Subxiphoid video-assisted thorascopic thymectomy for thymoma

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Clinical vignette

A 42-year-old male presented with an 8-month history of a thymic tumor associated with myasthenia gravis (MG) (*Figure 1*). The clinical stage was IIa according to the Myasthenia Gravis Foundation of America (MGFA), an electromyography (EMG) study was abnormal, and serum acetylcholine receptor (AChR) antibody testing was positive. The patient's clinical state was stable on pyridostigmine bromide, three tablets daily, and medical history revealed no serious comorbidities (2). On computed tomography (CT) of the chest, a 37×33×27 mm^3 well-encapsulated thymic tumour was found, with no signs of infiltration of the mediastinal structures. The treatment plan involved thymectomy without previous needle biopsy of the tumour.

Surgical technique

Preparation

The patient was positioned supine on the operating table with a roll placed beneath the thoracic spine to elevate the chest and to hyperextend the patient's neck. Under general anesthesia, an endobronchial tube was inserted to conduct selective lung ventilation during the latter part of the procedure.

Exposition

A transverse 5-cm subxiphoid incision and a single 10-mm port were inserted bilaterally into the chest cavity for video-assisted thoracoscopic surgery (VATS) and subsequently, for chest tubes. The sternum was elevated with two hooks connected to the sternal frame (Rochard bar, Aesculap-Chifa, Nowy Tomysl, Poland).

Operation

A transverse 5-cm incision was made above the xiphoid process. The subcutaneous tissue and the medial parts of the rectus muscles were cut near the insertions to the costal arches. The xiphoid process was removed. Selective left lung ventilation was started, resulting in the collapse of the right lung. The anterior mediastinum was opened from below the sternum. A sternal retractor connected to the traction frame was placed under the sternum, which was elevated to facilitate access to the anterior mediastinum from below. A thoracoscopic port for 10-mm, 30-degree oblique thoracoscope was inserted into the right pleural cavity in the 6th intercostal space in the anterior axillary line. The right mediastinal pleura was cut near the sternal surface up to the level of the right internal thoracic vein, which was left intact. The prepericardial fat and the right epiphrenic fat pads were dissected from the pericardium and diaphragm with bipolar cautery (Bi-Clamp, ERBE). Alternatively, devices such as a harmonic knife, LigaSure or vascular clips can be used to secure the vessels throughout the procedure. Dissection of the prepericardial fat containing the thymus gland proceeded cranially in en bloc fashion, without any attempt to dissect the thymus gland with thymoma separately. The right phrenic nerve was a margin of dissection. After dissection of the mediastinal tissue from the inner surface of the sternum, a 2-3 mm puncture was performed over the sternal notch and a single-tooth hook was inserted percutaneously under the sternal manubrium. The second hook improved

Figure 1 Subxiphoid video-assisted thorascopic thymectomy for thymoma (1).
Available online: http://www.asvide.com/articles/725

exposure of the superior mediastinal and the lower neck regions, enabling visualization of the whole upper poles of the thymus and the lower part of the thyroid. The dissection of the thymus proceeded along the left innominate vein, with closure by vascular clips and division of the thymic veins until the left internal thoracic vein (left mammary vein) was visualized. The left mediastinal pleura was opened and the dissected thymus with the right epiphrenic fat pad was transferred to the left pleural cavity to facilitate exposure of the rest of the thymus. Dissection proceeded cranially with closure and division of the lower thyroid veins, performed in the same way as for the thymic veins. The thyroid ima artery was found, which necessitated double clipping and division. Further dissection proceeded along the thymic poles until the lower part of the thyroid was clearly visualized. At this point, the upper poles were divided close to the thyroid. During the dissection, structures such as the innominate artery, the right carotid arteries and the trachea were clearly visualized. The liberated upper poles of the thymus were grasped and pulled caudally enabling dissection of the thymus from the pericardium. A single port was inserted into the left pleural cavity, in the same way as it was done on the right side. Dissection of the specimen along the left phrenic nerve was performed, the same as was done on the right side. The thymus containing the thymoma and the adipose tissue was placed in the plastic bag and removed through the subxiphoid incision. Finally, dissection of the aorto-pulmonary window was completed.

