Peer Review File

Reviewer A

This is a study illustrating a novel technique about electromagnetic navigation CT-guided percutaneous system for lung biopsy. As the feasibility of electromagnetic navigation bronchoscopy-guided lung resection has been performed worldwide for a few years, the manuscript indeed provide us with some new information about assistance of electromagnetic navigation in CT guided biopsy. However, the manuscript should be in major revision before publication.

1. The manuscript should be re-written with the help of native speaker, there were too many grammatical errors and some sentences were really hard to understand.

Reply: Thanks for your comment. The manuscript has already been re-written with the help of a native speaker.

2. The author should clearly address the terms: technical success rate and technical efficacy (instead of efficiency), because I can't understand this, as there were no description about the pathology of biopsy. In my point of view, here the author should use a table to show the different histological subtypes, and if there were missing in biopsy or the need for second biopsy. So you mean in all 141 patients, you succeeded in all biopsies and no failing? Is there any benign pathology report that you can't be sure if you punctured the right target?

Reply: Thanks for your comment. We have redefined the concept of technical success rate and technical efficacy and added the pathology of biopsy, and because many lesions were only submitted for cytopathological analysis, there were no specific pathological subtypes. If our biopsy procedure failed to yield the diagnosis, we will take a second biopsy or perform the 3-6 month follow-up according to the patient's condition. And in all 141 patients, we succeeded in all biopsies and no failing according to our concept of technical success rate. If pathological reports benign lesions, we will combine other results to analysis.

Changes in the text: We have modified our text as advised (See Page 6 Line 20-22, Page 7 Line 7-15, Page 8 Line 17- Line 21, Table 1).

3. The figures were poorly chosen. First, you should never put the patients name on a published paper. Second, in fig 1, we can hardly see the procedure of the puncture, what we can see was only a doctor do the gesture. So I insist that you should replace the figures to thoroughly show the whole biopsy procedure, especially how the

software works and how the system help you find the best skin puncture site.

Reply: Thanks for your comment. We have replaced the figures.

Changes in the text: We have modified our text as advised (See Figure 1, Figure 2 and Figure 3).

4. The limitation of the study should be discussed further, it is too short for such a study.

Reply: Thanks for your comment. We have added the limitation of my study.

Changes in the text: We have modified our text as advised (See Page 13 Line 5-11).

5. The procedure of this technique should be illustrated in detail. Now I really cannot figure that.

Reply: Thanks for your comment. We have re-explained the procedure of this technique.

Changes in the text: We have modified our text as advised (See Page 5 Line11-22, Page 6 Line1-18).

Reviewer B
The authors describe a retrospective study of the use of an electromagnetic navigation system for percutaneous lung biopsy vs CT-guided percutaneous lung biopsy. Patients either had a percutaneous biopsy using CT planning and EM guidance or CT confirmation (needle in lesion). The aim was to assess the clinical value of EM guidance. Technical success was defined as completion of the procedure and acquisition of tissue. Statistics was completed as t-test, Mann Whiteney U test or Chi-square.
141 patients were included in EM group, and 96 with conventional CT biopsy. There was no difference in size of lesion or distance from pleura. About 30% of nodules were more than 2cm from pleura. Technically success was 100% in both groups. Time to biopsy was the same in both groups. Results of the biopsy were not described in the study. Follow-up of the lesions was not described. Complications were similar in both groups which included pneumothorax, hemorrhage and hemoptysis.

1. The authors need to describe the pathology results - how many of these biopsies resulted in a diagnosis? If the biopsy was non-diagnostic, how was follow-up managed?

Reply: Thanks for your comment. We have added the pathology results of the biopsy. If the biopsy procedure failed to yield the diagnosis, we will take a second biopsy or perform the 3-6 months follow-up according to the patient's condition.

Changes in the text: We have modified our text as advised (See Page 8 Line 17-21, Table 1).

2. EM guidance for percutaneous lesions has already been described (Veran spinperc) so the authors should describe how their system is different to other systems. How is the registration process carried out? Does the patient need to be in the CT scanner?

Reply: Thanks for your comment. We have re-explained the procedure of this technique.

Changes in the text: We have modified our text as advised (See Page 5 Line 11-22, Page 6 Line 1-18).

3. Given that there is no superiority in technical success between EM guidance and conventional CT biopsy and no difference in complications, what is the clinical value of EM guidance on top of conventional CT biopsy?

Reply: Thanks for your comment. Although the electromagnetic navigation system is not superior to conventional CT guidance, the new technology is suitable for young doctors who lack experience in biopsy. And as experiences increases, we can improve the utilization efficiency of the electromagnetic navigation system.

