

# A CASE OF GIANT BULLA WITH THORACOSCOPIC RESECTION

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We resected a giant bulla that occupied half of the right thoracic cavity in a 51-year old male thoracoscopically. The patient's age and adhesions would have made conventional open thoracotomy by axillar approach difficult. Although there are criticisms that the operative field is much limited in endoscopic surgery as compared to open procedures, this was not true in our case. The patient recovered uneventfully and returned to his normal work. Complaints of postoperative pain were minimal. The experience is reported because the new method of surgery seems easy and beneficial.

## Introduction

We have been active in endoscopic operations, wanting to make full advantage of minimally invasive surgery. Bullectomy in thoracoscopic surgery may be equivalent to cholecystectomy in laparoscopic surgery in a sense: the technical difficulty and invasive effect on patients of the two operations may be considered similar. Both are good indications for endoscopic surgery. A laparoscope can be substituted for a thoracoscope, and many of the instruments are common in laparoscopic and thoracoscopic operations. So we wanted to resect bullae thoracoscopically when patients asked. As mainly general and gastroenterological surgeons, we began our first thoracoscopic bullectomy when we thought that we had accumulated enough experience in endoscopic surgery<sup>1)</sup>. That was when we had successfully finished some more than a hundred laparoscopic cholecystectomies.

We resected thoracoscopically a giant bulla

that occupied half of the right thoracic cavity in a 51-year-old male. In the present paper, we report our experience briefly.

## Case

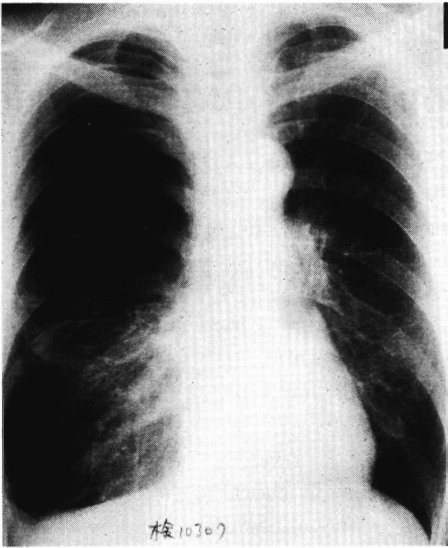
**Patient:** 51-year-old male.

**Chief complaints:** None.

**Past history:** He was hospitalized with pleuritis tuberculosa about two decades prior to admission.

**Family history:** None remarkable.

**Present history:** The patient had occasional right chest pain but consulted nobody. He was a smoker of about 40 cigarettes daily, and drank two cups of sake every evening. As his work required a health check, he visited our hospital on January 11, 1995. Chest roentgenogram showed absence of vascular markings in the right upper lung field and mild midline shift to the left. A small amount of pleural effusion was observed in the right thoracic cavity (Fig. 1). Although he was symptom-free them, he was admitted for further evaluation and treatment.



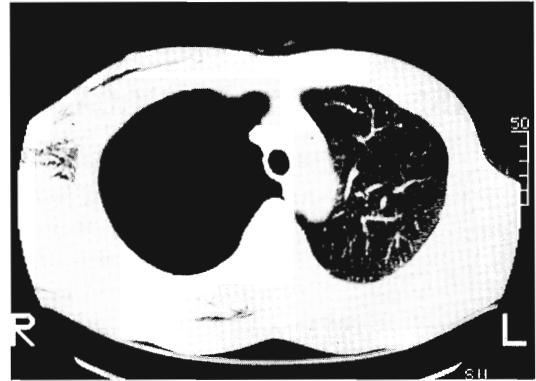
**Fig. 1** Roentgenogram taken on visit  
Vascular markings were completely absent in the upper half of the right thorax.

Blood and urine examinations showed no remarkable abnormality. A chest CT suggested collapsed right lung (Fig. 2). Arterial blood gas analysis was barely within normal limits.

On January 12, as chest X-ray showed no improvement, a chest tube was introduced under fluoroscopy on tentative diagnosis of spontaneous pneumothorax. Then we diagnosed that he had a giant bulla. Although the patient was reluctant to receive operation, we explained that an operation was necessary because the lung was collapsed, and that thoracoscopic operation was applicable. The patient finally agreed to receive it.

On preoperative evaluation, ultrasonocardiography showed mild tricuspid regurgitation with normal ejection fraction. Tuberculin skin test resulted in an erythema of  $12 \times 13$  mm. Other data were unremarkable. He was operated on January 20, 1995.

