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The influence of patient positioning to obtain adequate space for dissection in Video assisted thoracoscopic surgeries (VATS)

Galketiya KB[1], MBBS, MS, FRCS(Edin), Pinto V[2], MBBS MD FRCA ,FCARCSI

[1]Consultant Surgeon
[2]Consultant Anaesthetist Teaching Hospital, Peradeniya, Sri Lanka

Abstract- In thoracoscopy, there is a requirement for provision of adequate space to identify the anatomy and instrumentation for dissection. To obtain space lung is collapsed and the collapsed lung has to be retracted away from the field of dissection. This could be done with retractors which will need additional ports and assistants. Some of the procedures are traditionally being done as lateral decubitus position. We have used supine or prone positioning for the lung to fall away from the surgical field. Supine position for anterior and superior mediastinal procedures and prone position for posterior medistinal procedures were used. The use of gravity to retract lung by positioning provided space, which is a major requirement for the success and safety of the surgery. There were no derangements observed in the physiological stability in supine or prone positions.

Therefore we may be permitted to conclude that the position used for thoracoscopic surgeries were satisfactory.

Index Terms- Thoracoscopy

I. INTRODUCTION

Diagnostic and therapeutic procedures performed by thoracotomy or median sternotomy cause a significant morbidity[1, 2, 3,4,5,6]. Over the last 20 years there was an emerging interest and development of thoracoscopic surgeries which has cart off the morbidity related to the open access surgeries[7,8,9,11] There is a requirement for provision of adequate space for instrumentation, identification of structures, dissection and resection. In thoracoscopy, space was obtained by total or partial collapse of one lung either by use of a double lumen endotracheal tube or by achieving a partial lung collapse following insufflation of CO_2 while ventilating both lungs using a standard endotracheal tube.

The collapsed lung has to be retracted away from the field of dissection. However as in open surgery multiple retractors cannot be used as it need additional ports and may lead to clashing of instruments. In minimal access surgery positioning is very important as it can be used to get organs fall away from the site[.9, 10,11,12,13]

We have used supine and prone positions during a variety of thoracoscopic procedures performed in our institution.

The efficacy of positioning to obtain space for dissection during thoracoscopic surgeries was studied.

II. PATIENTS AND METHODS

A retrospective analysis was made of thoracoscopic procedures done at the university surgical unit, Teaching Hospital Peradeniya, Sri Lanka. The position adapted, the ventilation details, pressure maintained during the capnothorax., location of the lesion, adequacy of space for dissection and the need for retractors were recorded. Adequate space for dissection is a key for successful completion of the procedure and as indices of this the blood loss, time of surgery and conversion to open surgery were noted.

III. RESULTS

The same anaesthetic and surgical team led the procedures. All the procedures were performed under general anaesthesia,. Lung collapse was obtained by single lung ventilation and capnothorax or double lung ventilation and capnothorax. The capnothorax used was 6-8mmHg.

The following procedures were performed with the patient in supine or prone position.

Table 1-procedures performed and position of the patient

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

Table 2 –Number of procedure and per-operative parameters.

Procedure	Number	Average Time	Mean blood loss	Conversions
1.Lymph node biopsy (LNB)	10	30 min	minimal	No
2.Lymph node dissection (LND)	2	4 hrs	150ml	No
3.Thymectomy (TYM)	8	3.5 hrs	150 ml	No
4.Retrosternal goiter (RSG)	2	4.5 hr	150ml	No
5.Thoracic sympathectomy (TS)	8	30 min	Minimal	No
6.Bilateral splanchnicectomy (SPL)	6	1 hr	minimal	No
7.Lung biopsy (LB)	14	20 min	minimal	No
8.Mobilization of thoracic esophagus in three stage esophagectomy (OSE)	15	2 hr	100-150	No

The patients respiratory and cardiovascular parameters were stable during surgeries. There were no per-operative complications or conversions to open surgery.

