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Original Research Article

## Suture versus vessel sealer in vaginal hysterectomy: an observational study

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### ABSTRACT

**Background:** Vaginal route is considered to be the method of choice for removal of uterus and, in the absence of gross pelvic disease, can be carried out in most patients. Recent studies have shown that less than one-third of hysterectomies are performed vaginally. This could be due to technical difficulties occurring while operating in the narrow surgical field. This study was taken up to find out the easier alternatives in securing pedicles by using Electrosurgical Bipolar Vessel Sealer in Vaginal Hysterectomy.

**Methods:** A prospective observational study was conducted in the Department of Obstetrics and Gynaecology, BRD Medical College, Gorakhpur over a period of one year i.e. July 15 to June 16. A total of 62 patients posted for vaginal hysterectomy for benign conditions were enrolled after informed consent. Results were recorded under headings of procedure time (min), blood loss (ml), major intra-operative complications and post operative complications, post-operative pain (on VAS) and duration of hospital stay.

**Results:** Mean procedure time in suture method was found to be 55.66min, whereas, in sealer group it was 27.75 min. Mean blood loss in the sealer group was 83.78ml, while, in suture group it was 156.62ml. Mean pain score on Visual Analogue Scale on POD 1 was 8.44±1.1522 for suture group and 6±1.325 for sealer group. Mean pain score on POD2 in sealer group was 3.48±1.325 and in the suture group it was 5.31±1.754 (P<0.0001). Mean pain score on POD3 in suture group 2.82±0.508, in sealer group it was 1.0909±0.608 (P<0.0001). Pain scores, thereafter, did not differ significantly. Mean length of stay in suture group is 10.71 days (suture group) versus 5.3 days (sealer group). Blood loss >200ml was observed in 29.03% of suture cases, none in the sealer group (P-value .0006). Labial burn occurred in 2 out of 32 patients in sealer group.

**Conclusions:** From above study, we conclude that bipolar vessel sealer has shown a significant reduction in intra-operative blood loss, procedure time, immediate post-operative pain (POD1,2&3), mean length of stay in hospital, major intra-operative blood loss>200ml which was found in significant number of cases in suture group.

**Keywords:** Blood loss, Conventional sutures, Electrosurgical bipolar vessel sealer, Vaginal hysterectomy

### INTRODUCTION

Vaginal route is considered to be the method of choice for removal of uterus and, in the absence of gross pelvic disease, can be carried out in most patients.<sup>1-4</sup> Recent

studies have shown that less than one-third of hysterectomies are performed vaginally.<sup>5,6</sup> The advantages of vaginal hysterectomy include less perioperative morbidity, shorter hospitalization, and early return to normal activity.<sup>7</sup> Despite these advantages of vaginal hysterectomy, only one third of hysterectomies

are done vaginally because of the limited surgical planes for securing the pedicles.<sup>7-9</sup> Of particular concern for vaginal surgeons is the ability to assess, visualize and ligate structures while maintaining adequate hemostasis during the vaginal approach through a small opening. To create adequate visualisation, traction is applied to the tissue. This might cause not only increased postoperative pain, but also nerve damage, possibly explaining the increased rate of postoperative micturition symptoms found after vaginal hysterectomy.<sup>10,11</sup>

The present study was planned to evaluate the use of electrosurgical bipolar vessel sealer as it is expected that bipolar vessel sealer reduces the blood loss and procedure time when compared to conventional suturing. Its use is also expected to lower the major intra-operative and post-operative complications, as well as the mean hospital stay.

## METHODS

A prospective observational study was conducted between July, 2015 to June 2016 in Department of Obstetrics and Gynecology, BRD Medical college, Gorakhpur. A total of 62 patients participated in this study. Detailed history, preoperative examination and investigations were recorded on predesigned proforma. Patients were subjected to preanesthetic checkup and fit patients were taken up for vaginal hysterectomy.

