

An Improved Bipolar Cautery with Scissors for Laparoscopic Surgery with Additional Feature

Shelar Sharad Shivdas

Sushrut Maternity and Surgical Nursing Home, Miraroad, Thane, Maharashtra, India

Correspondence: Shelar Sharad Shivdas, Sushrut Maternity and Surgical Nursing Home, Miraroad, Thane, Maharashtra-401107, India, e-mail: sharad_shelar01@yahoo.co.in

Abstract

Background: In laparoscopic surgery, usually a vascular pedicle or a tissue to be cut is first coagulated and later cut by scissors separately. Here the author has created an instrument with dual function of hemostasis as well as cutting without changing the instruments.

Methods: The author has used the described instrument for comparison in 16 laparoscopic appendicectomy and 14 laparoscopic hysterectomy. Here the parameter was time required for only cauterization and subsequent cutting. Appendix was ligated by Meltzers knot.

Keywords: Laparoscopic bipolar cautery forceps with scissors.

LAPAROSCOPIC APPENDICECTOMY

Bipolar cautery with scissors, 7 cases were performed: 4, 5, 7, 6.5, 4, 6 minutes. Average time required: 5 minutes. Conventional Bipolar cautery forceps and scissors used separately. Nine cases were performed: 14, 10, 12, 14, 11, 16, 13, 24, and 13 minutes. Average time required: 13 minutes.

LAPAROSCOPIC HYSTERECTOMY

Bipolar cautery with scissors, 6 cases were performed: 10, 12, 14, 10, 15, 13 minutes. Average time required: 12 minutes. Conventional Bipolar cautery forceps and scissors used separately 8 cases were performed: 23, 31, 28, 31, 21, 35, 25, 30 minutes. Average time required: 28 minutes.

Thus there was less than 50% of time required with new instrument for the coagulation as well as cutting and indirectly the duration of surgery. In conventional method, the time is wasted in removal and introduction of instrument one by one. A significant amount of CO₂ is leaked through the port. Repeatedly introduction of instruments may create inconvenience to surgeon and occasionally may cause trauma to internal organs.

DESIGN AND FUNCTIONING

In close association with Jyoti Engineering, Vasai, the bipolar cautery forceps with scissors was developed (Fig. 1). The instrument is made up of stainless steel and contains two compartments (Fig. 2).

The main instrument is 10 mm sheath with length of 30 cm while hand operating part is 10 cm. The superior

compartment consists of bipolar unit which is fixed type while the inferior compartment consists of scissor which is sliding type. The instrument is passed through 10 mm cannula. The tissue to be cauterized is held between the jaws of bipolar forceps and coagulated. After adequate effect

