

Management of Persistent or Recurrent Pneumothorax with a Two millimeter Mini-Videothoracoscope

The aim of this study was to assess whether a 2 mm mini-videothoracoscope could be used as a conventional videothoracoscope in the management of pneumothorax. Thirty patients of ages from 15 to 35 years with recurrent or persistent pneumothorax were involved in this study. The subjects consisted of 27 males and three females. The indications for videothoracoscopic surgery were ipsilateral recurrent pneumothorax in 12 (40%), persistent air leakage in 15 (50%), visible bullae in 2 (6%), and 1 bilateral pneumothorax (3%). The mean operation time was 42.9 ± 12.9 min. The average number of uses for Endo-GIA was 1.9 ± 1.3 times and chest tube indwelling time was 3.8 ± 2.7 days. The average amount of keptoprofer® (100 mg/2 mL/ampule) used on the first postoperative day was 1.2 ± 1.1 ampules. No parenteral opioids were given to the patients for pain control after the procedures. After a follow up of 8 to 20 months, there was only one recurrence among the patients. In conclusion, a 2 mm videothoracoscope, in selective cases, can be successfully used as conventional videothoracoscope to manage persistent or recurrent pneumothorax with cosmetically excellent results.

Key Words: Thoracoscopy; Mini-Thoracoscopy; Thoracic Surgery; Video-Assisted; Pneumothorax

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Received: 19 April 2000

Accepted: 1 August 2000

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*This study was supported by Research Awards
from Inha University granted to the author in 1999.

INTRODUCTION

Video-assisted thoracic surgery (VATS) is becoming the mainstay of management for recurrent or persistent spontaneous pneumothorax (SP) with clinically excellent results due to less invasiveness (1, 2). However, postoperative chest pain after VATS has not been solved completely (3, 4) and the surgical wounds of VATS have not shown cosmetically excellent results - three or more port wounds for videothoracoscope (4). Recently, the development of technology in the videoscopic field has produced a 2 mm mini-videothoracoscope. There is still some limitation to its use partly due to poor viewing of surgical fields and due to the inconvenience to handling. However, VATS sympathectomy for hyperhidrosis and preoperative diagnostic work-up in general thoracic surgery fields using the mini-videothoracoscope showed clinically excellent results with less postoperative pain and less scarring (5, 6). The aims of this study are to review our clinical results of surgical bullectomy using a 2 mm mini-videothoracoscope and assess whether the mini-videothoracoscope can be used as a conventional videothoraco-

scope in the management of persistent or recurrent spontaneous pneumothorax.

MATERIAL AND METHODS

From June 1998 to June 1999, 30 patients, ages 15 to 35 years, requiring bullectomy were enrolled in this study. Our indications for bullectomy included recurrence, persistent air leakage (> 5 days), bilateral pneumothorax and visible bulla on chest radiography. Preoperative study included chest radiography and computed tomography of the chest in selected cases whose bulla was not seen on chest radiography.

Operating time, number of uses for Endo-GIA, duration of chest tube indwelling, and rate of recurrence were assessed. The amount of parenteral analgesics (ketoprofen, 100 mg/2 mL/ampule) used during the first postoperative day was recorded and used as an indirect parameter for postoperative pain. The follow-up chest roentgenograms were done on an outpatient basis after discharge at 1- and 4-week intervals. The patients were

evaluated for developing recurrence by telephone survey and at out-patient's clinic visits for 8 to 20 months post-operatively. Recurrence was proved by chest radiography.

Operative technique

Under general anesthesia, patients were intubated with a double lumen endotracheal tube. Patients were placed in the lateral decubitus position. The operative fields were prepared and draped as for thoracotomy. Contralateral single-lung ventilation was started. Two 2 mm ports for inserting the mini-videothoracoscope and mini-endograsper (United States Surgical Corporation, Norwalk, CT, U.S.A.) were made at the third or fourth intercostal space, anterior and posterior axillary line. A 15-mm port for inserting Endo-GIA stapling devices (United States Surgical Corporation, Norwalk, CT, U.S.A.) was made at the seventh or eighth intercostal space. Preoperatively 28 patients already had chest tubes inserted at the seventh or eighth intercostal spaces at the mid-axially line which was used as 15-mm port for Endo-GIA stapling device. Adhesions, usually mild, were completely freed using electrocautery under video-vision. Bulla was inspected and grasped with a mini-endograsper. Endo-GIA stapling devices were inserted and bullae were resected. Mechanical pleurodesis was done on the apical pleura. In some cases, where bulla could not be found, the 5-mm videothoracoscope (Karl Storz, Tuttlingen, Germany) was introduced through the 15-mm port and pleural cavity was inspected. A 28 Fr. or 32 Fr. chest tube was inserted. All patients were extubated in the operating room and transferred to the general ward. Antibiotics were administered to all patients. Keptoprofen (100 mg/2 mL/ampule) was administered intramuscularly to relieve postoperative pain every 6 hr according to patient's request. Morphine sulfate was prepared for patients who felt chest pain in spite of keptoprofen injection. Etodolac (200 mg/capsule, a non-steroidal anti-inflammatory analgesic) was given orally 3 times per day from the first postoperative day until removal of the chest tube. The criteria for the removal of the chest tube were no air leakage through the tube, no evidence of lung collapse on chest radiography, and less than 100 mL amount of drainage through the chest tube for 24 hr. All patients were discharged the day after removal of the chest tube.

