Minimizing bleeding in laparotomic myomectomy: A comparative study

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Abstract

Objective: To compare the effectiveness of pericervical tourniquet versus intra-myometrial injection of epinephrine in reducing blood loss in abdominal myomectomy.

Study Design: A prospective analysis, over 1 year.

Setting: University hospital's Gynaecology centre.

Subjects & Methodology: A total of 60 patients presenting with mass-matched uterine fibroid(s), and underwent abdominal myomectomy were studied, allocated into 3 groups; 20 patients each. Group 1 (tourniquet group), where a tourniquet was applied at the cervico-uterine junction from the start of surgery. Group 2 (epinephrine group), where intra-myometrial injection of epinephrine was undertaken at surgery. Group 3 (control) myomectomy was done without blood loss-reducing measures. Results: Group 2 showed a significant reduction in blood loss. No difference between groups in terms of need of blood transfusion nor febrile morbidity.

Conclusions: Intra-myometrial injection of epinephrine at the start of abdominal myomectomy seems a simple, and effective method to reduce blood loss during surgery and facilitate the enucleation of the myoma.

Keywords: Tourniquet, Myomectomy, Epinephrine.

Introduction

Almost one fifth of women at reproductive age, may suffer from uterine leiomyomas. They are thus, the commonest benign tumors of female genital tract.[1] They may manifest by a mass, vaginal bleeding, pelvic pain, or pressure symptoms, which largely relate to the size, site and number of the tumours and if complicated.[2,3] When indicated, Myomas may be surgically excised, thus myomectomy is the commonest conservative surgical procedure for patients with myomas[4,5] especially for those suffering from subfertility as well. The rate of performing abdominal myomectomies has risen in many countries.[6-8] Suggested methods to reduce blood loss during myomectomy include intrauterine injection of vasopressin, the use of Bonney's clamp, preoperative administration of drugs like misoprostol and the use of a tourniquet during surgery.[9] Epinephrine's vasoconstrictive effect on tissues lasts longer than vasopressin[10] and may be used during myomectomy to reduce blood loss. Evidence from controlled trials on the efficacy of haemostatic tourniquets for the same indication is scarce.[11] In this work was, we studied and compared the effectiveness of pericervical tourniquet versus intra-myometrial injection of epinephrine in reducing blood loss in abdominal myomectomy.

Subjects & Methods

The local ethical committee board approved the study before starting. 60 patients were enrolled, (October 2016 to October 2017) from a university hospital Gynecology centre, all diagnosed with interstitial uterine fibroid(s) and counselled for abdominal myomectomy with a full informed consent signed by each patient before being enrolled in the study. All cases with chronic medical conditions, adenomyosis, pre-operative hormonal or anticoagulant therapy were excluded. Detailed history was taken from all patients, past medical, surgical history. Pelvic examination was done to all subjects, followed by ultrasonographic 3 D scans, to assess the tumor mean size(s), and exclude concomitant pathologies. Subjects were then randomly allocated (using a sealed opaque envelope) into the following groups: Group 1 (n=20) (tourniquet group), where a tourniquet (sterile cable tie) was applied at the cervico-uterine junction close to the insertion of the uterosacral ligaments at the start of surgery, and tied to temporarily impede the blood flow in the uterine vessels and the infundibulo-pelvic ligaments, excluding both the Fallopian tubes and the ovaries.[12] This tourniquet will be released intermittently (at about 10 minutes intervals) during the surgery and finally will be removed after the repair of the uterus. Group 2: (n=20) (epinephrine group), where a solution of 50 mL bupivacaine HCl 0.25% and 0.5 mg. of epinephrine HCl was injected to the serosa and/or myometrium around the leiomyoma before uterine incision. The solution will be prepared by an assistant just before the procedure in a 50-mL syringe with a 18-gauge needle. Before each infiltration, repeated aspirations will be performed to prevent intravascular injection.[13] Group 3 (control) myomectomy was done without blood loss-reducing measures. A comparative analysis of the intra-operative and the post-operative outcomes of the 3 groups was performed assessing the operation time, the blood loss and/or the need for blood transfusion , as well as any operative morbidities.

Statistical analysis of the data: Data were fed to the computer and analysed using IBM SPSS software package version 20.0. Qualitative data were described using number and percentage. Quantitative data were described using Range, mean, standard deviation and median.

Results

Demographic and history-related data: There was no significant difference between the 3 studied groups in terms of age, BMI, gravidity, parity or tumor mass volume.

Operative and postoperative data: The fall in Hemoglobin level, as well as the postoperative Hematocrit was significantly different between the studied group, Group 2(Epinephrine group; giving a better outcome than the other 2 groups. (Table 1, Fig. 1 and 2)

The duration of surgery was comparable in the studied groups with a significant shorter time in group 2 than group 1 (Table 2, fig. 3) In terms of the need for blood transfusion, only 2 cases from control group (10%) required transfusion), meanwhile as for postoperative fever, and duration of hospital stay, no significant difference was seen between groups.

