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Comparison of Side Effect Profile of Misoprostol Versus Tranexamic Acid Both used in Adjunction with Tourniquet in Reducing Blood Loss during Abdominal Myomectomy in Enugu: A non-randomized Prospective Multi-Centre Interventional Study

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Abstract: **Background: Misoprostol and tranexamic acid have been shown to reduce intra-operative haemorrhage during abdominal myomectomy, however, the side effect profiles remain understudied.**

Aim: To determine whether misoprostol compared with tranexamic acid has less side effect profile when used to reduce bleeding during abdominal myomectomy in a tertiary hospital and two private specialist hospitals in Enugu. Materials and Methods: This was a non-randomized comparative prospective interventional study. A total of 52 consenting participants were recruited from women booked for abdominal myomectomy at the study centers over 7 months. They were consecutively selected by matching into group I (vaginal misoprostol 400 µg) and II (intravenous tranexamic acid 1g) one hour and 15 minutes before surgery respectively. Intraoperatively, all participants had a tourniquet application. The side effect profile, intraoperative blood loss and postoperative haematocrits were compared between the two groups. Descriptive and inferential analyses were carried out using IBM SPSS Version 26.0. A P- value of < 0.05 was considered statistically significant. All 26 participants (100%) completed the study according to the protocol in groups I and II, respectively. Socio-demographic characteristics were not significantly different in both groups. The side effect profile were nausea and vomiting seen each in 2(7.7%) participants in the tranexamic acid group while shivering and abdominal cramps were seen in 7(26.9%) and 3(11.5%) respectively in participants in the misoprostol group and these were tolerable in both groups. The mean intra-operative blood loss in Group I compared to Group II was not statistically difference (825 ± 471.7 ml vs 840 ± 514 ml, p = 0.918). There was also no significant difference in the mean pre and post-operative haematocrit of participants in group I and group II (5.2 ± 2.7 vs 6.2 ± 3.4, p = 0.245).

Conclusion: Among the women receiving tourniquet during open abdominal myomectomy in Enugu, the additional use of vaginal misoprostol 400 µg versus intravenous 1g tranexamic acid had comparable tolerable side effects as well as comparable effectiveness in reducing intraoperative haemorrhage.

Keywords: **Misoprostol and tranexamic acid, tertiary hospital, abdominal myomectomy.**

1. INTRODUCTION

Background.

Uterine leiomyoma is the commonest benign genital tract tumour in women of reproductive age[1,2] and also the commonest reason for gynaecological consultations in most Nigerian hospitals.[3-6] Hysterectomy is the definitive treatment for symptomatic uterine fibroids, however, for women desirous of future procreation or preservation of their uteri for reasons

like menstruation, psychological feeling of completeness and with strong aversion for hysterectomy like in our environment and in other low and middle income countries, myomectomy is the mostly preferred surgical option of care.[7,8] One of the common complications of abdominal myomectomy is intra-operative haemorrhage,[9] and if massive, may necessitate hysterectomy.[10,11] About 13.5% to 40% of patients undergoing myomectomy required blood transfusion[12,13] and approximately 2% of myomectomies were converted to unplanned hysterectomy intra-operatively due to excessive bleeding or inability to reconstruct the uterus.[7,12]The procedure has undergone several modifications over the years to ameliorate intraoperative haemorrhage.

For many years, various techniques of occluding uterine arteries have been in practice, such as Bonney's clamp, sutures, and rubber tubing, including the Foleys catheter. However, the use of rubber tubing as a tourniquet was popularized by Rubin in 1953, which replaced Bonney's clamp and ushered in trials on Foley's catheter thereafter.[14-16] Today, it has almost become a standard for preventing blood loss during an open abdominal myomectomy.[16-19]Other methods of reducing blood loss and their effectiveness during myomectomy including misoprostol, intravenous tranexamic acid intra-myometrial injection of Vasopressin and pre-operative administration of drugs like GnRH, have all been reported in some studies.[7]Despite this, an abdominal myomectomy is still associated with significant intraoperative and postoperative blood loss, causing postoperative anemia and requiring transfusion.[8] This has motivated scientists to continue to evaluate further on the most effective method of reducing blood loss to the least during myomectomy.