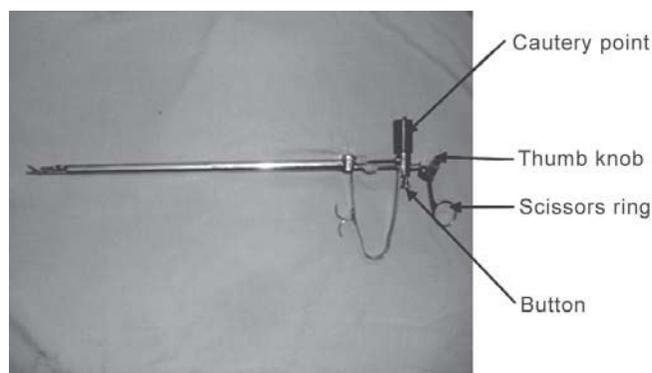


Fig. 1: Bipolar with scissors instrument

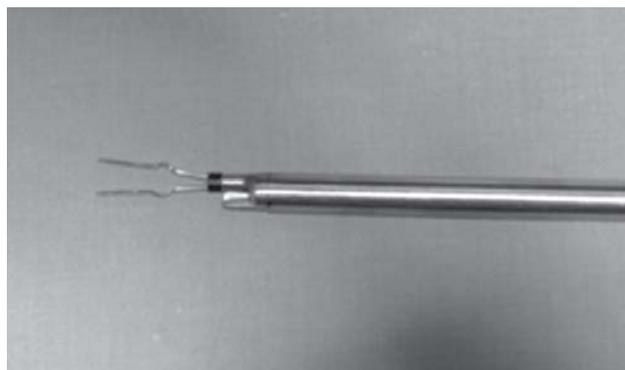


Fig. 2: Bipolar with hidden scissors

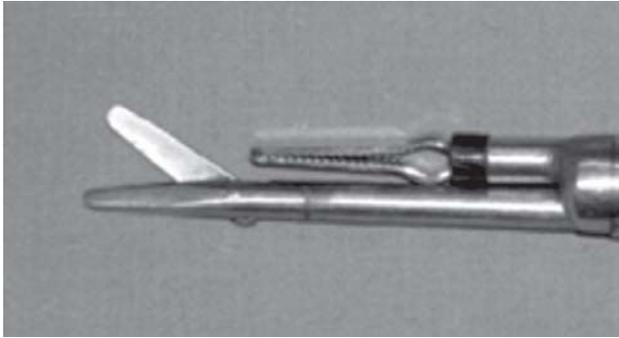


Fig. 3: Scissors with hidden bipolar



Fig. 4: Bipolar cautery forceps

the tissue is released. Now keeping the instrument in same position the knob of the scissors is pressed with thumb of same hand thus projecting out the scissors (Fig. 3). The scissor unit will automatically get locked. Now put the thumb of same hand in ring of scissors which will operate the jaws. Once the tissue is cut a button at the backside of the bipolar U arm is pressed, unlocking the unit and the scissors will be retracted inside. Now the instrument is ready for bipolar cauterization (Fig. 4).

DISCUSSION

The instrument can be used with single hand very easily. The surgeon should have proper knowledge of principles of electrosurgical dynamics to achieve maximum effect of coagulation and minimum side effects.^{1,7,9} If properly used with irrigation a vessel up to 5 mm can be coagulated.^{3,11,12,14} There are better coagulating systems like harmonic, ligasure¹³ available but they are costly and the operating handles have to be changed after 5 to 6 sittings. There are other limitations like Ligasure can not be used as dissector and its cutting of tissue with monopolar current/sliding blade is blind.

It also cannot be used as plain scissors. Harmonic is good dissector, excellent coagulant but it is not useful if a vessel starts bleeding profusely. It can be dangerous if its oscillating jaw which is in low side touches underlying important structure like vessel, ureter or bowel.⁸

The advantage of the new instrument is that it can be used as a tissue holding without trauma, cutting, coagulation, hemostasis of a bleeder as well as blunt dissection without changing the instrument. If a pedicle is having big vessel one can coagulate it in gradual steps and cutting under vision to confirm complete hemostasis and without charring of tissue and minimum lateral thermal tissue damage.

The instrument can be used to hold structure like bowel, adnexa for manipulation. The scissors can be used for continuous cutting of peritoneum, avascular bands, adhesion and sharp dissection.

The other advantages of the instrument are, it is cheap and does not require costly endosurgical unit or ultrasonic device. The instrument can be reused, autoclavable and has minimum maintenance.

The scissors is not damaged by charring and frequent cleaning as in roboscissors, Multifunctional bipolar scissors^{5,6} and ligasure where sliding blade becomes blunt. Few pediatric laparoscopic surgeon use⁴ single stapler for appendix along with mesoappendix. This method may be risky in case of thick turgid or very thin appendix as stapler pin may not hold the tissue firmly.

CLINICAL USE

A laparoscopic surgeon can use the said instrument for coagulation, cutting and dissection as a single step or in combination as per requirement.

Method of Coagulation

A tissue, vessel or a pedicle to deal with is held between the two jaws of the bipolar forceps. It is cauterized with coagulation current in short period to prevent charring of the tissue. If minimum of current and high voltage is used maximum effect of coagulation is achieved by coagulative necrosis of tissue and fluids. The further heat spread to surrounding tissue can be prevented by irrigation of the electrodes by glycine or weak electrolyte solution. Thus lateral tissue damage is minimal.

