SCIENTIFIC ARTICLE

Thoracoscopy: beyond the key hole

K.B.Galketiya[1], V.Pinto[2], S.M.Bandara[3]
[1]Department of Surgery, Faculty of Medicine, University of Peradeniya
[2,3]Department of Anaesthesiology, Faculty of Medicine, University of Peradeniya, Sri Lanka

Key words: Thoracoscopy; thoracotomy; median sternotomy.

Abstract

Background

Lateral thoracotomy or median sternotomy causes significant morbidity. Thoracoscopy reduces the morbidity of the incision and provides a clear and magnified display of anatomy. It involves a learning curve.

Objectives

To evaluate the safety, efficacy and advantages of thoracoscopy.

Method

A retrospective analysis of 67 thoracoscopic procedures performed at the university surgical unit, Teaching Hospital, Peradeniya.

Results

The total number of 67 procedures included thymectomy, lymph node biopsy, lymph node dissection, excision of retrosternal goitre, sympathectomy, splanchnicectomy, oesophagectomy, lung biopsy and diagnostic procedures. The time taken was acceptable with minimum blood loss and selective use of intercostal drainage. There were no conversions. Intensive care was needed only for oesophagectomy, thymectomy and excision of retrosternal goiter. The need for narcotic analgesics was minimal. Feeding, mobilization and discharge from hospital were early except after oesophagectomy. There was a mortality of 13% in the oesophagectomy group. No morbidity or mortality was recorded among others.

Conclusion

Thoracoscopy permitted a wide range of surgeries to be done safely with reduced morbidity.

Introduction

Diagnostic and therapeutic procedures of the thorax are performed by thoracotomy or median sternotomy. Open access causes significant morbidity, due to long incisions and division of muscles/ bone, use of prolonged retraction and significant post operetive pain which affects breathing. The result may be prolonged ventilatory support and extended intensive or high dependency care. Due to poor respiratory effort and coughing, chances of respiratory infections are higher [1]. The risk of wound infections and wound dehiscence, especially in sternotomy, may have disastrous outcomes [2,3,4,5]. Furthermore patients' return to work and resumption of a normal life is delayed [6].

Thoracoscopy is an established technique with the potential to minimise the morbidity of open access [7,8,9,10,11]. Clear display of anatomy is an added advantage. The image is magnified and it is possible to get a closer view by zooming in.

Lack of tactile sensation, difficulties of hand eye co-ordination, obtaining space for dissection and methods of haemostasis are challenges [9,10,11]. Specimen retrieval should be planned. Also an initial high cost will

Correspondence: K.B.Galketiya
E-mail: kbgalketiya@yahoo.com

be incurred for equipment. The objective of this audit was to evaluate the safety, efficacy and advantages of thoracoscopic procedures performed at the university surgical unit, Teaching Hospital Peradeniya, Sri Lanka.

Materials and methods

A retrospective analysis was made of 67 thoracoscopic procedures done in the unit. In every case, the position of the camera and the working ports were planned with the computerized tomography images. All procedures were performed under general anaesthesia and endotracheal intubation. Space for dissection was obtained by collapsing the lung which was achieved by single lung ventilation or insufflation of carbon dioxide while ventilating both lungs. During single lung ventilation capnothorax was required initially to assist with collapse.

We used laparoscopic equipment available in the hospital. Bipolar diathermy and ultrasonic dissectors were used to achieve haemostasis and dissection. Larger vessels like the azygous vein and the thymic vein were controlled with Titanium clips or intracorporeal ligation.

Specimens were retrieved as follows.

1. Small lymph nodes, sympathetic chain - via 10mm port.
2. Large lymph nodes, thymus - retrieved in a fashioned endobag, at times requiring a mini incision over the lateral chest wall.
3. Retrosternal goitre - through a neck incision
4. Oesophagus - through a neck incision or mini laparotomy .

Table 1: Patient position and procedure.

Supine position	Prone position
Thymectomy, Thyroidectomy for retrosternal goitre, Lung biopsies, Lymph node biopsy	Oesophagectomy, Thoracic sympathectomy, Splanchnicectomy

Table 2: Ventilator strategy.

