

Video-Assisted Thoracoscopic Suture Closure of Blebs to Treat Primary Spontaneous Pneumothorax

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ABSTRACT

Background and Objectives: If surgery is indicated for primary spontaneous pneumothorax (PSP), video-assisted thoracoscopic surgery (VATS) using an endoscopic linear cutter to resect the involved blebs is the most popular treatment. We tried to determine whether closure of the blebs with sutures without resection is also efficacious enough to treat PSP.

Methods: We prospectively analyzed 22 episodes of PSP in 21 patients from January 2001 to April 2002. We endo-sutured the blebs, without removing them, no matter what the size and the number of the blebs were. Coagulation pleurodesis was added in every case. Only 3 ports were needed during the procedure.

Results: Morbidity and cost efficiency were acceptable. Two recurrences were experienced. The reasons for the recurrences were poor performance of the endo-suture in 1 patient, and no obvious blebs found in the other.

Conclusions: We believe that VATS wedge closure of blebs by imbricating and buttressing them, without resection, is a feasible and effective alternative treatment for primary spontaneous pneumothorax.

Key Words: Spontaneous pneumothorax, Thoracoscope, Bleb, Pleurodesis.

INTRODUCTION

Primary spontaneous pneumothorax (PSP) is a benign disease, usually occurring in young patients without known underlying lung disorder. The occurrence rate is reported to be about 9 individuals per 100 000 each year.¹ Depending on the individual severity, the therapeutic options include simple observation, needle aspiration, tube thoracostomy and definite operation. If surgery is indicated, video-assisted thoracoscopic surgery (VATS) using an endoscopic linear cutter to resect the involved blebs is currently the most popular treatment. Nevertheless, we try to avoid using the endoscopic staple device at our hospital because payment for the device is excluded by the national health insurance system in Taiwan. Thanks to the increased experience with therapeutic thoracoscopy that we have gained in recent years, we used the technique of thoracoscopic suturing to imbricate the blebs, without resection, to treat the air leakage in PSP patients, and report here our early results.

METHODS

From January 2001 to April 2002, we had 50 episodes of primary spontaneous pneumothorax in 49 patients referred for the operation. Among them, 26 patients with 26 episodes received transaxillary thoracotomy with or without assisted-thoracoscopy inspection. Two patients received VATS wedge resection with the linear cutter. Twenty-one patients with 22 episodes of PSP received VATS wedge closure by suturing. In this study, we dealt solely with the VATS group. Study patients included 2 female and 19 male patients, with a mean age of 25 years, ranging from 16 to 52 years. These 2 female patients were much older than the other patients, being 52 and 45 years of age, respectively. Because of no abnormal pulmonary disease except for the attack of pneumothorax, they were included in this study. The surgical indications included recurrences in 11 episodes (10 patients), prolonged air leakage for more than 5 days in 4 episodes (4 patients), and apical blebs seen on radiography in 2 episodes (2 patients). Five patients in 5 episodes underwent the operation owing to fear of recurrence, thus not fitting the above indications. All the patients had been informed and consented to the proce-

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ture before the operation.

The patients were kept in the lateral decubitus position after anesthesia was administered with single-lung ventilation. The first 10-mm port was created in the 7th intercostal space (ICS), mid-axillary line. The 30-degree telescope was inserted to inspect the entire pleural cavity. The second 5-mm and third 10-mm ports were created in the 5th ICS, anterior-axillary, and posterior-axillary line, respectively. After the full exploration of the lung surface, the involved blebs were sutured with an absorbable (3-0) Vicryl polyglactin suture (Ethicon Endo-Surgery, Inc, Cincinnati, OH). The needle tip is in the taper cut shape. The curved needle had to be straightened before it could be put into the trocar port. Two layers of suturing were incorporated with the blebs imbricated within the suture line. The suture-ties were executed extracorporeally using an endo-push instrument. If no bleb was found, the apical scar area was sutured in the same way. Coagulation of parietal pleura by the endo-instrument was routinely performed in all patients to achieve pleurodesis. One 32F chest tube was routinely left in place after the operation.

RESULTS

The mean disease duration from attack to operation was 5 days, ranging from 1 to 30 days. Chest tightness was the main complaint. The mean operation time was 133 minutes, ranging from 80 minutes to 270 minutes. No conversion to open thoracotomy was necessary in any case. One patient had no bleb and thus received apical suturing. The mean drainage time was 3 days, ranging from 2 to 5 days. The mean hospital stay after the operation was 4 days, ranging from 3 to 8 days. No mortality or major morbidity occurred. Three patients complained of prolonged intermittent intercostal neuralgia during the follow-up period, and 1 patient suffered dehiscence at the chest tube port. During the mean 6-month follow-up, ranging from 1 to 16 months, most patients recovered well, except 2 patients who experienced recurrences. One patient had a recurrent pneumothorax 1.5 months after the initial VATS suturing operation. VATS endo-suturing of the leaking area was performed again, with apical pleurectomy for this patient. No further recurrence was recorded. The suture-puncture of the leaking blebs, instead of the normal tissue, in the prior operation was condemned. The other patient had a minor recurrent pneumothorax 1 month after the initial operation. No bleb was found in her prior VATS. A relationship between

the attack and her menstruation was discovered and the catamenial cause was thus suspected. She received observation treatment only. No further recurrence was experienced thereafter.

