Reviewer's report

Title: Value of Procalcitonin for Detection of bacterial peritonitis: A systematic review and meta-analysis

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Reviewer: Yvan FLEURY

Reviewer's report:

The authors performed a systematic review and meta-analysis to investigate the diagnostic accuracy of serum and ascitic procalcitonin (PCT) in patients with suspected bacterial peritonitis. They included 14 studies written in English or in Chinese, accounting for 1179 patients either with cirrhosis (9 studies), chronic hepatitis (1 study) or treated with peritoneal dialysis (4 studies).

They used appropriate analyses, and overall, the findings were reported according to relevant standards. The results, presented as pooled sensitivity, specificity, area under the receiver operating curve (AUROC), likelihood ratio and diagnostic odds ratio (DOR), suggest that procalcitonin may be helpful in the diagnosis of bacterial peritonitis, but should be interpreted in association with clinical data. Potential limitations of the study are stated, and the main conclusions agree with the findings reported in other infectious settings.

Following specific comments should be taken into account:

- Major Compulsory Revisions

1. Introduction, 1st paragraph:

   The introduction should include some epidemiological data about the prevalence of bacterial peritonitis in adult patients. The first paragraph should be shortened.

2. Results, study characteristics, first paragraph, line 1 to 3, and Table 1:

   The systematic review included 2 studies from the same investigators' group: Zhang W et al. (Chin J Infect Dis 2003) (ref. 24), and Zhang W et al. (Chin J Clin Hepatol 2004) (ref. 27). The serum PCR cut-off value used in both studies was different.

   Did the authors check that the patients recruited in these two studies were from different cohorts? If so, this point should be stated. If the cohort of patients was the same in both studies, the data with the highest Youden index should be used for the meta-analysis, as mentioned in Materials and methods for the results reported at different cut-off values in a same study.

3. Results, study characteristics, first paragraph, line 5 to 8, and Table 1:

   The authors claimed that 8 studies referred to cirrhotic patients and 2 studies
(ref. 22 and ref. 23) were performed in patients with chronic severe hepatitis. Actually, Connert et al. (ref. 23) included patients with cirrhosis in their study. Therefore, 9 studies with cirrhotic patients, and 1 study with chronic severe hepatitis patients should be mentioned in the results section and in table 1. The respective references should be corrected in accordance with these changes.

4. Results, subgroup analysis, first paragraph, line 4 to 8, and Table 2:

The subgroup analysis reported 4 studies that used a PCT cut-off value of less than 0.5 ng/mL (ref. 16, 19, 21, 22). However, the low cut-off value (0.3 ng/mL) used in the study of Viallon et al. (ref. 21) referred to ascitic PCT and not serum PCT. Therefore, the subgroup analysis of serum PCT with a cut-off value < 0.5 ng/mL should include only 3 studies (ref. 16, 19, 21). The range in this subgroup is 0.38-0.48 ng/mL (see also table 2).

Considering the small size of the 2 subgroups with lower serum PCT cut-off values, and the narrow discriminating range between them (4 studies: 0.5 ng/mL, and 3 studies: 0.38-0.48 ng/mL), these 2 categories should be merged in a larger single subgroup named “low cut-off value” (7 studies: less or equal to 0.5 ng/mL). The respective pooled sensitivity, specificity, DOR, AUROC, positive and negative likelihood ratios, should be determined again.

The comparison with the “high cut-off value” subgroup will be more reliable, without changing the main conclusions of the results.

5. Discussion, 4th paragraph:

The issue about the potential production of PCT in the ascitic fluid is interesting. However, the conclusion that the accuracy of ascitic PCT for the diagnosis of bacterial peritonitis could be better than serum PCT is not convincing. Results found in the ascitic PCT subgroup were compared with those of overall serum PCT analysis.

The total number of patients included in subgroups should be reported. Actually, there is an overlap between the 95% confidence intervals (CI) in each group, so that the difference was not significant. Nevertheless, as ascitic PCR was determined in cirrhotic patients only, the comparison of results should be drawn with those of serum PCT in cirrhotic patients’ subgroup. In that case, the difference in AUROC (0.94 [95% CI 0.91-0.95], versus 0.87 [95% CI, 0.84-0.90], respectively) may suggest a better diagnostic accuracy of ascitic PCR. However, the PCR sensitivity, specificity, and DOR were similar in both subgroups. These small and in part not significant differences rather support the assumption of Viallon et al. (ref. 21) that PCT detection in the ascitic fluid was the result of a passive shift due to increased vascular permeability instead of an intraperitoneal synthesis.

