

## AB011. Minimally invasive thymectomy (comparison of approaches)

Beatrice Aramini<sup>1,2</sup>, Gening Jiang<sup>2</sup>, Jiang Fan<sup>2</sup>

<sup>1</sup>Department of Thoracic Surgery, Division of Thoracic Surgery, Department of Medical and Surgical Sciences for Children and Adults, University of Modena and Reggio Emilia, Modena, Italy; <sup>2</sup>Department of Thoracic Surgery, Shanghai Pulmonary Hospital, Tongji University Shanghai Pulmonary Hospital, Shanghai 200433, China

**Abstract:** Minimally invasive surgery has replaced median sternotomy for resectable anterior mediastinal masses and is performed by various approaches. The most important histological patterns in mediastinal neoplasm are: thymomas, thymic carcinomas (TC) and neuroendocrine thymic tumors (NETTs). Thymic malignancies are uncommon tumors. Thymoma is the most frequent primary mediastinal neoplasm in adults, usually benign and slow-growing. The most frequent metastatic localizations are to the pleura, pericardium and/or diaphragm. Although it is not definitely established which patients should have a thymectomy or what type of operation should be performed, a thymectomy is frequently recommended for patients under the age of 60 (occasionally older) with anterior mediastinal mass associated with moderate to severe myasthenia gravis (MG) weakness. About 10% of MG patients have a tumor of the thymus called a thymoma. Thymus removal is an effort to improve the weakness caused by MG and to remove a thymoma, if present. Median sternotomy has been long considered the best approach for resection. However, the history about surgical techniques regarding thymectomy goes back to the beginning of the century. In particular, although the first thymectomy was performed transcervically by Sauerbruch in 1912, trans-sternal access gained popularity in the 1980s following the results of Jaretzki *et al.* who recommended a 'maximal transcervical-trans-sternal thymectomy for non-thymomatous MG patients. Since then, the trans-sternal approach has been employed and described with different modifications. In 1988, Cooper *et al.* described an extended transcervical approach using a dedicated self-retaining sternal retractor to lift the sternum. This technique offered the advantage of causing minimal pain because it does not

involve access through the intercostal space. However, the surgical operability and field of view are very poor; thus, this technique is not widely used. The second approach was lateral thoracotomy, which is currently the most widely used technique, especially for large anterior mediastinal masses or infiltrating tumors. Even if the traditional approach to thymectomy by median sternotomy or lateral thoracotomy is based on the assumption that it is the best means to achieve adequate resection margins, complete removal of the thymus and clearance of the anterior mediastinal fat, Landreneau *et al.* in 1992 removed an anterior mediastinal tumor under thoracoscopy. Actually, minimally invasive methods have emerged over recent decades including video-assisted thoracoscopic (VATS) and robotic video-assisted thoracoscopic (R-VATS) approaches. In the Hera of single/double port minimally invasive surgery, subxiphoid thymectomy represents the most advantage technique in treating small, early-stage thymic malignancies. Firstly, performed by Kido *et al.* in 1999, in recent years the subxiphoid approach led to less invasive thymectomy and extended the indications for VATS for invasive anterior mediastinal tumors, improving surgical access to the anatomical structures, patient satisfaction, reduces pain and offers superior aesthetic outcomes. With regards of the results between different surgical approaches, Lee *et al.* compared the trans-sternal approach with bilateral VATS, observing no differences in the extent of the resected specimen. Meanwhile, Liu *et al.* reported that unilateral VATS offered long-term neurological outcomes equivalent to that of bilateral VATS. Other authors reported interesting mid-term neurologic results on 107 consecutive non-thymomatous myasthenic patients who underwent unilateral VATS, with the sidedness of the approach based on individual cases and the computed tomography (CT) status of the thymus. However, VATS has some disadvantages as the planar vision of the operative field, the lack of ability to articulate the tips of the thoracoscopic instruments and the possibility to damage the intercostal nerves which extend the period and the intensity of pain after surgery. Robotic systems can overcome these limitations, combining the advantages of VATS (less operative trauma, short hospital stay and cosmetic results) with three-dimensional (3D) vision and the ability to articulate the tips of the instrument inside the chest cavity. Excellent results were reported in several series, showing low conversion rate, low morbidity and adequate operative time. However, in 2016 Suda *et al.* published comparison results between video-assisted thoracoscopic thymectomy and subxiphoid

thymectomy showing that subxiphoid approach can be considered nowadays the best minimally invasive approach for the successful postoperative outcomes related to the quality of life as guarantee for the patient after surgery. When a thymectomy is being considered, the patient is referred to a surgeon. It is important to choose a high-volume center regarding thymic pathologies and a surgeon experienced in performing thymectomy for patients with MG. In general, dedicated MG centers have the advantage to developed protocols for the care of MG patients and have a team of neurologists, surgeons, pulmonologists, intensive care and respiratory care specialists, nurses and anesthesiologists caring for MG patients undergoing a thymectomy. Patients should discuss all aspects of the pre- and post-operative care and anesthesia with the surgeon, anesthesiologist and neurologist. With regard of the technique, the subxiphoid thymectomy can be learnt easily by surgeons experienced in uniportal VATS but may take more time for younger surgeons with low volume Center experience. The camera views and instrument positioning can be more challenging than for conventional VATS, but

the necessary skills can be acquired over a middle learning curve, particularly for major procedures. In summary, nowadays there is no standardization regarding the surgical approach to adopt; each Center makes the appropriate choice considering the volume and the characteristics of the thymic mass, the surgeon experience, and the Hospital costs, which are necessary to support this kind of surgery. In conclusion, since there is no absolute proof as to which type of thymectomy is the procedure of choice, patients need to be fully informed, review the evidence presented by the neurologist and surgeon caring for them, and perhaps obtain additional consultation.

**Keywords:** Video-assisted thoracoscopic thymectomy (VATS thymectomy); subxiphoid thymectomy; robotic VATS (R-VATS); open thymectomy; myasthenia gravis (MG)

doi: 10.21037/shc.2018.AB011

**Cite this abstract as:** Aramini B, Jiang G, Fan J. Minimally invasive thymectomy (comparison of approaches). *Shanghai Chest* 2018;2:AB011.