Method of Cutting

Once the tissue is optimally coagulated the tissue is released and the scissor is protruded by pressing the thumb knob. Now the tissue is cut under vision with precision by the scissors with movement of the ring. One can guarded cutting under vision, as if there is incomplete hemostasis immediately coagulation can be done.

CONCLUSION

The described dual instrument has become very useful in laparoscopic surgery in our hands. The bipolar cautery

forceps with scissors have benefit over other forms of bipolar coagulation because coagulated tissue is divided without instrument changing saving the time by almost 50%. The other indirect advantages are as follows:

1. Less manipulation of instrument, thus less stress to surgeon and assistant.⁵
2. Precise and guarded cutting (which it is not in bipolar cautery with sliding or monopolar blade in between the jaws).
3. Less amount of CO₂ utilised as gas is leaked.
4. No sticking of tissue or charring of scissors as in case of robot scissors and in case of bipolar coagulation multifunctional instrument⁵ and its maintenance. No need of frequent cleaning.
5. Cost benefit as durable, cheap, less maintenance.
6. Reusable and can be autoclavable.
7. Does not require costly ESU/Ultrasonic device
8. Safer than monopolar cautery (No remote injury, direct coupling, insulation failure, capacitive coupling and minimum lateral tissue damage.^{2,10}

REFERENCES

1. Barret C, Capelluto E, Champault G. Intraoperative thermal variations during laparoscopic surgery. *Surg Endosc* 1999;13:136-38.
2. Tucker RD. Laparoscopic electro-surgical injuries: Survey results and their implications. *Surg Laparosc Endosc* 1995;5:311-17.
3. Tan HL, Segawa O, Stein JE. Laparoscopic Bipolar Strip Tease Appendectomy: A new endoscopic technique. *Surg Endosc* 1995;9:1301-03 (Medicine).
4. Olguner M, Akgur FM, Ucar B, Aktug T. Laparoscopic appendectomy in children performed using single endoscopic GIA stapler for both mesoappendix and base of appendix. *J Paediatr Surg* 1998;33:1347-49 (Medicine).
5. Clinical experience with bipolar multifunctional coagulation scissors in laparoscopic surgery. J P Eitenmuller. E Volckmann. *Surg Endosc* 2008;22:421-25.
6. Energy sources in Laparoscopy: Andrew G Harrell, Kent W Kercher and B Todd Heniford. *Surgical Innovation*, Sep. 2004;11:201-09.
7. Spivak H, Richardson WS, Hunter JG. The use of bipolar cautery, laparoscopic coagulating shears and vascular clips for haemostasis of small and medium sized vessels. *Surg Endosc* 1998;12:183-85.
8. Laparoscopic appendectomy without clip or ligature. An experimental study. Adnan Asid, Cagdas Karqueli and Ozlem Especk. *Surg Endosc*, Sept 2008;22(9).
9. Heniford BT, Mathews BD, Sing RF, Bacus C, Pratt B, Greene FL. Initial results with an electrothermal bipolar vessel sealer. *Surg Endosc* 2001;15:799-801.
10. Soderstrom RM. Electro-surgical injuries during laparoscopy: Prevention and management. *Curr Opin Obstet Gynecol* 1994;6:248-50.
11. Avishalor Saron, Ron Auvlader, Orly Brandes Klein, Zui Alter, Yural Kaufman and Aric Lissank. Cystoscopy after total/subtotal Laparoscopic Hysterectomy; *Gynecological Surg* 2006;3(2).
12. Christopher Cher Men Ng and Bernad Su Min. Total Laparoscopic Hysterectomy: A 5 years experience. *Archives of Gynecology and Obstetrics* 2007;276(6).
13. G Awdzi, J Frappell, A Oriolowa, T Sibwala. A clinical evaluation of Lotus Ultrasonic shear in gynecology surgery. *Gynecological Surgery* 2005;2(3).
14. William L Newcarl, William W Hope, Thomas M Schmelzer, Jessica J Heath, H James Norton, Amy E Lincourt, B Todd Heniford and David Ianniti. Comparison of blood vessel sealing among new electro-surgical and ultrasonic devices. *Surg Endoscopy*.