Vaginal hysterectomy was performed in a standard fashion for both the study groups. Pedicles were clamped, cut and then transfixed (uterine artery pedicle was ligated) using vicryl (polyglactin 910) 1-0 suture by conventional suturing technique in the suture group. For those patients operated by electrosurgical bipolar vessel sealer, vessel sealer was used on all of the pedicles on both the sides (cardinal ligament, broad ligament including the uterine arteries, and the round and utero-ovarian ligaments). The pedicles were clamped and sealed. The clamp was released after the beep from the system (indicating adequate coagulation) and coagulated pedicle was then cut. The procedure time for all cases was measured from initial incision on the vaginal mucosa to complete removal of uterus. Time taken for pelvic repair and other concomitant procedures was not included. Blood loss was estimated by weighing the mops on weighing scale (taking initial weight of dry mop and final weight of wet mop and taking the difference of two), multiplying by 1.0 (as mean density of blood) and adding to this the volume obtained in suction container, if any, to obtain blood loss in ml. All patients were asked to score their pain post-operatively on the picture depicting the Visual Analogue Scale (VAS) on a scale of 0 to 10 visual scale (0=no pain; 10=unbearable pain). Patients were re-evaluated post-operatively on the same evening and then daily during their stay in hospital. Patients were discharged on the advice of the consultants after patients' vitals were stabilised, they resumed bladder and bowel function and pain relieved consistently.

## RESULTS

Mean age for suture group was 49.82 years, whereas, mean age for suture group was 50.42 years. Age-wise distribution of patients of both groups shows that the two groups are comparable. Out of a total of 62 patients taken, 53.22% cases were done using vessel sealer rest 46.77% were done using conventional suturing. Choice of method used was solely surgeon's decision.

**Table 1: Distribution of patients based on indication for vaginal hysterectomy.**

Indication for VH	Vessel sealer	%	Suture	%
Utero-cervical descent	25	40.32	24	38.70
Myoma uterus	5	8.06	3	4.8
AUB	3	4.83	2	3.22

Table 1 shows the distribution of patients undergoing vaginal hysterectomy for various indications. 79.03% of all, underwent hysterectomy for utero-vaginal descent, 12.90% for myoma uterus and 8.06% cases for abnormal uterine bleeding.

**Table 2: The procedure time taken by each method.**

Time interval	Suture	%	Sealer	%
20-30 min	0	0	20	33.3
30-40 min	0	0	10	16.6
40-50 min	5	8.3	2	3.3
50-60 min	5	8.3	0	0
60-70 min	3	5	0	0
70-80 min	3	5	0	0
80-90 min	2	3.3	0	0
>90 min	10	16.6	0	0
Mean	55.66667		27.75	

Table 2 shows procedure time taken by the two methods. Individual time taken was noted for each case. Mean, median and standard deviation were calculated for the two groups. To this data unpaired t-test was applied. ( $P < 0.0001$ ) The difference was significant.

**Table 3: Blood loss in the suture group.**

Volume interval	Suture	%
120-140 ml	8	13.3
140-160 ml	5	8.3
160-180 ml	4	6.6
180-200 ml	0	0
200-220 ml	0	0
220-240 ml	11	18.3
Mean	156.62ml	

Table 3 and 4 are depicting the blood-loss in the two groups. In the sealer group, mean blood loss was 83.78ml while in suture group mean blood loss was 156.62ml. By

applying unpaired-t test to this data, p-value obtained was <0.0001 which is statistically significant.

**Table 4: Blood loss in the sealer group.**

Volume interval	Sealer	%
60-80ml	10	31.25
80-100 ml	11	34.37
100-120ml	3	9.37
120-140 ml	2	6.25
140-160 ml	5	15.62
160-180 ml	2	6.25
Mean	83.78ml	

**Table 5: Post-operative pain score on visual analogue scale.**

Avg VAS pain score on	Sealer group	Suture group
Post-op day 1	6.15	8.44
Day 2	3.48	5.31
Day 3	1.090	2.8422
Day 4, 5, 6, 7	1	1

Table 5 shows comparison of mean pain scores on Visual Analogue scale. Mean pain score on VAS on evening of surgery (POD1) was 8.44±1.1522 for suture group Whereas, mean pain score of sealer group was 6.15±1.325. On applying unpaired t-test p value obtained was less than .0001. Mean VAS score on POD2 in sealer group was 3.48±1.325. Mean VAS score on POD2 in suture group was 5.31±1.754 (p<0.0001). Mean pain score on POD3 in suture group 2.82±0.508, in sealer group it was 1.0909±0.608 (p<0.0001). Pain scores, thereafter, did not differ significantly between the two groups after day three.

**Table 6: Mean hospital stay.**

	Suture	Sealer	P value
Mean hospital stay	10.71	5.3	
Standard deviation	2.08	2.059	<0.001

Table 6 shows average length of hospital stay in days. Mean length of stay in suture group is 10.71±2.08 days, whereas, mean length of stay in sealer group was 5.3±2.059 days. Average length of hospital stay is significantly less in sealer group as compared to suture group.

