Advances in Equipment and Instrumentation in Laparoscopic Surgery

John C. Huhn, DVM, MS

KEYWORDS

• Laparoscopy • Equipment • Instruments • Electrosurgery • Stapling • Endoscopy • Suturing

KEY POINTS

- Several methods of laparoscopic access (Veress needle, Hasson method, Single incision laparoscopic surgery, threaded and optical ports) are available.
- The laparoscopic access method is of primary importance in determining instrument options (articulating or straight) and manipulative methods (direct or indirect triangulation).
- Laparoscopic suturing equipment (assisted suturing devices, endoscopic needle holders, barbed sutures) and familiarity with its use provide greater versatility to the laparoscopic surgeon.
- Hemorrhage control is a central principle in laparoscopic surgery, and several options (electrosurgical and endomechanical) exist to address this issue.
- Endoscopic staplers may be indicated when solid organ hemostasis is needed in thick tissue applications.

In 2005, a study was conducted to evaluate postoperative pain in female dogs sterilized laparoscopically compared with those altered via a conventional, open approach.[1] Prior to that time, sporadic reports of laparoscopic ovariohysterectomy existed in the literature, but none that specifically evaluated postoperative pain. The 2005 study demonstrated that patients undergoing laparoscopic spay exhibited significantly less pain than their open surgery counterparts.[1] This seminal study opened the door for laparoscopic ovariohysterectomy (LOH) and ovariectomy (LOE) to become the most widely practiced veterinary laparoscopic procedure. At present, nearly every veterinary laparoscopic training course teaches LOH or LOE to its participants. Not only is this surgery clinically relevant, but it presents an excellent opportunity for psychomotor skill enhancement.

Dr J.C. Huhn is a paid employee of Medtronic plc, formerly Covidien LLC.
Animal Health, Medtronic, 15 Forsyth Road, Salem, CT 06420, USA
E-mail address: John.Huhn@Covidien.com

Vet Clin Small Anim 46 (2016) 13–29
http://dx.doi.org/10.1016/j.cvsm.2015.08.005 **vetsmall.theclinics.com**
0195-5616/16/$ – see front matter

LAPAROSCOPIC ACCESS

Effective laparoscopic access is critical to the success of any laparoscopic procedure. The rigid telescope, retraction devices, and operative instruments must all be appropriately positioned to provide access to the target tissue.

Threaded Metal Port

A threaded metal cannula with reducing seals has been available for some time. The fact that this device is reusable and steam autoclavable makes it appealing to veterinary surgeons. It is designed to allow insertion of a 0° rigid telescope down its shaft during insertion into the abdomen via a twisting motion. A recent design improvement features a stopper, which maintains the telescope in optimal position during cannula advancement. The spiraling ridges of the cannula terminate in a protrusion at the cannula tip. Surgeons need to be cautious during advancement through the body wall and into the abdomen, as iatrogenic damage is possible if adequate visualization is not maintained.

Optical Port

An inherent difficulty in placing laparoscopic ports lies in their atraumatic placement. This is particularly true when placing the first port, which is usually for the rigid telescope. Use of a Veress needle to insufflate the abdomen prior to port placement has been described extensively.[1–5] It is a safe and reliable method and saves significant operative time. Once the abdomen has been inflated, an optical port can be inserted under direct visualization into the abdomen. The first such devices contained an integrated cutting blade, which became dull after a single use. An improved design that does not feature a cutting blade has since been developed (**Fig. 1**). The new optical port has a ribbed, translucent cannula and a conical dolphin tip. This device is inserted into the abdomen with a twisting motion, allowing visualization of the separating muscle and fascial layers until peritoneal penetration is achieved.

SINGLE INCISION LAPAROSCOPIC SURGERY

Laparoscopic spay procedures were initially performed as 2 or 3 port techniques.[6–8] The telescope was placed in a position on midline, caudal to the umbilicus. Instrument ports were placed either on midline or lateral to the umbilicus. In so doing, traditional principles of triangulation could be utilized. Over time, however, surgeons sought to perform ovariohysterectomy or ovariectomy through fewer incisions in keeping with the principles of minimally invasive surgery. Furthermore, surgeons came to realize

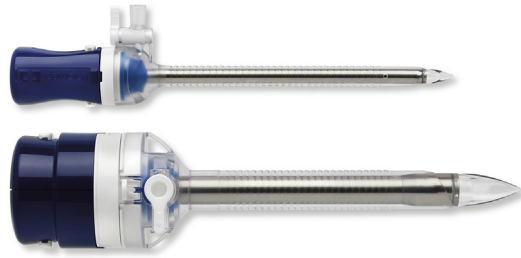

Fig. 1. Optical laparoscopic ports: 5 mm (*top*) and 5 to 12 mm (*bottom*); telescope is placed into obturator to allow visualization of abdominal entry. (*Courtesy of* Covidien, North Haven, CT; with permission. All rights reserved.)