



Comparison Between Bipolar Vessel Sealer (Liga Sure Vessel Sealer) and Harmonic Scalpel in Total Laparoscopic Hysterectomy

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ABSTRACT:

Aim: The aim of the present study was to compare the use of electrothermal bipolar vessel sealer (EBVS) with harmonic scalpel (HS) during total laparoscopic hysterectomy with respect to operation time, estimated blood loss and related complications.

Methods: A retrospective study was conducted in our hospital. Fifty patients who underwent total laparoscopic hysterectomy and bilateral salpingo-oophorectomy were enrolled. Twenty six hysterectomies were performed with HS and in 24 patients the same surgeons used EBVS. Data about the characteristics and details of the patients, operation time, and estimated blood loss at OT, uterine weights, related complications and length of hospital stay were registered and compared.

Results Mean procedure time and estimated blood loss were significantly less in the EBVS arm. The change in hemoglobin and hematocrit values was found to be more significant in the HS group.

Conclusion: EBVS was found to be less time-consuming and caused less bleeding when compared with HS.

Introduction

In the realm of minimally invasive surgery, advanced technologies like bipolar vessel sealers and harmonic scalpels have revolutionized surgical techniques. These instruments offer precise tissue manipulation, efficient hemostasis, and reduced operative time, leading to improved patient outcomes and faster recovery. This presentation aims to provide a comprehensive comparison between bipolar vessel sealers and harmonic scalpels, delving into their respective mechanisms of action, surgical benefits, and limitations

Bipolar vessel sealers employ high-frequency radio waves to generate heat. These waves travel through two electrodes, which are applied to the targeted tissue. The

concentrated energy creates a localized heat zone, causing tissue coagulation and sealing of blood vessels.

Harmonic scalpels utilize ultrasonic energy to cut and seal tissue simultaneously. These instruments generate high-frequency vibrations that disrupt cell membranes and coagulate blood vessels, effectively stopping bleeding.

The ultrasonic energy creates a localized heating effect, leading to tissue disruption and coagulation. This process is highly effective for sealing vessels and controlling bleeding, especially in delicate tissues.

Methods

This study was a randomized clinical trial conducted in the obstetrics and gynecology department of BMCH



Hospital west Bengal, India, from March 2022 till April 2024.

Fifty subjects for TLH were divided into two groups by randomization. Group (I) was allocated for TLH using the Harmonic scalpel and group (II) was assigned for bipolar diathermy for TLH. Each techniques used in the study was written in a card and was enclosed in an envelope; the fifty five envelopes were all identical to each other. Envelopes were serially numbered and held securely by trained nurse. The circulating nurse was asked to pull any card just before preparation for surgery. The patients were aware of the respective OT procedure and signed an informed consent, and they had equal possibility of entering into any of the trial groups of study.

An informed consent was taken from all patients and put through to the following examination: clinical history, physical examination, abdominal examination, per speculum examination, vaginal examination, cervical Pap smear and ultrasound examination.

Inclusion and exclusion criteria

Inclusion criteria:

- Patients gave consent for hysterectomy as suggested by gynecologist
- Negative Pap smear
- Family complete
- AUB not responding to medical management

Exclusion criteria:

- Suspected or confirmed malignancy in any part of

genital system

- uterus size more than 12 weeks gravid uterus size
- Contraindication to laparoscopic surgery
- Patients who had not given consent.

All operations were performed by the same surgeon and surgical team following standard procedure. Post-operative monitoring done included vital sign like temperature, blood pressure, pulse and respiratory rate on every 4 hourly. The blood loss was estimated by drop of Hb% which was compared with preoperative condition.

Data about the patients' characteristics, operation time, estimated blood loss, related complications and length of hospital stay were registered and compared.

Statistical analysis

Data were collected and entered into the SPSS version 12 for Windows. Qualitative variables were expressed as number and percentage while quantitative variables were expressed as mean and standard deviation and the significance (P value) was also calculated.

Results

This study comprised 50 patients divided into 2 groups. Group (I) underwent TLH operation using the Harmonic Scalpel (HS). Group (II) patients had the TLH operation using the electro-thermal bipolar vessel sealer technique with standard TLH procedure

. The demographic data are present in Table 1.

Characteristics of study group	Group I	Group II	P value
Age(year)	43.15±5.56	46.57±6.67	0.068
Parity	9	13	0.086
BMI	28.47±2.45	31.29±3.34	0.056
Pre-operative Hb	12.56±1.25	11.12±1.78	0.089
Pre-operative Haematocrit	34.20±3.45	35.88±2.87	0.107

Table1: Character of the study group



During the procedure it was perceived that bipolar vessel sealer method of TLH consume less time than the HS. Blood loss during operation was significantly

lower in group (II) patients compared to group (I). There was significant greater drop in hemoglobin and hematocrit in the latter compared to the former group.

