RUHUNA JOURNAL OF SCIENCE
Vol. 5: 1-6, 2014
http://rjs.ruh.ac.lk/
ISSN: 1800-279X

A new approach for thoracoscopic posterior mediastinal procedures

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Received: 23 July 2014, Revised version accepted: 25 November 2014

Abstract. The morbidity of thoracotomy is reduced by thoracoscopy. The space for dissection is obtained by collapsing the lung. During posterior mediastinal procedures the patient is positioned prone. This allows the collapsed lung to fall away from the field of dissection. In face of conversion to lateral thoracotomy re-positioning will take time, which may be dangerous like in a severe bleeding. An alternative is to place the patient semi prone and get in to a near prone position by tilting the table. Quick return to lateral position can be achieved by tilting the table in reverse direction. Upper thoracic sympathectomy and mobilization of thoracic oesophagus were done in the adopted prone position. Bilateral splanchnicectomy was performed in the prone position. In both situations, there was adequate space for instrumentation and dissection. Retractors were not required. All the procedures were completed safely with minimal blood loss and an acceptable time. There were no conversions. Therefore, the advantages of prone position to provide space for dissection in posterior mediastinal thoracoscopic surgeries were obtained by the adopted semi prone position.

Keywords. Mediastinal, positioning, thoracoscopy

1 Introduction

Surgical procedures performed by thoracotomy causes a significant morbidity. The post-operative pain may cause problems for breathing. Therefore the need for ventilatory support and the risk of respiratory tract infections is higher. The hospital stay will be prolonged with delayed return for work (Findik *et al*. 2008).

Thoracoscopy (Figure 1) takes away the morbidity related to the open access incision (Jones and Hooper 1995; Cuschieri and Steel 1995; Kwong *et al*. 2005; Tomaszewski *et al*. 2007; Shibasaki *et al.* 2012). It is necessary to create space for surgery at the beginning of the procedure. Space is required to identify the anatomy and for instrumentation for dissection. In thoracoscopy, space is obtained by collapsing the lung, which has to be retracted away from the field of dissection. In minimal access surgery gravity is used to get organs fall away from the site. This reduces the need of retractors. Use of retractors will need additional ports, assistants and may hinder dissecting instruments. By positioning the patient, collapsed lung can be allowed to retract away from the field of dissection. For surgeries of the posterior mediastinum, patient is placed prone (Dapri *et al.* 2006; Tomaszewski *et al.* 2007; Shibasaki *et al*. 2012), and this allows the lung to fall anteriorly (Figure 2).

Fig 1. Images of open thoracotomy (left), and thoracoscopic surgery through mini-incisions (center & right).

However prone positioning has problems. Positioning the patient in prone takes time and may hinder abdominal breathing if not placed properly with many complications documented in literature (Edgcombe *et al.* 2008). In case of emergency like displaced endotracheal tube or for conversion to thoracotomy, the position needs changing. Time taken to change position may be dangerous, for instance in face of a catastrophic bleeding. Therefore, we evaluated semi prone position with regards to space for dissection.

2 Methods

The surgeries included in the study were bilateral splanchnicectomy, thoracic sympathectomy and oesophagectomy. Splanchnicectomy was performed for disabling pain of chronic pancreatitis. Thoracic sympathectomy was

performed for digital ischaemia or hyperhydrosis. Oesophagectomy was for carcinoma of oesophagus as the thoracic part of a three stage procedure. All were performed under general anaesthesia and endotracheal intubation. The patients undergoing esophagectomy and thoracic sympathectomy were placed in semiprone position. The patients were positioned in a mid way of prone and lateral (Figure 3). During surgery, a near prone position was adopted by tilting the table. Getting back to lateral position for conversion to thoracotomy can be simply obtained by tilting the table, while changing to supine position too can be done without delay (Figure 3).

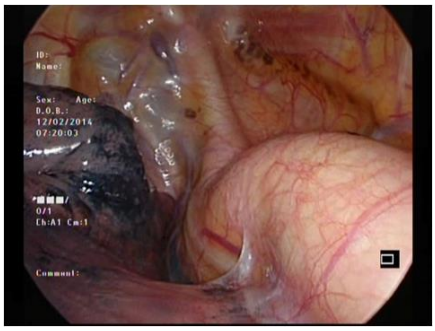

Fig 2. Collapsed lung falling away from posterior mediastinum by use of prone position.

