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Rapid diagnosis of pulmonary tuberculosis using Xpert MTB/RIF assay in gastric aspirate samples from adult patients with sputum-absent disease: A first-step alternative to bronchoscopy?

Diagnóstico precoz de la tuberculosis pulmonar mediante Xpert MTB/RIF en muestras obtenidas mediante aspirado gástrico en pacientes adultos que no expectoran: ¿una alternativa previa a la broncoscopia?

Sputum-absent pulmonary tuberculosis (PTB) is common in adult patients. It leads to misdiagnoses and delays of PTB and forces to rely on alternative diagnostic approaches such as bronchoscopy (BC). XpertMTB/RIF on gastric aspirate (GA) sampling is an option in this scenario,[1] mainly in the pediatric population,[2] but evidence of its usefulness on the adult population is scarce and no previous work has studied its diagnostic performance compared with a reference standard such as tuberculosis culture (TC) from BC samples. TC from GA samples has been previously compared with TC from BC samples showing a positive culture yield of 21% *vs.* 34% respectively.[3]

In the present study we compared the diagnostic yield of the Xpert MTB/RIF assay in GA samples with regard to TC obtained through BC in adult patients with suspected PTB and no sputum production. The secondary aim was to compare the diagnostic performance of the Xpert MTB/RIF assay *versus* that of the TC in the same GA sample. Overall, confirmed PTB diagnosis was made if either Xpert MTB/RIF assay or TC were positive.

We retrospectively reviewed all the GA samples obtained between January 2015 and May 2018 from adult patients with clinical or radiological suspicion of PTB, no sputum production and which fulfilled the inclusion criteria: (a) GA samples were processed for TC and Xpert MTB/RIF; (b) when the GA Xpert MTB/RIF assay was negative a TC was obtained through BC. GA samples were obtained through nasogastric tube in the morning after overnight fasting, and then processed and decontaminated within less than 2 h from sampling.[4] Since no bronchoscopic sampling was performed in patients with a positive Xpert MTB/RIF assay in GA, it was assumed that all GA-positive patients would have been diagnosed with TC obtained through BC.

Forty-three GA samples from 43 patients were reviewed and 31 were finally included in the analysis. The Xpert MTB/RIF was positive in 9 patients (29.0% [9/31]). Eight of them had a positive TC in the same GA sample, whereas the GA culture of the remaining patient was contaminated. Among the 22 patients with negative Xpert MTB/RIF assay in GA (70.9% [22/31]), two (9.1% [2/22]) had a positive TC only in the BC sample and one additional patient (4.5% [1/22]) had a positive TC only in the GA sample. Overall, the diagnosis of PTB was confirmed on the basis of TC performed in GA and/or BC samples in 12 patients (38.7% [12/31] of the overall study cohort).

The sensitivity and specificity of the Xpert MTB/RIF assay in GA samples by using TC in BC samples as reference method were 81.9% (95% CI: 48.2–97.7) and 100.0% (95% CI: 83.2–100), respectively. The NPV was estimated at 90.9% (95% CI: 74.1–97.2) (Table 1). On the other hand, the Xpert MTB/RIF assay exhibited a sensitivity of 88.9% (95% CI: 51.8–99.7) and a specificity of 95.5%

Table 1
Diagnostic performance of the Xpert MTB/RIF assay performed in GA samples.

Comparison of diagnostic methods	Sensitivity, % (95% CI)	Specificity, % (95% CI)	PPV, % (95% CI)	NPV, % (95% CI)	Positive likelihood ratio (95% CI)	Negative likelihood ratio (95% CI)
Xpert MTB/RIF in GA (*vs.* positive mycobacterial culture in BC sample)[a]	81.9 (48.2–97.7)	100 (83.2–100)	100.0 (NA)	90.9 (74.1–97.2)	NA	0.18 (0.05–0.64)
Xpert MTB/RIF in GA (*vs.* positive mycobacterial culture in GA)	88.9 (51.8–99.7)	95.5 (77.2–99.9)	88.9 (53.8–98.2)	95.5 (76.8.0–99.3)	19.56 (2.84–134.6)	0.12 (0.02–0.74)

BC: bronchoscopy; CI: confidence interval; GA: gastric aspirate; NA: not applicable; NPV: negative predictive value; PPV: positive predictive value.
[a] It was assumed that all the patients diagnosed on the basis of a positive Xpert MTB/RIF assay in the GA sample would have been also diagnosed if a bronchoscopic sample had been processed.

(95% CI: 77.2–99.9) when compared with TC in the same GA sample.

The diagnostic performance showed of the Xpert MTB/RIF assay in GA consistent with previous studies when it is compared with TC performed on the same sample,[1,5] although this evidence is mainly limited to the pediatric population. Interestingly, we observed that one out of 12 patients (8.3%) with a culture-proven diagnosis of PTB had a positive TC in GA but not in the BC sample, a complimentary diagnostic yield that has been sown in other studies.[3,6] Altogether, our study shows that Xpert MTB/RIF and TC from GA sampling can avoid up to 32% (10/31) of the BC in this scenario.

Our study has some limitations. Firstly, it lacks of simultaneous BC sampling in patients with a positive Xpert MTB/RIF assay in GA. This invasive procedure was spared by the attending clinicians due to the high specificity of the Xpert MTB/RIF assay in GA samples when there is a suspicion of PTB. We addressed this issue by assuming that all these patients would have been diagnosed by TC in BC samples. Secondly, we used an assay that has been replaced by the more sensitive Xpert MTB/RIF ultra assay.[7] Thus, it is likely that the actual sensitivity of the molecular diagnosis of PTB in GA samples was underestimated.

Our study supports the use of the Xpert MTB/RIF assay as a first line diagnostic approach in adult patients with PTB suspicion and who are unable to expectorate.

Conflicts of interest and source of funding

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