November 14, 2022

Reliability of results of MARS-MRI diagnostics for low-grade periprosthetic shoulder infections depends on the quality of the reference standard Commentary on an article by Jan Fritz et al.: "Diagnostic Performance of Advanced Metal Artifact Reduction MRI for Periprosthetic Shoulder Infection"

Oscar Dorrestijn
Shoulder surgeon
Department of Orthopedic Surgery, Sint Maartenskliniek, Nijmegen, The Netherlands

Other Contributors:

Nathalie Pruijn
PhD student
Sint Maartenskliniek Research, Sint Maartenskliniek, Nijmegen, The Netherlands

Fritz et al. (1) researched MARS-MRI findings for periprosthetic shoulder infection (PSI) and found an exceptionally high probability of > 99%. However, incorrect assumptions were made resulting in unreliable conclusions.

Most PSIs are low-grade shoulder infections caused by Cutibacterium acnes. The absence of characteristics of high-grade infections, such as wound disturbances, fever, or increased inflammatory blood levels, make diagnosis difficult (2,3). Fritz's study (1) used the ICM 2018 (4) criteria as a reference for PSI. However, the value of the combined criteria has not been investigated in prospective studies. Therefore, it cannot be used for research purposes (5).

Of the 67 non-infected participants, only 20 were operated. Missing items (e.g., samples) make this group less comparable to the infected group. For eight participants who were operated on, the surgical indication was "intractable pain and stiffness", which are typical characteristics of low-grade PSI (6,7). Four non-infected patients had positive cultures, which might indicate an infection. Furthermore, patients were considered non-infected if they had "no clinical or radiographic signs of an infection at 1-year follow-up", but such signs are only present in a minority of PSIs (6,8).

No standardized protocol for tissue samples for culture was used with different numbers in the study groups. Moreover, "obtaining five surgical culture specimens was not always possible because of a lack of tissue from some interfaces" or "no overt signs of infection" makes these results biased. Furthermore, the authors did not report from how many patients culture specimens were taken or the threshold of positivity for PSI. All the above-mentioned shortcomings cannot be considered good clinical practice.

An aspect that was not considered is the possibility of other causes of inflammation, like active inflammatory joint disease (5). In such cases, the MARS-MRI findings should be interpreted with caution.

In our opinion, the insufficient identification of low-grade PSI makes the MARS-MRI study results unreliable. Nevertheless, future studies using a well-standardized reference for PSI are desirable and will hopefully provide an

alternative to current invasive diagnostics.

Disclaimer: e-Letters represent the opinions of the individual authors and are not copy-edited or verified by JBJS.

References

1. Fritz J, Meshram P, Stern SE, Fritz B, Srikumaran U, McFarland EG. Diagnostic Performance of Advanced Metal Artifact Reduction MRI for Periprosthetic Shoulder Infection. The Journal of bone and joint surgery American volume. 2022;104(15):1352-61.
2. Kheir MM, Tan TL, Shohat N, Foltz C, Parvizi J. Routine Diagnostic Tests for Periprosthetic Joint Infection Demonstrate a High False-Negative Rate and Are Influenced by the Infecting Organism. The Journal of bone and joint surgery American volume. 2018;100(23):2057-65.
3. Akgün D, Müller M, Perka C, Winkler T. The serum level of C-reactive protein alone cannot be used for the diagnosis of prosthetic joint infections, especially in those caused by organisms of low virulence. The bone & joint journal. 2018;100-b(11):1482-6.
4. Garrigues GE, Zmistowski B, Cooper AM, Green A. Proceedings from the 2018 International Consensus Meeting on Orthopedic Infections: the definition of periprosthetic shoulder infection. Journal of shoulder and elbow surgery. 2019;28(6s):S8-s12.
5. McNally M, Sousa R, Wouthuyzen-Bakker M, Chen AF, Soriano A, Vogely HC, et al. The EBJIS definition of periprosthetic joint infection. The bone & joint journal. 2021;103-b(1):18-25.
6. Pottinger P, Butler-Wu S, Neradilek MB, Merritt A, Bertelsen A, Jette JL, et al. Prognostic factors for bacterial cultures positive for Propionibacterium acnes and other organisms in a large series of revision shoulder arthroplasties performed for stiffness, pain, or loosening. The Journal of bone and joint surgery American volume. 2012;94(22):2075-83.
7. Schneeberger AG, Gilbart MK, Sheikh R, Gerber C, Ruef C. Non-purulent low-grade infection as cause of pain following shoulder surgery: preliminary results. La Chirurgia degli organi di movimento. 2009;93 Suppl 1:S71-7.
8. Portillo ME, Salvadó M, Alier A, Sorli L, Martínez S, Horcajada JP, et al. Prosthesis failure within 2 years of implantation is highly predictive of infection. Clinical orthopaedics and related research. 2013;471(11):3672-8.

Conflict of Interest: None Declared