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Original Research Article

SUTURE VS VESSEL SEALER IN ABDOMINAL HYSTERECTOMY – AN OBSERVATIONAL STUDY

R. Komathi[1], R Aruna[2], R Sowmiya[3], K. Bharathi[4]

[1]Assistant Professor, Department of Obstetrics and Gynaecology, Government Villupuram Medical College, Tamilnadu, India.
[2]Assistant Professor, Department of Obstetrics and Gynaecology, Government Villupuram Medical College, Tamilnadu, India.
[3]Associate Professor, Department of Physiology, Sri Chamundeshwari Medical College Hospital and Research Institute, Ramanagara, Karnataka, India.
[4]Assistant Surgeon, Department of Obstetrics and Gynaecology, Government Hospital, Ambur, Tamilnadu, India.

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Corresponding Author:
Dr. R Aruna,
Email: dr.aruna.rajendran@gmail.com.

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Abstract

Background: Hysterectomy is one of the most frequently performed gynaecological procedures worldwide, with various surgical methods employed. This study aimed to evaluate the safety and efficacy of electrosurgical vessel sealers during abdominal hysterectomy compared with conventional suturing, focusing on differences in operative time, blood loss, and postoperative pain. **Materials & Methods:** This case-control study was conducted at Government RSRM Lying-in Hospital, Stanley Medical College, Chennai, from January to September 2019, with a sample size of 60 patients, the patients were divided into two groups: 30 undergoing hysterectomy with conventional suturing (Group A) and 30 with electrosurgical vessel sealer (Group B). The patients underwent comprehensive clinical evaluation, laboratory tests, and pre-anesthetic fitness assessments. Operative time, blood loss (measured by pad weight and suction volume), postoperative pain (VAS score), and hospital stay were recorded. **Results:** Group B had a shorter operative time (42.8±4.21 years vs. 45.23±5.13 years, p=0.049) and significantly less intraoperative blood loss (177.5 ± 22.00 vs. 215.33 ± 63.07 mL, p=0.001). Postoperative pain scores were lower in group B on the day of surgery, on postoperative day 1, and on postoperative day 2 (p<0.01). Group B patients, postoperative haemoglobin levels (9.97±1.21 vs. 9.23±0.90 g/dL, p=0.009) and hospital stays (11.83±2.47 days vs14.23±5.09 days, p=0.02). Complications were minimal and intraoperative injuries in group B compared to those in group A, and blood transfusions were lower in group B (3.3 vs. 23.3%). **Conclusion:** The LigaSure electrosurgical vessel sealer provides a safer and more efficient alternative to conventional suturing, reducing operative time, blood loss, and pain, and enhancing recovery in abdominal hysterectomy.

INTRODUCTION

Hysterectomy is one of the most frequently performed gynaecological procedures. Hysterectomy can be performed via vaginal and abdominal routes or laparoscopy. A large-scale survey of hysterectomies has shown that the abdominal route performs 70–80% of hysterectomies. Only 10% of hysterectomies were performed via the vaginal route. More than 5,00,000 women undergo hysterectomy for benign conditions annually in the United States.[1] In India, nationwide statistics for hysterectomy are unavailable. A study conducted in the Northern state of India (Haryana) states that the incidence of hysterectomy was 7% among married women above 15 years of age.[2] Selection of the patient depends for abdominal or vaginal hysterectomy depends on the shape and size of the uterus and pelvis, surgical indications, presence or absence of adnexal pathology, extensive pelvic adhesive disease, surgical risk, hospitalization and recovery length, hospital resources and surgeon's expertise.[1]

Abdominal Hysterectomy allows access to the manipulation of pelvic organs and requires less operating time than laparoscopic or robotic surgeries. The electrothermal bipolar vessel sealing system (EBVS, Ligasure, Covidien Energy-based Devices, Boulder, Colo) has achieved hemostasis in small, medium, and large arteries in several animal studies.[3,4,5] Ligasure, a controlled high-power current at low voltage, melts the collagen and elastin in tissue, leading to permanent fusion of the vascular layers and obliterating the lumen. The device fuses vessels up to 2–7 mm in diameter.[6]

