Diagnostic Value of a PCR-Based Technique for Prosthetic Joint Infection

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Prosthetic joint infection (PJI) is a catastrophic complication for patients with arthroplasty. Culture is the most commonly used method to identify PJI. However, it may not be accurate enough because of contamination and false-negative results (1). A PCR-based technique has been developed and provides great value for PJI diagnosis. Thus, we read with great interest the study by Qu et al. (2) evaluating the diagnostic value of PCR-based diagnosis for PJI. In their study, 14 studies with 1,480 patients were finally included. However, according to the inclusion criteria, the study by Moojen et al. (3) should not be included. In this study, patients undergoing various orthopedic surgeries, including osteosynthesis, were included. Besides, two similar studies (4, 5) by Kobayashi et al. were performed during the same period. However, the authors included the study with a relatively smaller sample size (4) rather than the study with a larger sample size (5), resulting in the data loss of some patients.

We then searched the databases (MEDLINE, EMBASE, Cochrane Library, and Google Scholar) from their establishment to March 2014. Reference lists and citations were also checked for additional studies. Studies on the diagnostic value of a PCR-based technique were selected. Finally, 21 studies (5–25) with 2,619 patients met the inclusion criteria (2) and were included. True-positive, false-negative, false-positive, and true-negative values in all studies were extracted. The statistical analysis was performed with Meta-DiSc (version 1.4). The pooled sensitivity, specificity, positive likelihood ratio (PLR), negative likelihood ratio (NLR), diagnostic odds ratio (DOR), and area under the curve (AUC) were 0.79 (95% confidence interval [CI], 0.76 to 0.82), 0.86 (95% CI, 0.84 to 0.87), 8.22 (95% CI, 4.66 to 15.16), 0.25 (95% CI, 0.18 to 0.34).

FIG 1  Summary receiver operating characteristic (SROC) curves for PCR. SE, standard error.
TABLE 1 Statistical results of previous study by Qu et al. (2) and current study

<table>
<thead>
<tr>
<th>Estimate</th>
<th>Study by Qu et al.</th>
<th>Current study</th>
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<tbody>
<tr>
<td>Sensitivity</td>
<td>(0.77–0.92)</td>
<td>(0.70–0.82)</td>
</tr>
<tr>
<td>Specificity</td>
<td>(0.81–0.96)</td>
<td>(0.84–0.87)</td>
</tr>
<tr>
<td>PLR</td>
<td>9.1 (4.6–18.2)</td>
<td>8.22 (4.66–15.16)</td>
</tr>
<tr>
<td>NLR</td>
<td>0.16 (0.10–0.25)</td>
<td>0.25 (0.18–0.34)</td>
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<tr>
<td>DOR</td>
<td>59 (29–118)</td>
<td>49.03 (30.72–78.25)</td>
</tr>
<tr>
<td>AUC</td>
<td>0.94 (0.91–0.95)</td>
<td>0.93 (0.92–0.94)</td>
</tr>
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</table>

*Abbreviations: PLR, positive likelihood ratio; NLR, negative likelihood ratio; DOR, diagnostic odds ratio; AUC, area under the curve; CI, confidence interval.

The results demonstrated that the diagnostic value of the PCR-based technique might have been overestimated in the previous study (2). With more studies and patients included, the results from the current study might be more accurate with a narrower 95% CI. Inevitably, as with the previous study (2), the statistical heterogeneity was still high. We hope that the enlarged sample size may minimize the bias.

The results showed that the PCR-based technique has an adequate diagnostic value for PJI. It may be helpful for PJI diagnosis for patients in whom a low-grade infection is suspected.

REFERENCES