Anesthetic Implications For Video Assisted Thoracoscopic Thymectomy In Myasthenia Gravis

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Citation

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Abstract

Thymectomy is an established therapy in the management of generalized myasthenia gravis (MG). However, the optimal surgical approach to thymectomy has remained controversial. There are advocates for transternal, transcervical approaches or "maximal" thymectomy. Video-assisted thoracoscopic thymectomy (VATT) presents new approach to thymectomy. By minimizing chest wall trauma, VATT not only causes less postoperative pain, shortens hospital stay, gives better cosmetic results but also leads to wider acceptance by patients for earlier surgery.

Anesthesia for thymectomy in MG is challenging. Currently we are using a non-muscle relaxant technique (NMRT) which we adopted in 1994, for maximal thymectomy (3). In this paper, we present our limited experience with two cases of VATT using two different NMRTs. Two cases of MG underwent VATT under general anesthesia (GA) and one lung ventilation (OLV) using a double lumen tube (DLT). In both cases, NMRT was used which encompassed light GA plus thoracic epidural analgesia (TEA) in one case and the same without TEA in the other case.

We believe that the use of NMRT provides good operative and postoperative conditions. Further studies are needed on large number of cases to establish an anesthetic protocol for VATT.

INTRODUCTION

MG is a disorder characterized by weakness and fatigue of voluntary muscles. The muscular disorder is generalized in 85% and confined to extraocular muscles in 15% of patients. The disease is graded based on pattern and severity of muscular involvement. MG is an autoimmune disease which leads to a reduction of the number of acetylcholine receptors (Ach-R) at the muscular motor endplate. This results in less receptors available for stimulation, lower amplitude stimulations, less muscle fiber activation, and the resultant clinical findings of weakness in the affected muscles. Medical therapy includes use of anticholinesterase agents, immunotherapy, and plasmapheresis ([1]). Thymectomy is an established therapy in the management of generalized myasthenia gravis, in addition to medical treatment.

However, the optimal surgical approach to thymectomy has remained controversial. There are advocates for transternal, transcervical approaches or “maximal” thymectomy. VATT presents new approach to thymectomy. By minimizing chest wall trauma, VATT not only causes less postoperative pain, shortens hospital stay, gives better cosmetic results but also leads to wider acceptance by patients for earlier surgery. However, the true role of this approach in thoracic surgery awaits long-term results ([2]). Anesthesia for thymectomy in MG is challenging. Currently we are NMRT which we adopted in 1994, for maximal thymectomy ([3]). In this paper, we are going to present our limited experience with VATT using NMRT.

CASE 1

A 28-year-old female weighing 62 kg known to have bronchial asthma. Since 1 year she started to complain of sudden diplopia in the morning which was preceded by severe headache and nervousness. The patient started to have progressive ptosis and drop of the right side of the face with difficulty in speech and dysphagia for which she was admitted to the neurology ward of our hospital. The diagnosis of myasthenia gravis Osserman class IIB was made, where she was receiving pyridostigmine (60 mg, 6

hourly) and prednisolone (20 mg once a day).

The patient was posted for VATT under GA. Her preoperative routine investigations including haematological and ECG were within normal limits. The morning dose of pyridostigmine was continued. As a routine, three sessions of plasmaphereses were performed preoperatively. One peripheral i.v cannula (16G) was inserted in addition to non-invasive monitoring of blood pressure, ECG,pulse oximeter, intra-arterial and central venous pressure monitoring.

Induction of GA was achieved with fentanyl (100mcg) followed by propofol (200mg),while she was breathing 60% N2O/O2/sevoflurane 1 Minimal Alveolar Concentration MAC. The larynx was sprayedwith xylocaine 10%. Two min later, the trachea was intubated with a left DLT 37Fr.

The position of the DLT was checked by auscultation and fiberoptic bronchoscopy (FOB). Anesthesia was maintained with fentanyl infusion running at 20mcg/hr and propofol infusion at 100mg/hr. The patient underwent uneventful thymectomy for 3hr. The patient was extubated on the table. She was then transferred to the surgical intensive care unit (SICU). Postoperative analgesia was achieved with ketoprufen 100mg/i.m/12hr. Her postoperative period was smooth and the chest tube was removed after 4 days. The histopathology report from the thymus removed showed a lymphoid hyperplasia consistent with MG.