6. Discussion, 6th paragraph, line 7 to 8:

The different analytical methods used to determine PCT may contribute to the
heterogeneity between studies to some extent. Actually, only two different methods were used for the measurement of PCT: a quantitative immunoluminometric assay, including the LUMItest, and a semi-quantitative immunochromatographic assay, the PCT-Q test.

7. Discussion, 7th paragraph, fourth limitation, last sentence, line 12 to 14:

A publication bias is a potential limitation of the present systematic review. Although an extensive database search was performed, it is possible that the analysis included the results from published studies with positive findings. This issue should be addressed by drawing a funnel plot, and the results reported as appropriate.

8. Discussion, 7th paragraph, limitations:

The fact that the study was restricted to English and Chinese language should be stated as an additional limitation. This point could be mentioned as the fourth limitation, before the issue of a potential publication bias.

9. Table 1 and Table 2:

The total number of patients included in each study (Table 1) and subgroup (Table 2) should be added in the tables.

- Minor Essential Revisions

10. Abstract, methods:

The name of databases used for the systematic review should be mentioned in the abstract.

The STATA 12.0 software should not be mentioned in the abstract.

11. Abstract, results:

The total number of patients included (n=1179) should be stated in the abstract.

12. Introduction, second paragraph:

The first sentence is in part duplicated from Wacker et al. (ref. 5), and should be modified.

13. Materials and methods, data synthesis and statistical analysis, line 10-11:

The value of I² statistic > 50 % means a moderate to high heterogeneity. It is better not to use the term “significant”, since even a low heterogeneity may be statistically significant.

14. Results, data extraction and calculation, last sentence:

The range of cut-off values for serum PCT should be corrected: it ranged from 0.38 to 13.7 ng/ml.

15. Results, diagnostic accuracy indices:
The first sentence could be deleted, and the reference to figures 5 and 6 should be added in the following text, as appropriate. The polled sensitivity and specificity should be reported before the results of ROC and AUROC. Similarly, the reference to figures 5 and 6 should not precede the reference to figures 3 and 4.

16. Results, PCT and long-term adverse outcomes of peritonitis:
The last sentence about the need for more prospective research should be deleted from the results section. This issue is already addressed in the discussion.

17. Conclusion, line 5-8:
The sentence is in part duplicated from Wacker et al. (ref. 5), and should be modified or the reference should be cited.
A modification could be as follows: “However, it is important to note that PCT cannot be recommended as a “gold standard” test for peritonitis up to now, and should be interpreted in combination with other clinical, analytical, and/or microbiological data. Given the limits of PCT as a single marker, additional large prospective studies should determine its diagnostic value in bacterial peritonitis, when interpreted in association with other biomarkers”.

18. References:
[18]: Turk J Med Sci

19. Table 1:
The column “Outcomes definition” should be positioned before column “Prevalence”.
The column “Cut-off” should be positioned close to column “Sensitivity, specificity”, so that the respective values are adjacent, and the 15 footnotes may be deleted.

- Discretionary Revisions

20. Running title:
“Procalcitonin in bacterial peritonitis”.

21. Introduction, first paragraph:
The micro-organisms cited should be “Gram negative bacilli”.

22. Materials and methods, data extraction and quality assessment, last sentence:
The reference to Stata 12.0 software should be given only once, preferably in the next paragraph.

23. Results, quality assessment, line 5-9:
The definitions of peritonitis were already detailed in the study characteristics and should not be repeated in this section.

24. Discussion, 3rd paragraph, line 4:
The sentence “PCT is a well-known acute-phase reactant protein” should be deleted.

- Minor issues not for publication

Spelling

25. Introduction, second paragraph: “[…] produced by extrathyroidal cells (e.g. monocytes)”.

26. Materials and methods, data sources and search strategy, line 8: “Figure 1 shows details of the search […].”

27. Materials and methods, data extraction and quality assessment, line 6: “[…], and in case of missing data, […].”

28. Materials and methods, data synthesis and statistical analysis, line 10: “[…] cut-off points”.

29. Results, identification of studies, first sentence: “Overall, our electronic search […].”

30. Results, data extraction and calculation, line 4-5: “cut-off values”.

31. Results, subgroup analysis, first paragraph, last sentence: “cut-off values”.

32. Results, PCT and long-term adverse outcomes of peritonitis, line 8: “[…] patients who died or survived during the follow-up period […].”

