Effect of oxytocin infusion on reducing the blood loss during abdominal myomectomy: A randomized double-Blind controlled trial

Original Article

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ABSTRACT

Background: Oxytocin is the agent of choice in the prevention of postpartum uterine atony and bleeding. This study aims at assessment of the efficacy of oxytocin infusion on reducing blood loss during abdominal myomectomy.

Materials and Methods: The current study was a randomized double-blind controlled trial conducted in a tertiary University Hospital. The study participants were randomized to one of two groups; Group 1 included 30 women received 30 IU of (Oxytocin) in 500 ml normal saline administered during abdominal myomectomy and Group 2 included 30 women received only saline infusion administered during the surgery. The primary outcome is the difference in mean blood loss in both groups.

Results: The estimated blood loss was significantly lower among oxytocin group in comparison to the control group as well as significantly higher Postoperative hemoglobin and hematocrit with significantly lower Hematocrit reduction ($p<0.001$). It showed also significant less blood transfusion in the post operative period among oxytocin group ($p=0.044$) as well as significantly shorter operative duration, ambulation time and duration of hospital stay.

Conclusion:Oxytocin infusion could reduce the blood loss during abdominal myomectomy in the lowest effective and safest dose.

Key Words: Abdominal myomectomy, blood loss, oxytocin

Received: 12 November 2019 , **Accepted: 16 January 2020**

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ISSN: 2090-7265, May 2020, Vol.10, No. 2

INTRODUCTION

Oxytocin is a peptide hormone secreted from the posterior pituitary gland. The main action of oxytocin is uterine contraction during labour. It plays an important role in the prevention of postpartum hemorrhage[1,2]. It should be used with caution in patients with heart disease or hypovolemic problems[3]. The concentration of the oxytocin receptors in the nonpregnant uterus is much lower than in the pregnant one. So there is a limited use of oxytocin in nonpregnant uterus[4,5].

Wang *et al.*[6] discovered that the oxytocin has the ability to decrease the hemorrhage and subsequent blood transfusion requirement during laparoscopic myomectomy and laparoscopic vaginal hysterectomy. The one published randomized double-blind study show that there is no benefit of using oxytocin to prevent blood loss during vaginal and abdominal myomectomy[5].

Uterine leiomyomas (fibroids) are the commonest benign tumors among women[7]. Fibroids are found in approximately 20% of women over 35 years of age[8].

Blood transfusion was required in 20% of the patients during abdominal myomectomy[9]. Some interventions were used to decrease the blood loss during myomectomy, for example: tourniquets, vaginal misoprostol, intra-myometrial infiltration of bupivacaine plus epinephrine, injection of vasopressin into the uterus, preoperative administration of gonadotropin-releasing hormone (GnRH) agonist, and perioperative injection of ascorbic acid. However, these strategies are accompanied by some complications, and some of these are ineffective or expensive or required extra steps before the actual procedure[1, 7, 10]. Complications included intraoperative hemorrhage, injury to adjacent organs (such as bowel, ureter and urinary bladder) and anesthetic complications [11].

 DOI: 10.21608/ebwhj.2020.22540.1073

AIM OF THE WORK

This study aims at assessment of the efficacy of oxytocin infusion on reducing blood loss during abdominal myomectomy.

PATIENTS AND METHODS

The present study was interventional randomized double-blind controlled trial conducted in Ain-Shams University Maternity Hospital.

Sample size:

Sample size was calculated using PASS 11.0 Sample Size Calculation Program and based on a study carried out by Atashkhoei *et al.*[12]. Group sample sizes of 30 and 30 achieve 80% power to detect a difference of 503.0 ml between the null hypothesis that both group means are 692.5 ml and the alternative hypothesis that the mean of group 2 is 189.5 ml with known group standard deviations of 89.9 and 16.7 and with a significance level (alpha) of 0.01000 using a two-sided Mann-Whitney test assuming that the actual distribution is uniform.

Allocation and concealment:

Sixty opaque envelopes were numbered serially and in each envelope the corresponding letter which donates the allocated group will be put according to randomization table. Then all envelopes will be closed and put in one box. When the first patient arrives, the first envelope will be opened and the patient will be allocated according to the letter inside

Randomization methods:

This was done using computer generated randomization sheet using MedCalc© version 13.

I) Patients : The study population was sixty women candidates for abdominal myomectomy divided into two groups : Group 1 included 30 women receiving 30 IU of (Oxytocin) in 1 cm ampoule (Syntocinon® 10 IU by NOVARTIS) in 500 ml normal saline administered while doing abdominal myomectomy. Group 2 included 30 healthy women receiving pure saline infusion administered while doing abdominal myomectomy.

