

Comparison Dissecting Techniques in Thoracoscopic Surgeries

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Abstract- The morbidity of thoracotomy or median sternotomy can be minimized by thoracoscopy whilst providing a clear vision for a precise dissection. One of the challenges of the new learning curve set is tissue dissection and haemostasis specially in complex procedures.

The methods available are blunt, scissor, diathermy and ultra-sonic dissections. Blunt cannot be used in complex procedures. Out of the energy sources ultrasonic dissector is more effective as it provides haemostasis and dissection but is more costly. Selective usage of ultra-sonic dissector will allow re-using the ultra-sonic dissector probes, done in developing countries to reduce cost. We have evaluated the use of energy sources in a combined and selective manner to increase the efficacy and to reduce cost in seventy seven patients undergoing a wide range of procedures. The duration of surgery, blood loss and successful completion without conversions were assessed. In minor ablative procedures (sympathectomy and splanchnicectomy) monopolar diathermy was the preferred technique of dissection.

In complex dissections (oesophagectomy, retrosternal goiter, thymectomy and lymph node dissection) ultra-sonic dissector with bipolar assist was preferred as it allowed quicker dissection. Using bipolar as a haemostatic adjunct allows better haemostasis and more cost effective as it increases the usage time of the ultra-sonic dissector.

In lung biopsy ultrasonic dissector provided adequate tissue sealing to prevent gas leaks.

Index Terms Cost, Dissecting techniques, Thoracoscopy, Ultra-sonic dissector

I. INTRODUCTION

Diagnostic and therapeutic procedures of the thorax are done via thoracotomy or median sternotomy. The trauma of access causes a significant morbidity. In thoracotomy there is division of muscles and in some cases excision of part of rib. Sternotomy involves splitting the sternum. Subsequently strong retraction is necessary. Opening and closing takes time. The post-operative pain is significant and will affect breathing. This will lead to prolonged ventilatory support, hence an extended intensive or high dependency care. Due to poor respiratory effort and coughing chances of respiratory infections is higher.¹ There is a risk of wound infections. Wound dehiscence specially in sternotomy may have disastrous outcome.^{2,3,4,6} The hospital stay will be prolonged with delay to report for work.⁵ The morbidity of open access will be taken away by minimal access surgery; thoracoscopy.^{7,8,9,10,11} An added advantage will be a clear display of anatomy. The image is magnified and it is possible to get a closer view of the anatomy by zooming in. However it involves a new learning curve. Lack of tactile sensation and difficulties of hand eye coordination will be challenges. Obtaining space for dissection and methods of dissection haemostasis should be worked out.^{9,10,11,20} Specimen retrieval should be planned. Initial cost of equipment poses problems to the institute.

One of the challenges which is tissue dissection and haemostasis was evaluated in this study.

The methods available are blunt, scissor, diathermy and ultra-sonic dissections^{12-19,21}. Blunt dissection with a dissector or suction tube is possible for limited dissections and cannot be used in complex procedures. Scissor will allow a precise dissection but has to be

combined with a haemostatic adjunct, best being bipolar diathermy^{16,21}. Monopolar diathermy provides a precise dissection but is less haemostatic^{17,21}. Compared to these methods ultrasonic dissector is more effective as it provides haemostasis and dissection but is more costly^{13,14,15,18,19,21}. Bipolar diathermy can be used for additional haemostasis along with the ultra-sonic dissector^{14,21}. Using bipolar diathermy along with ultra-sonic dissector may allow better haemostasis and longer usage of ultrasonic dissector probes²¹. Reusing the ultra-sonic dissector probes, done in developing countries is cost-effective as the probes are expensive²¹.

Table 1 - Comparison of the techniques of dissection and the cost²¹.

Technique	Quality of dissection	Haemostasis	Cost of instrument
Blunt	Limited	Nil	Low
Scissor	Precise and quick	Nil	120,000 LKR
Monopolar diathermy	Precise and quick	Minimal	50,000 LKR
Ultrasonic dissector	Precise and intermediate	Provides ; depend on vessel size	490,000 LKR

The cost shown for monopolar diathermy and ultrasonic dissector are those for the working instrument only, which has a wear and tear, specially for more costly ultrasonic probes. The diathermy machine and the ultrasonic dissector machines cost about 3 million LKR but are long durable.