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The application of Ligasure as an alternative to conventional suture techniques for hemostasis during surgery first began in non-gynecologic procedures including hemorrhoidectomies, prostatectomies, and hepatectomies.[7,8] Following Ligasure usage in general surgeries, surgeons started using gynecologic surgery in hysterectomies, including robotic radical parametrectomy.[9] Studies comparing abdominal or vaginal hysterectomies with Ligasure and conventional methods have indicated that there are differing results in the operative time, blood loss, postoperative pain scores, complications, and length of hospital stay associated with these procedures.

Aim

This study aimed to evaluate the safety and efficacy of electrosurgical vessel sealers during abdominal hysterectomy compared with conventional suturing, focusing on differences in operative time, blood loss, and postoperative pain.

MATERIALS AND METHODS

This case-control study was conducted at the Government RSRM Lying-in Hospital, Stanley Medical College, Chennai, from January to September 2019, with a sample size of 60 patients. This study was approved by the Institutional Ethics Committee before initiation, and informed consent was obtained from all patients.

Inclusion Criteria

Patients who underwent abdominal hysterectomy for benign conditions, fibroid uterus, Adenomyosis, AUB, Endometrial hyperplasia and other benign conditions were included.

Exclusion Criteria

Patients with malignancies, coagulation defects and severe comorbidities were excluded.

Methods

The patients were divided into two groups: Group A-control group (n= 30) patients who underwent Abdominal Hysterectomy in a standard manner. The pedicles were clamped, cut and then transfixed using a vicryl 1-0 suture the conventional suturing technique. Group B - study group (n=30) underwent an abdominal hysterectomy with an electrosurgical vessel sealer (biclamp), in which the pedicles were clamped and sealed. The clamp on the pedicles was released after a beep sound from the system and the coagulated pedicle was cut.

Patients were subjected to complete clinical history, general and pelvic examination, complete blood count, serum urea, creatinine, coagulation profile, thyroid function test, ECG, chest X-ray, echocardiogram, viral markers, and other investigations, if necessary. A pre-anesthetic evaluation was performed for fitness.

The procedure time for all patients undergoing hysterectomy was measured from the initial incision on the skin to the complete removal of the uterus. Blood loss was estimated by weighing the pads before and after surgery, and the difference was multiplied by one (as the mean density of blood) and added to the volume in the suction container. All patients were asked to score their pain postoperatively on a picture depicting the visual analogue scale of 0 to 10 on the day of surgery, POD 1, POD2. Postoperative hospital stay was also noted.

Statistical Analysis

Data are presented as mean, standard deviation, frequency and percentage. Continuous variables were compared using an independent-sample t-test. Significance was defined as P values less than 0.05 using a two-tailed test. Data analysis was performed using IBM-SPSS version 25.0 (IBM-SPSS Corp., Armonk, NY, USA).

RESULTS

The mean age of participants in group B was lower than that of group A (42.8 ± 4.21 years vs. 45.23 ± 5.13 years, p = 0.049). Group B had significantly less intraoperative blood loss (177.5 ± 22.00 mL vs. 215.33 ± 63.07 mL, p = 0.001). Postoperative pain scores were lower in group B on the day of surgery (5.53 ± 0.63 vs. 7.27 ± 0.58, p = 0.001), postoperative day 1 (2.93 ± 0.64 vs. 4.3 ± 0.92, p = 0.01), and postoperative day 2 (1.47 ± 0.51 vs. 2.07 ± 0.64, p = 0.001), group B had higher postoperative haemoglobin levels (9.97 ± 1.21 g/dL vs. 9.23 ± 0.90 g/dL, p = 0.009) and had a hospital stay (11.83 ± 2.47 days vs. 14.23 ± 5.09 days, p = 0.02). [Table 1]