Effectiveness of misoprostol and tranexamic acid in reducing intraoperative blood loss independently and in adjunction with other techniques during myomectomy have been documented with varying results.[20-23]

Though combination of tourniquet with tranexamic[21,22] as well as combination of tourniquet and misoprostol[23] have been demonstrated by researchers to have a better efficacy in reducing blood loss compared to use of either tourniquet, tranexamic acid or misoprostol independently, the comparison of the side effects profiles of these drugs in the terms of tolerability remains understudied.

Misoprostol is a prostaglandin E1 analog that causes regular uterine contraction. A vaginal dose has a 20 minutes onset of action with a duration of action of approximately 4 hours.[26]Hence, postoperative blood loss due to uterine relaxation could be prevented for up to 4 hours and more. In addition, misoprostol is cheap, readily available, and stable at room temperature. Its role in reducing blood loss during abdominal myomectomies has been reported in some studies.[20,23]The common disturbing side effects are fever, shivering, abdominal cramps, nausea, vomiting and diarrhea.[27]

Tranexamic acid is a synthetic lysine derivative with antifibrinolytic activity has been used since the 1960s in a variety of clinical settings where anti-fibrinolytic therapy is appropriate. It acts as an anti-fibrinolytic through the reversible blockade of lysine-binding sites on plasminogen molecules.[24] It is an inhibitor of fibrinolysis.[25] The role of tranexamic acid in reducing blood loss in patients undergoing open myomectomy have demonstrated in some studies.[20-22]The common side effects are nausea, vomiting, diarrhea, hypotension, thromboembolism and seizures.[28] These occur commonly with overdosing.

In developing Negroid countries like Nigeria, women commonly present with huge and multiple uterine fibroids due to lack of knowledge, lack of access to care and late presentation,[29]and myomectomy in this clinical scenario, is even more commonly complicated with both intra-operative and post-operative haemorrhage requiring blood transfusion. [11,19]Therefore, additional use of misoprostol or tranexamic acid with the standard tourniquet aimed at further reducing blood loss more significantly during myomectomy suits these class of women and determining the prevailing side effect profile may also affect the choice of any of these drugs for overall optimal patient care and satisfaction.

2. METHOLOGY

Study design

The study was a prospective multi-centre interventional study conducted over a period of 7 months (10th August, 2022 to 1st March 2023).

Participants

All consenting women of reproductive age diagnosed with symptomatic uterine fibroids and booked for abdominal myomectomy were recruited proportionally from the three study centers. Exclusion criteria included fibroid size above 34 weeks, fibroids located at the cervix, surgeries lasting longer than 4 hours, known allergy to prostaglandins including

misoprostol, known allergy to tranexamic acid, chronic medical disorders including hypertension, diabetes mellitus, cardiac or pulmonary diseases, previous myomectomy or caesarean section, pelvic adhesions, pelvic masses, adenomyosis/ endometriosis, genital tract malignancies, known bleeding or clotting disorders, anaemia and patient refusal.

Study settings/locations

This study was carried out in three healthcare facilities (Enugu State University Teaching Hospital (ESUT-TH), Parklane, a faith-based private specialist hospital-Mother of Christ Specialist Hospital and a private specialist hospital-Saint Patrick Specialist Hospital) in Enugu metropolis. Enugu metropolis is the capital of Enugu state. Three local governments (Enugu South, Enugu North and Enugu East) are located in Enugu metropolis. According to the last Nigeria census figures of 2006, the Enugu metropolis has a total population of 722,664 (male- 348,902 and females- 468, 223). Enugu State is located in the southeastern region of Nigeria with a total area of about 8727.1km^2 and a population of approximately 3.26million[29]and ESUT-TH is a major referral centre for gynecological cases in southeastern Nigeria. The gynecology units of the health facilities are very functional, with consultant-led clinics held from Monday to Friday. The abdominal myomectomy rate at ESUT-TH and the private specialist hospitals were about 9 and 7 myomectomies per month respectively. The main method of achieving haemostasis during myomectomy in the health facilities was the tourniquet method (use of Foleys catheter).

Interventions

The intervention (400µ of misoprostol (Cytotec, Pfizer) tablets) was given to group I (n = 26), while those in group II control (n = 26) received intravenous 1g tranexamic acid (Prexam tranexamic acid by Protech Biosystems Private limited). However, all participants in both groups I and II received a tourniquet. Vaginal misoprostol was administered by a trained research assistant 1 hour and intravenous tranexamic acid 15 minutes before the abdominal incision, while a tourniquet was applied as soon as the uterus was delivered, intra-operatively by the surgeon (consultant).

