

Thoracoscopic mediastinal tumor resection by subxiphoid approach – dual port thymectomy plus one (DPT+1)

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Abstract: Thoracoscopic subxiphoid approaches, such as the single-port thymectomy (SPT) and dual-port thymectomy (DPT) approaches have been demonstrated to have several advantages compared with the traditional median sternotomy approach or the bilateral or hemilateral video-assisted thoracoscopic (VATS) approach. However, SPT and DPT are technically demanding for novice surgeons since they require precise concomitant manipulation of surgical instruments and the thoracoscope within the same port, without interference. To overcome these limitations, we have developed a new method, termed DPT plus one (DPT+1), to facilitate separation of the surgical access ports and camera port by adding another intercostal port to the DPT approach. Our method is easy and safe not only for simple mediastinal resection but also for extended thymectomy.

Keywords: Subxiphoid approach; mediastinal tumor; dual port thymectomy

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Introduction

Recently, thoracoscopic subxiphoid approaches to mediastinal tumor such as single-port thymectomy (SPT) and dual-port thymectomy (DPT) using CO₂ insufflation have been reported (1,2). The thoracoscopic approach has been demonstrated to have several advantages compared with the traditional median sternotomy approach, without compromising the oncological outcome, such as the following advantages: reduced intraoperative blood loss, lower risk of mediastinitis, earlier removal of chest drains, shorter hospital stay and superior cosmesis (3). Compared to the bilateral video-assisted thoracoscopic approach, thoracoscopic subxiphoid approaches are less invasive for chest wall paraesthesia and they allow prompt conversion to median sternotomy without posture change when needed (such as in the case of unexpected vascular injury) since the patient is in the supine position. However, SPT and DPT are technically demanding for novice surgeons since they require simultaneous insertion of surgical instruments and the thoracoscope into the same port, leading to interference between the surgical instruments and limitation of surgical view. To overcome these limitations, we propose a new

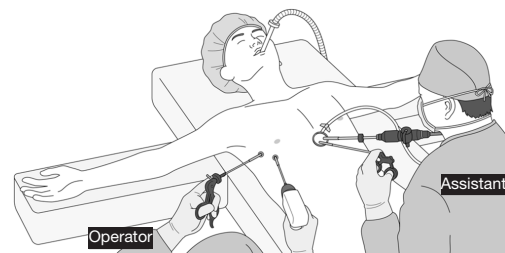


Figure 1 A schema of dual-port thymectomy plus one (DPT+1). The operator performs operative procedures via the 5th intercostal two 5-mm ports. The assistant uses a uniportal subxiphoid port as a camera port and assist ports. DPT+1 separates the access ports for the operator and the camera port for the assistant to function independently. DPT, dual-port thymectomy.

surgical method, termed DPT plus one (DPT+1) (Figure 1).

Technique

The patient was positioned in an open-armed supine position and intubated with a double-lumen endotracheal tube for one-lung ventilation. First, a 3-cm vertical skin

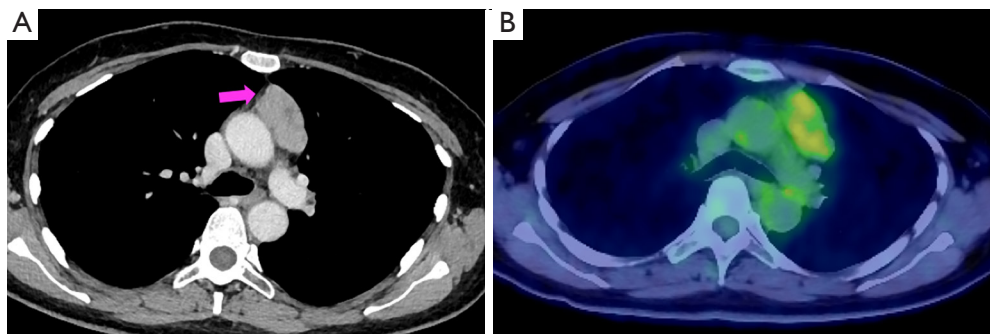


Figure 2 A case of a 53-year-old female with 5-cm thymoma. (A) CT revealed a 50 mm × 40 mm well-circumscribed, lobulated mass at the left anterior mediastinum (arrow); (B) FDG-PET showed abnormal uptake in the tumor with a maximal standardized uptake value (SUVmax) of 3.2. CT, chest computed tomography; FDG, fluorodeoxyglucose; PET, positron emission tomography.



Figure 3 We performed a thoracoscopic thymothymectomy on a patient with 5-cm thymoma by DPT+1 (4). DPT, dual-port thymectomy.

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incision was made 1-cm caudal to the xiphoid process and the connective tissue between the xiphoid and the rectus abdominis was detached. The GelPOINT mini (Applied Medical, Rancho Santa Margarita, CA, USA) was fixed there as a utility port, and the two attached ports were inserted in GelPOINT mini platform. This utility port was used as a camera/assist port for the assistant. CO₂ insufflation of the mediastinum was initiated at 8–10 mmHg to secure the surgical view. Next, the mediastinal pleura on the tumor located side was resected via the utility port using a LigaSure™ Maryland Jaw 37 cm (Covidien, Mansfield, MA, USA) and the thoracic cavity was opened. Two 5-mm ports at the 5th intercostal anterior axillary line and the 5th intercostal midclavicular line on the tumor located side were made by optical trocars (Medtronic, Minneapolis,

MN, USA) while observing the insertion site via the thoracoscope. By using these two ports as access ports for the operator, we were able to completely separate the surgical access ports and the camera port added an accessory port for the assistant to avoid both interference between the surgical instruments and limitation of the surgical view.

We present a case of a 53-year-old female without myasthenia gravis in which a 5-cm thymoma was resected by DPT+1 (Figure 2). Operation time: 97 min, blood loss: 10 mL (Figure 3). The patient had no postoperative complication and discharged at the 6th postoperative day.

Comments

Although SPT and DPT are markedly advantageous in various aspects for mediastinal tumor resection as described above, they are technically difficult for novice surgeons and may even be a challenging for the experienced surgeons. In particular, compared with DPT, SPT is technically demanding to be familiar with operating flexible clinch instruments. By simply adding one more intercostal port to DPT, DPT+1 separates the access ports for the operator and the camera port for the assistant to function independently, thereby allowing for a safer and easier surgery while taking advantage of the subxiphoid approach.

Our method might be feasible not only for simple mediastinal resections but also for extended thymectomies. When performing an extended thymectomy, it is crucial to visually identify the bilateral phrenic nerve in order to avoid surgical complications and to resect as much of the thymus as possible. Although Abdelnour-Berchtold *et al.* (5) reported on thoracoscopic thymectomy with intercostal

ports from the right- or left-side approach in the supine position, with such approaches it is difficult to recognize the contralateral phrenic nerve visually. The subxiphoid approach clearly visualizes the bilateral phrenic nerve and allows easy dissection of the superior pole of the thymus. Furthermore, our method may provide advantages for more complicated cases, such as those involving pericardial invasion or lung infiltration since the independent dual access ports allows the operator to perform without interference between surgical instruments, therefore complex maneuvers such as suturing may even be achieved.

Acknowledgments

None.

Footnote

Conflicts of Interest: The authors have no conflicts of interest to declare.

Ethical Statement: The authors are accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are

appropriately investigated and resolved. Written informed consent was obtained from the patient for publication of this manuscript and any accompanying images.

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