

Novel Approaches to Eliminate the Use of Additional Trocars to Introduce a Flexible Carbon Dioxide Laser Fiber for Laparoscopic and Robotic-Assisted Excision of Endometriosis

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Objective

This evaluation study assessed the use of four different novel approaches for introducing a flexible carbon dioxide (CO₂) laser fiber for laparoscopic and robotic-assisted surgery to treat endometriosis without using an additional 5mm trocar through a separate incision.

Introduction

Flexible carbon dioxide laser fiber allows for easy access to difficult-to-reach anatomy and provides delicate treatment options.

In order to obtain flexibility and maneuverability necessary to treat difficult-to-reach anatomy successfully, the laser fiber is placed within a variety of handpieces for laparoscopic surgery and within a drop-in guide for robotic surgery. The handpieces and drop-in guide require the use of an additional 5mm trocar for access into the body.

The advantages of laser surgery, which includes optimal tissue ablation, coagulation, incision, and excision with minimal thermal necrosis compared with other energy based devices^{1,2,3,4}, may be offset by needing to use an additional 5mm trocar leading to another visible scar and loss of pneumoperitoneum.

Materials and Methods

A total of twenty patients undergoing laparoscopic (n=10) and robotic*-assisted surgery (n=10) for endometriosis using carbon dioxide laser through a flexible fiber (Lumenis® AcuPulse laser system and FiberLase™ fiber) were studied.

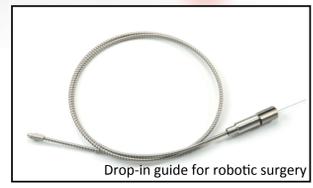
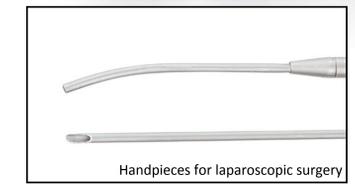
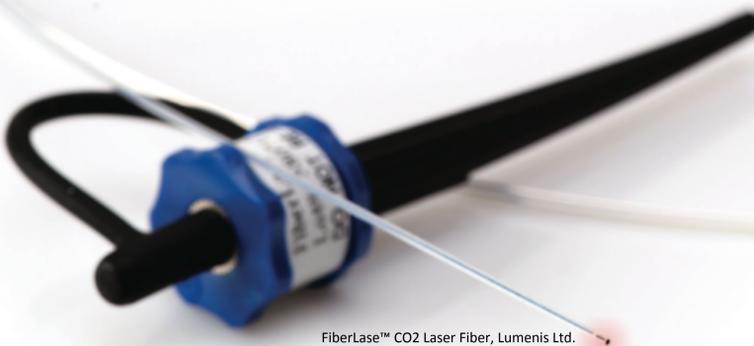
For laparoscopic excision of endometriosis, we evaluated the use of a 12ga BD Angiocath™ I.V. Catheter (OD 2.8mm) and the Medtronic VersaStep™ Radially Expandable Sleeve (OD 3mm).

For robotic-assisted excision of endometriosis we evaluated the use of the Applied Medical GelPOINT® Mini housing a 12mm trocar with a 10mm scope and a trocar for the drop-in guide, and a 12mm trocar with an 8mm scope with the drop-in guide placed alongside the scope.

We assessed ease of placement of the handpieces and drop-in guide, maintenance of pneumoperitoneum, use of the flexible CO₂ fiber to excise endometriosis, complications, and overall cosmesis.

We compared our observations with our prior experience using a 5mm trocar.

* da Vinci® Si Surgical System, Intuitive Surgical, Inc.



Results

Estimated blood loss, operative time, and length of hospital stay were comparable with all four approaches.

APPROACH	MEAN BLOOD LOSS	MEAN OPERATIVE TIME	MEAN LENGTH OF STAY
12ga BD Angiocath™ I.V. Catheter	50cc (10-100cc)	60min (30-90min)	0 day
Medtronic VersaStep™ Radially Expandable Sleeve	50cc (10-100cc)	60min (45-90min)	0 day
Applied Medical GelPOINT® Mini Advanced Access Platform	70cc (20-150cc)	90min (60-120min)	0 day
12mm Trocar with an 8mm Viewing Scope	60cc (50-150cc)	90min (60-110min)	0 day

All visible endometriosis was excised safely from a variety of areas in the pelvis. When indicated, there was also optimal tissue ablation, coagulation and incision. There were no complications or adverse events.

All access devices were easy to use and accommodated the handpieces and drop-in guide very well. There was no loss of pneumoperitoneum with the sleeve and the 12ga I.V. catheter, as may occur with a 5mm trocar. There was minimal loss of pneumoperitoneum with the GelPOINT® Mini housing a trocar for the drop-in guide, and a 12mm trocar with an 8mm scope with the drop-in guide placed alongside the scope.

We found placing the drop-in guide alongside the viewing scope during robotic-assisted surgery or through the GelPOINT® Mini made using the flexible CO₂ laser fiber easier than when placing the guide through a lateral 5mm trocar or other larger "assistant's port."

The very small access devices (VersaStep™ Sleeve and 12ga Angiocath™) used during laparoscopic surgery made a mark that was hardly noticeable. Similarly, use of the GelPOINT® Mini in the umbilicus during robotic surgery resulted in a barely visible incision.



Small entry point in skin from 12ga Angiocath™ used during laparoscopic surgery.



Unnoticeable 15mm incision in umbilicus from GelPOINT® Mini used during robotic-assisted surgery.

Conclusions

Laparoscopic and robotic-assisted excision of endometriosis with a flexible CO₂ laser fiber is safe and effective.

Handpieces and robotic drop-in guide containing the flexible CO₂ laser fiber can be placed in a patient without using an additional 5mm trocar and without sacrificing operative ergonomics while maintaining excellent safety, efficacy, and cosmesis.

Each approach is simple to execute and does not cause additional burden to the surgeon or support staff.



Flexible CO₂ laser fiber used through laparoscopic handpiece to excise endometriosis

#Laparoscopic and robotic-assisted excision, #Flexible carbon dioxide (CO₂) laser fiber, #Endometriosis

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