Korean J Thorac Cardiovasc Surg 2012;45:134-137 □ Case Report □
ISSN: 2233-601X (Print) ISSN: 2093-6516 (Online) http://dx.doi.org/10.5090/kjtcs.2012.45.2.134

Fluid-filled Giant Bulla Treated with Percutaneous Drainage and Talc Sclerotherapy: A Modified Brompton Technique

Kyung-Hak Lee, M.D.[1], Seong-Joon Cho, M.D.[1], Se Min Ryu, M.D.[1], Sung-Min Park, M.D.[1], Kil Soo Yie, M.D.[1], Seon-Sook Han, M.D.[2]

A 75-year-old man who was diagnosed as having a fluid-filled giant bulla was treated with a modified Brompton technique due to his poor performance status. Percutaneous drainage, suction, and talc sclerotherapy through a Foley catheter can be good treatment options for patients with conditions that are too poor to allow surgical intervention, especially if there is adhesion between a giant bulla and parietal pleura. Talc can also be used safely when mixed with normal saline as a sclerosant.

Key words: 1. Bullae
2. Sclerotherapy

CASE REPORT

A 75-year-old male was hospitalized due to severe dyspnea following a four day history of fever, pleuritic chest pain, and productive cough. His history included a previous diagnosis of multiple asymptomatic bullae in both lungs. A previous computed tomography (CT) scan showed multiple small bullae in both lungs and a large bulla in the left lower lung with several crisscrossed septa in the cavity (Figs. 1A, 2A). He had also been documented to have hypertension and hyperlipidemia.

On admission, he complained of severe dyspnea (New York Heart Association functional class IV) and could not even complete a pulmonary function test. His body temperature was 37.9°C and breath sounds were diminished on the left side. Abnormal blood test results were as follows: white blood cell (WBC) count 18,100/μL and C-reactive protein (CRP) 29.7 mg/dL. Arterial blood gas values on room air were a pH of 7.43; PCO_2, 34.6 mmHg; and PO_2, 59.5 mmHg. A chest radiograph showed a fluid-filled giant bulla in the left lung that had increased in size as compared to the previous film (Fig. 1B). A CT scan of the chest confirmed a 12 cm, thin-walled, fluid-filled bulla in the lower lobe of the left lung (Fig. 2B).

Despite intravenous antibiotic treatment (ceftriaxone 8 g and clindamycin 7.2 g for 4 days, and tazobactam/piperacillin 67.5 g and ciprofloxacin 2 g for five days) the patient remained febrile, although a sputum culture did not demonstrate any bacterial growth.

As the patient was not a suitable candidate for a surgical resection, an 8.5 F pigtail catheter was placed into the cavity under fluoroscopic guidance and attached to an underwater seal drainage unit. A total of 350 mL of yellow turbid fluid was drained, but cultures from the cavitary fluid showed no

[1]Department of Thoracic and Cardiovascular Surgery, [2]Division of Pulmonology, Department of Internal Medicine, Kangwon National University Hospital, Kangwon National University School of Medicine
Received: August 26, 2011, Revised: September 23, 2011, Accepted: October 16, 2011
Corresponding author: Seong-Joon Cho, Department of Thoracic and Cardiovascular Surgery, Kangwon National University Hospital, Kangwon National University School of Medicine, 156 Baengnyeong-ro, Chuncheon 200-722, Korea
(Tel) 82-33-258-2294 (Fax) 82-33-258-2182 (E-mail) joon@kangwon.ac.kr

