Initial Experience with a Bipolar Coagulating/Cutting Forceps

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Bipolar coagulation has long been a safe and effective method of achieving surgical hemostasis. With the advent of laparoscopic procedures, the safety of bipolar coagulation has become even more vital. Unfortunately, the inability of this technology to divide tissue safely has limited its use. For the last 18 months, a new bipolar coagulating/cutting forceps has been evaluated. Its overall benefit has been its ease of use and a reduction in operating time and cost.

This multifunctional instrument (the Seitzinger Tripolar™ Cutting Forceps (Cabot Medical, Langhorne, Pa.) provides surgical hemostasis when used with a standard bipolar generator. Precise cutting is achieved by means of a guillotine-style knife which is advanced between the jaws of the device. The tissue to be coagulated and incised is grasped between the jaws of the instrument (Figs. 1a-b). Bipolar energy is delivered to the forceps (Figs. 2a-b) by depressing the generator foot switch in the usual fashion. Once the tissue is sufficiently desiccated, the bipolar current is discontinued and the blade advanced through the tissue by depressing the thumb lever on the instrument's pistol grip. Note that the blade excursion is limited to a point several millimeters from the distal tip of the jaw (Figs. 3a-b). This feature ensures that only coagulated tissue is transected. The coagulating/cutting forceps can be used like a standard bipolar forceps to seal any residual bleeders.

Since the blade is not energized during the cutting process no char or coagulum builds up on blade edge. However, it is recommended that bipolar energy not be delivered to the instrument while the blade is advanced. Doing so will cause premature dulling of the blade edge. When utilizing any energy source, the surgeon must be careful to use only the amount of energy sufficient to achieve the desired tissue effect. Varying the bipolar generator settings allows for better desiccation and hemostasis. If tissue is desiccated with very high wattage, the surface tissue will reach a high resistance before the energy can affect the deeper tissue and assure complete hemostasis. Therefore, use of lower settings allows the current to pass between the tongs of the instrument to distribute the current evenly. For example, 50 W of power may be required to desiccate a ligamentous tissue while 15 W of power may be all that is necessary to perform adhesiolysis.

LAPAROSCOPICALLY ASSISTED VAGINAL HYSTERECTOMY (LAVH)

To date, the coagulating/cutting forceps has been used to perform 75 LAVH procedures. All surgeries were completed without the need for ligatures or stapling devices and no patient recoveries were complicated by postoperative bleeding or infection.[1,2] Operating times for all surgeries averaged 1½ hours, including complicated cases in which patients presented with large uteri (greater than 780 g) and multiple myeloma.

For most procedures a 10-mm trocar was placed in the umbilicus and two lateral 5-mm ports were positioned inferior to the umbilicus and lateral to the inferior epigastric vessels. This arrangement, of course, requires the use of a 5-mm laparoscope. If a 5-mm laparoscope is not available, then a 10-mm port is required laterally. The coagulating/cutting forceps is inserted through the umbilical port and the 5-mm ports are used for the laparoscope and atraumatic grasper. The LAVH is performed in a manner similar to the abdominal hysterectomy (Fig. 4) except that bipolar coagulation is substituted for suture ligatures and staples.

After initial laparoscopic examination of the pelvis, the procedure begins by identifying both ureters and incising the overlying peritoneum with either scissors or the coagulating/cutting forceps. This creates a window through which the ureteral course can be viewed. It has been found helpful at this time to identify the course of the contralateral ureter. If oophorectomy is to be performed, the infundibular pelvic ligament is grasped, desiccated, and divided using the coagulating/cutting forceps. The dissection continues, hemostatically dividing the round ligament and the anterior and posterior broad ligaments down to the uterosacral ligaments posteriorly, and developing the bladder flap anteriorly. Careful dissection continues until the uterine vessels are exposed. The coagulating/cutting forceps is applied to the uterine artery, being careful to identify the ureteral course. The 5-mm laparoscope is then inserted on the ipsilateral side for completion of the procedure and development of the bladder flap.

