Video assisted trans-cervical thymectomy
A minimally invasive approach to treat non-thymomatous myasthenia gravis

Ann. Ital. Chir., 2013 84: 667-670
Published online 5 November 2012
pii: S0003469X12020313
www.annitalchir.com

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Video assisted trans-cervical thymectomy. A minimally invasive approach treat non-thymomatous myasthenia gravis

Contemporary surgical options to remove the thymus gland include median sternotomy with extended resection or minimally invasive techniques. Transcervical thymectomy has been criticized as potentially giving a "lesser" thymectomy. We describe the trans cervical approach with telescope enhancement using a standard VATS camera. This report describes the method emphasising the excellent visualization, and discuss the pro and cons over the classic trans-cervical approach or thymectomies performed by VATS or sternotomy.

KEY WORDS: Myasthenia gravis, Minimally Invasive Technique, Thymectomy, Transcervical approach.

Introduction

One century following the first proved beneficial surgical effect of thymectomy, the optimal surgical approach remains controversial. Thymectomy was described for the first time in an adult patient in 1912 [1], and was divulgated by Blalock et al [2] and Kayne [3] In 1988 Cooper published an improved technique to facilitate TT for MG [4]. In recent years, the emphasis on minimally invasive surgery has increased extensively, and several minimally invasive techniques for thymectomy have been reported.
We have used telescopic imaging to facilitate exposure of the anterior mediastinum during thymectomy with excellent result. This has allowed complete clearance of the mediastinum without the need of additional thoracic port access. This report is a preliminary communication describing the method.

Operative technique

The patient is anaesthetized and intubated with a single lumen tube. The position of the patient is supine with a pillow behind the shoulders to allow hyperextension of the neck. After entering the superior mediastinum through a short trans cervical incision 2 cm above the sternal notch. The surgeon moves to the head of the patient for the thymectomy. The assistant surgeon stays on the left side with the nurse on the right. The television monitor stays in front of the surgeon. The hystmus of the thyroid gland is retracted cranially. The strap muscles are separated longitudinally along their midline raphae. The upper poles of the thymus gland are detected behind these strap muscles (Fig. 1). The sternum is

Pervenuto in Redazione Settembre 2012. Accettato per la pubblicazione Ottobre 2012
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Fig. 1: Left: intraoperative overview. A: Sternal retractor. B: left upper pole; C: Right upper pole.
Right: the left upper pole of the thymus gland is detected behind the strap muscles and blunt dissection is carried out anterior and laterally to the thymus gland.

elevated with a sternum retractor suspended from a transverse bar. A 0° degree 5 mm telescope is used to visualize the operative field. A 30° telescope may be useful during the procedure. Blunt dissection is carried out anterior and laterally to the thymus gland. Care is taken to identify the innominate vein. The thymus is then retracted anteriorly to display the thymic veins. Vascular clips are placed and the veins divided. The thymic arteries tributaries from the internal mammary artery are then clipped and divided. The thymus can then freed using a blunt dissection from the pericardium and pleurae on each side. When the thymus gland is removed, dissection is easing carried out for the entire length of the mediastinum down to the diaphragm. The magnification attended by the telescope allows full clearance leaving an empty anterior mediastinum.

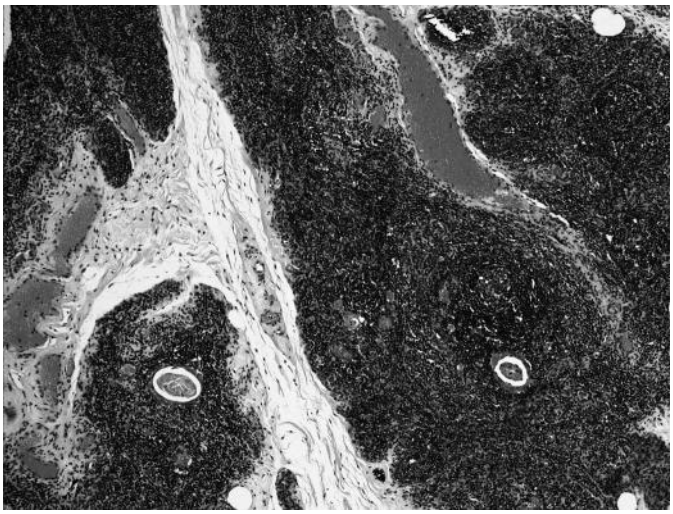

Fig. 2: Pathology report: View of true thymic hyperplasia showing Hassall's corpuscles.