Outcomes

Primary: The rate of occurrence of side effects including nausea, vomiting, diarrhoea, shivering and elevated temperature (temperature $\geq 38^0$C) were determined.

Secondary: The volume of estimated intraoperative blood loss in the two groups was obtained by converting the difference in weights of the mops, gauze, surgical drapes, and towels after use to volume plus the volume of blood in the suction bottle at the end of surgery. The mean difference in the post-operative haematocrit value and the mean difference in the pre-operative and post-operative haematocrit (postoperative haematocrit was carried out 24 hours after surgery via venous blood and subtracted from the preoperative haematocrit was carried out 24 hours after surgery via venous blood) was found.

Recruitment of participants:

Recruitment of participants for the study were at the gynaecology clinics and wards in the health facilities selected for this study.

Allocation of the participants:

The participants that were eligible and met the inclusion criteria were selected consecutively first into group 1 and then participants into group 2 by matching. The recruited participants were allocated to their groups by matching for uterine size, fibroid location estimated ultrasonographically and the type of anaesthesia used. The participants were allocated into two groups i.e. those that received peri-operative misoprostol plus tourniquet (Group I) and those that received peri-operative intravenous tranexamic acid plus tourniquet (Group II).

Matching of the Study Groups

Consenting participants were selected first into group 1 while those in group 2 were selected by matching those in group 1 for the uterine size, fibroid location estimated ultrasonographically and the type of anaesthesia that was used for the surgery. This was because these factors are important determinants of blood loss at myomectomy. For every participant that was assigned to group I, the next eligible participant was recruited into group II, matching for uterine size (±2 weeks), fibroid location estimated ultrasonographically and type of anaesthesia. The recruitment continued until the sample size was reached.

Ethical considerations

Ethical clearance was obtained from the Ethical Research Committee of Enugu State University Teaching Hospital (ESUT-TH), Parklane, before the commencement of the study.

Protocol

The myomectomies were performed by the consultants in Obstetrics and Gynaecology at the three study centers. This ensured uniformity in the procedures. Five research assistants were selected from each center and trained. They assisted the researcher in collecting data using the proforma designed for the study. A research assistant (junior resident doctor) in each gynecology unit of the teaching hospital and medical officers with at least 2 years of clinical practice experience in the private health facilities helped insert 400 µg misoprostol into the posterior fornix of the vagina 1 hour or intravenous tranexamic acid 15 minutes before surgery and weighed the gauze, mops, and abdominal drapes before and immediately after the surgery.

Procedure for myomectomy

The technique of abdominal myomectomy used in this study was originally described by Bonney and modified by Hudson[30,31] and adapted to our practice in the three study centers. All participants received prophylactic antibiotics (intravenous ceftriaxone 1gram statim and metronidazole 500 mg statim 30 minutes before the procedure).

Anesthesia: Anesthesia was administered mainly through the spinal or epidural routes. However, those with very large uterine sizes (28 weeks and above) had general anesthesia.

Weighing of materials: Before the commencement of surgery, all the mops (each of 26 x 21 cm), gauze (each of 10 x10 cm), and drapes were weighed using a standardized weighing scale. The weighing process was such that asepsis was maintained. A sterile bowl was weighed first to record its empty weight before the mops, gauze, and drapes were weighed. The same research assistant who measured the weights before surgery was responsible for reweighing these materials after the surgery in the centers. Otherwise, the researcher carried out the measurements. The weighing scales, Camry Digital kitchen weighing scale model EK3250ISO 9001, 2015, used in the three centers were from the same company (Camry Industries Company Limited, Hong Kong).[32]They were standardized before use. Batteries were changed when it was necessary.

Abdominal skin incision: The type of abdominal incision used depended on the size of the uterus. Transverse incisions were used when the uterine size was less than or equal to 20 weeks, and midline incisions were used when the uterine size was >20 weeks. Some abdominal incisions were extended above the umbilicus as necessary.