33. Discussion, 1st paragraph, line 13-14: “[…] detection and differential diagnosis of inflammatory states […]. However, there are few meta-analyses on the accuracy of PCT […].”

34. Discussion, 4th paragraph, line 5 and 7: “ascitic PCT […]” and “ascitic fluid”.

35. Discussion, 4th paragraph, last sentence:
“[…] it is not recommended to use ascitic PCT testing as a stand-alone test […].”

36. Discussion, 6th paragraph, line 6: “ascitic PMN”, twice.

37. Discussion, 6th paragraph, last sentence: “homogeneous”.

38. Discussion, 7th paragraph, line 2-3: “First, in our meta-analysis […].”

39. Discussion, 7th paragraph, line 2: “First, in our meta-analysis […].”

40. Discussion, 7th paragraph, line 5: “[…] cut-off value“.
41. Discussion, 7th paragraph, line 7: “Second, most studies […]“.

42. Discussion, 7th paragraph, line 10: “Third, as mentioned […]“.

43. Discussion, 7th paragraph, line 12: “Fourth, despite the extensive electronic search performed […]“.

44. Conclusion, first sentence: “our meta-analysis […]“.

45. Conclusion, line 3: “cut-off value”.

46. Figure 1: “288 irrelevant studies excluded on the basis of title and abstract review”

Typographical errors

47. Missing space before brackets, units, numbers, or after a comma:

   Abstract: 2 occurrences.
   Introduction, first paragraph: 2 occurrences.
   Introduction, second paragraph: 6 occurrences.
   Materials and methods, data sources and search strategy: 3 occurrences.
   Materials and methods, study selection: 1 occurrence.
   Materials and methods, data extraction and quality assessment: 3 occurrences.
   Materials and methods, data synthesis and statistical analysis: 4 occurrences.
   Results, identification of studies: 1 occurrence.
   Results, study characteristics: 10 occurrences.
   Results, quality assessment: 6 occurrences.
   Results, data extraction and calculation: 3 occurrences.
   Results, diagnostic accuracy indices: 12 occurrences.
   Results, subgroup analysis: 12 occurrences.
   Results, PCT and long-term adverse outcomes of peritonitis: 3 occurrences.

Discussion: 37 occurrences.

   Figure legends: 2 occurrences.
   Figure 1: 7 occurrences, and delete one space after “CBM”.
   Table 1: 57 occurrences, and delete one space between PCT (or CRP) and the cut-off value: 10 occurrences.
   Table 2: 56 occurrences.
48. Comma after “95% CI” or “DOR”:
Results, diagnostic accuracy indices: 12 occurrences.
Results, subgroup analysis: 4 occurrences.

49. Running title: meta-analysis

50. Abstract, results: “Fourteen studies were included in the present meta-analysis.”: add a dot at the end of the sentence.

51. Introduction, first paragraph: “[…] micro-organisms such as Escherichia coli. The mortality of peritonitis […] was close to 90%. With the introduction […]”: add 2 points.

52. Introduction, first paragraph, line 4 to 11: the size of characters should be checked.

53. Introduction, second paragraph, line 5 to 6: the size of characters should be checked.

54. Introduction, second paragraph: “[…] extrathyroidal cells (e.g. monocytes)”: delete space after first bracket.

55. Materials and methods, data sources and search strategy, line 2: “[…] reporting guidelines [8]. We performed a literature search […]”: add a space after end of first sentence.

56. Materials and methods, data sources and search strategy, line 8: “[…] search method used in the meta-analysis”.


58. Materials and methods, study selection, last sentence: “[…] assessed the full-text articles independently. We presented […]”: add a point before last sentence.

59. Materials and methods, data extraction and quality assessment, line 5: “[…] meta-analysis”.

60. Materials and methods, data extraction and quality assessment, last sentence: “ […] by S.K.Y. and […]”: add point after last letter.

61. Results: subtitle: “Identification of studies”.

62. Results, identification of studies, line 3: “Having reviewed the full text of the remaining 139 articles, we then excluded […]”: add a comma after “articles”.