CASE 2

A 20-year-old female (weighing 59kg) patient was complaining of generalized fatigability and ocular features of MG for the past two years. A CT scan revealed thymus gland enlagement (Fig 1). She was planned to undergo VATT. She was on oral pyridostigmine 60 mg 6 hourly. She was also getting prednisolone (20mg once daily). Preoperative haematological profile and ECG were normal. Pulmonary function tests revealed mild restrictive airway disease. The morning dose of pyridostigmine was continued on the day of surgery. She was premedicated with lorazepam 1mg orally, 90 min prior to surgery. In the operating room, her body temperature was maintained with water heated mattress. After placement of the ECG and automated blood pressure cuff, intravenous and arterial cannulae were inserted under local anesthesia. EEG bispectral index (BIS) monitor was used intraoperatively where a value < 40 (Fig 2) was maintained throughout the procedure (Aspect Medical Systems Inc., Natick, MA; all impedences <5 kOhms) ($_4$). Anesthesia was induced with sufentanil 0.1mcg/kg followed by propofol 3mg/kg body weight while she was breathing 60% N2O/O2 through a Magill anesthetic circuit. Direct laryngoscopy was then performed and the larynx was sprayed with 4% lignocaine 2-4ml using a laryngotracheal anlgesia cannula (LTA, 24 laser pores, Abbott, USA). Two minutes later, the trachea was intubated with a left sided DLT (Fr 35) which was checked by auscultation and FOB. A thoracic epidural catheter was then inserted at T 8-9. Anesthesia was maintained with propofol infusion 6-12mg/kg/hr and epidural bupivacaine 0.25% 5-7ml/hr. Incremental dose of 10mcg sufentanil was given if required. OLV was excuted with DLT and surgery was performed in the left lateral decubitus position. Four incisions were performed (10 mm) at different intercostal spaces to accomodate ports for video camera, and dissecting forceps (Fig 3, 4). Surgery lasted uneventfully for 2hr and at the end the patient was extubated and transferred to the SICU. Postoperative analgesia was satifactory using an epidural bupivacaine infusion drip. On the next day, the patient was transferred to a high dependency unit and the day after she was sent to the surgical floor.

Figure 1

Figure 1: CT scan. Arrow indicates thymus gland.