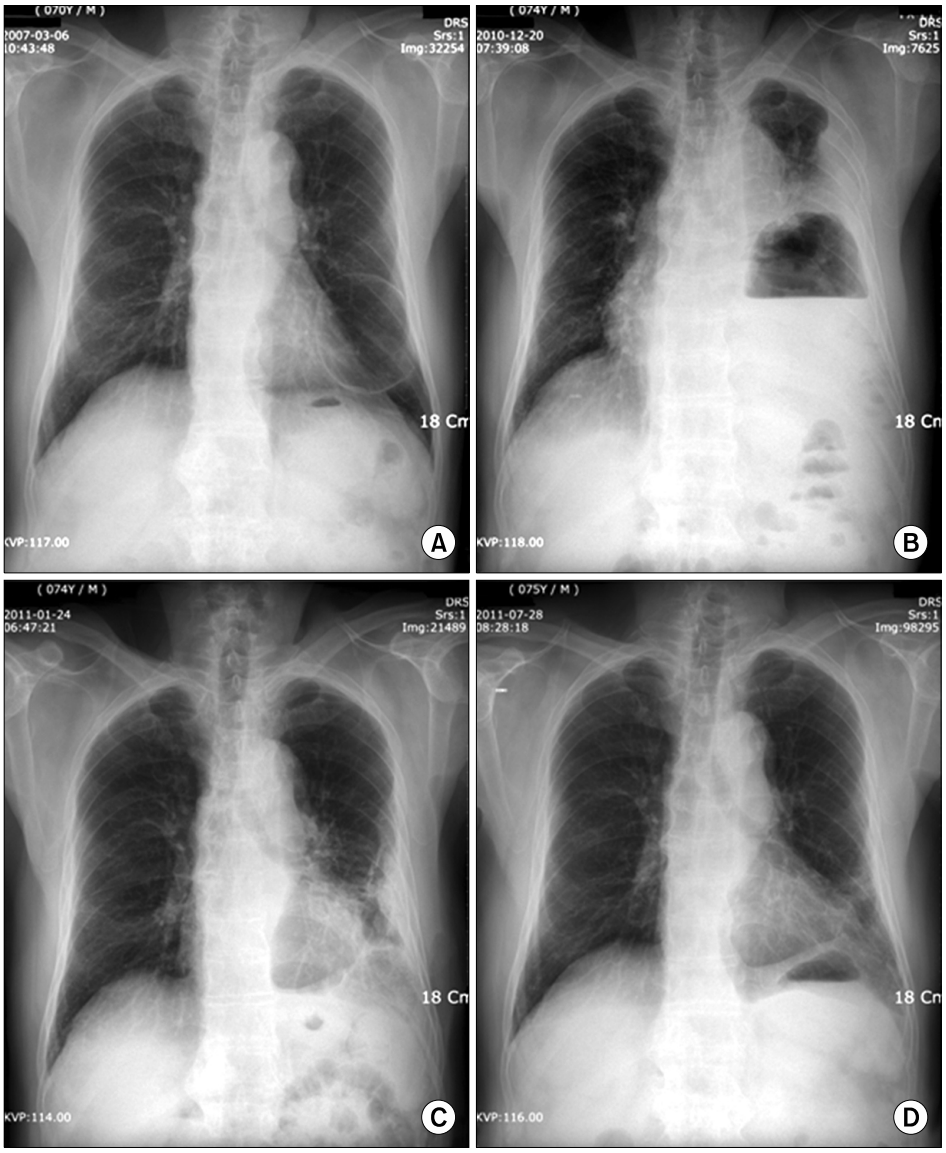

Fig. 1. (A) A chest radiograph shows the incidental finding of a giant bulla in the left pleural cavity. (B) A chest radiograph shows a giant bulla with air-fluid level when the patient developed symptoms. (C) The giant bulla decreased in size after the sclerosants were infused through the Foley catheter. (D) A chest radiograph shows no bulla in the left lung field.

growth of any organism. Initially, continuous air leakage was observed, suggesting that the cavity had bronchial communication. Dyspnea and atelectasis improved immediately after the procedure and the patient felt much better. Fever and leukocytosis disappeared 14 days after the procedure. At this time, the blood test showed a WBC of 8,100/μL and CRP of 7.3 mg/dL. Arterial blood gas values on room air were pH 7.46; PCO_2, 34.1 mmHg; and PO_2, 74.5 mmHg.

