A Convenient Method Using a Foley Catheter and Dye for Thoracoscopic Resection of Mediastinal Cyst

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Abstract
Video-assisted thoracoscopic surgery has been useful for resection of a cystic mass in the mediastinum. However, there are difficulties that a thin wall of the cyst is easy to rupture, and that a large and tension cyst also interferes with a thoracoscope vision. Therefore, we present herein a convenient method using a Foley catheter and dye. A cystic mass is punctured directly with a needle and the content is aspirated. After removal of the needle, an 18F Foley urethral catheter is inserted into the mass. Then, the balloon is inflated with normal saline, and the content in the mass is almost removed through another lumen of the Foley catheter. Next, the cystic mass is inflated with diluted indocyanine green (ICG) through the lumen, and refilled with an adequate volume of ICG solution to detect the wall. The ICG solution is aspirated, and removal of the mass is accomplished simply by deflating the balloon. Finally, the mass can be removed from the thoracic cavity. Using ICG can make the margin clearer. We have successfully treated 2 patients with this technique. (Kitakanto Med J 2007 ; 57 : 175~177)

Key Words : Video-assisted thoracic surgery, mediastinal cyst, Indocyanine green

Introduction
Video-assisted thoracoscopic surgery (VATS) has been useful for resection of a cystic mass in the mediastinum. However, there are difficulties that a thin wall of the cyst is easy to rupture, and that a large and tension cyst also interferes with a thoracoscope vision and leads to incomplete resection. Therefore, we present herein a convenient method using a urethral catheter and indocyanine green (ICG) solution to remove cystic mediastinal masses.

We applied the above technique to 2 patients. On case 1, a 65-year-old asymptomatic woman was referred to our hospital because of an abnormal shadow on a chest roentgenogram of routine physical examinations. A computed tomographic scan demonstrated a cystic mass at the right cardiophrenic angle (Fig. 1). On case 2, a 34-year-old woman had a similarity in clinical characteristic of case 1. Surgical resection was scheduled separately.

Fig. 1 CT scan of the chest demonstrating a cystic mass at the right cardiophrenic angle.

Technique
To allow unilateral ventilation, intubation is performed with a double lumen endobronchial tube. A patient is placed in the left lateral position under general anesthesia. Placement of ports depends on the

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mass location. In case of the right cardiophrenic angle, a camera port is inserted into the seventh intercostal space (ICS) along the mid axillary line (5-mm port), ballooning ports in the seventh ICS along the anterior axillary line (12-mm port) and working ports in the three 5-mm trockers are inserted into the sixth and ninth ICS along the posterior axillary line (5-mm ports). A 5-mm thoracoscope is adequate for visualization.

The cystic mass is punctured directly with a 21 G needle (0.8 × 10mm) through a 12-mm port, and about 20ml of the cystic fluid is aspirated through the guide needle. When there is small space inside the cystic mass, the needle is pulled out. An 18F Foley urethral catheter is inserted into the mass through a port (Fig. 2a). This has a balloon on the end and is usually used as a soft plastic tube inserted into the bladder to provide continuous urinary drainage. After that, the balloon is inflated with normal saline so that the catheter is not pulled out, but is retained in the mass as an indwelling catheter (Fig. 2b). Leakage from the cyst is blocked with the expanded baloon on inner wall of the cyst. Most of the cystic fluid in the mass is removed through another lumen of the Foley catheter, and the expanded mass is deflated gradually after this procedure (Fig. 2c). Next, the cystic mass is inflated with dye, which is 5% ICG diluted with normal saline, through the lumen (Fig. 2d). The mass is refilled with an adequate volume of ICG solution. This makes the margin of the cyst wall more demarcat-

Fig. 2 Operative procedure shows the following: (a) An 18F Foley urethral catheter is inserted into the mass through a port. (b) The balloon is inflated with normal saline. (c) Most of the cystic fluid in the mass is removed through another lumen of the Foley catheter, and the expanded mass is deflated gradually after this procedure. (d) The cystic mass is inflated with dye, which is ICG diluted 20 times with normal saline, through the lumen.

Fig. 3 A cystic mass is refilled with ICG. The margin between the mass and neighboring tissue is demarcated.

Fig. 4 A removed mass with a Foley catheter.
ed (Fig. 3). Finally, ICG solution is aspirated and removal of the mass is accomplished simply by deflating the balloon and slipping the catheter out (Fig. 4).

In case 1, the operation time was 118 minutes with 100 g blood loss. In case 2, the operation time was 130 minutes with minimal blood loss. Both the patient was able to be discharged on postoperative day 3. Both histological examinations confirmed a diagnosis of benign pericardial cyst.

Discussion

A pericardial cyst is a benign congenital mediastinal mass and rarely detected on routine radiological examinations. A pericardial cyst is most commonly found at the cardiophrenic angle with an incidence of 0.001%. Kutlay et al reported that the incidence at right — and left-sided CP angles was 70% and 22%, respectively. They also reported that this cyst was usually isolated adjacent to the pericardium, but that 20% of them communicated with the pericardium. Our case did not communicate with the pericardium. We believe that surgical treatment is the most appropriate because of cyst rupture and cardiovascular compression and erosion. Incomplete resection sometimes results in a recurrence or fluid production by the stranded tissue of the cyst wall. Therefore, we must beware the margin of a cystic wall and remove a cystic mass entirely.

ICG is green dye that binds serum albumin and is used in determining blood volume and liver function. In recent years, ICG has also been used in lymphatic mapping for identifying sentinel nodes in gastric cancer. So, the effectiveness and safeness of ICG localization has been well known in surgically excised mass.

Iwasaki et al reported original technique of this method. He used a balloon cholangiography cannula, which was a small and double-lumen cannula with a balloon. This cannula can also be used in our presented procedure, but a balloon cholangiography cannula is more expensive than a Foley cannula. Additionally, using ICG can make the margin clearer. In conclusion, we believe strongly that the present method is cost-effective.

References