63. Results: subtitle: “Study characteristics”.

64. Results: subtitle: “Quality assessment”.

65. Results: subtitle: “Data extraction and calculation”.

66. Results, diagnostic accuracy indices, line 1-2: “A total of 13 studies [...]”.

67. Results, diagnostic accuracy indices, second paragraph, line 2: “[...] value of serum CRP levels [...]. The pooled sensitivity for CRP [...]”:
   add a point at the end of the sentence.

68. Results, diagnostic accuracy indices, 4th paragraph, line 2: “[...] across all settings. We found that the diagnostic OR was [...]”:
   add a point at the end of the sentence.

69. Results, diagnostic accuracy indices, 4th paragraph, line 5: “[...] respectively. The pooled positive likelihood ratio [...]”: add a point at the end of the sentence.

70. Results, subgroup analysis, 2nd paragraph, line 6: “[...] PCT in cirrhotic patients. The pooled sensitivity [...]”:
   add a point at the end of the sentence.

71. Results: subtitle: “PCT and long-term adverse outcomes of peritonitis”.

72. Results, PCT and long-term adverse outcomes of peritonitis, first sentence:
   “Only two studies”.

73. Results, PCT and long-term adverse outcomes of peritonitis, line 4:
   “However, Contert et al. [...]”.

74. Discussion, 1st paragraph, line 2-3: “[...] long half-life of 25-30 h [3]. It was first identified [...] hypocalcaemia associated with [...]”:
   add a point at the end of the sentence, and correction.

75. Discussion, 1st paragraph, line 5-6: “[...] patients with bacterial infection. It is most commonly produced from neuroendocrine cells in non-thyroidal tissues such as lung [...]”:
   add a point at the end of the sentence, and correction.

76. Discussion, 1st paragraph, line 8: “[...] or sterile inflammation. In the serum [...]”:
   add a point at the end of the sentence.

77. Discussion, 2nd paragraph, line 13: “[...] by Opatrna et al. [...]”.

78. Discussion, 7th paragraph, line 5: “[...] cut-off value effect. Despite the adjustment [...]”:
   delete a space after the point.

79. References:
   The space between issue number and the double point should be deleted in the following references: [10], [11], [15], [16], [25], [26], [27], [28], [29], [33], [34], [38], [40], [41], [42].

80. References:
   [24]: “TNFa and IL-6”:
   add a space.
   [26]: “TNFa and LPS”:
   add a space.
81. Table 1: “Cut-off”.

82. Table 2: “High cut-off value”, “Cut-off value”, “Low cut-off value”: in table and footnote.

83. Table 2, footnote a: “High cut-off value”.

Grammatical errors

84. Introduction, first paragraph: “It frequently occurs in […] patients receiving continuous ambulatory peritoneal dialysis therapy”.

85. Introduction, second paragraph: “[…] their ability to diagnose bacterial infections, […]”.

86. Introduction, second paragraph: “[…] produced by extrathyroidal cells (e.g. monocytes)”

87. Introduction, second paragraph, last sentence: “[…] we calculated the summary receiver operating characteristic (ROC) curve […]”.

88. Materials and methods, data synthesis and statistical analysis, line 9-10: “[…] area under the receiver operating characteristic curves (AUROC), irrespective of the different cut-off points used”.

89. Results, identification of studies, line 4-8: “[…] among them, 46 were review articles; 22 were case reports; 8 were animal studies; 5 did not investigate the diagnostic value of serum PCT level; and 34 were not in English or Chinese in the text; 4 were retrospective studies, and 6 studies were unable to reconstruct 2×2 tables. Finally, 14 eligibility studies were included in the analysis”.

90. Results, quality assessment, line 9-10: “[…] lead to potential spectrum bias existed. […] or uninterpretable results. Seven studies did not state whether the PCT results were interpreted without knowledge of outcome assessment […]]. It was poorly reported […]”.

91. Results, diagnostic accuracy indices, 4th paragraph, line 2: “[…] We found that the diagnostic OR was […]”.

92. Results, subgroup analysis, 1st paragraph, line 2: “Four studies […] reported test results […]”.

93. Results, subgroup analysis, 1st paragraph, last sentence: “[…] showed slightly decreased sensitivity, but increased specificity […]”.

94. Discussion, 2nd paragraph, line 10: “[…] new reliable diagnostic markers such as PCT […]”.

95. Discussion, 4th paragraph, line 8: “[…] and PCT was not synthesized by leucocytes […]”.
96. Figure legends: Figure 5: “[…] diamond shape, and the respective […]”: add a comma.