As the bulla shrank, air leakage diminished over time but persisted over a month after the drainage procedure. We changed the pigtail to a 24 Fr Foley catheter that would act as a self-retaining drain that tightly anchored the bulla adjacent to the parietal pleura and chest wall (Figs. 1C, 2C). To prevent sclerosant from spreading to the contralateral lung through a slit of bronchial communication, we instilled a small amount of saline (less than 5 mL) prior to the sclerosant instillation. The patient showed a mild cough but no aspiration into the right lung occurred. We then instilled 5 mL of 10% povidone iodide (Korea Pharma. Co. Ltd., Seoul, Korea) for sterilization and sclerosis through the Foley catheter into the bulla cavity. As the patient continued to show no cough following repeated povidone iodine sclerotherapy, we changed the sclerosant to ethanolamine oleate (5 mL), administered 3 times during a 1 week period. The sclerotherapy

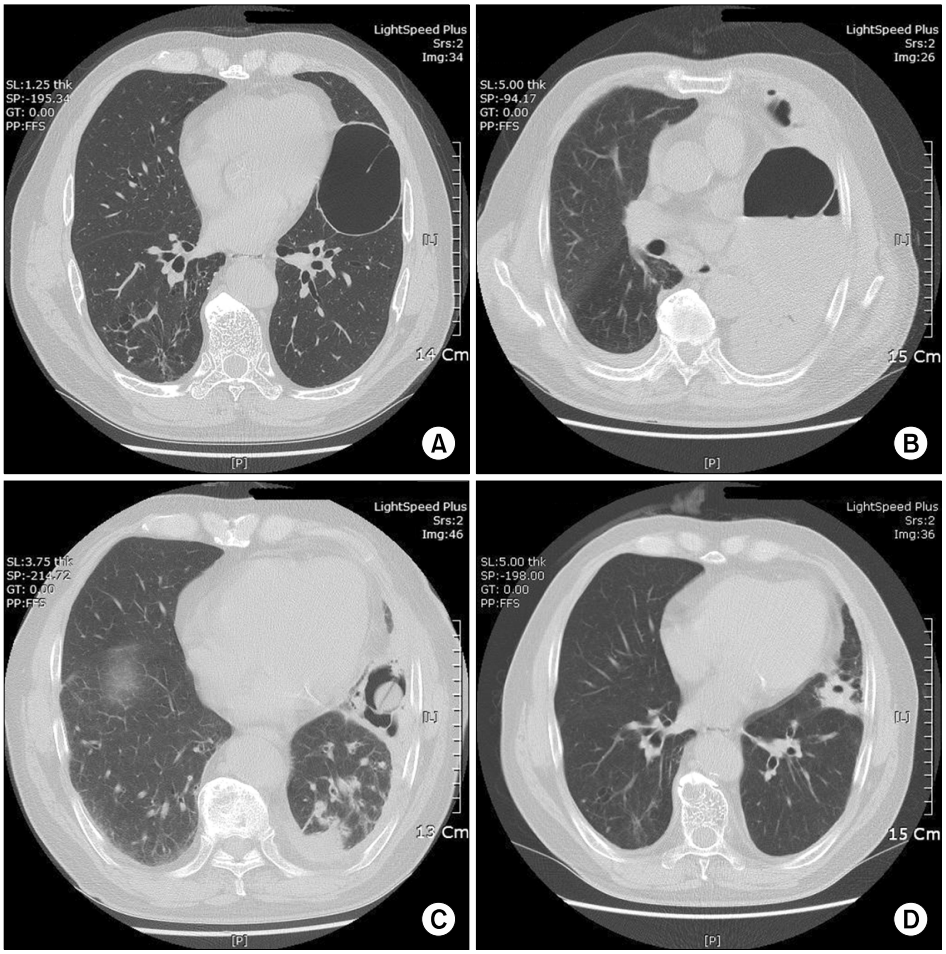

Fig. 2. (A) A chest computed tomography (CT) scan shows the incidental finding of the giant bulla. (B) A chest CT scan shows a giant bulla with an air-fluid level when the patient developed symptoms. (C) The giant bulla decreased in size after the sclerosants are infused through the Foley catheter. (D) A 1 cm bulla with thick walls remained after the removal of the Foley catheter.

with ethanolamine oleate appeared to be less effective because intermittent air leakage persisted. Talc (0.5 g mixed with 5 mL saline) was then 4 times within 4 days, and it produced rapid contraction and fibrosis of the bullous cavity. For all the sclerosant procedures, the patient was positioned in a left-down decubitus position and the catheter drainage continued without clamping. After a CT scan confirmed that the bulla had shrunk into a 2 cm, thick-walled, small cavity, we removed the Foley catheter and the patient was discharged on the 45th day after the pigtail insertion. Five months after discharge, the patient showed a round cavity smaller than 1 cm on a follow-up CT scan (Fig. 2D) and has remained asymptomatic.

