New applications for the lap-loop in laparoscopic surgery

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ABSTRACT: The use of the electrosurgical loop for cervical section during laparoscopic supracervical hysterectomy (LASH) is well known. This paper describes new applications for his device in total laparoscopic hysterectomy (TLH) and myomectomy. The monopolar device consists of a specially designed stainless steel wire adapted at both ends to be held in the introducer. It may be positioned around the vagina slightly past the cervix. The vagina is rapidly and cleanly cut with minimal bleeding, making TLH a safer procedure and reducing operating time. The application of the loop for the removal of pedunculate myomas is also described. However, this technique is reserved for experienced surgeons aware of the proper management of electrical energy in laparoscopy.

Key words: Lap-loop – Cervix and vaginal section

Introduction

The first procedure describing laparoscopic removal of the uterus was for total laparoscopic hysterectomy (TLH) [1-3]. Since then supracervical, or subtotal hysterectomy as regained interest and is now commonly used in patients presenting benign uterine disease with a healthy cervix.

Various techniques for partial laparoscopic hysterectomy were proposed in the early 1990s [4, 5], among which the classical supracervical laparoscopic hysterectomy (LASH) technique described by Donez and Nisolle [6]. Some of the potential advantages of this procedure include shorter operating time, fewer complications and earlier return to normal activity including sexual function [6, 7].

A difficult and time-consuming part of the laparoscopic procedure is the sectioning of the uterine cervix in LASH and the vagina in TLH. Conditions are often far from optimal due to the angle of approach of the cutting electrode or scissors and due to the proximity of neighboring structures which are sometimes difficult to keep at a safe distance (Fig. 1.1).

The idea of placing a circular monopolar electrode around the cervix to more easily separate the cervix from the corpus uteri during LASH was proposed in 1998 [8]. More recently, the authors have further adapted this technique by using the so called lap-loop for total hysterectomy and myomectomy as well [8].

Material and Surgical technique

The electrode loop device consists of an 18 cm long disposable stainless steel wire with a screw attachment on one end and a ball attachment on the other to facilitate handling (Fig. 1.2). In order to provide additional security, the device is electrically isolated except at the extremities near the introducer and the middle portion which does the actual cutting. The loop is fixed on the introducer (Fig. 1.3, 1.4, 1.5, 1.6) and after proper placement around the cervix at the level of the isthmus (over the ligated uterine vessels), monopolar current is applied resulting in facilitated separation of the cervix from the corpus uteri with less danger to neighboring structures.

To better understand the new applications this device has been used for, it is essential to review the basic technique of laparoscopic hysterectomy.

For subtotal laparoscopic hysterectomy, preparation includes placement of a uterine manipulator and catheterization of the bladder. Surgical approach is through the usual laparoscopic portals: a primary portal for the optic and two or three secondary portals (5 and 12 mm) for ancillary instruments. Treatment of the round ligaments and adnexae follows standard hysterectomy technique. The broad ligament and vesico-uterin fold are dissected to the superior cervix.
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The various ways of managing the uterine arteries have been described and are useful as the basis of classification for supracervical hysterectomy [9, 10]. Prior to applying the electro surgical loop, the authors dissect and cut the uterine vessels after occluding them with bipolar coagulation or sutures. Treatment of the uterine arteries in this fashion corresponds to a type III procedure according to the Munro-Parker classification system [10].

Once the uterine arteries are cut, it is important to remove any manipulating device that has been placed in the uterus. The wire electrode loop is then introduced into the abdominal cavity and placed around the cervix (Fig. 1.7, 2.1, 2.2, 2.3, 2.4). The extremities are firmly held with the introducer to form a lasso around the cervix at the level of the isthmus. The uterus is retracted laterally by pulling on the stump of the round ligament in order to allow clear vision of adjacent structures: bladder, rectum, intestine etc. (Fig. 2.5, 2.6, 2.7). Sectioning of the cervix is accomplished by applying high frequency monopolar current to the electrosurgical loop while it is pulled back in horizontally (Fig. 2.8, 2.9, 2.10, 2.11). It is sometimes necessary to pause during section to remove smoke in order to maintain good vision during amputation. After the cervix has been cut, any residual bleeding may be treated with bipolar coagulation if necessary (Fig. 2.12, 2.13). The minimal power setting of the generator is 100 watts in pure cutting mode (often as high as 120 watts). At the end of the procedure the uterine corpus is removed from the abdominal cavity by morcellation.

