

Original Research Article

# Comparison of Ultra-Sonic Dissector with Scissor and Monopolar Diathermy in Complex Laparoscopic Surgeries for Tissue Dissection and Hemostasis

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## Abstract

**Background:** A wide variety of intra-abdominal procedures are performed by laparoscopy with reduced morbidity than open procedures. Dissection and hemostasis specially in complex surgeries is

a challenge. The methods available are blunt, scissor, diathermy and ultra-sonic dissections whilst bipolar diathermy can be used to assist hemostasis.

**Aim:** An evaluation was done of the efficacy of ultra-sonic dissector for tissue dissection in comparison with scissor and monopolar diathermy.

**Material and methods:** An analysis was done on the usage of ultra-sonic dissector comparative to scissor and monopolar diathermy. The time of dissection and blood loss were evaluated. The procedures performed were oesophagectomy, Hellers cardomyotomy, Nissen fundoplication, splenectomy, cholecystectomy, distal pancreatectomy, laparoscopy assisted pancreaticoduodenectomy, adrenalectomy, right hemicolectomy, anterior resection and abdomino-perineal resection.

**Observation:** Hundred and ninety five patients underwent cholecystectomy and preferred technique of dissection was monopolar diathermy hook assisted with Merrylands dissector. In hundred and fourteen patients who underwent complex abdominal surgeries dissection on planes which are vascular ultrasonic dissector with bipolar assistance was quicker than bipolar and scissor, whilst providing good hemostasis.

**Conclusion:** Using ultra-sonic dissector with bipolar assist was preferred to use of ultra-sonic dissector alone. The hybrid approach provides better hemostasis whilst reducing the usage time of ultra-sonic dissector allowing longer usage of probes. On less vascular planes monopolar diathermy is adequate. Selective use of ultrasonic dissector will reduce cost of surgery.

## Key words

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Laparoscopy, Dissecting technique, Ultrasonic Dissector, Bipolar Diathermy, Monopolar hook.

## Introduction

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A wide variety of intra-abdominal procedures are performed by laparoscopy with reduced morbidity than open procedures. During laparotomy, strong retraction of the abdominal wall is required. Once opened, internal organs may need handling and/ or retraction. The closure of the abdominal wall will add to tissue trauma. By laparoscopic approach, the post operative pain due to the exposure involving incision of skin and abdominal wall is minimized. Wound infection, bleeding/hematoma of wound and late complications like incisional hernia and chronic pain are less. With reduction of pain breathing will be less disturbed, specially in upper abdominal surgeries. This leads to reduced post operative respiratory complications. With less pain early mobilization is possible which also help to reduce incidence of chest infections and deep vein thrombosis. With reduced morbidity early discharge from hospital is possible [1-9].

There are other benefits. There is less exposure of body cavities to exterior, less handling of other viscera, lack of strong retraction, clear vision of anatomy due to magnification allowing precise dissection and less post operative ileus. However a new learning curve was set for the surgeon. There is lack of tactile sensation, difficulties of hand-eye co-ordination, difficulties of dissection and hemostasis specially in complex surgeries. The method of retrieval of specimen also needs to be planned.

One of the challenges which is tissue dissection and hemostasis was evaluated in this study. The methods available are blunt, scissor, diathermy and ultra-sonic dissections [10-17]. 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 [14]. Monopolar diathermy provides a precise dissection but is less haemostatic [15]. Compared to these methods ultrasonic dissector

is more effective as it provides hemostasis and dissection but is more costly [11-13, 16, 17]. Bipolar diathermy can be used for additional hemostasis along with the ultra-sonic dissector [14]. Using bipolar diathermy along with ultra-sonic dissector may allow better hemostasis and also may allow longer usage of ultrasonic dissector. As ultra-sonic dissector probes are expensive in developing countries they are re-used. Being allowed re-use more sessions is cost-effective.

An evaluation was done of the efficacy of ultra-sonic dissector for tissue dissection in comparison with scissor and monopolar diathermy.

### Material and methods

An analysis was done on the usage of ultra-sonic dissector comparative to scissor and monopolar diathermy. The time of dissection and blood loss were evaluated. The procedures performed were oesophagectomy, Hellers cardomyotomy, Nissen fundoplication, splenectomy, cholecystectomy, distal pancreatectomy, laparoscopy assisted pancreatico-duodenectomy, adrenalectomy, right hemicolectomy, anterior resection and abdomino-perineal resection.

### Results

A total of 309 procedures performed were evaluated as per **Table – 1**. Details of Cholecystectomy were as per **Table – 2**. Complex procedures were as per **Table – 3**. Mobilization of rectum was as per **Table – 4**. Details of Liver Resection were as per **Table – 5**.

