Peer review file

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Reviewer A

Comment 1: Referring to the methods of this study, patients' information regarding chest pain/paresthesia was obtained from telephone interviews. I'd recommend the authors to attach the questionnaire used for telephone interviews to the supplementary file. It may be helpful for upcoming studies.

Reply 1: We thank the reviewer for the kind suggestion. The questionnaire used for the telephone interview has been attached as supplementary file.

Changes in the text: We've added a statement in Materials and Methods section, and we have attached the questionnaire as supplementary file (see Page 5, lines 102-103).

Comment 2: In addition, excluded patients should be divided into those with incomplete information and those with insufficient follow-up period. Especially, it is important to describe the proportion of completed interviews.

Reply 2: A total of 258 patients were excluded from the study: in 35 cases the follow-up was <2 months and in 223 cases the data about pain and/or paresthesia at follow-up were incomplete.

Changes in the text: We've added a statement in Results section (see Page 6, lines 126-127).

Comment 3: Referring to surgical procedures, no one underwent VATS without pleurodesis. From the perspective of chronic pain/paresthesia, VATS without pleurodesis may be another option, unless it significantly raises the recurrence rate after VATS. It would be good to comments on such a surgical option.

Reply 3: From the perspective of chronic chest pain/paresthesia, VATS without pleurodesis may be a potential option for primary spontaneous pneumothorax surgical management. However, the primary aim of the surgical treatment is to reduce the risk of ipsilateral pneumothorax recurrence. Thus, as suggested by the current guidelines, surgeons should always perform pleurodesis in order to reduce this risk. Conversely, no common

agreement is reported about the need of lung resection in absence of lung alterations. In this study all patients underwent pleurodesis, while lung resection was not routinely performed in all cases.

Changes in the text: No changes.

Comment 4: 24 and 28 Fr chest tubes were used in all patients of this study. According to the BTS (British Thoracic Society) guidelines for the management of spontaneous pneumothorax, large-bore chest drains are not recommended. Any descriptions about why smaller chest tubes were not used in this study are needed.

Reply 4: We are aware that for the treatment of primary spontaneous pneumothorax the BTS guidelines suggests the use of small-bore chest tubes. However, no further indications are reported about the ideal size for chest tube to leave in place after surgery. Thus, in the past larger tube were used for this kind of surgery, and our cohort refers to period of time comprised between 2007-2017. Recently all the centers have started to use chest tube with a smaller size.

Changes in the text: No changes.

Comment 5: Line 123, the word "chest tube size" was duplicated.

Reply 5: We thank the reviewer to have reported this mistake.

Changes in the text: We've corrected the mistake (see Page 8, lines 168-169).

Comment 6: The subtitle "Conclusion" should be replaced with "Discussion".

Reply 6: We thank the reviewer for the kind suggestion, and we've replaced the subtitle "Conclusion" with "Discussion".

Changes in the text: We've replaced the subtitle "Conclusion" with "Discussion" (see Page 9, line 192).

Comment 7: Authors suggested that intercostal nerve block could reduce chronic pain/paresthesia. Therefore, the proportion of intercostal nerve block should be mentioned and its impact on chronic pain/paresthesia should be analyzed to reinforce the assumption.

Reply 7: Unfortunately, as we reported in the discussion, one of the limitations of this study is the lack of data about perioperative pain management. Thus, we're not able to do further analysis to text the impact of

intercostal nerve block on chronic pain and paresthesia. We can only assume that the improvement of chronic chest paresthesia we observed in more recent years may be due to the recent improvement of perioperative control techniques.

Changes in the text: We reformulated a statement in Discussion section (see Page 11, line 262).

Reviewer B

Comment 1: How do we know is the chronic discomfort the patients are experiencing are related to the actual surgery and not the previous chest-tube treatments? According to table 1 - 65% of the patients included have experienced pneumothorax twice and therefore possible have experienced several chest-tubes before the actual surgery. How do we know the number of previous chest-tubes and size of those did not affect the surgical trauma?

Reply 1: We do not know how many patients with primary spontaneous pneumothorax were treated with chest tube at their first episode of pneumothorax. However, as we reported in Results (page 7, lines 156-157), no patient was under medical treatment for chronic chest pain before surgery, suggesting that previous treatments may have had no significant impact on chronic pain and paresthesia after surgery. Moreover, at first episode of pneumothorax requiring chest tube, a small size (12-16 F) chest tube is usually used and it is usually left in place for few days.

Changes in the text: No changes.

Comment 2: What were the credentials of the 9 centers including in this study? Are they cardiothoracic centers with experienced thoracic-surgeons or general surgeons performing thoracic surgery? This might be very important to the surgical outcome.