UTEROSACRAL NERVE TRANSECTION

For cases of central uterine pain, the division of the uterosacral nerve plexus may provide some relief. Care must be taken to identify the ureter as case reports have been published discussing ureteral injury and transection during this procedure.[3,4] The procedure continues by grasping the ligament with the coagulating/cutting forceps and applying traction medially (Fig. 5). Bipolar hemostasis is achieved, the knife advanced, and the space entered. Using

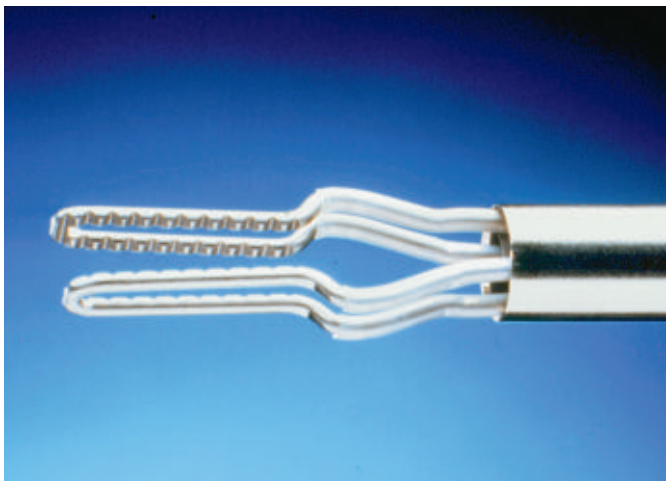

Figure 1a. Bipolar coagulating/cutting forceps: jaw configuration permits use as a grasper.

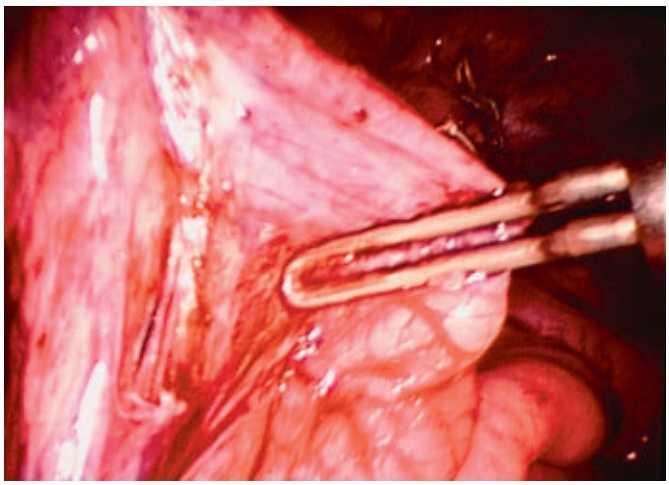

Figure 1b. Grasping small bowel (animal model used in a teaching lab).

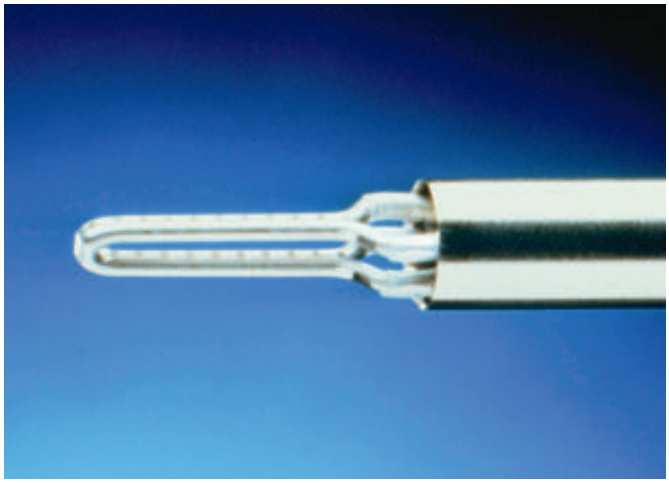

Figure 2a. Jaw position for coagulation function.

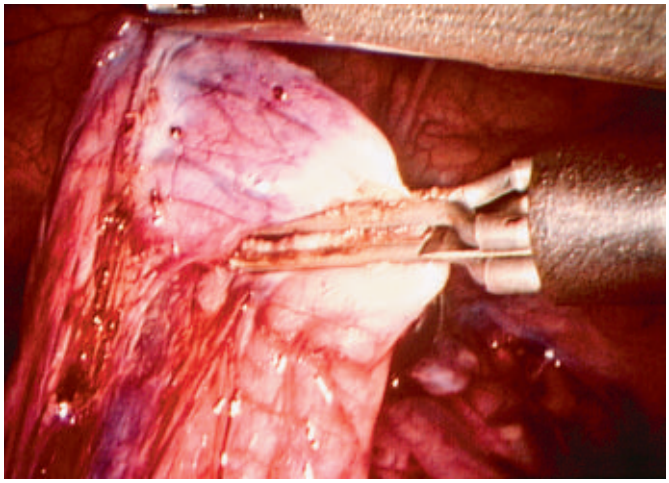

Figure 2b. Coagulation of small bowel (animal model).