Completion

Hemostasis was checked and a single 24 French chest tube was inserted into both pleural cavities through the port insertion sites. Ventilation of both lungs was resumed. The subxiphoid incision was closed in the standard manner, a puncture incision was closed with a single 5/0 suture which was replaced with a peri-strip the next day. The patient was extubated immediately after the operation.

Comment

Clinical results

There were 14 patients were operated on for thymoma and 75 patients operated on for non-thymomatous MG in the period from March 2nd 2009 to May 31st 2015. The diameter of the thymomas ranged from 3×3×2.5 cm^3 to 12×9×5 cm^3. The mean operative time was 119.3 min (75-155 min). There was no mortality and morbidity rate was 1.1% (revision for bleeding in one patient).

Advantages

The presented technique is the only VATS technique of thymectomy with documented visualization of the thyroid gland, which means that this is the only one fully complete VATS technique of thymectomy performed without additional transcervical incision (3,4). In our opinion, the supine position for VATS thymectomy is more useful than a semi-lateral position used for most of thoracic surgeons, due to the easy access to both sides of the mediastinum, with removal of fat containing the ectopic foci of the thymic tissue in the substantial number of patients with MG (5). Despite minimal invasiveness, it was possible to perform extended resection of the thymomas infiltrating the pericardium, the right phrenic nerve and the right lung. The subxiphoid incision was widely opened due to elevation of the lower angle of the sternum, enabling greater access to the chest than any intercostal utility thoracotomy. The combination of the subxiphoid incision and single port bilateral VATS is a minimally painful approach with no risk of disruption or infection of the sternotomy wound. There is also a clear cosmetic advantage with no visible scar in the cervical/upper chest area.

Caveats

Potentially, the subxiphoid-VATS approach enables less extensive dissection in the neck in comparison to a transcervical thymectomy. The use of bilateral thoracoscopy

Table 1 Advantages and disadvantages of the subxiphoid-VATS thymectomy

Advantages of subxiphoid-VATS approach
1. Relatively non-painful
2. Total avoidance of the risk of disruption or infection of the sternotomy wound
3. Visualization and dissection up to the thyroid possible, which enables complete removal of the thymus
4. Access to the chest wider than for intercostal utility thoracotomy
5. Perfect cosmetic result with no visible scar in the neck
Disadvantages of subxiphoid-VATS approach
1. Not applicable in advanced thymomas
2. Limited possibility of visualization and dissection of the laryngeal recurrent nerves and the fatty tissue in the lower neck
3. Possible chronic intercostal pain after VATS

VATS, video-assisted thoracoscopic surgery.

may lead to chronic intercostal pain (common disadvantage of all VATS thymectomies). Advanced thymomas cannot be successfully resected with this technique, similar to the other minimally-invasive techniques (*Table 1*).

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Footnote

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

References

1. Zieliński M, Rybak M, Wilkojc M, et al. Subxiphoid video-assisted thorascopic thymectomy for thymoma. Asvide 2015;2:148. Available online: http://www.asvide.com/articles/725
2. Jaretzki A 3rd, Barohn RJ, Ernstoff RM, et al. Myasthenia gravis: recommendations for clinical research standards. Task Force of the Medical Scientific Advisory Board of the Myasthenia Gravis Foundation of America. Ann Thorac Surg 2000;70:327-34.
3. Shigemura N, Shiono H, Inoue M, et al. Inclusion of the transcervical approach in video-assisted thoracoscopic extended thymectomy (VATET) for myasthenia gravis: a prospective trial. Surg Endosc 2006;20:1614-8.
4. Zielinski M, Czajkowski W, Gwozdz P, et al. Resection of thymomas with use of the new minimally-invasive technique of extended thymectomy performed through the subxiphoid-right video-thoracoscopic approach with double elevation of the sternum. Eur J Cardiothorac Surg 2013;44:e113-9; discussion e119.
5. Zielinski M, Hauer L, Hauer J, et al. Comparison of complete remission rates after 5 year follow-up of three different techniques of thymectomy for myasthenia gravis. Eur J Cardiothorac Surg 2010;37:1137-43.

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