Table 7 shows major intra and post-operative complications. Blood loss >200ml as major intra-operative complication was observed in 29.03% of suture cases, whereas, none of the sealer group patients had such an amount of blood loss. The difference is statistically significant (p<0.0006). Bladder perforation was seen in 6.8% cases in suture group and 3.1% cases in sealer group. There is no significant difference between the two groups. Labial burn is purely a complication of sealer

group and was not found in suture group. Amongst those who underwent VH with vessel sealer, 2 patients, out of 32 i.e. 6.8% patients had labial burn.

**Table 7: Major intra and post-operative complications.**

Complications	Suture	Sealer	P value
Blood loss >200ml	9 (29.03%)	0 (0%)	0.0006
Bladder perforation	2 (6.8%)	1 (3.1%)	>0.001
Labial burn	0 (0%)	2 (6.8%)	>0.001

## DISCUSSION

Fewer than 30% of all hysterectomies in the UK are currently performed via the vaginal route.<sup>12</sup> In India, vaginal route accounts for only 17.8%. This could be due to technical difficulties encountered during vaginal surgery.<sup>13,14</sup> Therefore, it is important to investigate alternatives in surgical technique so that more surgeons are encouraged to operate vaginally. Technological advances in haemostatic methodology have provided the surgeons with a number of alternative methods for achieving haemostasis. High frequency electrocautery has been the workhorse of operating rooms and recent development of an electrosurgical bipolar vessel sealer offers vaginal surgeons a safe and effective alternative haemostatic method. The device delivers a controlled high-power current at low voltage to melt the collagen and elastin in the tissue leading to permanent fusion of the vascular layers and obliteration of the lumen. The collagen and elastin within the tissue reform to create a 'seal zone' which appears as a distinctive, translucent area and has plastic resistance to deformation. In addition, the vessel sealing mechanism produces significantly reduced thermal spread compared with existing bipolar instruments, as energy is automatically switched 'off' when tissue impedance reaches a critical level. The current delivered to achieve haemostasis takes between 2 and 7 seconds, and hence, can be relatively faster compared with suture ligation. Electrocoagulation diathermy is unreliable for vessels larger than 2 mm in diameter. Electrosurgical bipolar vessel sealer consists of a specialised electrosurgical generator and handset which can effectively seal vessels and vascular bundles upto 7mm in diameter. It has been found that operating time, operative blood loss and average length of hospital stay are significantly lower when operating with electrosurgical vessel. Placing sutures high in the pelvis, under and around a narrow pubic arch is difficult. Vessel sealer seems uniquely suited for vaginal surgeries.

Mean age for suture group was comparable to that of sealer group was 49 years versus 50.42 years as seen in other studies (Lakeman et al, Lewy et al, Ibrahim et al and Hefni et al).<sup>12,15-17</sup> Most common indication for vaginal hysterectomy in our patients was utero-vaginal descent 79% (49 out of 62). The second most common indication was myoma uterus in 12.9% (8 put pf 62). Myomas upto 16 weeks size were included in our study. Hysterectomy

was done for abnormal uterine bleeding (AUB) in 8.06%. Most studies had similar indications for vaginal hysterectomies, though, Lakeman et al excluded utero-vaginal descent. They included patients with abnormal uterine bleeding, post-menopausal bleeding, dysmenorrhoea, mechanical discomfort and cervical pathologies.<sup>15</sup>

Present study depicted significant reduction in the operative procedure time. The intra-operative procedure time was noted beginning from initial incision on vaginal mucosa till complete removal of uterus. This end point was deliberately chosen to exclude the procedure time for cystocele, enterocele, rectocele repair and other concomitant procedures that were done according to the needs of patients.