the coagulating/ cutting forceps as a blunt dissector, the nerve fibers are identified, subsequently divided, and the procedure completed. The ability to grasp, dissect bluntly, coagulate, and cut structures makes this multifunctional instrument approach superior to the use of the laser in this procedure. Furthermore, minimal smoke is produced compared to the CO_2 laser, enhancing the surgeon's visibility in this critical dissection.

LAPAROSCOPIC OOPHORECTOMY

The approach used by the author to perform laparoscopic oophorectomy is similar to open surgery. However, the infundibular pelvic ligaments are desiccated and divided using the coagulating/cutting forceps. The instrument is then used effectively as a grasper to facilitate the removal of the ovary, either transabdominally or vaginally via colpotomy.

LAPAROSCOPIC OVARIAN CYSTECTOMY

In cases of endometriosis occupying the ovarian stroma, a cystectomy is easily performed using the coagulating/ cutting forceps. The ovary is grasped with an atraumatic grasper and the cortex is entered bloodlessly, utilizing the coagulating/cutting forceps.

The endometrioma can then be easily stripped from the ovary. A major advantage of the coagulating/cutting forceps in this procedure is that it is available immediately should additional hemostasis be required, thus decreasing operative time and blood loss. A similar application for this instrument has been found when performing excision of an unruptured ectopic tubal pregnancy.

LAPAROSCOPIC MYOMECTOMY

The serosal surface of the myoma should be incised in the usual fashion. When the pseudo-capsule has been opened, the coagulating/cutting forceps is an ideal instrument for dissecting the myoma from its base in the myometrium. Due to its multifunctional attributes, procedure time is decreased and blood loss minimized.

LAPAROSCOPIC RETROPUBIC COLPOSUSPENSION

The treatment of stress urinary incontinence has received a great deal of attention over the past few years. This often bloody procedure benefits significantly from the use of the coagulating/cutting forceps. The technique used is to grasp the anterior peritoneum 2 to 3 cm above the pubic symphysis and transect the tissue. The space of retzius is entered and the dissection continued until the paravaginal tissue has been cleared of fat. The colposuspension is then completed either as a Burch or a MMK procedure.

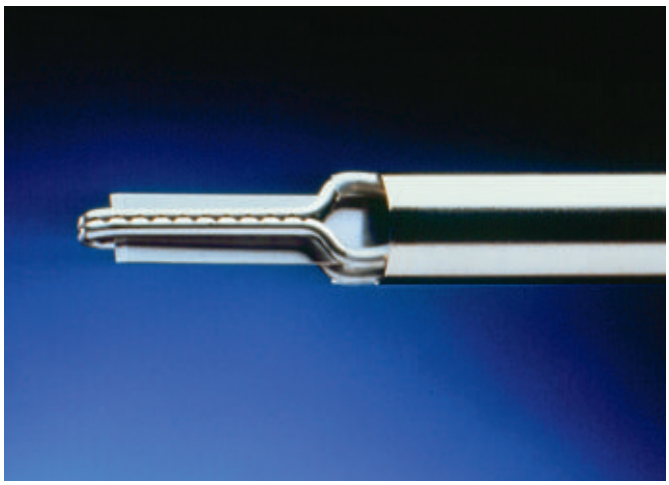

Figure 3a. Guillotine cutting blade passes through the jaws, but not completely to the tip of the jaws.