### Discussion

The methods of dissection used in different surgeries are discussed below.

#### Cholecystectomy (Table - 2)

Callots triangle dissection requires sharp and precise penetration of peritoneal covering best done with diathermy hook and ultrasonic dissector was not used. Once peritoneal

coverings are dissected to isolate the cystic duct and artery dissecting with the tip of Merryland dissector was used. In two patients with inflamed gall bladder blunt/ hydro dissection with suction-irrigation probe was used.

**Table – 1:** List of procedure done.

Procedure	Number of patients
Gastric mobilization	22
Cardiomyotomy	4
Fundoplication	8
Cysto-gastrostomy	2
Splenectomy	24
Pancreatico-duodenectomy	20
Distal pancreatectomy	2
Choledochal cyst excision	3
Liver resection	5
Colorectal resections	24
Cholecystectomy	195
Total	309

Dissecting gall bladder off the liver bed was comparable with diathermy hook and ultra-sonic dissector in time with no measurable blood loss. However with the tip of hook of diathermy identification of proper plane was subjectively felt easier than ultra-sonic dissector. Therefore except for 5 patients done for purpose of comparison later in series all were done with monopolar diathermy hook.

#### Upper and lower gastro-intestinal resections (Table - 3, 4, 5)

Ultra-sonic dissector with bipolar assist was quicker than bipolar and scissor for division of peritoneal folds which are more vascular such as hiatal dissection of stomach, gastro-colic/ gastro-splenic ligament, dissecting portal vein and medial mobilization of left or right colon. In both situations there was no measurable blood loss. Using bipolar as an adjunct for hemostasis with ultra-sonic dissector was preferred to use of ultra-sonic dissector alone. Bipolar assist allows better hemostasis and less use of ultrasonic dissector.

**Table – 2:** Details of Cholecystectomy.

	<b>Monopolar diathermy hook assisted by Merryland dissector</b>	<b>Ultra-sonic dissector</b>
Dissection of Gall bladder of Liver bed	190 patients Average time-8 min Average blood loss-insignificant	5 patients Average time-10 min Average blood loss-insignificant
Dissection of Callot's triangle	195 patients Average time-20 min Average blood loss-insignificant	Not used

**Table – 3:** Complex Procedures.

	<b>Bipolar and scissor</b>	<b>Monopolar</b>	<b>Bipolar and ultrasonic dissector</b>	<b>Ultrasonic dissector</b>
Vascular peritoneal folds e.g.-gastro-colic ligament	Average time-60 min Average blood loss <100 ml 10 patients		Average time-40 min Average blood loss <50 ml 42 patients	Average time-50 min Average blood loss <50 ml 4 patients
Lateral peritoneal mobilization of right and left colon	average time-30min Average blood loss <50 ml 4 patients	Average time-20min Average blood loss <50 ml 18 patients		Average time-25 min Average blood loss <50 ml 2 patients

**Table – 4:** Mobilization of rectum.

	<b>Ultrasonic dissector and bipolar</b>	<b>Bipolar, scissor and monopolar</b>
Mobilization of rectum	15 patients Average time-60 min Average blood loss-50ml	3 patients Average time-75 min Average blood loss-100 ml

**Table – 5:** Liver Resection (5 patients).

<b>Dissection of hepatic arteries/ portal vein and bile ducts</b>	<b>Bipolar diathermy, scissor and ultrasonic dissector</b>
Division of liver	Bipolar diathermy and ultra-sonic dissector

Less vascular peritoneal mobilizations such as lateral mobilization of colon along para-colic gutters, pre-sacral mobilization of rectum, were done with monopolar diathermy in a shorter time than ultra-sonic dissector with no difference in blood loss.

In dissection of liver vasculature and bile ducts during liver resections bipolar to obtain hemostasis and for sharp dissection scissor assisted with ultra-sonic dissector. Once vessels are isolated, ligated and divided division of the liver was done with bipolar and ultra-sonic dissector.

In all the main vascular pedicles were dealt with clips or suture ligation. We don't routinely use vascular staplers as they are costly.

## Conclusion

For cholecystectomy monopolar diathermy hook assisted with Merrylands dissector was the preferred technique of dissection. In complex abdominal surgeries dissection on planes which are vascular ultrasonic dissector with bipolar assistance is quicker than bipolar and scissor whilst providing good hemostasis. Using ultra-sonic dissector with bipolar assist was preferred to use of ultra-sonic dissector alone. The hybrid approach provides better hemostasis whilst reducing the usage time of ultra-sonic dissector allowing longer usage of probes. On less vascular planes monopolar diathermy is adequate. Selective use of ultrasonic dissector will reduce cost of surgery.

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