A useful technique for specimen extraction from the thorax: the vacuum-packing method

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Abstract
Most thoracic surgeons have encountered a number of situations in which a specimen was too large to fit through a small intercostal incision. This report highlights a useful technique for specimen extraction from the thorax using a vinyl bag and a sucker. The sucker creates negative pressure, and the liquid and air components from the specimen are removed. The specimen can be deflated and removed from the thoracic cavity through the access incision. We call this method the 'vacuum-packing method'.

Keywords: Video-assisted thoracic surgery

INTRODUCTION
As the uses of video-assisted thoracic surgery (VATS) expand, situations requiring the removal of large or potentially contaminated specimens from the thoracic cavity are increasingly encountered [1]. Thus, we have been using a vinyl bag and sucker to surgically facilitate removal of a variety of specimens from the thorax. This technique is simple to apply, and the tools are readily available. We call it the 'vacuum-packing method' and briefly present it here.

TECHNIQUE
Briefly, for the lobectomy, an access incision measuring <4–5 cm in length was made in the fourth or fifth intercostal space. Then we made an incision in the intercostal muscle equal in length to the skin incision, being careful not to spread the intercostal space.

Since January 2010, we have attempted a number of alternative methods for completion of this procedure. A description of our technique is as follows. First, an oval clamp is inserted into a vinyl bag (Fig. 1A). The oval clamp is then covered with the bag, which is passed into the thorax through an access incision. The small end of the specimen is grasped while keeping the oval clamp wrapped up with the bag (Fig. 1B). Next, the specimen is enveloped by reversing the bag (Fig. 1C). By lifting the edge of the cuff, the specimen is placed into the bag. Once the whole specimen is inside the bag, the oval clamp is loosened. The cuff of the bag is lifted and pulled out of the chest through the access incision. The tip of a sucker is then placed into the bag (Figs 1D and 2A), and the mouth of the bag is closed tightly with a hand or binding until it looks like a 'drawstring pouch'. The liquid in the bag is sucked out until almost none remains (Figs 1E and 2B). Finally, the liquid and air components of the specimen are removed, and the specimen is collapsed under negative pressure close to vacuum conditions. The bag with the specimen inside is pulled through the access incision (Figs 1F, 2C and D).

If the vacuum-packing method is used, each pulmonary lobe can be extracted through a 3–5 cm incision. Specifically, the middle lobe and pulmonary segments can be removed through a 2–4 cm incision. A wedge-resected lung can be extracted through a 1–2 cm incision. In fact, we do not use a hard rule to determine the size of the incision for removing the specimen, but usually base it on our judgement. As a rough guide, the vacuum-packing method can reduce the volume of the pulmonary parenchyma by 50–70%. If the lobe to be removed is deflated completely in advance, the vacuum-packing method is more effective. Essentially, the limit of the size of the lesion depends on the width of the intercostal space. Tumours up to ~3 cm can be extracted from the pleural space. Anterior access incisions are advantageous when extracting the specimen because the anterior intercostal spaces are wider than the posterior spaces.

COMMENT
Most surgeons have encountered a number of situations in which a specimen was too large to fit through a small intercostal incision during a VATS procedure. In a previous report, Lewis et al. were bold enough to say that large tumours could be individually slid into the plastic bag in the thorax to avoid spreading the ribs [2]. We do not always recommend Lewis' idea. Arzouman et al. [3] reported a method by which a
specimen was placed into a sleeve-shaped bag through two port sites. Yin et al. [4] also reported a unique technique for specimen extraction during VATS. They developed an extraction sac with two positioning finger sacs, similar to a medical glove. An oval clamp is inserted into the two fingers of the sac, and the following steps are identical to ours. Our method can be
applied to these techniques because the sucker only needs to be inserted into the vinyl bag. The sucker creates negative pressure, and the liquid and air components of the specimen are removed. The specimen can be deflated more than may be expected, and can be removed from the thoracic cavity through the access incision.

The central concept of our method is based on a device that people sometimes use in daily life to store items such as futons, mattresses and pillows neatly: the item is packed into a large vinyl bag; the air in the bag is removed with a vacuum cleaner; and the item is deflated; its volume is decreased more than expected. We call this method the ‘vacuum-packing method’. Tips and pitfalls of this technique are summarized as follows:

(i) Equalize negative pressure in the plastic bag including the tumour.
(ii) Use the access incision on the anterior ribs where the intercostal spaces are widest.
(iii) Do not stick to only a minimal incision. Keep in mind that there is no choice but to enlarge the access incision for large tumours; we must divide and spread the ribs to remove large tumours.

In summary, we believe that surgeons must consider various surgical techniques, especially young surgeons. This paper presents one such example.

Conflict of interest: none declared.

REFERENCES