Mean procedure time in sealer group was 27.75min, whereas, in the suture group it was 55.66min, the difference being significant statistically ( $P < 0.0001$ ). Most studies, indeed, depicted reduction in intra-operative time such as those of Ding et al. (30 min versus 61min) and Ibrahim et al (40±8min versus 65±10minutes).<sup>12,18</sup> In a few studies, however, the difference did not reach significance in terms of intra-operative time such as those of Lakeman et al. (71.3 min versus 59.7 min); Hefni et al (57 versus 66 minutes) and Cronje and de Coning (32 min versus 40 min).<sup>15,17,19</sup>

There was a significant reduction in intra-operative blood loss. Mean blood loss in the sealer group was 83.78 ml and in the suture group it was 156.62 ml. These observations were conforming with those of Lewy et al. (68.9 ml sealer group versus 126.7 ml in suture group), Elhao et al (230ml in sealer group versus 360ml in suture group), Silva Fihó et al (84±5.9 ml in sealer versus 136.898 ml in suture group).<sup>16,21,22</sup> Relatively more number of women had blood loss >100 ml in suture group i.e. 34 out of 86 versus 9 out of 88 patients in the sealer group in the study by Zubke et al.<sup>20</sup> Even though most studies noted this difference in blood loss, studies of Hefni et al and Cronje and de Coning did not find any significant difference in blood loss between the two group of patients.<sup>17,19</sup>

We evaluated post-operative pain on Visual Analogue Scale on a score of 1-10. Average pain score on the evening after surgery was 8.44±1.1522 for suture group and 6±1.325 for sealer group ( $p < 0.0001$ ). Mean pain score on post-operative day two and three also reached statistical significance ( $P < 0.0001$ ). Thereafter, the pain scores did not differ much between the two groups and mean was 1 for both the groups. Significant reduction in pain score was also noted by Ibrahim et al, and Cronje and de Coning.<sup>12,19</sup> Zubke et al noted a significant reduction in post-operative pain medication.<sup>20</sup> Lakeman et al, however, found that the post-operative pain was significantly different only on the evening after surgery, while, the pain scores and the return to normal activities in the two groups from the next day onwards.<sup>15</sup>

Major intra-operative complications were noted in the forms of bladder perforation, major blood loss >200ml and labial burn. None of the cases operated in our theatre had major hemorrhagic complications as requiring conversion to abdominal route, or a bowel perforation, slippage or retraction of stump or a readmission for bleeding. Bladder perforation was noted in 6.8% cases in suture arm and 3.1% cases in sealer group ( $p < 0.006$ ) which was not statistically significant. Ibrahim et al. found no significant complication regarding intra-operative and immediate post-operative period with regard to major blood vessels injury, ureteric injury, and bladder injury.<sup>12</sup> No significant difference in terms of bladder injury was found in any of the other studies either. Hefni et al in their RCT found the incidence of peri-operative haemorrhagic complications was lower in the LigaSure group (0/57 (0%) vs 4/59).<sup>17</sup>

Labial burn is purely a complication of sealer group, 2 patients out of 32 i.e. 6.8% patients had labial burn. Both were superficial, <1cm burns, were managed conservatively with daily dressing and healed well without scarring. Hefni et al and Zubke et al, each had one case in sealer group.<sup>17,19</sup> The burn was superficial and was managed conservatively.

Mean length of stay at hospital was significantly less in the vessel sealer group (mean 5.3 days) compared to suture group (mean 10.71 days). A significant reduction in hospital stay was also seen by Clave et al (6 days vs 1 day), Ding et al (1.2 vs 3 days), Lewy et al (1 vs 3 days) and Zubke et al (6.6 vs 7.4 days).<sup>16,18,20,23</sup> Cronje and de Coning did not find a significant difference.<sup>19</sup>

We conducted present study on a mixed group of patients with various indications, with different surgical difficulties in different groups. Inferences of each indication could not be drawn. Other limitations were small sample size and lack of randomisation, as done in other studies. In order to give more valuable results, further research is needed with larger sample size.

## CONCLUSION

Bipolar vessel sealer is an effective alternative to conventional suturing in vaginal hysterectomy. Significant reduction in intra-operative blood loss, procedure time, immediate post-operative pain, significant difference in VAS on POD1,2,3 and mean length of stay in hospital was seen. Major intra-operative blood loss >200ml which was found in significant number of cases in suture group. However, we found no significant difference in major intra-operative complications in terms of bladder or bowel perforation. None of the patients in our study needed conversion to laparotomy or readmission for any major bleeding. Labial burn occurred in 2 patients which was superficial burn <1cm and healed well with conservative management. As students need training in vaginal hysterectomy because of technical skills needed which are difficult to acquire,

especially with a narrow surgical field, vessel sealer appears safer and more effective in the hands of trainees and relatively less experienced surgeons as much as more experienced ones. No such study has been conducted in this part of India. Present study was conducted to find easier alternatives to minimize the technical difficulties in vaginal hysterectomy

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