

Comparative Study between Monopolar Electrodes and Bipolar Electrodes in Hysteroscopic Surgery

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ABSTRACT

Background: The hysteroscopic surgery has become a simple and safe technique, with the use of small hysteroscopes and bipolar energy with trained surgeons, which can prevent abortions and probably increase fertility.

Aim: The study was conducted to evaluate the outcomes after hysteroscopic surgery by using unipolar or bipolar electrodes.

Setting and Design: At the department of Obstetrics and Gynaecology, Qena university hospital and is a prospective non randomized clinical study.

Materials and Methods: One hundred fifty patients who included in this study were non randomly classified into two groups; one for hysteroscopic surgery by using bipolar electrode and the second group using unipolar electrode. Operative complications; bleeding, perforation, fluid over load and hyponatraemia were recorded. Also, operative time and hospital stay were included.

Results: There were no statistically significant differences between both groups in patient's characteristics, ultrasonographic findings, serum sodium levels before surgical interference, perforation and intraoperative bleeding. The fluid overload was significantly higher in unipolar group (p value= 0.03), postoperative hyponatraemia was significantly marked in unipolar group ($p < 0.05$) and the changes of the levels of serum sodium in unipolar group in comparison to bipolar group were significantly different ($p = 0.01$). The mean operative time was significantly less in the bipolar group when compared to the unipolar group ($p = 0.01$) and the hospital stay was obviously less for patients of the bipolar group in comparison to unipolar group ($p = 0.04$).

Conclusion: Operative hysteroscopy using bipolar electrodes associated with significant decrease in hyponatraemia, operative time and postoperative hospital stay. So, it is safe and effective method when compared to using the unipolar electrodes.

Keywords: Fertility, Hysteroscopes, Operative hysteroscopy

INTRODUCTION

Hysteroscopic surgery is an effective and safe method. Also, it has the advantages of rapid recovery, early return to normal activities and reduced hospital stay for the patient [1]. The unipolar electrode was the first electrode designed for resectoscopy that required non electrolytic solutions, which may cause changes in serum electrolyte levels [2]. Mini-hysteroscopes with bipolar electrodes with use of isotonic saline reduce the risk of electrical burns due to proximity of the electrodes and electrolyte imbalance [3].

Septate uterus can be responsible for recurrent miscarriages and infertility. Hysteroscopic septoplasty has become simple, safe and an effective procedure for prevention of abortions and probably increase fertility with the use of bipolar energy [4]. Monopolar or bipolar resectoscope efficacy in operative hysteroscopy is same for both. But no study has found the increased reliability of bipolar resection, which makes it to be considered as a gold standard [5]. This study was conducted to evaluate the outcomes after hysteroscopic surgery by using monopolar or bipolar electrodes.

MATERIALS AND METHODS

This is a prospective non randomized clinical study; it was performed at the department of Obstetrics and Gynaecology, Qena university hospital. In this study we included 150 patients with uterine size less than 12 weeks and cavity depth less than 12 cm. Different types of intrauterine lesions (submucous fibroids of types 0, 1 and 2 with diameter less than 4 cm, polyps and septum) from January 2013 until March 2015. The patients with contraindications to hysteroscopic surgery and intrauterine adhesions were excluded.

An informed written consent was taken from every participant in the study. The study was approved from the ethical committee for Medical Research Ethics of the Faculty of Medicine, South Valley University, Egypt.

Preoperative evaluation by detailed history, physical examination and 2D transvaginal ultrasound (GE ultrasound, logic p5) were used to measure anterior-posterior diameter, fundal-isthmic length, diameter of fibroids and polyps, length of the uterine septum and endometrial thickness. Blood picture, serum creatinine, coagulation profile, blood sugar, liver function test and serum sodium level were done. The patients were allocated into two groups; group A was for unipolar electrode (karl Storz unipolar resectoscope) and group B was for bipolar electrode (olympus bipolar resectoscope).

Preoperative 200 microgram prostaglandin E1 (misopros, Multipharma Company, Egypt) was taken vaginally from 3-6 hours as a cervical priming agent. The operations were performed under general anaesthesia, after dilatation of the cervix to Hegar 9 or 9.5. The automatic pressure cuff (Olympus) maintained an infusion pressure of 120 mm Hg, and suction of 10-15 mm Hg was applied to the outflow tube to achieve a sufficient flow. All fluid from the outflow tube was collected, and the difference between this and the fluid used were recorded as deficit. The tissue chips were removed at intervals by using curette and forceps. The specimens were sent for histological analysis.

