



Results of treatment for catamenial pneumothorax since the introduction of video-assisted thoracoscopic surgery: a systematic review

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Comment on: Bricelj K, Srpčič M, Ražem A, *et al.* Catamenial pneumothorax since introduction of video-assisted thoracoscopic surgery: A systematic review. *Wien Klin Wochenschr* 2017. [Epub ahead of print].

Received: 22 September 2017; Accepted: 06 October 2017; Published: 26 October 2017.

doi: 10.21037/vats.2017.10.01

View this article at: <http://dx.doi.org/10.21037/vats.2017.10.01>

Catamenial pneumothorax is an uncommon form of pneumothorax in women of reproductive age (1); it is strongly related to endometriosis and menses. Diaphragmatic changes, such as holes or endometrial implants, were features in patients with catamenial pneumothorax (2). Endometriosis of the visceral pleura was sometimes observed (2,3). Although some theories have been suggested, the etiology is not known in detail. Treatment was difficult because patients with catamenial pneumothorax have frequent recurrences (2). Optimal treatments for catamenial pneumothorax have not been conclusively confirmed. We need to understand the etiology or pathophysiology of the disease to resolve these problems, including recurrences in patients with catamenial pneumothorax. For that reason, the report by Bricelj *et al.* (1) is very important, and focusing on the period after the introduction of video-assisted thoracoscopic surgery (VATS) is informative.

VATS is useful for observing the whole thorax. Before the introduction of VATS, diaphragmatic changes such as holes or endometrial implants might not have been discoverable using thoracotomy because common thoracotomy approaches included a transaxillary approach (4). VATS provides a superior opportunity for inspection of the diaphragmatic surface (3). The use of VATS might enable the operator to find thoracic endometriosis more easily.

Bricelj *et al.* performed a PubMed search of publications about catamenial pneumothorax since 1993, when VATS was first described, and wrote a systematic review of catamenial

pneumothorax (1). This review should include most manuscripts with findings from VATS-based procedures. It included 182 patients from 101 papers. Of those patients, 172 (94.5%) had adequate information about intraoperative findings, and 68 patients had pelvic endometriosis. At presentation, the right side was involved in the majority of cases (93.9%). The main intraoperative findings were endometrial implants, diaphragmatic perforations, or blebs/bullae. Compared with patients without pelvic endometriosis, patients with pelvic endometriosis had a significantly higher rate of findings of endometrial implants. There was a significant difference in the finding of histologically confirmed thoracic endometriosis between patients with pelvic endometriosis and patients without. Regarding treatments, 68.1% of patients had hormone treatment, and 62.6% chose combination therapy with VATS and hormone treatment. Overall, 26.9% had a recurrence. In this study, there were no significant differences between the main intraoperative findings and recurrences. Moreover, there were also no significant differences between treatment types and recurrences.

Various theories could explain the clinicopathological features of catamenial pneumothorax (1), including the following: thoracic endometriosis with cyclic tissue breakdown, hormonally induced diaphragmatic endometrial tissue with cyclic necrosis, rupture of bullae or alveoli caused by hormonal changes, or alveolar rupture due to increased prostaglandin. This condition may be caused by retrograde regurgitation of endometrial tissue during menses, and

endometrial tissue may circulate in the abdominal cavity up to the right gutter of the peritoneal surface of the right diaphragm (3). However, none of these theories can explain all features. Predominance on the right side may offer a chance to explain the etiology of catamenial pneumothorax.

The study by Bricelj *et al.* revealed a higher rate of identified pathological findings, such as endometrial implants or diaphragmatic perforation, than previous studies (1). VATS might have contributed to the increase in identified pathological findings. However, the appropriate timing of VATS is also important for exploration of thoracic endometrial tissue. This study included patients with catamenial pneumothorax and concurrent pelvic endometriosis and those without concurrent pelvic endometriosis. Patients with concurrent pelvic endometriosis had a significantly higher rate of histologically confirmed thoracic endometriosis compared with patients without pelvic endometriosis (1). Thus, there must be a strong association between thoracic endometriosis and pelvic endometriosis. These findings suggest that the primary source of thoracic endometriosis may be pelvic endometriosis. However, as shown in Table 2, alternative mechanisms should be considered because many patients without pelvic endometriosis had thoracic endometriosis. The main treatment method was a combination of surgical and hormonal treatment. Pleurodesis was an intervention performed in most patients. Pleurodesis was divided into surgical (84.1%), chemical (32.6%), and combined pleurodesis (16.7%).

In this study, one limitation was the lack of uniformity in the data for patients and surgical methods because the systematic review included numerous case reports (1). Thus, conclusions about the timing of VATS could not be made. There was no reference to agents of pleurodesis, although various agents of pleurodesis were used for patients with the typical spontaneous pneumothorax (4). Although there is a report showing the effectiveness of the GnRH agonist, this study revealed no significant effect of hormonal treatment for patients with catamenial pneumothorax recurrence.

However, the study shows that VATS is useful for the exploration of findings in patients with catamenial pneumothorax (1). VATS can be decisive in advancing correct diagnoses for patients with catamenial pneumothorax (3), and VATS is effective for decision-making regarding the treatment strategy in those patients. Based on this study, the relationship between intraoperative findings, especially diaphragmatic changes, and catamenial pneumothorax became clear (1). In addition to theories related to pelvic

endometriosis as the etiology, we found that it is necessary to consider alternative mechanisms in patients without pelvic endometriosis. However, the introduction of VATS did not prevent the recurrence of catamenial pneumothorax. Therefore, we should consider all surgical treatment options for the treatment of catamenial pneumothorax in addition to advancing hormonal treatment or pleurodesis. We need to conduct new studies for the exploration of optimal treatment in patients with catamenial pneumothorax.

Acknowledgments

Funding: This study was supported in part by JSPS KAKENHI Grant Numbers (C) JP15K10272.

Footnote

Provenance and Peer Review: This article was commissioned and reviewed by the Section Editor Dr. Federico Raveglia (Department of Thoracic Surgery, Asst Santi Paolo e Carlo, University of Milan Medical School, Milan, Italy).

Conflicts of Interest: Both authors have completed the ICMJE uniform disclosure form (available at <http://dx.doi.org/10.21037/vats.2017.10.01>). The authors have no conflicts of interest to declare.

Ethical Statement: The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.

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doi: 10.21037/vats.2017.10.01

Cite this article as: Azuma Y, Iyoda A. Results of treatment for catamenial pneumothorax since the introduction of video-assisted thoracoscopic surgery: a systematic review. *Video-assist Thorac Surg* 2017;2:71.