Clinical Experience

This technique was used electively in 7 patients with non thymomatous myasthenia gravis. Indication for operation were made by the neurologists, and criteria for performing VATT were class I, class IIa or class IIb according to the MGFA clinical classification [5]. The mediastinum was evaluated prior to thymectomy by contrast-enhanced computed tomography or magnetic resonance imaging in all patient. Preoperative stage classification was class 1 in 4 and class 2 in 3 patients. One patient with dysphagia has been operated 3 years before for hiatal hernia. The length of the operation was always less than 90 minutes with minimal blood loss. There were no complications. The length of stay was 2 days. Thymic hyperplasia and Hassal's corpuscles were demonstrated in all patients. All patients presented a reduction of neurological symptom at a mean follow up of 31 months. The patient with dysphagia experienced a minimal neurological improvement, but dysphagia persisted.

Discussion

During the last decade advances in endoscopic techniques have facilitated a less invasive approach to mediastinum [6,7]. Numerous modifications of minimally invasive techniques to perform thymectomy have been published

including the use of robotic instrumentation [8]. The goal of surgery is complete thymectomy along with resection of pericardial fat, and the indications for surgery depends on multidisciplinary care involving neurologists, surgeons and anaesthesiologists [9,10].

Left, Right or Bilateral Video Assisted surgical techniques (VATS) have been described as the optimal modern techniques for thymectomy for MG [11]. Whilst acknowledging the cosmetic advantages of these techniques over mid-line sternotomy and their possible improvement over transcervical thymectomy, there are potential disadvantages over our technique. First, VATS approach needs the use of a double lumen tube. Second, difficulties may be encountered in patients with pleural adhesions. Third, lung exclusion cannot easily be performed in patients with respiratory insufficiency.

Full or partial median sternotomy has the advantage of excellent visualization of the anterior mediastinum. This incision has the potential risk of wound infection, dehiscence and reduced mobility for 6 weeks. Even more this incision does give an optimal cosmetic appearance. Evidence to support significantly better substantial result compared to the other methods is lacking [12,13].

Trans-cervical Thymectomy is a truly minimally invasive technique but has been criticized as potentially giving a "lesser" thymectomy than more extensive means. However we have found that this disadvantage can be avoided using the telescope [14]. The use of a camera and telescope system allows excellent visualization with magnification of the anterior-superior mediastinal space including the aorto-pulmonary window. In addition projection of the image on a television screen allows everyone in theatre to observe the progress of the operation allowing staff to be more engaged throughout the procedure. As TT is a difficult technique to teach because the surgical field is very small, with television imaging techniques different surgeons can follow the operation, which can also be recorded. This improves the teaching of the surgical method. The advantage of the reported technique over other methods are summarized in Table I.

All patients presented reduction of symptoms after 31 month follow-up. It is interesting that one of our patient who also presented preoperative dysphagia remained with the same symptom postoperatively. This demonstrates that dysphagia was not correlated with the MG but, in this case, with the previous operation for GER. Although myasthenia leads to dysphagia with significant oral, masticatory, and pharyngeal components, it was not possible in our patient to establish the exact cause of the symptom even with an accurate esophageal manometry [15-17].

Although it has been recently demonstrated that VATS has a longer operative time than the transternal approach its improved cosmesis, reduced need for postoperative medication and equivalent disease resolution outcomes make it a preferable surgical option to the transsternal approach [18].

In conclusion, the use of the telescope during transcervical thymectomy to treat non thymomatous myasthenia gravis permits to perform the complete clearance of the mediastinum without the need of additional port access. The use of the telescope allows excellent visualisation of the steps of the operation for teaching purposes.

TABLE I - *Potential advantages of Video assisted trancervical thymectomy over other surgical methods. TT trans-cervical thymectomy; VATS videoassisted thoracic surgery*

Versus TT
– Operation can be performed under direct vision even if the optic is inserted;
– Visual enhancement allows extended removal of anterior mediastinal fat;
– Better teaching method.
Versus VATS
– Single lumen tube;
– Faster operation;
– Less hospital cost;
– Operation can be performed in patient with previous operation in the chest;
– Operation can be performed in patients with respiratory insufficiency.
Versus Sternotomy
– Cosmesis;
– Faster operation;
– Less hospital stay;
– Fewer complication.

Riassunto

Le moderne possibilità per rimuovere il timo variano dalla chirurgia toracica mini-invasiva alla sternotomia mediana con resezione estesa. La timectomia transcervicale è stata spesso criticata perché secondo molti chirurghi non permette una timectomia estesa.

L'obiettivo di questo studio è di descrivere la tecnica trans-cervicale eseguita mediante l'uso di un ottica tradizionale. Gli autori discutono i pro ed i contro di questa metodica confrontandola con la timectomia effettuata per via sternotomica o mediante le tecniche tradizionali mini-invasive.

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