Intraoperative complications such as perforation, heavy bleeding were recorded and the average change in serum sodium levels from baseline at the initiation of the procedure to immediately after the procedure in both groups was considered as a primary

outcome, while the secondary outcome was the average operating time (resection time was recorded by time from introduction of the resectoscope into the uterus to time of removal of the resectoscope) and hospital stay.

STATISTICAL ANALYSIS

Statistical analysis was performed using SPSS software (version 16.0) and statistical significance was considered using student's t-test for real number, and Pearson Chi-square test (χ^2 test) for non-real variables. A p-value of ≤ 0.05 was considered statistically significant.

RESULTS

A total of 156 patients were eligible for hysteroscopic surgery and 39 patients failed to fulfill the inclusion criteria, 3 patients refused to sign the consent for surgery. One hundred and fifty three patients were enrolled in the study but before the time of the operation 3 patients were excluded by anaesthesia team for multiple indications. Only 150 from 195 patients were enrolled in the study and allocated into two groups.

The patient's characteristics including age, parity, recurrent pregnancy loss, menometrorrhagia, postmenopausal bleeding, submucous fibroid, endometrial polyp, uterine septum and fibroid polyp were similar in both groups. There were significant differences between groups with infertility and menorrhagia ($p < 0.001$) [Table/ Fig-1].

Charecteristics	Unipolar group	Bipolar group	p-value
Age (years)			
Mean \pm S.D	39.13 \pm 13.87	41.03 \pm 15.52	0.72
Median (range)	35 (21-66)	38 (17-75)	
Parity			
0-1	15 (20%)	36 (48%)	0.54
2	25 (33.3%)	9 (12%)	
≥ 3	35 (46.7%)	30 (40%)	
Infertility			
Primary	5 (6.6%)	20 (26.6%)	0.01
Secondary	2 (2.6%)	8 (10.6%)	0.04
Recurrent pregnancy loss	12 (16%)	7 (9.3%)	0.21
Menorrhagia	36 (48%)	9 (12%)	0.001
Menometrorrhagia	6 (8%)	11 (14.6%)	0.19
Postmenopausal bleeding	14 (18.6%)	20 (26.6%)	0.12
Submucous fibroid	8 (10.6%)	5 (6.7%)	0.38
Endometrial polyp	33 (44%)	38 (50.6%)	0.21
Uterine septum	15 (20%)	20 (26.6%)	0.23
Fibroid polyp	19 (25.3%)	12 (16%)	0.15

[Table/Fig-1]: Patients characteristics in both groups
All data expressed as number and percentage except the age

Ultrasonographic findings Mean \pm S.D	Unipolar group	Bipolar group	p-value
AP diameter (cm)	5.32 \pm 0.25	4.92 \pm 0.68	0.07
FI length in (cm)	6.48 \pm 0.41	6.48 \pm 0.65	0.9
Endometrial thickness (mm)	12.76 \pm 6.71	13.99 \pm 8.21	0.3
Fibroid size (cm)	2.82 \pm 0.98	2.81 \pm 0.89	0.7
Endometrial polyp size (cm)	1.93 \pm 0.57	1.72 \pm 0.75	0.7

[Table/Fig-2]: Ultrasonographic findings of the patients in both groups
SD: standard deviation, A.P: anterioposterior
FI: fundal isthmic, cm: centimeter
mm: millimeter

Parameters		Unipolar group	Bipolar group	p-value
Serum sodium (mmol/L) Mean \pm S.D	Preoperative	138.11 \pm 0.91	138.05 \pm 1.55	0.97
	Postoperative	134.84 \pm 1.54	137.39 \pm 1.83	0.05
	Change in level	4.77 \pm 0.831	0.66 \pm 0.31	0.01
Operative time (Min)	Mean \pm SD	31.93 \pm 12.92	17.15 \pm 13.92	0.01
	Median (range)	45 (15-60)	55 (5-60)	
Hospital stay (hours)	Mean \pm SD	11.20 \pm 6.645	4.68 \pm 3.749	0.04
	Median (range)	30 (6-36)	23 (1-24)	

[Table/Fig-3]: The outcomes in both groups

Mmol/L: Milli mole per liter

SD: Standard deviation

Min: Minute

There were no statistically significant differences in all the ultrasonographic parameters of the lesions in both groups ($p > 0.05$) [Table/Fig-2]. There were no significant differences between both groups as regard to the intraoperative bleeding and perforation while, this difference was statistically significant (p -value= 0.03) as regard to the fluid overload; (16% in unipolar group and 2.7% for bipolar group).