Patients were selected according to the inclusion and exclusion criteria. The inclusion criteria included women presented by single, two or three symptomatic fibroids and/or a uterine size equivalent 14-18 weeks of gestation. While, the exclusion criteria included women with chronic diseases such as liver disease, angina or ischemic heart disease, cardiomyopathy, congestive heart failure, hypertension, dyslipidemia, diabetes, acute or recent vascular thrombosis, known or suspected gynecological malignancy, intramural leiomyoma with a size less than 3 cm by ultrasound, pattern of hyperplasia with cytological atypia in the endometrial biopsy performed because of menometrorrhagia, abnormal papanicolaou test, or positive urine pregnancy test result.

Ethical Approval: Informed written consent will be obtained from all patients and will be approved by local ethical committee of Ain-Shams Maternity Hospitals.

II) Methods :

A) Data Collection : Enrollment (recruitment)

All women would be asked for history of heavy bleeding or painful periods, fullness feeling in the pelvic area, lower abdominal enlargement, frequent urination, pain during sex, lower back pain and complications during pregnancy and labor.

Then all women would be examined generally for vital signs (blood pressure, temperature, pulse rate), physical abdominal examination and local abdominal examination for firm irregular pelvic mass.

There were some laboratory investigations including complete blood count, blood grouping and Rh, liver and kidney functions and INR, PT, PTT.

All women would be examined by ultrasonography to detect exact site, size and number of myoma and to detect any other lesions.

Method of Randomization:

In which 60 syringes of 30 IU oxytocin in 3 cm syringe of (Syntocinon® 10 IU by NOVARTIS) with another 60 syringes of 3 cm saline will be prepared. Then they will be enveloped and numbered from 1 to 120.

Calculation of blood loss:

We used the following mathematical model to calculate the exact blood loss amount.

$$IBL = EBV\ (mL) \times \ln(\text{pre-Hct}/\text{post-Hct})$$
$$ABL = (\text{RBCs unit} \times 200\ mL)/\text{post-Hct}$$
$$TBL = IBL + ABL.$$

Where:

IBL: intraoperative estimated blood loss volume
EBV: estimated blood loss volume
Hct: hematocrit
ABL: added a blood volume
RBC: red blood cell
TBL: total blood loss volume.

STATISTICAL ANALYSIS:

Statistical analysis will be performed using SPSS software version 20 (SPSS, Chicago, IL, USA). For

independent samples : Student's t-test will be used to compare normal distribution numerical data between two groups, and Chi square or Fisher's exact tests for categorical data. The distribution normality will be tested using Kolmogorov–Smirnov test. Changes in quantitative variables will be compared between two groups using paired t-test. $p < 0.05$ is considered to be significant.

RESULTS

In the pressent study, table 1 showed no clinically significant difference between both groups regarding the basal characteristics. While, table 2 showed the blood loss and the Hb, Hct levels difference in two groups. Blood loss is lower significantly in the oxytocin group ($p<0.001$). Moreover, the reduction in Hb level was higher significantly in the placebo group ($p<0.001$). Similarly, Hct value was higher significantly in the oxytocin group ($p<0.001$).

Moreover, table 3 showed significant reduction in all secondary outcomes in oxytocin group. The operative duration was shorter significantly in oxytocin group ($p<0.001$). Six cases required blood transfusion in control group versus one case in oxytocin group ($p=0.044$). Finally, the time till full ambulation and the hospital stay duration were shorter significantly in oxytocin group.

Table 1: Basal characteristics of the study groups

Items	Measure	Study group (N=30)	Control group (N=30)	*P-value*
Age (years)	Mean±SD	35.4±4.5	34.3±3.9	0.302
	Range	27.0–46.0	28.0–45.0	
BMI (kg/m2)	Mean±SD	24.9±2.1	25.6±1.7	0.204
	Range	21.7–28.7	22.7–28.6	
Parity	Mean±SD	3.1±1.1	2.9±0.8	0.439
	Range	1.0–5.0	1.0–4.0	
Uterine size (weeks)	Mean±SD	16.7±1.1	16.3±1.2	0.183
	Range	14.0–18.0	14.0–18.0	

Table 2: Estimated blood loss and Hb levels among the study groups

Time	Measure	Study group (N=30)	Control group (N=30)	*P-value*
Estimated blood loss (mL)	Mean±SD	393.7±65.6	590.0±120.2	<0.001*
	Range	170.4–800	320–1100	
Pre operative Hb level	Mean±SD	10.1±1.6	10.8±1.3	0.068
	Range	8.5–11.7	9.5–12.1	
Post operative Hb level	Mean±SD	9.2±1.98	8.9±1.98	0.560
	Range	7.8–10.6	7.5–10.3	
Reduction in Hb level	Mean±SD	0.9±0.38	1.9±0.68	<0.001*
	Range	0.5–1.5	0.8–3.4	