DISCUSSION

Patients with a large intrapulmonary emphysematous bulla present a considerable therapeutic problem, particularly if they are elderly or their respiratory reserve is low, due to the risks of surgery. Draining cavities can be useful in these cases. Intracavitary drainage for cavitary lung diseases was first introduced by Monaldi [1] in cases of post-tuberculous cavities. This method was first adopted for the treatment of emphysematous bulla by Head and Avery [2]. This procedure was performed in two stages to decrease the risk of pneumothorax; the first stage produced pleural adhesions using iodine packs and the second stage drained the bulla. This technique not only saves the residual lung but also reduces morbidity and mortality.

Macarthur and Fountain [3] were the first to use a Foley catheter in a one-stage endocavitary aspiration with mini-thoracotomy and rib resection, percutaneously. The Foley catheter has the advantage of approximating the bulla to the parietal pleura.

Shah and Goldstraw [4] have reported on using the Brompton technique with a Foley catheter, but also insufflating the pleural space and the cavity with iodized talc for pleurodesis and fibrosis of the cavity with thoracotomy. However, if local adhesion has already formed, percutaneous placement of the catheter and talc sclerosis is possible without thoracotomy.

Because the patient in our case was in very poor condition, we decided to apply the Brompton technique. However, the procedure was slightly different from that described by Shah and Goldstraw [4]. Initially, we placed a pigtail catheter under fluoroscopic guidance, and the pigtail catheter was then simply exchanged for a Foley catheter along the fibrous tract. No rib resection or purse-string suture was needed because adhesion between the parietal pleura and bulla was suspected. Hata et al. [5] have advocated that the paucity of complications is due to the sufficient time between the onset of conservative management which complied of drainage for adhesion and granulation to form.

Three different kinds of sclerosant, povidone iodine, ethanolamine oleate, and talc, were used for sclerosis of the giant bulla through the catheter. Ethanolamine oleate is a very strong sclerosant but can cause complications such as fever, pain, or a systemic reaction, and can also erode the Foley catheter. Talc can be infused through the Foley catheter after mixing with water (Talc slurry) if talc insufflations are not possible.

Infection of a bulla is unusual. Most bullae showing an air-fluid level are merely the result of an inflammatory reaction secondary to peribullous infection. A culture of the fluid usually shows no growth of any organism, as occurred in this case. Truly infected bullae should be managed conservatively, even though conservative treatment is often unsuccessful because of the poor communication between the infected bulla and the bronchial tree. Dean et al. [6] have shown that percutaneous drainage of the infected bulla should be considered in these high-risk patients.

Percutaneous drainage and suction and talc sclerotherapy through a Foley catheter can be a good treatment option for patients with conditions that are too poor to allow for surgical intervention, especially if there is adhesion between the giant bulla and parietal pleura. Talc can be safely mixed with normal saline and used as a sclerosant.

REFERENCES

1. Monaldi V. *Endocavitary aspiration: its practical applications.* Tubercle 1947;28:223-8.
2. Head JR, Avery EE. *Intracavitary suction (Monaldi) in the treatment of emphysematous bullae and blebs.* J Thorac Surg 1949;18:761-76.
3. Macarthur AM, Fountain SW. *Intracavity suction and drainage in the treatment of emphysematous bullae.* Thorax 1977; 32:668-72.
4. Shah SS, Goldstraw P. *Surgical treatment of bullous emphysema: experience with the Brompton technique.* Ann Thorac Surg 1994;58:1452-6.
5. Hata Y, Takagi K, Sasamoto S, et al. *Infected giant bulla treated by percutaneous drainage followed later by resection: report of a case.* Surg Today 2007;37:656-9.
6. Dean NC, Stein MG, Stulbarg MS. *Percutaneous drainage of an infected lung bulla in a patient receiving positive pressure ventilation.* Chest 1987;91:928-30.