Procedure	One Lung ventilation	Both Lung ventilation
Lymph node biopsy	-	1
Lymph node dissection(secondary lymph node deposits in medullary carcinoma)	2	-
Thymectomy	2	6
Thoracoscopy assisted excision of retrosternal goitre	-	2
Thoracic sympathectomy	-	8
Splanchnicectomy	-	6
Lung biopsy	2	12
Mobilization of thoracic esophagus in three stage oesophagectomy	10	5
Diagnostic thoracoscopy	1	1

Table 3: The procedures performed and operative details

Procedure	Number	Use of additional ports for Retractors	Mean Blood loss	Conversion to open Surgery	Intercostal drainage	Time range	Average time taken
Lymph node biopsy	10	Nil	Minimal	Nil	-	25 - 40min	30 min
Lymph node dissection (secondary lymph node deposits in medullary carcinoma)	2	Nil	150ml	Nil	-	3.5 - 4.5hr	4 hr
Thymectomy	8	One	150ml	Nil	Yes	3 - 4.5hrs	3.5 hr
Thoracoscopy assisted excision of retrosternal goitre	2	One	150ml	Nil	Yes	3 - 5.5hrs	4.5 hr
Thoracic sympathectomy	8	Nil	Minimal	Nil	-	25 - 40min	30 min
Splanchnicectomy	6	Nil	Minimal	Nil	-	50 - 80min	1 hr
Lung biopsy	14	Nil	Minimal	Nil	-	15 - 25min	20 min
Mobilization of thoracic oesophagus in three stage esophagectomy	15	Nil	100-150	Nil	Yes	1.5 - 3hrs	2 hr
Diagnostic thoracoscopy	2	Nil	Minimal	-	-	25 - 35min	30 min

Once the procedure was completed the lung was expanded under visual guidance of the camera using hand ventilation.

Results

A total of sixty seven operations were performed. Patients were positioned supine for anterior and

Table 4 - Post operative outcome

Procedure	ICU stay	Narcotic analgesics (hrs after op)	Mobilization out bed (hrs after op)	Feeding (hrs/days after op)	Morbidity	Mortality	Discharge from hospital Post op day
LN biopsy	nil	Nil	12 hrs	6 hrs	Nil	Nil	1-3
LN dissection	nil	Nil	24 hrs	6 hrs	Nil	Nil	3
Thymectomy	24 hrs	24 hours	24 hrs	6 hrs	Nil	Nil	5
Retrosternal goitre	1 pt for 24 hrs	24hours	24 hrs	6 hrs 1 pt 24 hrs	Rt phrenic nerve palsy(1 pt)	Nil	5
Thoracic sympathectomy	Nil	Nil	12 hrs	6 hrs	Nil	Nil	1-2
Splanchnicectomy	Nil	Nil	12 hrs	6 hrs	Nil	Nil	2
Lung biopsy	Nil	Nil	12 hrs	6 hrs	Nil	Nil	2
Mobilization of Thoracic esophagus	2 -5 days	48 -72 hours	48 -36 hrs	5 -7 days	Anastomotic leak- 1 Pneumonia 1	2	2
Diagnostic	Nil	Nil	24 hrs	6hrs	Nil	Nil	

superior mediastinal procedures and the prone position was used for posterior mediastinal procedures. These positions allowed the collapsed lung to fall away from the field of dissection.

Two diagnostic procedures were performed in planned oesophagectomy which were abandoned as the tumours were deemed non-resectable.

Discussion

Thoracoscopy reduces the trauma of access and has the

advantage of clear display of anatomy. Specific challenges were: obtaining space for dissection, dissecting technique, haemostasis and specimen retrieval.