Pre operative Hct value	Mean±SD	40.7±2.2	41.5±1.9	0.127
	Range	38.2–46.7	38.1–45.2	
Post operative Hct value	Mean±SD	39.0±2.1	35.5±1.9	<0.001*
	Range	36.6–44.7	31.9–39.3	
Reduction Hct value	Mean±SD	1.7±0.2	6.0±0.6	<0.001*
	Range	1.3–2.1	4.8–7.6	

*Significant difference

Table 3: The secondary outcomes among the study groups

Time	Measure	Study group (N=30)	Control group (N=30)	*P-value*
Operative duration (min)	Mean±SD	93.3±6.0	114.2±6.4	<0.001*
	Range	87.0–112.0	92.0–123.0	
Need for blood transfusion	Yes	1 (3.3%)	6 (20.0%)	0.044*
	No	29 (96.7%)	24 (80.0%)	
Time till ambulation (hours)	Mean±SD	7.6±0.6	10.1±0.6	<0.001*
	Range	6.6–9.7	8.4–11.2	
Duration of hospital stay (days)	Mean±SD	1.7±0.4	2.1±0.4	0.002*
	Range	1.0–2.0	1.0–3.0	

*Significant difference

DISCUSSION

Our study revealed that oxytocin can be an efficient medication for decreasing intraoperative bleeding during abdominal myomectomy.

Concerning the basal characteristics features within the recruited study subjects showed clinically insignificant difference between the two groups in age, BMI, parity and uterine size. This corresponds with the studies by Atashkhoei *et al.*[12], Wang *et al.*[1], Shokeir *et al.*[4] as well as Agostini *et al.*[5]

In the current study, the estimated bleeding and blood transfusion needed were clinically significant lower in oxytocin group than placebo group. This corresponds with the studies by Atashkhoei *et al.*[12] which showed that infusion of 30 IU oxytocin during abdominal myomectomy resulted in decreasing in intraoperative bleeding and decrease the blood transfusion needed in a clinically significant fashion when compared with control group. In Wang *et al.*[1], they observed that the oxytocin infusion during laparoscopic-assisted vaginal hysterectomy for large size uterus helped to reduce the intra-operative bleeding, and the blood transfusion needed in a clinically significant fashion when compared with placebo group. In Shokeir *et al.*[4] study, they evaluated the oxytocin drip effect on intra-operative bleeding and irrigation fluid (glycine) deficit during hysteroscopic endometrial resection and they have said that oxytocin drip helped to decrease intra-operative bleeding and the blood transfusion needed in a clinically significant fashion when compared with placebo group.

However in Agostini *et al.*[5] study, they evaluated the oxytocin effect on peroperative blood loss during myomectomy and they have said that preoperative bleeding and the blood transfusion needed were clinically insignificant between study and placebo groups.

In the present study, preoperative hemoglobin of the study subjects showed clinically insignificant difference between the two groups, while postoperative hemoglobin was clinically significant greater within the oxytocin group than control group, while hemoglobin reductions was clinically signify cant lower within the study group than the control group. Oxytocin infusion reduced hemoglobin reduction in a clinically signify cant fashion.

The present study corresponds with the studies by Atashkhoei *et al.*[12] research groups which showed clinically insignificant difference between the studied groups regarding preoperative hemoglobin values, while postoperative hemoglobin was clinically significant greater among research study group than control research group, while hemoglobin reductions was clinically significant lower among the study group than the control research group. Oxytocin infusion reduced hemoglobin reduction in a clinically signify cant fashion. In Shokeir *et al.*[4] study which showed clinically insignificant difference between the studied groups regarding preoperative hemoglobin values, while postoperative hemoglobin was clinically signify cant greater among research study group than control research group. However in Agostini *et al.*[5] study, hemoglobin reductions showed clinically insignificant difference between both groups.

In the current study, the estimated operative duration was clinically signifi cant shorter among the oxytocin group than control group. The present study corresponds with the study by Atashkhoei *et al.*[12] research groups which was clinically signifi cant shorter among the research study group than control research group regarding estimated operative duration values.

However, the other two studies showed different results regarding operative duration results in relation to the current study, in Wang *et al.*[1] and Shokeir *et al.*[13], the operative duration results showed clinically insignificant difference between the studied groups regarding estimated operative duration values.

In the present study, hospital admission time was clinically signifi cant shorter within oxytocin than control group. The current study corresponds with the studies by Atashkhoei *et al.*[12] and Wang *et al.*[1] research groups which was clinically significant shorter among the research study group than research control group regarding the hospital admission time values. However in Shokeir *et al.*[13], hospital admission time results showed clinically insignificant difference between the study groups.

CONCLUSION

The study found that using of oxytocin infusion is effective to decrease the bleeding during abdominal myomectomy

CONFLICT OF INTEREST

There are no conflicts of interests.

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