Also, no differences in the serum sodium levels before surgical interference in both groups ($p > 0.05$), while the postoperatively levels were significantly different between two groups ($p < 0.05$) and the changes of the levels of serum sodium in unipolar group in comparison to bipolar group were significantly different ($p = 0.01$) [Table/Fig-3].

The mean operative time was markedly less in the bipolar group when compared to the unipolar group and this difference was statistically significant ($p = 0.01$) and the hospital stay was obviously less for patients of the bipolar group in comparison to unipolar group ($p = 0.04$) [Table/Fig-3].

DISCUSSION

The safety and the efficacy of the type of electrosurgery was a matter of debate. Bipolar electrosurgery is an innovation was firstly used in traditional open and laparoscopic surgery. Many researchers started to address the safety and efficacy of bipolar electrosurgery in hysteroscopic surgery, so in this study we try to compare between the traditional unipolar electrosurgery with bipolar surgery in some types of hysteroscopic procedures as regard their safety and efficacy.

Fortunately, in our study the patient's characteristics in both groups were nearly comparable. This is in agreement with many studies [5,6], however, this is not supported by another study [2]. In our study the most frequent complaint was menorrhagia, in the unipolar group, and infertility was the most frequent complaint in the bipolar group, these results were supported by a Norwegian study [2].

In our study, endometrial polyp was the most frequent type of lesion in both groups. Many studies supporting that [6,7], these studies are not global like our study but more specific to one type of lesion. The ultrasonographic parameters of the lesions, intraoperative bleeding and perforation in both groups were similar and these are supported by Berg et al., study [2].

Fluid overload was markedly noticed in patients included in unipolar group when compared with those in bipolar group. This was also concluded by Litta et al., who discussed hysteroscopic myomectomy and reported that intraoperative complications are nil in bipolar group, but sample size was of a great conflict as bipolar group was of 60 patients only which is different from unipolar group where 216 case were involved [8].

Our study demonstrated that the use of glycine 1.5% as distension media increased the risk of reducing serum sodium, as preoperative serum sodium levels in both groups were similar and postoperative levels were significantly decreased in unipolar group in comparison with preoperative level in the same group and those of bipolar

group which not changed significantly postoperatively, this is in accordance with the results of another studies, as the operative data reported a significant drop in serum sodium at the end of operation was found in the unipolar group, compared with the two other groups using bipolar energy, where the change was significant [2,9,10]. On the contrary, Youssef, reported that there was no statistically significant difference between both groups regarding operative complications; this study was confronted with uterine septum surgery only, with a sample size of 84 patients [11].

As regard to operative time in our study, the mean operative time was significantly less in the bipolar group when compared to the unipolar group. This is in agreement with an Egyptian study which found the similar results [11]. In another study, authors concluded that, the operative time was in significantly greater in the unipolar group in comparison to the bipolar group [8]. However, Berg et al., reported that, the operative time was much less than our study and the mean time for the unipolar group was shorter than that needed in the bipolar group [2]. This is also in disagreement with what Roy et al., mentioned in their study as there was no difference in the operative time needed in both groups [10].

The mean hospital stay was obviously less in the patients of the bipolar group in comparison with those of the unipolar group. The difference in both groups may be due to the more frequent complication associated with the unipolar group which was caused mainly by fluid overload by the glycine 1.5% used as the distension media. This finding supported by Youssef study [11] and in contrary with Berg et al., and Guida et al., where in both studies there was no significant difference in hospital stay between unipolar and bipolar group [2,7].

LIMITATION

There was a limitation in this study in dealing with the patients diagnosed to have intrauterine adhesions to avoid exposure of the patients to hazards due to lack of experience with hysteroscopic surgery for intrauterine adhesions.

CONCLUSION

Operative hysteroscopy using bipolar electrodes with saline 0.9% are associated with significant decrease in hyponatraemia, operative time and postoperative hospital stay. So, it is safe and effective method when compared to using the unipolar electrodes with glycine 1.5%.

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