Irrespective of the ventilator strategy of single or double lung ventilation, we found that working space obtained by lung collapse was adequate. Furthermore, a capnothorax of 6-8mmHg used for lung collapse was well tolerated. Bipolar diathermy and the ultrasonic dissector allowed meticulous haemostasis and dissection. Larger vessels were controlled with clips and intra-corporeal ligation. Average blood loss was about 100 - 150 ml in major procedures and was negligible in minor procedures, while we used intercostal drainage selectively. Specimen retrieval, although challenging, was not unusually difficult. The operating times were acceptable-a reduction in time was facilitated by avoiding the time taken to open and close the chest. Only operations which involved major dissection required intensive care. Post operative ventilation was needed only after oesophagectomy and after one retrosternal goitre procedure. Except in oesophagectomy and thymectomy, all other patients were managed with oral analgesics. Early feeding, mobilization and discharge was possible except after oesophagectomy. Post operative complications were minimal in contrast to respiratory and wound complications reported after open surgery [1,2,3,3,4,5].

Conclusions

A diversity of procedures were possible by thoracoscopy. Absence of a large incision reduced the time of procedure and resulted in less morbidity. Clear, magnified and zoomed views permitted a safe anatomical dissection in acceptable time, with resultant diminutive blood loss and less complications.

Conflict of interest statement

None declared

References

1. Findik G, Gezer S, Sirmali M, Turut H, Aydogdu K, Tastepe I, Karaoglanoglu N, Kaya S. Thoracotomies in children.Pediatr Surg Int. 2008 Jun;24(6):721-5.

2. Cohen M, Yaniv Y, Weiss J, Greif J, Gur E, Wertheym E, Shafir R. Median sternotomy wound complication: the effect of reconstruction on lung function. Ann Plast Surg. 1997 Jul;39(1):36-43.

3. Grmoljez PF, Barner HH, Willman VL, Kaiser GC. Major complications of median sternotomy. Am J Surg. 1975 Dec;130(6):679-81.

4. Yuen JC, Zhou AT, Serafin D, Georgiade GS. Long-term sequelae following median sternotomy wound infection and flap reconstruction. Ann Plast Surg. 1995 Dec;35(6):585-9.

5. Zacharias A, Habib RH. Factors predisposing to median sternotomy complications. Deep vs superficial infection. Chest. 1996 Nov;110(5):1173-8.

6. McKenna RJ Jr, Benditt JO, DeCamp M, Deschamps C, Kaiser L, Lee SM, Mohsenifar Z,Piantadosi S, Ramsey S, Reilly J, Utz J J. Safety and efficacy of median sternotomy versus video-assisted thoracic surgery for lung volume reduction surgery. Thorac Cardiovasc Surg. 2004 May;127(5):1350-60.

7. Mark T Jones, Hooper TL. Video assisted thoracic surgery in introduction to Minimal Access Surgery BMJ publishing group 1995;62-64

8. Cusheri Alfred, Steele RJC. Surgical craft and technology in Essential surgical practice 4th ed Arnold 1995;45

9. Dapri G, Himpens J, Cadière GB. Robot-assisted thoracoscopic esophagectomy with the patient in the prone position. J Laparoendosc Adv Surg Tech A. 2006 Jun;16(3):278-85.

10. Shibasaki H, Kinoshita T, Ogata A, Miyazaki M. Thoracoscopic esophagectomy in the prone position.

DestroHepatogastroenterology. 2012 Sep;59(118):1840-3

11. Rückert JC, Gellert K, Einhäupl K, Müller JM. Thoracoscopic thymectomy for treatment of myasthenia gravis. Zentralbl Chir. 1998;123(5):506-11.

Editorial note

This audit of thoracoscopic procedures reveals the variety of surgical operations that may be performed in the thoracic cavity using a minimally invasive approach.

While the effort from this very experienced team of surgeons is commendable, it may not be advised for all general surgeons without sufficient training, sans a multi-disciplinary team. Despite the availability of a specialist thoracic surgery unit in the country, the workload presented here makes a case for increasing the number of thoracic surgeons who undergo training.

Editor in chief

Announcement of Sri Lanka Journal of Surgery Case Reports issue in 2014

Each year the journal receives an overwhelming number of case report submissions which results in considerable delay in publication from the time of acceptance. To facilitate earlier publication of accepted case reports we are pleased to announce a new issue - Sri Lanka Journal of Surgery - Case Reports. This issue will be published annually in October commencing 2014.

Editorial Team