An evaluation was done of the efficacy of ultra-sonic dissector for tissue dissection in comparison with scissor and monopolar diathermy. This evaluation is important as selective use of ultra-sonic dissector is more cost effective.

II.PATIENTS AND METHODS

An analysis was done on the usage of ultra-sonic dissector comparing that of scissor and monopolar diathermy in a wide range of procedures. The time of dissection and blood loss were evaluated. The procedures performed were oesophagectomy, thoracic lymph node biopsy, thymectomy, resection of retrosternal goiter, thoracic sympathectomy, splanchnicectomy and lung biopsy.

III.RESULTS

A total number of seventy seven patients underwent thoracoscopic procedures (Table 2)

Table 2-Procedure and number of patients

Procedure	Number of patients
oesophagectomy	20
Lymph node biopsy	09
Thymectomy	10
Retrosternal goitre	03
Thoracic sympathectomy	10
splachnicectomy	14
Lung biopsy	11

Table 3- Dissecting techniques, duration, blood loss in oesophagectomy, Lymph node biopsy, Thymectomy and retrosternal goiter.

Procedure	Patient number /Bipolar and scissor / Average time / Average blood loss	Patient number/ Ultrasonic dissector and bipolar / Average time / Average blood loss
oesophagectomy	6 patients 180 min 110 ml	14 patients 120 min 100 ml
Lymph node biopsy	4 patients 90 min insignificant	5 patients 50 min Insignificant
Thymectomy		10 patients 150 min 100 ml
Retrosternal goiter		3 patients 180 min 90 ml

Table 4 - Dissecting techniques, duration, blood loss in sympathectomy, splanchnicectomy and lung biopsy

Procedure	Number of patients equipment / Dissecting / Average time /	Number of patients / Dissecting equipment /

	Average blood loss	Average time / Average blood loss
Thoracic sympathectomy	2 patients Ultrasonic dissector and monopolar diathermy 50 min Blood loss- not measurable	8 patients Monopolar diathermy 45 min Blood loss- not measurable
Splanchnicectomy (bilateral)		14 patients Monopolar diathermy 25 min/ per side Blood loss- not measurable
Lung biopsy	11 patients Ultrasonic dissector and scissor 10 min Blood loss- not measurable	

IV.DISCUSSION

Prior to availability of ultra-sonic dissector, bipolar diathermy and scissor were used to dissect in oesophagectomy and lymph node biopsy, which were the initial thoracoscopic procedure done in our unit. Once ultrasonic dissector was available the dissections were performed using this and bipolar diathermy. The time of dissection was less for ultra-sonic dissector and bipolar compared to bipolar and scissor with comparable blood loss. Using ultra-sonic dissector with bipolar diathermy to assist haemostasis allows better haemostasis and reduces the usage time of ultra-sonic dissector which is cost-effective.

With this observation thymectomy and retro-sternal goiter were performed using ultra-sonic dissector with bipolar assistance. For larger veins; azygous and thymic clips were used.

Sympathectomy and splanchnicectomy involves opening of mediastinal pleura and ablation of nerve trunks. The initial ablative procedure done in our unit was sympathectomy which was done using ultrasonic dissector and monopolar diathermy. As this

procedure doesn't involve dissecting any vascular tissues after the first two patients all sympathectomies and splanchnicectomies were done with monopolar diathermy which can also be done quicker than ultra-sonic dissector.

In lung biopsy a small sample of lung tissue is obtained from the surface of lung. This was done using ultrasonic dissector to seal off lung parenchyma and then divide with scissor. The sealing with ultra-sonic dissector was adequate to prevent gas leaks.

V. CONCLUSION

In minor ablative procedures (sympathectomy and splanchnicectomy) monopolar diathermy was the preferred technique of dissection.

In complex dissections(oesophagectomy, retrosternal goiter, thymectomy and lymph node dissection) ultra-sonic dissector with bipolar assist was preferred as it allowed quicker dissection. Using bipolar as a haemostatic adjunct allows better haemostasis and more cost effective as it increases the usage time of th ultra-sonic dissector

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