**Operative findings:** With rapid induction, the patient was intubated with a 9.0 mm Phycon Univent Tube (Fuji Systems Corporation, Tokyo, Japan)<sup>2)</sup>. The blocker was advanced to the right main bronchus and the effectiveness of unilateral lung ventilation was confirmed with



**Fig. 2** Preoperative CT  
The right lung was collapsed. CT confirmed the findings on plain chest X-ray.



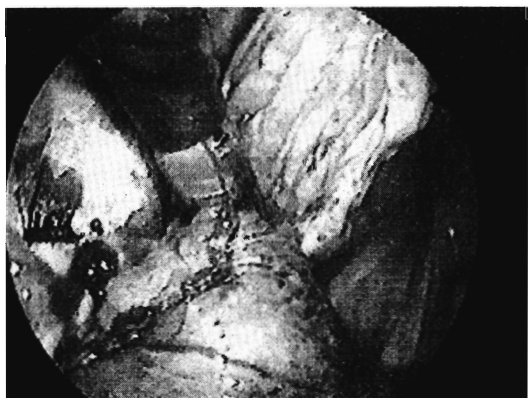
**Fig. 3** The patient's position and placement of the ports  
The ports were introduced from 2, 4 and 6 ICS to make a triangle. This alignment prevented banging of the instruments compared to in-line one advocated by some authors.

bronchoscopy as well as auscultation. The patient was placed on left lateral decubitus position and the position of the blocker was confirmed again. The chest tube that was previously introduced from the right 6th intercostal space (ICS) on middle axillary line was removed and a 12 mm port was inserted from the opening. A 10 mm 30 degree oblique view rigid scope was inserted to observe the intrathoracic cavity using a three-CCD video monitoring system. Only bulla wall was observable at that point. Two other 12 mm ports were introduced from 4 ICS on the right posterior axillary line and from 2 ICS on the right anterior axillary line (Fig. 3).

Using a fan retractor we observed the



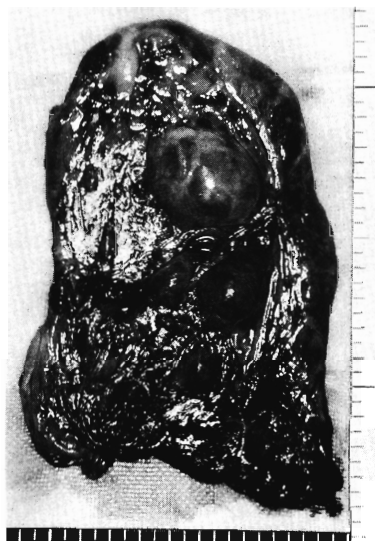
**Fig. 4** Intraoperative view of adhesiolysis near a major vein  
Magnification of the video monitor permitted safe adhesiolysis.



**Fig. 5** Intraoperative view of dividing the root of the bulla  
Sequential application of Multifire Endo GIA 30 facilitated operation.

intrathoracic cavity. There were multiple adhesions, probably related to the previous pleuritis, that prevented good operative field and mobilization of the bulla. The adhesions were lysed little by little, using electrocoagulation and clips. We cut fibrous adhesions only a few millimeters away from the azygos vein, safely under the magnification of the video monitor (Fig. 4).

After the bulla was sufficiently mobilized, it was clear that the disease was a single giant bulla. Thoracoscopically, no other lesion exist-