For total laparoscopic hysterectomy, the technique is the same up to the ligation of the uterine arteries. After that, cervical dissection is continued with the aide of the "Clermont cannulator" or with use of the "Australian tube" (McCartney). A small vaginal window is opened on the opposite side to anker the loop (Fig. 3.1, 3.2). This is followed by strangulation of the vagina (Fig. 3.3), which then allows precise cutting just below the cervix once the monopolar current is activated (Fig. 3.4, 3.5, 3.6). At the end of the procedure the uterine corpus is removed from the abdominal cavity either by morcellation or by vaginal extraction.
For **pedunculated fibroids** the device is used as shown in the illustrations (Fig. 4.1, 4.2, 4.3, 4.4, 4.5, 4.6, 4.7). The mode of utilization is however slightly different due to the necessity of obtaining good hemostasis. Thus, after placement of the cutting electrode, we start by coagulating the blood vessels (60 watts) at the base of the fibroid for a short time before applying the standard pure cut power setting (100 watts) for section.

**Discussion**

The authors have now successfully employed the lap-loop technique in 214 patients for LASH, 37 patients for TLH, and in 48 patients for the removal of fibroids. No complications have been observed in any of these cases. The main advantages of the technique are: *reduced operating time; higher precision of the surgical section and greater safety.*

Safety has always been the major concern. As an indication, in the supracervical procedure, where one avoids all risk associated cervical dissection and possible
ureteral lesions, the complication rate has been clearly reduced [6]. When cutting the cervix with any monopolar instrument there is always the risk of damaging adjacent structures. But this risk is reduced considerably with the use of the electrosurgical loop because it is very precise and because a large portion of the loop is electrically isolated (Fig. 1.2). The angle of application is always adequate (90°) and stable. And finally, the loop actually returns back into the introducer as cutting proceeds and is then no longer exposed. Therefore, the risk of accidentally damaging adjacent organs is minimal.

Another advantage of laparoscopic supracervical hysterectomy is reduced operating time [11-13]. A yet further decrease in operating time has been achieved with the loop technique for cervical amputation. Prior to the development of the electrosurgical loop, the time required to cut the cervix was inconveniently long (approximately 16 minutes), due to frequent changes of angle and ports to achieve the section. With the introduction of this new device the time needed has been greatly reduced to about four minutes including set up and extraction of the device. The section time is often less than one minute. The efficiency of the loop is not reduced by the size and form of the uterus.

Precision of the surgical section with this device has been especially appreciated in cases of tracheoceleptosis where, following hysterectomy, a precise suture to prosthesis material is required to permit efficient pro-montofixation. The exact anchoring of the loop at the proper level was an initial difficulty encountered when adapting this technique for TLH. The solution, to avoid any "derapage", is to simply create a small opening or window in the vagina at the opposite side after removal of the vaginal cannulator. After that, strangulation and section of the vagina at the right level becomes very easy. In some cases however, further hemostasis with a bipolar forceps is required.

For myoma removal, use of the loop technique was strictly limited to pedunculated fibroids, the goal being to avoid tedious dissections and late correction of hemostasis. The technique was modified by starting with a short period of coagulation with the loop itself before starting the actual cutting.
at 100 watts. No additional correction of bleeding has been found necessary for pedunculate fibroids up to 2 cm.

Technical problems did occur during the initial evaluation period with the prototype electrode either occasionally breaking or presenting defective electrical connections. Currently however, with the device finalized by Medsys in 1998, no major complications have occurred despite the need for delivery of over one hundred watts of power from the monopolar generator. Only in five cases did recurrent bleeding of the uterine arteries occur during the procedure, which of course were quickly corrected with bipolar coagulation. In all of these cases, the surgeon had cut below the level of occlusion of the uterine vessels. The presence of smoke has occasionally obscured vision during section, forcing the surgeon to briefly stop the procedure until good visibility could again be restored.

Conclusion

An electrosurgical loop has been designed and successfully employed to decrease the time required and facilitate section of the uterine cervix during LASH for benign uterine conditions. It is also more recently being successfully used in total laparoscopic hysterectomy and for removal of pedunculate myomas. It facilitates and increases the safety of both these procedures. It must however be emphasized that safe use of the electrosurgical loop requires an experienced staff and surgeon aware of the proper management of electrical energy in laparoscopy.

References