

Modified Open Laparoscopy Using a 5-mm Laparoscope

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BACKGROUND: In an effort to minimize injuries associated with closed laparoscopic entry, many surgeons use a 10-mm standard open laparoscopy technique. Disadvantages of this open technique are that it requires a larger incision, fascial sutures, and does not always achieve an airtight seal. Although 5-mm laparoscopies with excellent optics are available, little has been written about open techniques using them.

TECHNIQUE: We report a modified 5-mm open laparoscopy technique without fascial sutures. The fascia is elevated with small Kocher forceps and incised in the midline. The peritoneum is bluntly perforated with a hemostat-directed cephalad, and a blunt trocar with a sleeve is inserted in this direction. After rotating the sleeve toward the pelvis, a 5-mm laparoscope is placed into the abdomen before insufflation.

EXPERIENCE: We have performed approximately 350 laparoscopies with only one major complication of a perforated transverse colon densely adherent beneath the umbilicus in a woman without previous abdominal surgery. Minor carbon dioxide leakage was uncommon and no wound infections or hernias occurred.

CONCLUSION: This 5-mm modified open laparoscopic entry technique minimizes some of the disadvantages associated with conventional open and closed 10-mm laparoscopic techniques while avoiding blind placement of sharp instruments into the peritoneal cavity.

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More than half of laparoscopic complications occur during entry, with an estimated risk for major vessel injury of 0.03–0.1% and for abdominal viscera of 0.08–0.14%.¹ Surprisingly few changes have been made in entry techniques since the earliest days of laparoscopy.

In an effort to minimize the injury risk during laparoscopic entry, Hasson² introduced an open laparoscopy technique in 1971. For this technique, the fascia is incised sharply, the peritoneum entered bluntly, and a 10-mm blunt trocar with a sleeve is introduced. A recent Cochrane review concluded that the open-entry technique is associated with a reduction in failed entry when compared with a closed-entry technique but that there is insufficient evidence to detect a difference in the incidence of visceral or vascular injury.³ Despite this, the open technique is commonly used by the majority of general surgeons, in part because very few vascular injuries have been reported using this technique.^{4,5}

Disadvantages of standard open compared with closed-entry techniques include requirement for a larger skin incision and fascial sutures, an airtight seal is not always achieved, and increased postoperative discomfort.⁵ For these reasons, and because complications are uncommon with either open or closed entry, most gynecologists continue to use a closed technique.¹

Recent technical improvements have made excellent visualization possible with 5-mm laparoscopes. However, little has been written about open laparoscopy techniques for these smaller diameter laparoscopes. We report a modified open laparoscopy technique using a 5-mm laparoscope. It maintains the advantage of the standard 10-mm open technique of avoiding blind placement of sharp instruments through the abdominal wall while utilizing a smaller skin and fascial incisions without the need for fascial sutures.

TECHNIQUE

The abdomen is prepared and draped with the patient in the dorsal lithotomy position. The umbilical skin



fold is grasped and elevated with Allis forceps, and an 8-mm full-thickness vertical or horizontal infraumbilical skin incision is made with a scalpel (Fig. 1, Video 1, available online at <http://links.lww.com/AOG/A787>). A 10-mm skin incision is used in obese women, because the fascia is often greater than 4 cm below skin level.⁶ The skin edges are grasped with Allis clamps, and the subcutaneous tissue is bluntly dissected to the fascia with a “curved hemostat,” eg, Crile artery forcep.

The fascia is grasped bilaterally with two small (14-cm) Kocher forceps with the tips separated by 5 mm. The fascia is elevated and a 2- to 3-mm vertical incision is made with a #11 scalpel (Fig. 2). The curved hemostat is then inserted through the fascia at a 45° angle cephalad to bluntly perforate the peritoneum (Fig. 3). The hemostat is withdrawn 50% and partially opened to widen the incision to 4–5 mm in width.

A 5-mm blunt-tipped trocar with a sleeve (available from multiple manufacturers) is placed through the facial incision 3–4 cm into peritoneal cavity at the same 45° angle cephalad (Fig. 4). The trocar is rotated 180° in a lateral arc until directed toward the pelvis (Fig. 5). The trocar is removed and a 5-mm laparoscope is placed into the peritoneal cavity. After confirmation of intraperitoneal placement, the peritoneal cavity is insufflated. Local anesthetic is injected into the incision after entry to avoid distorting tissue planes.