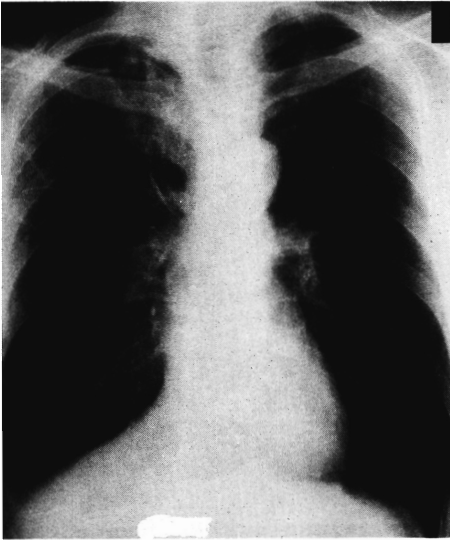


**Fig. 6** Macroscopic view of the sample  
The bulla measured 16 × 11 cm.

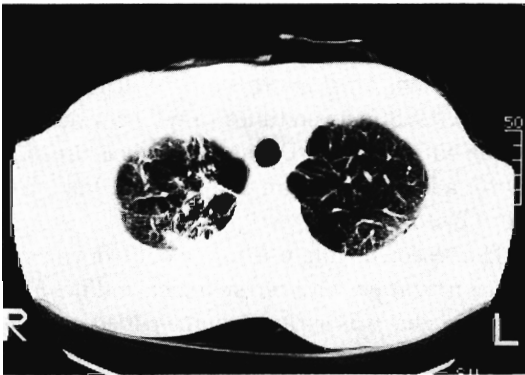
ed in the right intrathoracic cavity. After measuring the thickness of the root of the bulla with an Endo Gauge (United States Surgical Corporation, USSC), we used Multifire Endo GIA 30 (USSC) seven times to fully cut the root of the bulla (Fig. 5). During this procedure, still more adhesions became apparent, but they were lysed easily.

The resected bulla was taken out from a port. After irrigation with physiological saline, 3 ml of fibrin glue was sprayed on the cut edge of the lung. The port at the 6 ICS was removed and a 18 Fr chest tube was inserted from the opening. Its tip was placed near the apex of the lung guided thoracoscopically. Since we wanted to avoid reexpansion syndrome, we did not do a leak test. Other ports were removed. Muscle and subcutaneous tissue were approximated with synthetic absorbable sutures. The skin was approximated with staples. The chest tube was connected to a bag with a Heimlich valve. Total operation time was one hour and ten minutes.

**Sample:** The bulla measured 16 × 11 cm. There was no macroscopic finding suggestive of malignancy (Fig. 6). This was confirmed pathologically but the origin of the bulla was



**Fig. 7** Postoperative chest roentgenogram  
The lung expansion was good.



**Fig. 8** Postoperative chest CT  
The lung expansion was good. There was no sign of bulla remaining.

unknown.

**Postoperative course:** The recovery was uneventful. He needed a pentazocin injection only once after the operation. Chest roentgenogram and CT showed good lung expansion (Fig. 7, 8).

### Discussion

We have done resection or oversewing of the bullae many times with small axillar thoracotomy. Thoracoscopic resection began in

Japan more than a decade ago, but it was done in only limited institutions. The technique and instruments employed there then seemed so special that thoracoscopic resection of bullae did not spread widely.

Laparoscopic surgery began with laparoscopic cholecystectomy in Europe only several years ago, and rapidly spread over the world. It seems that patients want to receive endoscopic surgery because it offers better cosmesis, lesser postoperative pain, better recovery, earlier return to work, and lesser overall cost. Now, more and more surgeons are doing laparoscopic cholecystectomies, herniorrhaphies, colectomies, oophorectomies, etc.

Today, endoscopic operation is done widely for benign diseases and for some malignant ones as well. It is done for intrathoracic lesions as well as intraabdominal ones. Since spontaneous pneumothorax is a frequent, benign disease with high rate of recurrence, it is considered a good indication for endoscopic surgery<sup>3)</sup>. In Europe, operation for spontaneous pneumothorax heads the list of thoracoscopic operations, followed by lung biopsy and wedge resection<sup>4)</sup>.

In this case, we knew preoperatively that at the age of 51, the rib cage would be rigid. This meant that open surgery with axillar thoracotomy might not permit adequate operative field. Since history of pleuritis suggested existence of adhesions and the size of the bulla was large, we thought we might need an axillar skin incision of 10 to 15 cm, and have to cut a rib or two. Such procedure required division of the intercostal nerve and vessels, increasing the risk of neuralgia and bleeding. And even with division of the ribs, it would be difficult to lyse the adhesions on the far side and externalize the bulla. If we had to work with a bad operative field, the risk of adverse injury would increase. This is the reason we chose thoracoscopic surgery in this case.

We had to cut a fibrous adhesion while dividing the radix of the bulla. But it was accomplished with ease using Ligaclip ERCA Endoscopic Rotaing Multiple Clip Applier (Ethicon

Endo-Surgery, USA). Endo GIA 30 controlled bleeding and cut the lung reliably. It places six rows of titanium staples, three on each side, for 3 cm and divides the proximal 2.5 cm of tissue when fired. By changing the disposable loading unit and firing again, the staple line can be extended. The 30 degree oblique view scope that we used permitted a better view than zero degree scope, although stronger light source was needed. With conventional open thoracotomy by axillar approach, such good view and meticulous management of tissue might have been impossible.

