of life. The use of implanted devices has thus become widespread, owing to their positive impact on quality of life and, in some cases, patient survival rates. The number of joint replacement surgeries is expected to rise steadily as the population ages. Bearing an artificial joint, on the other hand, causes wear, friction, and surface damage, eventually leading to prosthetic failure due to repetitive contact stresses. In fact, the average lifespan of a prosthetic is about 15 years. Furthermore, prostheses can be associated with a number of complications, including infection [2].

PJI pathogenesis is linked to microorganisms growing in biofilms, making these infections difficult to diagnose and treat. Despite the use of well-established diagnostic methods, a significant number of PJIs are culture-negative or misdiagnosed as aseptic failures. Misinterpretation may result in incorrect or unnecessary antimicrobial treatment, or even unnecessary surgery. The first step towards successful treatment is accurate diagnosis, which includes pathogen identification and antimicrobial susceptibility. Because traditional microbiological cultures have most likely reached their peak of efficacy, an optimal combination of laboratory, histopathology, and imaging studies, combined with non-culture microbiological methods, is required to improve the diagnosis of PJ. Implementing early antimicrobial therapy or planning an appropriate surgical treatment necessitates an accurate infection diagnosis [3].

NGS will most likely revolutionise microbiology departments, just as matrix-assisted laser desorption ionisation-time of flight mass spectrometry did for microorganism identification. NGS platforms employ a variety of approaches that are certain to alter diagnosis, treatment (genotypic detection of resistance genes and virulence factors), and epidemiological analysis. (Possibility to compare entire genomes). Microbiology is critical for the accurate diagnosis and treatment of PJI. As a result, it is critical to reconsider the utility of NGS in the context of PJI. To date, only a few groups have evaluated the role of NGS in the diagnosis of PJI, and the methodologies used have been far from uniform. This review aims to describe the most important aspects of PJI microbiological diagnosis, with a particular emphasis on the types of research protocols that can be used.

Acute PJI occurs as a hematogenous or early postoperative infection, whereas chronic infections are caused by low-virulence microorganisms such as coagulase-negative staphylococci and typically manifest three months after surgery. Early infection symptoms include persistent local pain, erythema, edema, impaired wound healing, hematoma, and fever. Delayed infections can occur when there is ongoing or increasing joint pain and early prosthetic loosening but no clinical signs of infection. As a result, such infections are frequently difficult to distinguish from aseptic failure. Late infections manifest as either a sudden onset of systemic symptoms (in approximately 30% of cases) or as subacute infections following undiagnosed bacteremia (in approximately 70% of cases) [4].

A two-week incubation period is frequently recommended for diagnosing PJI, particularly in chronic PJI cultures. Some researchers believe that culture plates may have been contaminated during the sampling procedure and/or by the prolonged plate incubation time. However, adhering to some basic microbiological recommendations, such as performing the procedures in sterile conditions or adhering to the criteria for culture positivity discussed in Section 2.7, below, may keep the contamination under control, even if the plates are incubated for up to 2 weeks. It is possible, however, to shorten the time of positivity (and thus of incubation) by inoculating blood culture bottles with sonication fluid. However, this typically raises the risk of laboratory contamination during bottle inoculation [5].

Conclusion

Patients with a sinus tract, persistent wound drainage from a joint prosthesis, or a painful prosthesis should be suspected of having PJI, especially in the first few years after implantation. Today, PJI management can rely on new, more accurate, and faster diagnostic techniques. However, samples should always be obtained for culture so that the pathogen's susceptibility can be tested. Non-culture techniques are an important adjunct in patients with culture-negative PJI caused by fastidious or slow-growing microorganisms, as well as in patients who have previously been on antibiotics. This will allow for more timely and effective treatment. For the correct diagnosis of PJI, close collaboration between all medical and surgical specialists is required.

Acknowledgement

None.

Conflict of Interest

None.

References

1. Patel, Robin. "Periprosthetic joint infection." *N Engl J Med* 388 (2023): 251-262.
2. Pannu, Tejbir S., Jesus M. Villa and Carlos A. Higuera. "Diagnosis and management of infected arthroplasty." SICOT-J 7 (2021).

***Address for Correspondence:** Lgnacio Sancho, Department of Microbiology, Iuliu Hatieganu University of Medicine and Pharmacy, 400000 Cluj-Napoca, Romania; E-mail: lgnaciosancho@gmail.com*

Received: 02 February, 2023; Manuscript No. jmmd-23-95714; **Editor Assigned:** 03 February, 2023; PreQC No. P-95714; **Reviewed:** 16 February, 2023; QC No. Q-95714; **Revised:** 21 February, 2023, Manuscript No. R-95714; **Published:** 28 February, 2023, DOI: 10.37421/2161-0703.2023.12.397

3. Corvec, Stéphane, María E. Portillo, Bruna Maria Pasticci and Olivier Borens, et al. "Epidemiology and new developments in the diagnosis of prosthetic joint infection." *Int J Artif Organs* 35 (2012): 923-934.

4. Li, Cheng, Nora Renz, Andrej Trampuz and Cristina Ojeda-Thies, et al. "Twenty common errors in the diagnosis and treatment of periprosthetic joint infection." *Int Orthop* 44 (2020): 3-14.

5. Esteban, Jaime and Enrique Gómez-Barrena. "An update about molecular biology techniques to detect orthopaedic implant-related infections." *EFORT Open Rev* 6 (2021): 93.

How to cite this article: Sancho, Lgnacio. "Microbiological Advances in the Diagnosis of Prosthetic Joint Infections." *J Med Microb Diagn* 12 (2023): 397.