Postmenopausal bleeding occurred only in group B 2 (100%), while postmenopausal bleeding with irregularities occurred in group A 1 (100%). Women with two births were more common in group B 25 (55.6%), while three births were higher in group A 6 (75%). Diagnostically, adenomyosis was more common in group A 3 (60%), while abnormal uterine bleeding in 11 (55%) and thickening of the uterine lining in 3 (60%) were more common in group B. Fibroids were similar in group A 15 (55.6%). Postoperative complications were minimal, wound discharge occurred only in group A 3 (100%), and wound healing was equal to 1 (50% each). [Table 2]

Previous caesarean sections were equal, with 7 (50%) in group A and 7 (50%) in group B. Intraoperative complications occurred in 1 (100%) in group A and none in group B. Regarding blood transfusions, 7 (87.5%) were in group A, while 1 (12.5%) was in group B. [Table 3]

Table 1: Comparison of clinical and surgical outcomes between groups

	Mean ± SD		P value
	Group A	Group B	
Age (in years)	45.23±5.131	42.8±4.213	0.049
Blood loss	215.33±63.067	177.5±22.001	0.001

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Postop pain on DOS	7.27±0.583	5.53±0.629	0.001
Postop pain on POD 1	4.3±0.915	2.93±0.64	0.01
Postop pain on POD 2	2.07±0.64	1.47±0.507	0.001
Postop Hb	9.23±0.8991	9.97±1.2092	0.009
Postop stay in days	14.23±5.09	11.83±2.465	0.02

Table 2: Comparison of demographics, diagnosis, and postoperative complications between groups

		(%Count)	
		Group A	**Group B**
Menstrual H/o	RMP	15 (48.4%)	16 (51.6%)
	IRMP	12 (52.2%)	11 (47.8%)
	PM	0	3 (100%)
	PMBM (postmenopausal)	2 (100%)	0
	Irregular	1 (100%)	0
Parity	0	2 (66.7%)	1 (33.3%)
	1	0	100%
	2	20(44.4%)	25 (55.6%)
	3	6 (75%)	2 (25%)
	4	2 (66.7%)	1 (33.3%)
Diagnosis	Adenomyosis	3 (60%)	2 (40%)
	Fibroid	15 (55.6%)	12 (44.4%)
	AUB	9 (45%)	11 (55%)
	Endometrial hyperplasia	2 (40%)	3 (60%)
	Benign adnexal lesion	1 (33.3%)	2 (66.7%)
Postoperative Complications	NIL	26 (47.3%)	29 (52.7%)
	Haemorrhage	0	0
	Thermal burn	0	0
	Wound discharge	3 (100%)	0
	Wound gapping	1 (50%)	1 (50%)

Table 3: Comparison of previous caesarean, intraoperative complications, and blood transfusion between groups

		(% Count)	
		Group A	**Group B**
Previous Caesarean	Yes	7 (50%)	7 (50%)
	No	23 (50%)	23 (50%)
Intraoperative complications	Yes	1 (100%)	0
	No	29(49.2%)	30(50.8%)
Blood transfusion	Yes	7 (87.5%)	1 (12.5%)
	No	23 (44.2%)	29 (55.8%)

DISCUSSION

In our study, the operative time in the vessel sealer group was shorter than that in the conventional suture group. Our study result is similar to the study of Aydin et al. on "Efficacy of electrosurgical bipolar vessel sealing for abdominal hysterectomy with uterine myomas more than 14 weeks in size: a randomized controlled trial" observed that the LigaSure device significantly reduced the operation time ($p<0.05$), no significant difference was determined in haemoglobin reduction, hospital stay and visual analogue scale parameters between the two groups.[6]

When the two groups were compared, it was observed that the LigaSure device significantly reduced the operation time ($p<0.05$), supported by the Askin et al. study on "Comparison of the Electrosurgical Bipolar Vessel Sealing with the Standard Suture Technique in patients with Diverse Benign Indications for Abdominal Hysterectomy: A Controlled Trial". The median operation of Ligasure was 105 min (range 70-175) compared to 130 min (range 60-230) with the standard suture technique ($p=0.001$).[10]