Table 3 : scale for the anatomical location and dissection of the pathology

Very Difficult	Difficult	Moderate	Easy	Very easy
1	2	3	4	5

Table 4-The location of the lesion and difficulty of dissection using above scale

Procedure	Location Of the lesion					Dissection of the lesion					Additional port for Retractors	*OLV/ DLV	
	1	**2**	**3**	**4**	**5**	**1**	**2**	**3**	**4**	**5**		**O**	**D**
LNB - (10)				10					4	6	nil		10
LND - (2)		2					2				nil	2	
TYM - (8)		1	7					8			in one	2	6
RSG - (2)			1	1				1	1		in one		2
TS - (8)				1	7					8	nil		8
SPL - (6)					6					6	nil		6
LB - (14)					14					14	nil	2	12
OSE- (15)			15					15			nil	10	5

*OLV – One Lung DLV- Both Lung ventilation

The difficulty of dissection is also reflected by the time taken and the blood loss. The space for dissection was not a predicament in any of the above surgeries. The collapsed lung stayed away from the field of dissection providing adequate room for visualization and dissection. Retractors were required only in two patients. In these two, retractor was to retract the large lesion, not the collapsed lung. Positioning provided satisfactory retraction of the collapsed lung in all patients.

The blood loss in major resections; oesophagectomy, thymectomy, thyroidectomy and lymph node block dissection ranged from 100-150ml while in all other surgeries there was no measurable blood loss.

There were no conversions.

IV. Discussion

Space for dissection is a mandatory requirement in both open and minimal access approaches. In open surgery it does not pose a problem with an adequate incision and the use of retractors. For space within the body additional retractors, packs and even hands of assistants are used.

Obtaining space in minimal access surgery is a challenge. In thoracoscopy space is created by collapsing the lung. Major VATS is usually performed under general anesthesia with one lung ventilation by using a double-lumen endotracheal tube or endobronchial blocker to collapse one lung. However in this series many surgeries were performed with a single-lumen endotracheal tube with both lung ventilation, a capnothorax being used to obtain lung collapse.

Once the lung is collapsed it has to be retracted away from the field of dissection. This may be achieved by the aid of gravity and use of retractors. Use of retractors will need additional ports, assistants and may hinder the dissecting instruments. Lung retraction in this study was gravity assisted by positioning. The procedures of the anterior and superior mediastinum; lymph node biopsy, thymectomy , thyroidectomy for retrosternal goiter, were performed with the patient supine. This allowed the lung to fall out posteriorly. The procedures of the posterior mediastinum ie ,oesophagectomy, sympathectomy and splanchnicectomy, were performed with the patient prone. This helped the lung to fall anteriorly. During lung biopsy position of the collapsed lung is of no importance. Therefore patient was placed supine. The anatomy was clearly displayed and there was space for instrumentation and safe completion of the procedure. These positions helped the lung to fall away from the field of dissection and provided space for surgery. Retractors were not required.

The procedures were completed in an acceptable time with minimal blood loss. There were no conversions to open surgery. .

V. Conclusion

Space for dissection in thoracoscopy is obtained by collapsing the lung. The collapsed lung can be kept away from the field of dissection by positioning the patient without using retractors. For procedures of the superior and anterior mediastinum supine position is useful. Prone position is useful for procedures of the posterior mediastinum,

Authors Contribution

Both Dr K.B Galketiya and Dr V.Pinto contributed to the creation of the concept and design of the article, drafting the manuscript and revising it critically for important intellectual content.

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Authors

First Author – Galketiya KB, MBBS, MS, FRCS(Edin), Consultant Surgeon, Teaching Hospital, Peradeniya, Sri Lanka
Second Author – Pinto V, MBBS MD FRCA ,FCARCSI, Consultant Anaesthetist Teaching Hospital, Peradeniya, Sri Lanka

Correspondence Author – Dr. K. B. Galketiya, Senior Lecturer, Department of Surgery, Faculty of Medicine, Peradeniya. Sri

Lanka, Fax no; 0094812388371, Telephone: +94 777 884008,
Email: kbgalketiya@yahoo.com