Stylistic suggestions

97. Key words: “[…]; and meta-analysis”: the “and” should be deleted.

98. Abstract, background: “Many studies have highlighted the potential usefulness of procalcitonin”.

99. Abstract, methods: “We performed a systematic review in multiple databases to identify studies that evaluated […]”.

100. Abstract, results: “Fourteen studies were included in the present meta-analysis.”


102. Abstract, results: Use of higher PCT cut-off values could improve […]”.

103. Abstract, conclusions: “However, with regard to methodological limitations and significant heterogeneity between studies, […]”.

104. Introduction, first paragraph: “However, it is still a common illness that adversely affects the prognosis, […]”.

105. Introduction, first paragraph: “It frequently occurs in children and adults, and can endanger life, particularly in patients with decompensated cirrhosis or in patients receiving continuous ambulatory peritoneal dialysis therapy”.

106. Introduction, first paragraph: “Consequently, diagnosis of bacterial peritonitis continues to be a major clinical challenge, and an accurate biomarker for the early identification of peritonitis would be of great diagnostic value.

107. Introduction, second paragraph, line 5: “There is some evidence indicating a good diagnostic accuracy of the PCT test […]”.

108. Introduction, second paragraph, line 11: “Additionally, several new studies of procalcitonin […]”.

109. Introduction, second paragraph, line 12-14: “Therefore, we undertook the present systematic review and meta-analysis mainly to quantitatively summarize the current evidence about PCT as a marker […]”.

110. Introduction, second paragraph, last sentence: “Because there is no consensus […], and as different PCT thresholds have been used between studies, we calculated summary receiver operating characteristic (ROC) curves approach to perform […]”.

111. Materials and methods, data sources and search strategy, line 2-5: “We
performed a literature search in MEDLINE, […] Cochrane databases, China Biology Medicine database (CBM), and China National Knowledge Infrastructure (CNKI) databases […]”.

112. Materials and methods, data sources and search strategy, line 9: “[…] and unpublished studies were sought initially without language restrictions”.

113. Materials and methods, data sources and search strategy, last sentence: “[…] in order to identify other potentially relevant trials”.

114. Materials and methods, study selection, first sentence: “Only studies that investigated the diagnostic accuracy […]”.

115. Materials and methods, study selection, line 4-5: “[…], we only included articles published in English and Chinese although there was no language restrictions”.

116. Materials and methods, data synthesis and statistical analysis, line 3-4: “[…] diagnostic odds ratio (DOR) and the likelihood ratio et al. based on the bivariate random effect […]”.

117. Materials and methods, data synthesis and statistical analysis, line 8: “[…] receiver operating characteristic curves (ROC), and calculated […]”.

118. Materials and methods, data synthesis and statistical analysis, line 9-10: “[…] area under the receiver operating characteristic curves (AUROC), irrespective of the different cut-off points used”.

119. Results, study characteristics, line 4-7: “All studies were conducted in adult patients: 4 of them referred to peritoneal dialysis patients […]; 9 studies reported spontaneous bacterial peritonitis in cirrhotic patients […], and 1 study in chronic severe hepatitis patients […]”.

120. Results, study characteristics, line 10-12: “Common bacteria isolated were Escherichia coli, and Streptococcus species. PCT levels were measured in serum samples in 13 studies […] and in ascitic fluid samples in 4 studies […]”.

121. Results, data extraction and calculation, line 3-6: “PCT measurement was performed at the beginning of the trial in most of the included studies. We reported the PCT and CRP cut-off values in Table 1. Cut-off values for serum or ascitic PCT varied between studies, ranging from 0.38-13.7 ng/ml, or 0.3-10 ng/ml, respectively”.

122. Results, diagnostic accuracy indices, line 1-3: a shorter sentence is better: “A total of 13 studies […] have investigated the diagnostic value of PCT in serum. Our analysis indicated that serum PCT has a high degree of accuracy for the diagnosis of peritonitis”.

123. Results, subgroup analysis, 2nd paragraph, last sentence: “[…] AUROC was 0.87 […]”.
124. Results, PCT and long-term adverse outcomes of peritonitis, line 5: “[…] cirrhotic patients with PCT levels above […]”.