At the end of the procedure, the 5-mm laparoscope and sleeve are removed from the peritoneal cavity. The fascial defect is not closed with sutures, because it has been demonstrated that fascial incisions

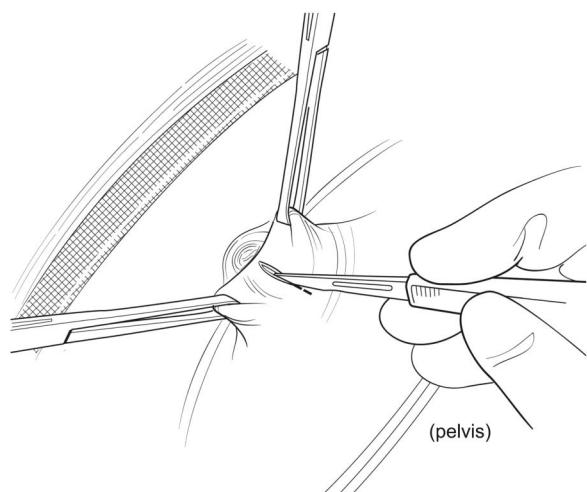


Fig. 1. An 8-mm infraumbilical skin incision is made with a scalpel while elevating the skin with Allis forceps. Illustration: Sharon Teal.

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Video 1. Demonstration of a 5-mm modified open laparoscopic entry technique that minimizes some of the disadvantages of conventional 10-mm open techniques while avoiding blind placement of sharp instruments. Video courtesy of William W. Hurd, MD. Used with permission.

less than 10 mm left to close without suturing do not pose a measurable risk of subsequent herniation.⁷ The skin incision is closed in the standard fashion.

EXPERIENCE

Our 5-mm technique is identical to our previously described 10-mm technique, except that a 5-mm laparoscope is used.^{8,9} The senior author (W.W.H.) has performed approximately 350 laparoscopies using this 5-mm open technique over the past 15 years. Indications included pelvic pain, infertility, adnexal cysts, and leiomyomas. Procedures performed included ablation and resection of endometriosis and adhesions, removal of adnexal structures, myomectomy, hysterectomy, and appendectomy.

The only major complication that occurred using this technique was perforation of the transverse colon in a woman with no previous abdominal surgery. In this case, the transverse colon was densely adhered to the peritoneum immediately beneath the umbilicus as a result of diverticulitis. The 5-mm colon perforation was closed primarily without further sequelae.

We were unable to complete the technique in four women with body mass indices (calculated as weight



Scan this image to view Video 1 on your smartphone.



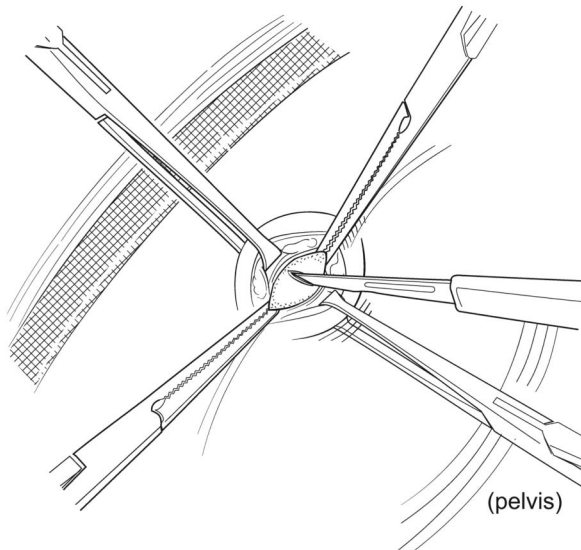


Fig. 2. After the subcutaneous tissue is bluntly dissected with a curved hemostat, the fascia is grasped bilaterally with small Kocher forceps, and a 2- to 3-mm incision is made with a scalpel. Illustration: Sharon Teal.

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(kg)/[height (m)]² greater than 50. The difficulty was related to the greater than 5-cm distance from the skin to the fascial layers and the widely separated anterior and posterior fascial layers. In these cases, a standard 10-mm open technique was used successfully. There

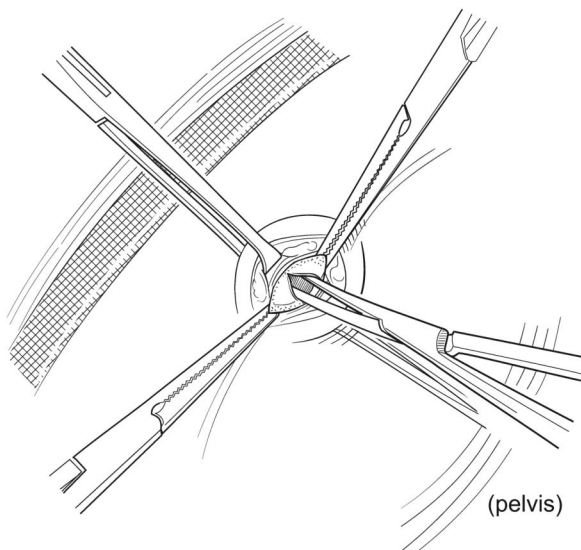


Fig. 3. The peritoneum is bluntly perforated with a curved hemostat at a 45° angle from perpendicular in a cephalad direction. Illustration: Sharon Teal.