Table 1: Comparison between the different studied groups in terms of Hemoglobin fall and haematocrit

		Tourniquet (n = 20)	Epinephrine (n = 20)	Control (n = 20)	F	p
	Postoperative fall in Hemoglobin					
	Min. – Max.	0.50 – 2.50	0.10 – 1.40	1.30 – 3.30	38.239*	<0.001*
	Mean ± SD.	1.32 ± 0.67	0.63 ± 0.35	2.20 ± 0.64		
	Median	1.05	0.60	2.0		
		p_1<0.001*, p_2<0.001*, p_3<0.001*				
Haematocrit	**Pre-operative**					
	Min. – Max.	33.30 – 42.90	30.0 – 43.80	31.80 – 42.90	1.876	0.163
	Mean ± SD.	39.29 ± 2.92	40.09 ± 3.40	38.09 ± 3.56		
	Median	40.05	40.80	38.25		
	Post-operative					
	Min. – Max.	28.20 – 41.10	28.20 – 42.90	26.10 – 38.40	18.321*	<0.001*
	Mean ± SD.	35.34 ± 3.51	38.22 ± 3.31	31.49 ± 3.76		
	Median	35.55	38.55	32.10		
		p_1=0.001*, p_2<0.001*, p_3= 0.012*				

F: F test (ANOVA), Sig. bet. grps was done using Post Hoc Test (LSD)
p_1: p value for Paired t-test for comparing between pre and post operative in each group
p_1: p value for comparing between Control and Tourniquet
p_2: p value for comparing between Control and Epinephrine
p_3: p value for comparing between Tourniquet and Epinephrine
*: Statistically significant at $p \leq 0.05$

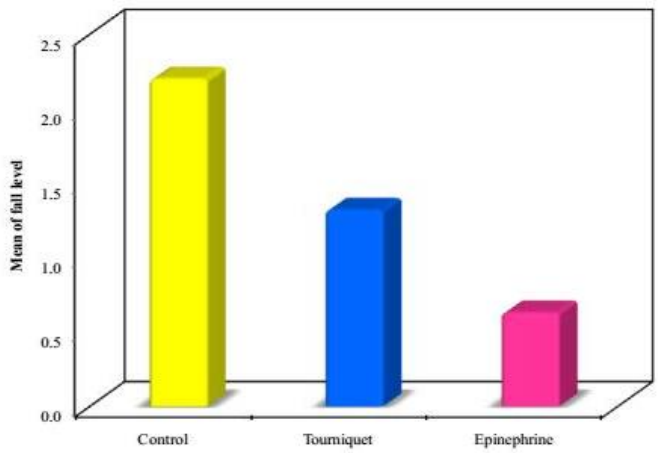

Fig. 1: Comparison between the different studied groups according to Hb fall level

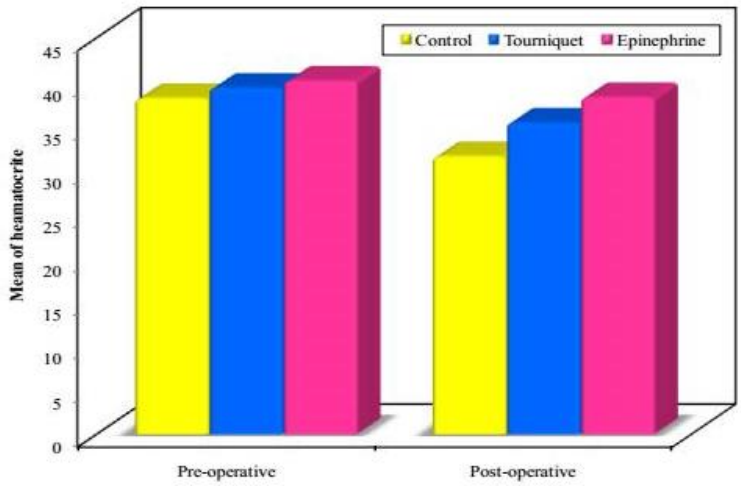

Fig. 2: Comparison between the difeerent studied groups according to haematocrite pre and post operative

Table 2: Comparison between the different studied groups according to duration of operation

	Tourniquet (n = 20)		Epinephrine (n = 20)		Control (n = 20)		Test of sig.	p
	No.	**%**						
Duration of operation								
Min. – Max.	35.0 – 65.0		30.0 – 55.0		30.0 – 120.0		$^{KW}\chi^2$= 11.463*	0.003*
Mean ± SD.	48.25 ± 9.22		40.05 ± 9.05		57.0± 23.92			
Median	45.0		36.0		50.0			
Sig. bet. grps	p_1=0.222, p_2=0.003*, p_3=0.007*							