DISCUSSION

No matter what surgical approach is executed, the goal of treatment is to find the offending bleb, remove it, and perform some manipulations to encourage adhesion formation.²⁻³ Recently, video-assisted thoracoscopic surgery (VATS) has been shown to produce results comparable to those obtained following open thoracotomy, yet with a reduction of postoperative pain, respiratory dysfunction and catabolic response to trauma, and decrease in wound-related complications.⁴ We believe that for PSP VATS is the best treatment, as Abdala et al⁵ recommend, because it allows us to treat the ruptured bleb radically avoiding any recurrence.⁶ It also reduces the hospitalization time and the use of analgesic drugs after surgery.⁷⁻⁸ Moreover, patients return to work earlier.^{5,7-8} However, it is not the treatment of choice for all physicians due to the high cost of the equipment and the stapling devices needed for the wedge resection of the involved blebs.⁶ In Taiwan due to the financial policy of the national health system, the charge of the high price of the endo-stapling instruments to the patient always concerns us, which is just the same as that in Yim's report.⁹ Finding a way to replace the endo-stapling method is pursued by us all the time.

Endo-suturing is not a new skill, and it is widely applied in laparoscopic surgery. Nevertheless, using the endo-suturing method to treat spontaneous pneumothorax was only reported by Yim in 1995 in the English literature.⁹ He reported that small blebs were sutured and large blebs were resected after suturing. Our method is different. Because the incurred blebs are always idiopathic in patients with primary spontaneous pneumothorax,¹⁰ we think that it is not necessary to remove them. Furthermore, the preserved bleb tissues are of help in wound healing and prevent air leakage from the wound, which can shorten the duration of the chest tube insertion. We thus imbricate all the blebs into the suturing line without resection. Therefore, the length of suturing is not a problem, and in 1 case a 10-cm suturing-line was performed without prolonged air-leakage.

Without adequate treatment, the recurrence rate after the first pneumothorax on the same side is about 25%, and

after the second episode, more than 50%.¹¹⁻¹³ Although no general agreement exists about the best time for surgical intervention (ie, after the first or second episode⁶), VATS therapy is now accepted as a definite treatment even in the first episode. In this study, we had 5 patients receiving thoracoscopic treatment for their first episodes. They were all well informed about the conventional indication of the surgery before being included in this study.

Ventilation of 1 lung is mandatory in this procedure because complete lung collapse promotes the effect of suturing. The suture tension becomes tight enough to stop any air leaks after the lung fully expands. In addition, the tissue of the bleb itself can be used as a buttress to enforce the suturing area. We thus believe that resection of the blebs is not necessary.

The recurrence rate after the VATS operation is reported to be high, between 13.7% and 20%, due to newly formed blebs or bullae unidentified during operation.¹⁴⁻¹⁵ It is more frequent than in thoracotomy cases (6.8%).¹⁴ Recently, a favorable 2.1% recurrence rate by VATS has been reported by Maier et al⁶ who use a rotating brush as a supplement. We had 2 recurrences in our patients. In 1 case, the cause of recurrence is thought to be improper suturing with direct puncture of the blebs during the operation and thus the leakage area is not repaired well. During reoperation by VATS, the air leak was found near the previous sutured area, which adhered intensively to the parietal pleura. Step-by-step dissection has to be carefully executed to prevent tissue damage during the second-look operation. Therefore, we have an 9.1% (2/22) recurrence rate, which is acceptable compared with that of the other VATS reports. The coagulation pleurodesis seems ineffective if the definite treatment of the ruptured blebs is not accurately executed. It is thought that the limited pleura being applied via the 3 small ports during VATS renders coagulation pleurodesis ineffective. We intend to perform more radical pleurectomy in the cases without blebs.¹⁶ We hope that as experience accumulates, the recurrence rate can be reduced further.

The incidence of chronic postoperative complaints after minimally invasive procedures for spontaneous pneumothorax is relatively high.¹⁷ In the majority of the patients, the pain was located in the area of the trocar incisions.¹⁷ Two of our patients complained of intermittent anterior chest pain in the ipsilateral side, which may have been due to concurrent injury to the intercostal

nerve at the trocar site. Ongoing treatment is not necessary in such cases.

CONCLUSION

The VATS wedge closure of the blebs by suturing, without resection of the involved blebs, is a feasible and effective alternative treatment for primary spontaneous pneumothorax if cost of the endo-stapler is regarded as a major problem.

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