Factors	Group	Mean±SD	P value
Operation time	Group I	121.34±16.25	<0.005
	Group II	78.19±12.34	
Blood loss(ml)	Group I	136.87±46.56	<0.005
	Group II	86.74±24.35	
Haemoglobin drop%	Group I	2.98±0.65	<0.005
	Group II	0.34 ± 0.39	
Haematocrit drop %	Group I	3.78 ± 1.45	<0.005
	Group II	0.98 ± 0.56	
Hospital stay	Group I	1.56 ± 0.34	>0.005
	Group II	1.98 ± 0.34	

Table2: Operative and post-operative details.

Complications

Common complications were noted as intra-operative bleeding, bleeding from vascular stumps or uterine vessels, difficulty in dissection of vesicouterine free fold of peritoneum, vault margin bleeding. Rate of complication was higher among group (I) patients 9 (34%) as compared to group (II) patients 4 (16%); though the difference was not statistically significant.

Discussion

Over the last ten years, gynecologists have been obtaining the necessary skills to perform Laparoscopically Assisted Vaginal Hysterectomies (LAVH) or Total Laparoscopic Hysterectomies (TLH) in order to convert an abdominal procedure into a laparoscopic/vaginal procedure.⁶

Bipolar diathermy was found to be less time-consuming and less bleeding when compared to harmonic scalpel. Mean procedure time was (121.34± 16.25min) in harmonic scalpel and was (78.19 ± 12.34min) in bipolar diathermy which was statistically significant. The

estimated blood loss were significantly less in the bipolar diathermy compared to the harmonic scalpel (86.74 ± 24.35 vs. 136.87±46.56mL; P <0.005, respectively). The changes in hemoglobin level was found significant in case of harmonic scalpel group than bipolar diathermy group. Our study demonstrated similar results when compared to Bansal et al.¹ Campagnacci et al.,⁶ Demirturk et al. work,⁷ and Ashraf TA et al.⁸ According to Akira Tsunoda, bipolar diathermy is quick and bloodless and, more painful than ultrasonic scalpel, is associated with a reduced analgesic requirement immediately after operation.¹⁰

Our study included that blood loss during operation was significantly lower in bipolar vessel sealer group than HS group. It was demonstrated that there were significant greater drop in hemoglobin and hematocrit in the latter compared to the former group. This could be imputed to the limited ability of HS technique to deal with larger vascular stumps such as the infundibulo-pelvic and large uterine stumps.



Conclusion

The bipolar vessel sealer technique appears to be less time-consuming and less blood loss during operation when compared with harmonic shears. Further studies are required with larger number of patients for further opinion regarding best management procedure for TLH.

References

1. Bansal V, Bansal A, Bansal AK, Kumar A. Comparison between bipolar vessel sealer (LigaSure vessel sealer) and harmonic scalpel in total laparoscopic hysterectomy. *Int J Reprod Contracept Obstet Gynecol* 2014;3:1006-9.
2. Whiteman MK, Hillis SD, Jamieson DJ, Morrow B, Podgornik MN, Brett KM, et al. Inpatient hysterectomy surveillance in the United States, 2000-2004. *Am J Obstet Gynecol*. 2008;198:34.e1-7.
3. Johnson N, Barlow D, Lethaby A, Tavender E, Curr E, Garry R. Surgical approach to hysterectomy for benign gynecological disease. *Cochrane Database Syst Rev*. 2006;19(2):CD003677.
4. Hur HC, Guido RS, Mansuria SM, Hacker MR, Sanfilippo JS, Lee TT. Incidence and patient characteristics of vaginal cuff dehiscence after different modes of hysterectomies. *J Minim Invasive Gynecol*. 2007 May-Jun;14(3):311-7.
5. Hefermehl LJ, Largo RA, Hermanns T, Poyet C, Sulser T, Eberli D. Lateral temperature spread of monopolar, bipolar and ultrasonic instruments for robot-assisted laparoscopic surgery. *BJU Int*. 2014 Aug;114(2):245-52.
6. Meikle SF, Nugent EW, Orlear M. Complications and recovery from laparoscopy-assisted vaginal hysterectomy compared with abdominal and vaginal hysterectomy. *Obstet Gynecol*. 1997;89(2):304-11.
7. Campagnacci R, de Sanctis A, Baldarelli M, Rimini M, Lezoche G, Guerrieri M. Electrothermal bipolar vessel sealing device vs. ultrasonic coagulating shears in laparoscopic colectomies: a comparative study. *Surg Endosc*. 2007;21:1526-31.
8. Demirturk F, Aytan H, Caliskan AC. Comparison of the use of electrothermal bipolar vessel sealer with harmonic scalpel in total laparoscopic hysterectomy. *J Obstet Gynecol Res*. 2007;33:341-5.
9. Ashraf TA, Gamal M. Bipolar vessel sealer versus harmonic scalpel in laparoscopic supracervical hysterectomy. *Gynecol Obstet*. 2012;2:5.
10. Akira Tsunoda, Haruki Sada, Takuya Sugimoto, Nobuyasu Kano, Mariko Kawana, Tadanori Sasaki, et al. Randomized controlled trial of bipolar diathermy vs. ultrasonic scalpel for closed hemorrhoidectomy. *World J Gastrointest Surg*. 2011 Oct;3(10):147-52.