125. Discussion, 2nd paragraph, line 1-4: “There are many types of bacterial peritonitis. In clinical practice, they are most commonly found in patients with peritoneal dialysis (PD), and in cirrhotic patients. PD represents an important treatment option for […]”.

126. Discussion, 2nd paragraph, line 7-9: “Microbiological culture system in PD effluent is the gold standard for diagnosis of PD-associated peritonitis, but suffers from […]”.

127. Discussion, 2nd paragraph, line 12-13: “[…] is the major pathway for clearance of PCT [36]”.

128. Discussion, 2nd paragraph, line 16-19: “[…] PCT correlated weakly with renal function dysfunction, and […] based on PCT [36,38]. Our meta-analysis also confirmed a quite favorable diagnostic accuracy of high PCT values in PD patients […]”.

129. Discussion, 3rd paragraph, line 5-6: “There is considerable evidence indicating that high PCT levels may be related to infections in cirrhosis [23]. Although the liver is considered as the main source […]”.

130. Discussion, 3rd paragraph, last sentence: “[…] PCT testing has a good accuracy for the diagnosis of bacterial peritonitis in cirrhotic patients […]”.

131. Discussion, 4th paragraph, first sentence: “Some authors postulated that ascitic PCT might be more sensitive than serum PCT […] because bacterial infection could trigger peritoneal inflammatory cells […]”.

132. Discussion, 4th paragraph, line 4-5: “In the present study, the pooled analysis of 4 studies […] suggested that ascitic PCT […] could be a more accurate test […]”.

133. Discussion, 4th paragraph, last sentence: “[…] it is not recommended to use ascitic PCT testing as a stand-alone test, and […] to fully elucidate the potential diagnostic value of ascitic PCT”.

134. Discussion, 5th paragraph, line 2-4: “In a virtual population with a 20% prevalence of peritonitis (the actual prevalence […]), use of a serum PCT test […]”.

135. Discussion, 5th paragraph, line 10: “Using data from the subgroup with a higher PCT […]”.

136. Discussion, 5th paragraph, last sentence: “[…] a negative post-test probability or 7%. Therefore, higher PCT cut-off values may be a more useful […]”.

137. Discussion, 6th paragraph, first and 2nd sentences: “[…] for the overall
results between the fourteen included studies. Potential source of heterogeneity included the different characteristics of the studies, such as methodological quality, prevalence of case patients (range from 0.1 to 0.74), size of the study populations, different reference standards in PD [...].

138. Discussion, 6th paragraph, line 8-11: “Other unrecorded differences among these studies may also contribute to the heterogeneity. Evaluation of individual patient data or meta-regression would help in this analysis of the sources of heterogeneity”.

139. Discussion, 6th paragraph, line 13: “[...] it limits our ability to further evaluate heterogeneity”.

140. Discussion, 6th paragraph, last sentence: “On the other hand, using more homogeneous trials could solve this difficulty, but could induce selections bias”.

141. Discussion, 7th paragraph, line 3-4: “[...] specificities varied between studies. We constructed the ROC curve [...]”.

142. Discussion, 7th paragraph, line 7-9: “[...] most studies have a case-control design. It has been demonstrated that case-control studies could over-estimate the accuracy of a diagnostic test [42], therefore more larger prospective trials should be performed to elucidate [...]”.

143. Discussion, 7th paragraph, line 10-12: “[...] our study suffered from moderate heterogeneity, mainly owing to different patients characteristics, and different definitions of peritonitis.

144. Discussion, 7th paragraph, last sentence: “[...] especially because positive studies are more easily reported”.

145. Conclusion, line 1-3: “Our meta-analysis showed that PCT is a helpful marker in identifying bacterial peritonitis. Although PCT performs as well in PD patients as in cirrhotic or severe hepatitis patients, use of a higher cut-off value [...]”.

146. Conclusion, line 5-7: “However, it is important to note that PCT cannot be recommended as a “gold standard” test for peritonitis up to now, and should be interpreted in combination with other clinical, analytical, and/or microbiological data. Given the limits of PCT as a single marker, additional large prospective studies should determine its diagnostic value in bacterial peritonitis, when interpreted in association with other biomarkers”.

Level of interest: An article whose findings are important to those with closely related research interests

Quality of written English: Needs some language corrections before being published
**Statistical review:** No, the manuscript does not need to be seen by a statistician.

**Declaration of competing interests:**

I declare that I have no competing interests.