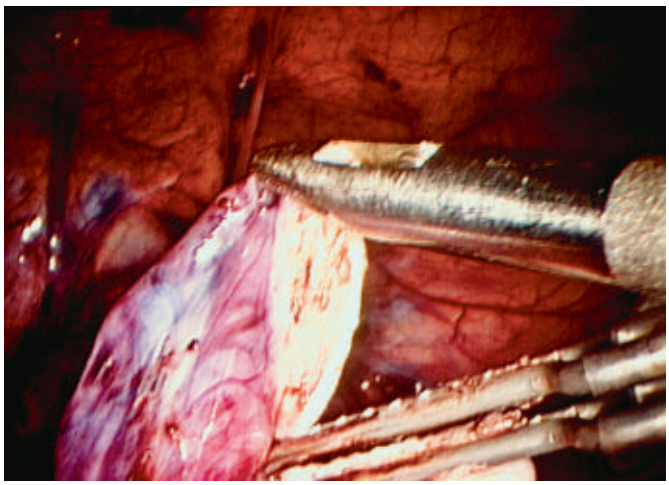

Figure 3b. Divided small bowel (animal model).

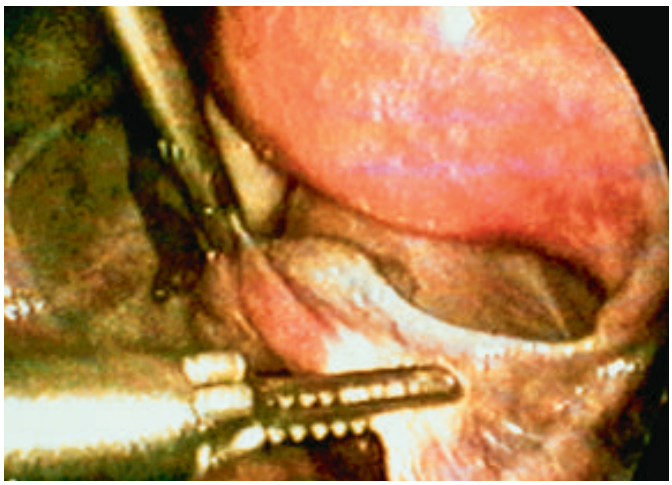

Figure 4. Coagulation in a salpingectomy (clinical case).

Figure 5. Application with a uterosacral ablation (clinical case).

LAPAROSCOPIC ADHESIOLYSIS

Transecting adhesions can present many challenges to the laparoscopic surgeon. Filmy adhesions, though often bloodless to dissect, can still transmit unipolar current to the bowel and other vital structures. Dense adhesions complicate the procedure by their propensity to bleed. The coagulating/cutting forceps has been found especially effective for lysing adhesions of both types. The safety of bipolar coagulation obviates the concern for current spread while providing hemostatic lysis of even the densest of adhesions. Filmy adhesions can be dissected easily, solely with the instrument's knife. The atraumatic jaws facilitate blunt dissection and the creation of windows within the adhesions for further dissection and coagulation.

LAPAROSCOPICALLY ASSISTED COLON RESECTION

The benefits of the coagulating/cutting forceps discussed above for gynecologic procedures also facilitate many laparoscopic general surgical procedures. In particular, the experience at our hospital with laparoscopically assisted colon resection is that the coagulating/cutting forceps provides excellent and safe hemostasis with which to incise the lateral peritoneal reflection. The need for expensive staples and clips is eliminated when transecting the mesentery to facilitate mobilization of the sigmoid colon. Careful attention was given to bipolar settings, and as a result no bowel injury was observed. Operating time for one such procedure was less than 1½ hours.

LAPAROSCOPIC APPENDECTOMY

Six cases of acute appendicitis were successfully treated using coagulating/cutting forceps as an adjunct to a linear stapling device. The base of the appendix was identified, a window made, and a linear stapling device placed across tissue and fired. The coagulating/cutting forceps was then used to isolate and locate the appendiceal vessels. The instrument was also used as a dissector and grasper until the appendix was completely resected. The procedure was enhanced since fewer staples were required and the multifunctional coagulating/cutting forceps eliminated the time-consuming instrument exchanges.

SUMMARY

Operative laparoscopic equipment is continually changing and new devices are introduced almost daily. In most instances, however, noticeable improvements in operative efficiency, patient safety, and cost containment are not realized. The bipolar coagulating/cutting forceps evaluated in this study is proving to be an exception by providing a safe, cost-effective, and time-saving alternative to staples, clips, and ordinary bipolar coagulating forceps.[5] This multifunctional instrument is valuable in reducing the number of instruments required for surgery; therefore instrument exchanges are reduced. This results in much less time spent on refocusing on the operative site and maintaining the momentum of the operation. Costs are reduced as a result; in addition, costs are contained from the shortened operative time, and the patient also benefits from shorter anesthesia time. STI

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