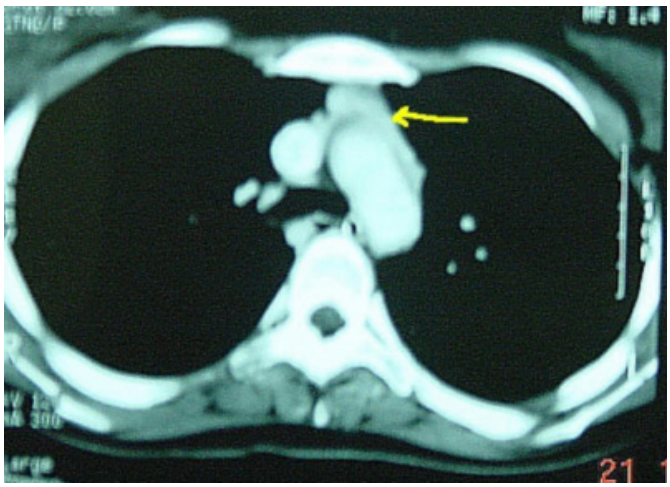

Figure 2

Figure 2: EEG BIS monitor. Arrow indicates the EEG BIS value during surgery

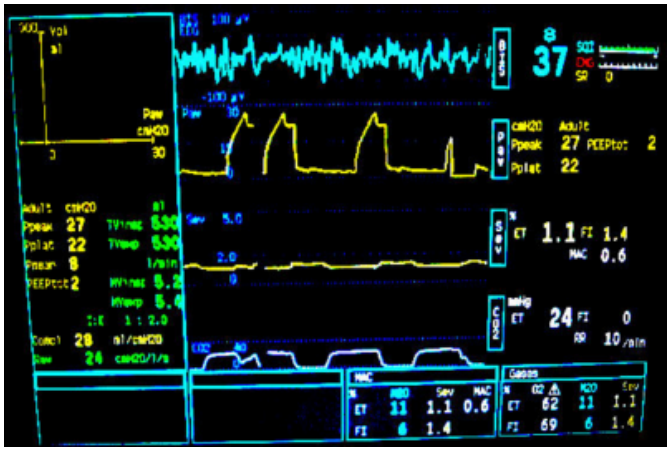

Figure 3

Figure 3: Operative field with lung collapse during VATT

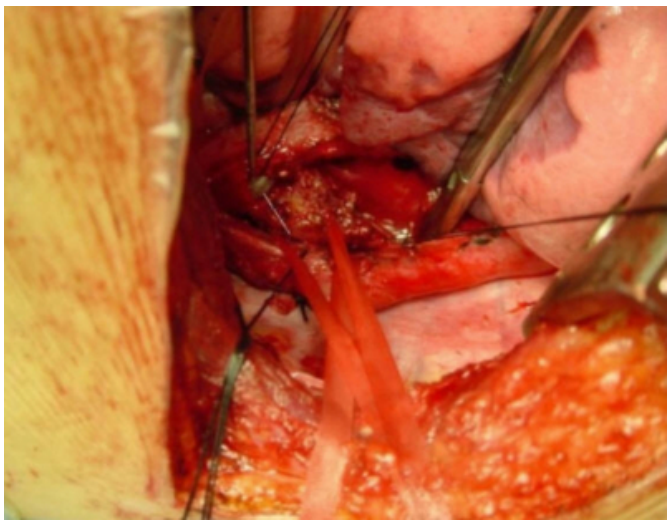

Figure 4

Figure 4: Four ports, for the video camera and dissectors

DISCUSSION

Total thymectomy is the established surgical therapeutic method for generalized MG. Several approaches are used for the surgical removal of the thymus and these include the transcervical approach, partial sternotomy, median sternotomy and a combination of transsternal and transcervical approaches ([5], [6]).

All of these procedures have demonstrated excellent results in the resection of the thymus. More recently VATT has been advocated as a less invasive technique for the management of MG and also as an alternative to conventional transsternal approach for patients with MG undergoing thymectomy ([7], [8]). This technique offers several advantages as patients who undergo this procedure experience less postoperative morbidity and minimal discomfort. There is rapid functional recovery manifested by shorter postoperative hospital stays, thus reducing the hospitalization cost. Thoracoscopic thymectomy offers excellent cosmetic healing compared to sternotomy as no midline scar remains. The patient also experiences minimal chest-wall trauma during the operation ([9], [10]). The published anesthetic experience in this disease is quite large ([11], [12]). We can classify the different anesthetic techniques into muscle relaxant and NMRTs.

The myasthenic patient is sensitive to nondepolarizing neuromuscular blockers (NMBs). Intermediate and short acting nondepolarizing NMBs can be used with EMG or mechanomyogram (MMG) ([13]). Myasthenic patients are resistant to depolarizing NMBs ([14]). Inhalation anesthetics may produce muscle relaxation in myasthenic patients. Isoflurane and sevoflurane were demonstrated to produce

that effect. Desflurane in myasthenic patients was not reported, however, in normal patients it reduces the requirements of nondepolarizing NMBs ([15]). We have first coined and adopted NMRT with combined TEA and light general anesthesia in 1994 ([3]). Since then, there was increasing interest for this technique ([16, 17]). It is still a subject of debate if the determinants of postoperative mechanical ventilation are the preoperative pulmonary function or the intraoperative use of NMBs ([18]). We believe that with the use of NMRT the spontaneous respiration at the end of surgery is effectvely restored without residual muscle weakness. VATT is a new era in the operative management of MG. OLV using DLT or single lumen tube with capnothorax is essential to achieve better operative view during VATT ([19, 20]). We have used two different NMRTs in the cases presented. One case GA without TEA and the other case GA plus TEA. In both cases, intra and postoperative conditions were optimal.

CONCLUSIONS

In conclusion, anesthesia for thymectomy is challenging. We believe that the use of NMRT which encompasses GA plus LTA provides good intubating conditions. Also, the use of propofol i.v infusion and epidural bupivacaine provides good operating and postoperative conditions. In this report, we described two different NMRTs. One with TEA and the other one without. Further studies are needed on a large number of cases to establish an anesthetic protocol for VATT.

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