Reply 2: All the centers included in the study are thoracic surgery centers with experienced thoracic surgeons and residents in thoracic surgery involved in patients' management.

Changes in the text: We've added this information in Materials and Methods section (see Page 4, line 79).

Comment 3: Why does the protocol in the 9 centers in Italy suggest postsurgical chest-tube for 5 days? This will naturally affect the patient's outcome very much and bind him to the hospital for at least 5-6 days. In many countries chest-tubes are now removed on the same day of routine VATS surgery or the following days if no air-leakage may be observed. Is seems very outdated to keep chest-tubes in place for a strict period instead of looking at each patient isolated.

Reply 3: We agree with the reviewer. However, as explained in Materials and Methods, only in three centers, during the first years of this study period, the management of chest tube after VATS for primary spontaneous pneumothorax consisted in keeping chest tube in place for at least 5 days after surgery (generally under suction) despite the absence of postoperative complications, probably with the idea of promoting pleurodesis. Recently in all centers the postoperative chest tube management has been consisting in removing chest tube as soon as possible.

Changes in the text: No changes.

Comment 4: As this is a retrospective study, we need to be informed who conducted the interviews and when? It is not clear what your questions were, and when the exact information about smoking habits and so on was collected.

Reply 4: Patients' clinical (including smoking habit) data were collected from patients' medical records. Thus, they refer to the period in which patients underwent surgical procedure. The telephone interviews were conducted by one clinician from each thoracic surgery center at least at 2 months after surgery. We have attached the questionnaire used as supplementary file.

Changes in the text: We've added a statement in Materials and Methods session, and we have attached the questionnaire as supplementary file (see Pages 4-5, lines 87-88, 102-103).

Comment 5: Figure 1 – do you have an explanation to the somewhat rising tendency of pain and paresthesia in the end of the observation period.

Page 6 line 135 – the statement here seems unclear and needs to be rephrased.

Reply 5: We observed a significant reduction of chronic chest pain and paresthesia during the first years of the study period (between 2007-2009 and 2007-2011, respectively). After that, chronic chest pain and

paresthesia rates showed an inconstant trend, with, recently, a slight increase between 2014-2016 and a decline after 2016. We've tried to give an explanation about this recent slight increase, evaluating patients' clinical data and each thoracic surgery center clinical and surgical practice but we've not found a reasonable answer.

Changes in the text: We've reformulated the description of Figure 1 (see Page 8, lines 187-190).

Comment 6: Many of the references har quite old – I believe it would be possible to find some more recent papers in some cases. I suggest an updated search.

Reply 6: We've reviewed the more recent literature but no further studies about chronic chest pain and paresthesia after VATS for primary spontaneous pneumothorax has been found apart from a recent review.

Changes in the text: We have updated the References section (see Page 15, lines 355-356).

Comment 7: You state that you focus on long-term pain and paresthesia following surgical treatment but at the same time you have included all patients observed for more than 2 months. This does not make any sense in my opinion. F you wish to focus on long-term effects, I would recommend excluding all patients observed less than 1 year. This would make for a stronger message and separate the short-term from long-term effects more clearly.

Reply 7: We decided to use this timing because in the literature chronic chest pain and paresthesia after surgery are defined as a condition persisting at least 2 months after surgery and other authors have previously used this definition. So, in order not to underestimate these conditions and to be in line with the previous literature we included all the patents with at least 2 months of follow-up.

Changes in the text: We have added a statement in the Discussion section (see Page 12, lines 274-276).

Comment 8: Is there a difference in reported effects depending on the observation time? Meaning does patients observed for 90 months report the same problems as those observed for 12 months?

Reply 8: We evaluated chronic chest pain and paresthesia trends in relation to observation time, grouping patients in five groups according to the length of follow-up: $\geq$2 and $\leq$12 months; >12 and $\leq$24 months; >24 and $\leq$36 months; >36 and $\leq$60 months; >60 months. In detail, chronic chest pain rates were 10%, 14%, 18%, 10% and 5%, respectively. Chronic chest paresthesia rates were 23%, 40%, 27%, 22% and 19% respectively.

After 90 months of follow-up, chronic chest and paresthesia rate remained relatively stable (7% and 24%, respectively). Aware that the difference in follow-up time may have had an impact on the trend of chronic chest pain and paresthesia rates over the study period, we analyzed the potential risk factors for chronic chest pain and paresthesia using the Cox regression model, in order to overcome the time bias.

Changes in the text: We've added a statement in the Results and Discussion (see Page 8, lines 180-185 and Page 12, lines 273-280).