Application of tourniquet: A size 20-gauge Foley catheter provided for each participant was applied to the lower part of the uterus by the surgeon, being careful not to damage the fimbria, ovaries, and intestines or the infundibulo-pelvic ligament. Traction was exerted on the two ends of the catheter to occlude the two uterine arteries. The traction was maintained with one strong Kocher's forceps applied anteriorly. Tourniquet time, the time interval from application to release of tourniquet intervals of 45 minutes,[14] was carried out for all patients. The tourniquet was released to enable reperfusion at 30-minute intervals and reapplied till the fibroid nodules are removed and uterine incisions closed in layers to achieve haemostasis. Points of bleeding were noted, and the figure of eight stitches was applied accordingly.

Surgical technique: As many fibroid nodules as possible were enucleated through an anterior incision on the uterus, while those not accessible through the anterior incision were enucleated from separate incisions. After the enucleation of all visible and palpable myoma masses, number 2/0 Vicryl suture was used for the endometrium when it was breached; otherwise, number 2 Vicryl suture was utilized in closing dead spaces and achieving hemostasis. This prevented hematoma formation.

Wound Drain: An improvised closed drain was placed into the Pouch of Douglas using a size 20-gauge Foleys catheter with five fenestrations created on it, each measuring about 1 cm in diameter and 2 cm apart. A urine bag was attached to form a closed drain. The drain enabled complete egress of blood that could have collected after abdominal closure.

Assessment of side effects of misoprostol and the tranexamic acid

The monitoring for the onset of the side effects; nausea, vomiting, diarrhea was carried out by the researcher or the assistants. This commenced immediately after the administration of the drugs in both groups.

For the misoprostol group, temperature was checked before the insertion of misoprostol and thereafter, continued at the interval of 30 minutes throughout the surgery and for the period of 6 hours from the insertion of the drug to detect onset of fever. The temperature of 37.5^0c or more was regarded as onset of fever. Monitoring for the onset of shivering for the misoprostol group was also commenced immediately after the insertion of the drugs.

Measurement of blood loss

This was carried out by the researcher or a research assistant. The blood volume in the suction-calibrated bottle was read, and the used mops, gauze, and drapes were counted and reweighed (in gram) as described above. The difference in weight (in grams) was converted to milliliter using the gravimetric method which assumed that the density of water at room temperature is similar to blood, that is, 1 g/ml (1 g difference in weight is equivalent to 1 milliliter of blood).[33,34] Therefore, the total intraoperative blood loss was the total difference in weight (grams) of mops, gauze, and drape converted to milliliter plus the blood volume in the suction-calibrated bottle. Both preoperative weighing and postoperative weighing of the drapes, gauze, and mops were conducted by the same person during each procedure at the two hospitals with the same type of weighing scales, which were standardized before use.

Postoperative care: Postoperative care was the same in the three centers. Participants received intravenous antibiotics (ceftriaxone and metronidazole) for 48 hours and then converted to orals; received intramuscular analgesics (pentazocine and diclofenac) for 48 hours; and then converted to orals, and vital signs were monitored from the immediate postoperative period till discharge. They were commenced on graded oral sips as soon as bowel sounds were established within the first 24 hours of surgery. The wound drain was monitored every 24 hours, and the volume of effluent was recorded in milliliter. It was removed when the effluent became macroscopically non-bloody. Participants received a blood transfusion intraoperatively when there was cardiovascular instability from haemorrhage or signs of inadequate perfusion and oxygenation of the vital organs.

Blood transfusion was also commenced when the transfusion trigger is reached i.e. the maximum allowed blood loss for the patient before blood transfusion is commenced.[35]

Allowable blood loss = Estimated Blood volume × (Pre-operative Hb-Lowest acceptable Hb)

(Average of Pre-operative and Lowest acceptable Hb

Estimated blood volume = Expected average blood volume (65ml/kg in women) x weight of the patient.[36]The blood loss estimation was a continuous process during the surgery.

Postoperatively, a participant also received a blood transfusion if there was symptomatic anemia or hypovolemia or when the 48 hours postoperative haematocrit was less than 28%. After discharge, they were seen two weeks later with the histology results. Preoperative haematocrit was recorded before surgery, while postoperative haematocrit was recorded from estimation done on the first day postoperative in percentages at the haematology laboratory of ESUTH.

Data collection

Data collection was carried out with the designed proforma by the researcher and the trained assistants.