$^{KW}\chi^2$: Chi square for Kruskal Wallis test, Sig. bet. grps was done using Mann Whitney test
χ^2: Chi square test
MC: Monte Carlo for Chi square test
FE: Fisher Exact for Chi square test
p_1: p value for comparing between Control and Tourniquet
p_2: p value for comparing between Control and Epinephrine
p_3: p value for comparing between Tourniquet and Epinephrine
*: Statistically significant at $p \leq 0.05$

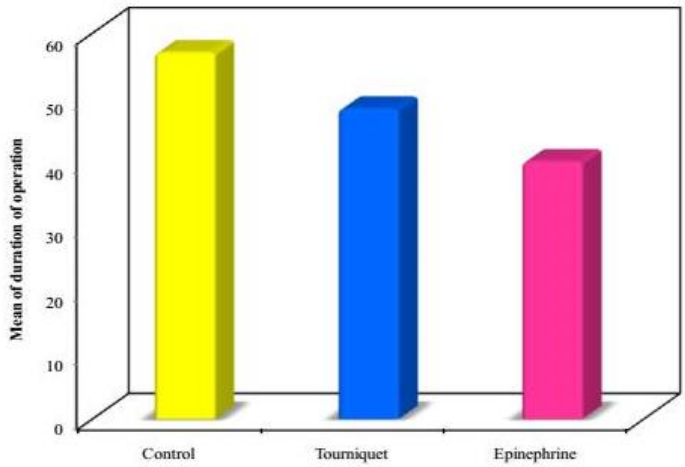

Fig. 3: Comparison between the different studied groups according to duration of operation

Discussion

The current work compared the effectiveness of pericervical tourniquet versus intra-myometrial injection of epinephrine in reducing blood loss in abdominal myomectomy. Similar works were conducted by Zullo et al., who used bupivacaine plus epinephrine during Laparoscopic myomectomy, and Gilabert-Estelles et al., who used epinephrine and levobupivacaine in cornual pregnancy to reduce blood loss.[14,15] Some published data from Fletcher et al., Helal et al., and Ikechebelu et al., who used Foley's catheter as a uterine tourniquet during myomectomy, however, and to our knowledge, our work was unprecedented to compare tourniquet using Foley's catheter versus intra-myometrial injection of bupivacaine plus epinephrine in reducing blood loss in abdominal myomectomy.[16-18] Ikechebelu et al., however, concluded that the use of tourniquet might be limited with large cervical or intra-ligamentry fibroids. They also published similar findings in terms of the mean operative blood loss after abdominal myomectomy.[18] Our data showed a mean operative duration in the group 2 (epinephrine group) to be 40.05 minutes which may be due to better heamostasis and better line of demarcation which facilitated enucleation of the fibroid(s). The current work's mena operation time is shorter than that reported by Zullo et al. (78.7 minutes), which may be attributed to the difference in the operation techniques, or tumor mass volume.[14] As regards need for blood transfusion, our data was similar to that published by Alptekin et al., where postoperative blood transfusion was necessary in only two patients from the control group. They also reported that the tourniquet significantly reduced postoperative haemoglobin fall, which neatly matched our findings.[19] Helal et al., study found that the mean values for post operative haemoglobin, haematocrite and haemoglobin fall in the tourniquet group were (10.1g/dl, 30.0%, 1.4 g/dl) which are relatively similar to the results of the present study.[17] Repeat laparotomy for the management of haematomas with the tourniquet technique has been reported by Darwish et al., who concluded that tourniquet is frequently associated with haematoma formation and recommended that tourniquet should not be used during myomectomy. In fact, this complication has not been encountered in the present study. This may be due to meticulous closure of the incision, and caring of accurate hemostasis.[20]

The vasoconstrictive effect of Epinephrine on tissue lasts longer than vasopressin (5–6 hours versus 17–35 minutes), which may result in inaccurate hemostasis with an occulted postoperative bleeding. In addition, the prolonged vasoconstriction could induce tissue damage, which may hypothetically be counterbalanced by bupivacaine's local vasodilatation.[21] No significant side effects in the epinephrine group was reported in the current work.

Conclusion

Intra-myometrial injection of a solution of bupivacaine plus epinephrine is significantly more effective than pericervical tourniquet in reducing intra-operative bleeding, total operative time, and myoma enucleation time in laparotomic myomectomy, with acceptable safety profile. Limitations of this study included the number of studied subjects that may not be representative enough, and the large surgical load, and stress on the participating surgeons, which may be taken into consideration while conducting similar research.

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