In the study group, the mean blood loss was 177.5 ml. In the control group, the mean blood loss was 215.33 ml ($p<0.001$); thus, the difference in blood loss was significant. It is like the study of Chanchai et al., "Comparison of Conventional Suture versus Electrosurgical Bipolar Vessel Sealing in Abdominal Hysterectomy: A Randomized Control Trial". Mean intraoperative blood loss in the conventional suture group was 357±245.34 ml versus 248.33±154.52 ml for the Biclamp group ($p=0.04$).[11]

In the control group, 1 patient had a bladder injury, and in the study group, there were no intraoperative complications ($p=0.3$). Hence, there were no significant differences in intraoperative complications between the suture and vessel sealer groups. Similarly, a study by Filho et al. showed that the overall complication rate in the study was 7.8% (7/90) and did not differ between patients in the BVSS and control groups. Therefore, Bipolar vessel sealing for vaginal hysterectomy appears to be an effective and safe hemostatic control method with reduced operating time, perioperative blood loss, postoperative pain, and hospital stay.[12]

In the study group,1 case (3.3%) had wound gapping compared to the control group, which had three cases of wound discharge (10%), and one case (3.3%) had wound gapping. There were no cases of postoperative

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haemorrhage or thermal burns in either group. The incidence of postoperative complications appeared to be lower in the vessel sealer group. In the control group, seven patients had intraoperative or postoperative blood transfusions (23.3%), and in the study group, one patient (3.3%) had blood transfusions. The suture group required more blood transfusions than the vessel sealer group did. A meta-analysis by Roger et al. proves surgical sealants appear to reduce suture-hole bleeding significantly in vascular prosthetic graft anastomoses compared with standard haemostatic measures.[13]

In the control group, the mean postoperative pain calculated with a visual analogue scale was 7.27 In the study group the mean post-operative pain was 5.53 on DOS. In the Control group, the mean postoperative pain on POD1 and POD2, calculated with a visual analogue scale was 2.93 and 1.47, respectively, which was lower than the mean postoperative pain in the control group on POD1 and POD2, with a visual analogue pain scale of 4.3 and 2.07, respectively. This result regarding postoperative pain is similar to that reported by Askin et al. "Comparison of the Electrosurgical Bipolar Vessel Sealing with the Standard Suture Technique in Patients with Diverse Benign Indications for Abdominal Hysterectomy: A Controlled Trial" which found there was a significant reduction in postoperative pain in patients underwent hysterectomy with vessel sealer.[10] The study by Peker et al. Postoperative pain and required analgesic dose were significantly lower for conventional haemorrhoidectomy.[14]

In the study group, the mean postoperative haemoglobin level (9.97) was higher than that in the control group (9.23). This result is similar to the Chanchai et al. study conducted in Phuket, the median value of the reduction in haemoglobin in the vessel sealer group is lower compared to the suture group.[11] In the study group, the mean postoperative hospital stay is 11.83 days. In the control group, the mean length of postoperative hospital stays was 14.23 days (p=0.020); this result appeared to be significant.

CONCLUSION

In conclusion, the LigaSure vessel sealer has emerged as a transformative tool for abdominal hysterectomy, offering significant advantages over conventional suturing techniques. Its ability to reduce the operative time by combining vessel sealing and tissue cutting in a single step enhances surgical efficiency and minimizes the burden on operating room resources. Furthermore, the superior hemostatic capabilities of LigaSure result in significantly less intraoperative blood loss, which is particularly beneficial in patients with pre-existing anaemia or coagulopathies. Postoperative recovery is also improved as reduced tissue trauma and inflammation contribute to lower pain levels and faster mobilization. While the initial costs may be higher, the overall cost-effectiveness of LigaSure, due to reduced complications, shorter hospital stays, and faster recovery times, makes it a greater choice in modern surgical practice. Hence, LigaSure represents a safer, more efficient, and patient-friendly approach to abdominal hysterectomy with the potential to set new standards in surgical care.

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