4. The Authors should describe previously published EM guidance systems for percutaneous biopsy and discuss the differences in systems.
Yarmus LB, Arias S, Feller-Kopman D, Semaan R, Wang KP, Frimpong B, Oakjones Burgess K, Thompson R, Chen A, Ortiz R, Lee HJ. Electromagnetic navigation transthoracic needle aspiration for the diagnosis of pulmonary nodules: a safety and feasibility pilot study. J Thorac Dis. 2016 Jan;8(1):186-94. doi: 10.3978/j.issn.2072-1439.2016.01.47. PMID: 26904228; PMCID: PMC4740165.

Reply: Thanks for your comment. We have described previously published EM guidance systems for percutaneous biopsy and discuss the differences in methods.

Changes in the text: We have modified our text as advised (See Page 10 Line 18-Page 11 Line 1).

Reviewer C
The study described in the current article entitled " The clinical value of an electromagnetic navigation system for CT-guided percutaneous lung biopsy of

peripheal lung lesions" aims to evaluate the impact on clinical outcome of an electromagnetic identification system in guiding CT-based biopsy of peripheric lung lesions. This system is yet used in bronchoscopy and its application is valuated in CT guided biopsy for increased accuracy, the reduction of operation time and procedure-related complications. The article is divided in four section: Introduction, Materials and Methods, Results and Discussion.

In the Introduction is presented the reason why an electromagnetic navigation system could be applied in CT-guided biopsy of peripherical lung lesions. Its main advantage could be the possibility of a real-time imaging; this in fact could increase the techinque accuracy and reduces the procedure complications. In other terms this technique reappraises the impact of operator experience on clinical outcome.

The following Section Materials and Methods is subdivided in four subsections. Study population, the first one, describe the target population of the study that is divided in Group A (assisted using an electromagnetic navigation system) and Group B (assisted using conventional CT-guided percutaneous lung biopsy). Study procedure, the second one, describes practical aspects of the used procedure. In the final subsections, Data collection and Statistycal analysis, information is given about data acquisition and analysis.

Accurate and detailed information is given about the Results of the study, that is the third section of the paper, about patients and lesion characteristics, technical and efficiency, and complications.

In the Discussion are treated different aspects of the analyzed question, advantage and limitations. The clinical background on wich was reasoned to apply electromagnetic navigation is presented. Two favorable studies and one not favorable are cited. It is to say that the present study doesn't relevate significative differences in operation time and the number of CT scan, this being related to its intrinsic limitations.

In fact the study was carried out with a retrospective data analysis, in a single centre and concerns a small number of patients. All this represent disantvage, like underlined, and more studies are needed to evaluate the effective utility if such technique.

The references are many, in line with the studied topic and most of them are recent.

The table and figures are exhaustive. The manuscript is clearly written.

Reply: Thanks for your comments.

Reviewer D

Authors attempted to compared and evaluate the technical success rate and diagnostic accuracy of CT-guided percutaneous lung biopsy between electromagnetic navigation system- assisted and conventional method. The authors concluded that electromagnetic navigation system is an effective and safe tool for CT-guided percutaneous lung biopsy. However, the results of this study showed no additional benefits of using electromagnetic navigation system in conducting CT guided lung biopsy.

The reviewer thinks that the idea of the study is interesting and may be useful in clinical setting; however, several questions are raised about the methodological issue to draw the conclusions that the authors described. In addition, there are many grammatical errors that are needed to be corrected.

Material and Methods

Please provide the detailed information of the procedures such as the gauge of needle, the use of coaxial needle, and number of obtained specimen.

Please provide CT parameters during procedure such as image thickness, mA, Kvp.

CT images during the procedure were acquired at end expiration or spontaneous respiration? Pre-procedural CT scans are usually obtained at end inspiration. Given that the electromagnetic system superimposes the needle tip on the pre-procedural dataset, the patient movement between the pre-procedural scan and needle placement could lead to misintegration during the procedure, especially in lower lobe lesions. Please, describe this issue in M&M and Discussion.

Reply: Thanks for your comments. We have provided detailed information on the biopsy procedures and CT parameters. CT images during the procedure were acquired at end expiration.

Changes in the text: We have modified our text as advised (See Page 5 Line 11-22, Page 6 Line 1-22, Page 12 Line 16-22).

Results

Please add the results of final pathology.

The reviewer thinks that "diagnostic accuracy" is more appropriate than "technical effectivity". The authors present only "technical effectivity". Please add the sensitivity, specificity, accuracy, PPV, and NPV.

Please add the radiation dose exposure during the procedures in Table 2.

The solidity of the nodule (solid vs subsolid), the presence of air-bronchogram, and the presence of emphysema of fibrosis affect the occurrence of complications of CT-guided lung biopsy. Please, provide the information regarding these issues in both groups.

Reply: Thanks for your comments. We have added the pathology results of the biopsy. According to the formal comments, we have re-defined the concept of technical success rate and technical efficacy. Because of the limitation of our study, we did not calculate the radiation dose in the system.

Changes in the text: We have modified our text as advised (See Page 8 Line 17-21 ,Table 1, Page 7 Line 7-15, Page 9 Line 19-20, Table 4, Table 5).