However, all thoracoscopic splanchnicectomies were performed in the standard full prone position (Figure 3); the reason to use the standard prone position is because splanchnic nerve ablation has to be performed on both sides. In a bilateral procedure re-positioning, cleaning and draping is required if semi-prone position is used, as explained next. This will increase the operating time and has a risk of dislodgement of the endotracheal tube.

The ipsilateral lung was collapsed to obtain space for dissection. In some patients, the lung collapse was obtained with single lung ventilation. In others, both lungs were ventilated while lung collapse was by a capnothorax of 6-8mmHg. The respiratory and cardiovascular parameters were monitored. The space for dissection was evaluated. Adequate space should provide a clear display of anatomy. There should be space for instrumentation and dissection. The need for retractors was also noted. Adequate space is essential for safe completion of the procedure. As measures of successful completion, time taken, blood loss, complications and need for conversion were recorded.

Fig 3. Images of patient placed semi-prone (left), near prone (center) and full prone positions (right) for thoracotomy.

3 Results and discussion

A total number of 30 procedures were performed. The position adapted is given with time duration, blood loss, use of retractors, and adequacy of space for visualization and dissection and conversions (Table 1).

Table 1. Summary of the procedures and related information.

procedure	position	number of patients	average duration (min)	average blood loss (ml)	use of retractors	adequacy of space	conversions
Oesophagectomy	Semi prone	15	150	100	Nil	Good	Nil
Thoracic sympathectomy	Semi prone	8	30	NM	Nil	Good	Nil
Bilateral splanchnicectomy	Prone	7	60	NM	Nil	Good	Nil

NM = not measurable

Space for dissection is essential to perform any surgery. In surgeries in the posterior mediastinum, the space was obtained by collapsing the lung and positioning the patient prone. Prone position allows the collapsed lung to be retracted away from the field of dissection with the help of gravity (Dapri *et. al*. 2006, Tomaszewski *et al*. 2007, Shibasaki *et al*. 2012).

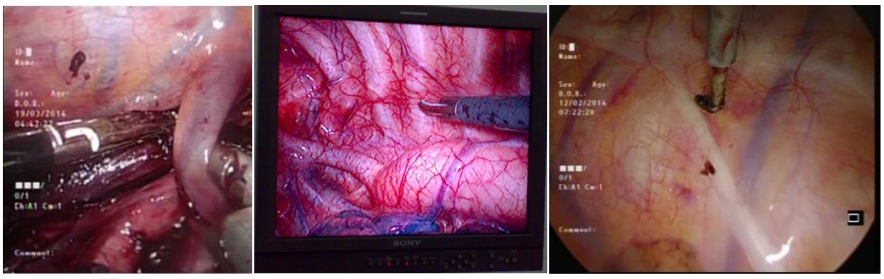

Fig 4. Thoracoscopic oesophagectomy (left), thoracoscopic sympathectomy (center) and thoracoscopic splanchnicectomy (right) demonstrate the adequacy of space.

Positioning the patient in prone takes more time and may hinder abdominal breathing, if not placed properly with many other complications (Edgcombe *et al.* 2008). In case of emergency like displaced endotracheal tube or for conversion to thoracotomy, the position needs changing. Time taken to change position may be dangerous, for instance in face of a catastrophic bleeding.

Therefore, we evaluated a new position, an adopted prone position during oesophagectomy and thoracic sympathectomy. The patient was kept in between lateral and prone position. With a table tilt a near prone position was achieved during the procedure. In face of conversion to thoracotomy lateral position can be adopted simply by tilting the table.

Thoracoscopic splanchnicectomies were performed in the prone position as it's a bilateral procedure. Even though a different procedure, a comparative visual assessment of the space provided was possible. Furthermore, in sympathectomy and splanchnicectomy, the anatomical structure dealt is the same, the thoracic sympathetic chain.

Both prone and semi prone positions provided adequate space for identification of anatomy, instrumentation and dissection. Retractors were not used as there was adequate lung retraction by gravity facilitated by the positions used. There were no conversions with minimal blood loss and all procedures were completed safely, for which an adequate space is essential.

4 Conclusion

The advantages of prone position to provide space for dissection in posterior mediastinal thoracoscopic surgeries were provided by the adopted semi prone position. Placing the patient semi prone is easier than placing them prone. In case of emergency conversion to lateral thoracotomy, changing the position will be easy with the semi prone position.

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