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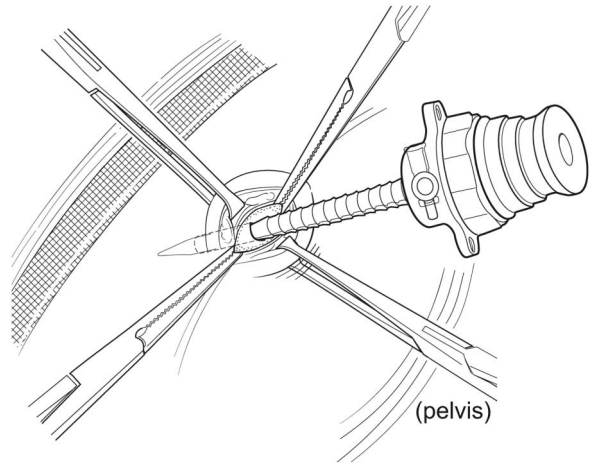


Fig. 4. A 5-mm blunt trocar with a sleeve is placed through the trocar sleeve into the abdomen. Illustration: Sharon Teal.

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were no subsequent wound infections or hernias in any of our patients.

One drawback of this technique is that some right-handed surgeons have difficulty placing the hemostat and trocar at a cephalad angle while standing to the patient's left. It helps if right-handed surgeons stand at a position caudal to the level of the umbilicus and rotate their body to face cephalad before placement. Alternatively, this entry technique can be performed from the patient's right side.

The most common difficulty encountered during the procedure is related to separation of the fascial layers beneath the umbilicus in obese women. In

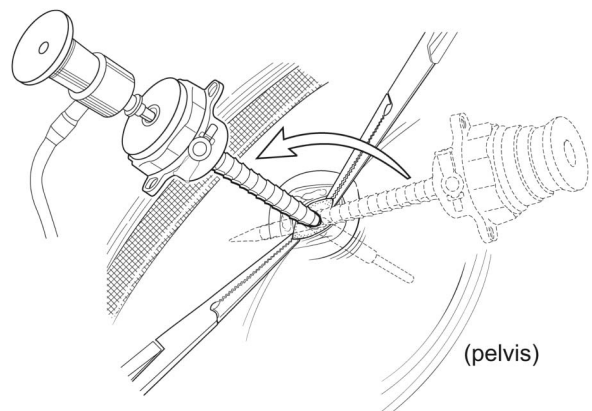


Fig. 5. The 5-mm blunt trocar with a sleeve is rotated 180° toward the pelvis before removing the trocar and inserting the laparoscope. Illustration: Sharon Teal.

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nonobese women, the anterior and posterior fascial layers are fused in the midline and are grasped and incised together beneath the umbilicus. In obese women, the hemostat placed through the fascial incision sometimes encounters a second fascial layer, indicating that only the anterior layer has been incised. When this occurs, the anterior fascial incision is enlarged to greater than 5 mm, the edges grasped with hemostats, and the entire process of grasping and incising the fascia is repeated for the posterior layer, which is often adjacent to the peritoneum.

Occasionally, when the laparoscope is placed through the sleeve, it will be found to be located retroperitoneally, indicating that the blunt trocar and hemostat did not traverse the peritoneum. In these cases, the fascia is elevated with Kocher forceps, the port directed at a 90° angle to the abdominal wall, and the peritoneum perforated with either the blunt trocar or the tip of the 5-mm laparoscope, a technique first described by Semm.¹⁰ If unsuccessful, it is likely that the posterior fascial layer has not been incised. In these cases, the sleeve is removed and another attempt made to incise the second fascial layer and perforate the peritoneum.

We estimate that carbon dioxide leakage at the umbilical port site occurred less than 5% of cases, usually related to fascial incisions greater than 5 mm. This leakage did not interfere with surgery when using a high-flow insufflator and the distracting sound was minimized by wrapping a moistened laparotomy pad around the base of the port.

COMMENT

The 5-mm modified open laparoscopic entry technique appears to minimize some of the disadvantages associated with conventional open and closed 10-mm laparoscopic techniques while avoiding blind placement of sharp instruments into the peritoneal cavity. The 8-mm skin and 5-mm fascial incisions we used are smaller than those required for either closed or open 10-mm insertion techniques. Although we did not objectively measure postoperative pain, our perceptions were consistent with a recent prospective study found that the closed 5-mm technique without fascial sutures resulted in less postoperative pain than the closed 10-mm technique utilizing fascial sutures.¹¹

One concern about using a 5-mm rather than a 10-mm laparoscopy is a potentially compromised view of the surgical site. However, it has been well documented that modern 5-mm laparoscopes provide excellent image quality as a result of advances in both fiberoptics and digital cameras.¹²

A limitation of this technique is that using a 5-mm fascial and blunt peritoneal perforation makes it impossible to visualize structures adherent to the peritoneum near the entry point before trocar placement. However, the original Hasson technique also utilizes blunt peritoneal perforation, apparently to avoid inadvertently grasping and injuring the bowel during entry.² Because of the inability to visualize immediately beneath the point of entry, we do not recommend using this technique for patients with prior abdominal surgery through a midline incision because of the increased risk of periumbilical adhesions. In these cases we use a closed left upper quadrant insertion technique.¹³

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