RESULTS

All data are summarized in Table 1. Among the 30 patients, 27 were male and 3 were female. All patients were diagnosed as having primary SP. The indications for

Table 1. Patients profile and results of 2 mm mini-thoracoscopic bullectomy

Characteristics	Results
No. of patients	30
Sex (M/F)	27/3
Recurrent SP	12
Persistent SP	15
Visible bullae	2
Contralateral SP	1
Operation time	42.9±12.9 min
Number of Endo GIA used	1.9±1.3
Chest tube indwelling time (POD#)	3.8±2.7 days

Mean±standard deviation

SP, spontaneous pneumothorax; POD#, postoperative day

operation were ipsilateral recurrent pneumothorax in 12 (40%) subjects, persistent air leak in 15 (50%), visible bullae in 2 (6%), and bilateral pneumothorax in one patient (3%). The mean operation time was 42.9±12.9 min. The average number of uses for Endo-GIA was 1.9±1.3 times and the mean chest tube indwelling time was 3.8±2.7 days. The average amount of chest tube drainage on the first postoperative day was 38.9±25.4 mL. The average amount of parenteral analgesics on the first postoperative day was 1.2±1.1 ampules. No one was given morphine sulfate postoperatively. There were no postoperative complications. The range of follow-up period was from 8 to 20 months. There was only one recurrence during the follow-up period. The only visible surgical scar was an incision wound at 15-mm port site.

DISCUSSION

VATS bullectomy for managing persistent or recurrent SP is the mainstay of surgical approach and its clinical results are excellent (1, 2). Although VATS is a simple and less invasive procedure, Landreneau *et al.* (3) reported that there was no significant difference in postoperative pain-related morbidity parameters between VATS and thoracotomy groups one year after surgical procedures. Kim *et al.* (4) reported that there was no clinical advantage of VATS over transaxillary minithoracotomy for the management of persistent or recurrent pneumothorax using analgesics on the first postoperative day. No such differences may be related to local trauma to the chest wall structures caused by excessive torquing of big-sized videothoracoscope and endosurgical instruments as described by Landreneau and associates (3). Accordingly, if mini-videothoracoscope and mini-endosurgical instruments were used, patients would feel less pain and their surgical wounds would be smaller. The patients in our study did not require morphine sulfate

for pain control postoperatively. Keptoprofen was enough to control postoperative chest pain. Their surgical wound measured only 15 mm in length on the lateral chest wall. VATS wounds of 2-mm ports did not leave any visible scar 1 or 2 months later. Mean operation time, mean chest tube indwelling time and recurrence rate in this study seem to fall in acceptable ranges similar to conventional videothoroscopic surgical results, although there was one recurrence during follow-up periods (4, 7-9). However, some problems in conducting bullectomy with a 2-mm mini-videothoracoscope still remain. Vision through the mini-videothoracoscope was poor compared to conventional videothoracoscope, probably due to current technological limitation. The 5-mm videothoracoscope was used through the 15-mm port for Endo-GIA stapler and in some cases there was difficulty in locating the bullae through the 2-mm mini-videothoracoscope. The bulla was grasped with the mini-endograsper initially and then the 2-mm mini-videothoracoscope was inserted. The Endo-GIA was inserted through the 15-mm port and the bulla was resected. The mini-endograsper was inconvenient in grasping the bulla tightly because its end was very small and narrow. If the mini-endograsper can be modified to hold the bulla tightly, it would be easier to resect the bulla through the mini-videothoracoscope.

More comparative and prospective studies will be needed to prove that this procedure is less painful and cosmetically better than conventional methods. However, our study showed that it is possible to use a mini-videothoracoscope and mini-instruments as a conventional videothoracoscope in thoracic surgery.

In conclusion, our surgical results shows that 2-mm videothoracoscope can be used successfully in the management of persistent or recurrent spontaneous pneumothorax with cosmetically excellent results and less postoperative pain in selected cases.

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