Endoscopic surgery usually requires more instruments and personnel than conventional open surgery. From economical point of view, not every hospital can afford endoscopic operations. Since many of the instruments are common in laparoscopic and thoracoscopic surgeries, laparoscopic surgeons may want to do simple thoracoscopic operations. For example, Mutifire Endo GIA 30 that we used was developed originally for gastrointestinal anastomosis in laparoscopic surgery, as suggested by its name. Application of this instrument to thoracoscopic lung resection has made it widely practicable.

Thoracoscopic bullectomy requires unilateral lung ventilation. This means more instruments, monitors, and personnel are necessary for bronchoscopy and safe anesthesia. This may be the only significant demerit of thoracoscopic bullectomy.

Completing the endoscopic operation of this case, our feelings were that it was easier and safer than conventional open surgery. Often have we heard that the operative field of endoscopic surgery is limited, only two-dimensional and narrow. The tactile sense is still much limited in endoscopic surgery. The issues are that therefore higher technique is needed and so is much more training to do an endoscopic operation. Recently, we challenged a radical operation for congenital biliary dilatation laparoscopically but had to convert it to open. Although open surgery has its advantages in

many ways, a blood vessel, for example, can be identified more easily in endoscopic surgery because of electronic magnification. The 30 degree oblique view scope that we used permits us to see the field from different angles to facilitate three-dimensional orientation.

In our opinion, endoscopic surgery can command a better operative field in some instances. The techniques needed may be totally different, intracorporeal tying, for example. Maybe it is wrong to compare the techniques required for open and endoscopic surgeries on the same scale. We may be experiencing the "industrial revolution" of surgery. We regard endoscopic operation as a different kind of operation. If application is appropriate, it can yield the same or even better outcome in comparison to conventional open surgery<sup>5)6)</sup>. We have reported a successful endoscopic operation of a rare disease whose exact diagnosis needed laparoscopy<sup>7)</sup>.

We think we are the "first generation" endoscopic surgeons with enough experience in (open) general surgery as well, and therefore capable of safely controlling conversion (to open surgery) or any other emergency that may arise during or after operation. Now surgery has been subdivided into many subspecialties. Some gastrointestinal surgeons may never see a bulla that caused pneumothorax. Some endoscopic surgeons of newer generations may never see a good old open appendectomy or even a laparoscopic cholecystectomy. On the other hand, it seems unfeasible to start training in endoscopic surgery after finishing full course of training in various fields of general open surgery. There may exist a great issue of postgraduate training and credentials.

Postoperative course of endoscopic operations usually does not require intensive care. It was so in this case as well as in other thoracoscopic and laparoscopic operations of our experience. This feature may mean that minimally invasive surgery may be for small hospitals as ours, not for major university hospitals in a sense. We are afraid that the present guideline

of the Ministry of Public Welfare requiring 50 thoracotomies to do a thoracoscopic bullectomy under health insurance may hinder patients from receiving the newer method of surgery. Our feeling with this case was that those with sufficient experience in laparoscopic surgery may resect bullae thoracoscopically with ease. Although there are many problems yet to be solved, we think endoscopic surgery should gain a wider acceptance. It would improve the quality of life of patients and the quality of hospital stay. The overall cost is definitely in favor of the new method of surgery.

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### 胸腔鏡下切除を行った巨大ブラの1例

清心会至聖病院外科

ホリエ ヨシアキ カナマル ヒロシ タダ マサカズ ハマノ キョウイチ  
堀江 良彰・金丸 洋・多田 真和・浜野 恭一

我々の施設では minimally invasive surgery の利点を生かすべく、鏡視下手術に積極的に取り組んでいる。多数の胆嚢摘出術の他にも自然気胸に対する鏡視下手術を若干例行っている。開胸術は例え腋窩切開であれ、術後の疼痛やそれに伴う呼吸状態の悪化などの問題があるが、鏡視下手術においては、これらの問題は比較的起こりにくいと考えられる。

今回我々は51歳の男性の右胸腔の半分を占める大きなブラを発見し、胸腔鏡下にこれを切除した。年齢、ブラの大きさ、癒着を認めた点を考えると、通常の腋窩切開では手術は困難であったと考えられる。従来の open 術式と比べて鏡視下手術は術野が不良であるという批判があったが、本症例においては良好な視野が得られた。患者は術後特に問題なく退院した。

本術式に用いる器械類は腹腔鏡下手術と共通のものが多く、腹腔鏡下手術の十分な経験があれば比較的簡単に遂行可能と思われた。