3. DATA ANALYSIS

The data analysis was intention to treat and both descriptive and inferential with Statistical Package for Social Science (IBM SPSS) software version 26.0 for windows. Descriptive statistics, which included frequency and percentages, which were used to summarize categorical variables such as type of incision, indications for surgery, and marital status. Age, parity, and body mass index (BMI) were analyzed as categorical variables using the Chi-square or Fisher's exact test. Means and SDs were obtained for continuous variables such as age and preoperative and postoperative haematocrits and compared using Student's t-test. A P value less than 0.05 was regarded as significant.

4. RESULTS

Intention to treat analysis was performed. A total of fifty two participants were recruited for the study, and all, 52 (100%) completed study; 26 (50%) were in the misoprostol group, while 26(50%) were in the tranexamic acid group. The details of the study flow are shown in **Figure 1.** Participants' basic characteristics **Table 1** shows that the basic characteristics of participants were similar for the misoprostol group and the tranexamic group. The mean age of participants 38.3 ± 5.0 vs 36.2 ± 6.4 years for the misoprostol and tranexamic acid groups, respectively (t = 1.309, p = 0.196). Majority of the participants in both groups were nullipara (23/26, 88.5% vs. 23/26, 88.5%).

Comparison of side effects of misoprostol and the tranexamic acid

Shivering and abdominal cramps were seen in 7(26.9%) and 3(11.5%) respectively in participants in the misoprostol group while nausea and vomiting were seen each in 2(7.7%) participants in the tranexamic acid group as shown in **figure 2**. Nausea and vomiting were not seen in the misoprostol group. There was no recorded fever in the misoprostol group and diarrhea was absent in both groups.

Comparison of blood loss and haematocrit differences between the misoprostol and tranexamic acid group

Table 2 shows that when compared between the two groups, the mean intraoperative blood loss was not significantly lower in the misoprostol than the tranexamic acid groups (825 ± 471.7 vs 840 ± 514, P =0.918). Similarly, there was no statistically significant difference in the mean haematocrit after 24 hours postoperative (27.8 ± 4.3 vs 27.7 ± 3.0, P=0.879) and the difference in mean haematocrit (%), that is, preoperative PCV– PCV 24 hours postoperative was not significant (5.2 ± 2.7 vs 6.2 ± 3.4, P= 0.245). The details of the results are shown in Table 3 respectively

Table 1: Participants' basic and gynecological characteristics

Variables	**Sub-groups**	**Misoprostol group I**	**Percentage (%)**	**Tranexamic acid group II**	**Percentage (%)**	χ^2	P value
		n=26		n=26			
Age group	26 – 30	0	0.0	5	19.2	7.143	0.129
	31 – 35	8	30.8	8	30.8		
	36 – 40	12	46.2	6	23.1		
	41 – 45	3	11.5	4	15.4		
	46 – 50	3	11.5	3	11.5		
	Mean ± SD	**38.3 ± 5.**		**36.2 ± 6.4**			
Marital Status	Single	13	50.0	18	69.2	1.997	0.158
	Married	13	50.0	8	30.8		
Educational status	Primary	1	3.8	0	0.0	1.024	0.599
	Secondary	5	19.2	5	19.2		
	Tertiary	20	76.9	21	80.8		
Occupation	Business	6	23.1	7	24.0	0.981	0.806
	Civil servant	14	53.8	14	56.0		
	Self employed	1	3.8	0	0.0		
	Unemployed	5	19.2	5	20.0		
Parity	0	23	88.5	23	88.5	2.000	0.736
	1	0	0.0	1	3.8		
	2	1	3.8	1	3.8		
	3	1	3.8	1	3.8		
	4	1	3.8	0	0.0		
Number of children alive	1	0	0.0	1	33.3	2.000	0.572
	2	1	33.3	1	33.3		
	3	1	33.3	1	33.3		
	4	1	33.3	0	0.0		
BMI group	< 18.5	2	7.7	2	7.7	3.950	0.557
	18.5 – 24.9	14	53.8	9	34.6		
	25 – 29.9	7	26.9	10	38.5		
	30 – 34.9	1	3.8	2	7.7		
	35 – 39.9	1	3.8	3	11.5		
	≥40	1	3.8	0	0.0		
	Mean ± SD	**25.5±6.5**		**26.5±5.6**		t = 0.559	p= 0.578

Figure 2: Side effects of the use of tranexamic acid and misoprostol among the participants.

Shivering and abdominal cramps were seen in 7(26.9%) and 3(11.5%) respectively in participants in the adjunctive misoprostol group while nausea and vomiting were seen each in 2(7.7%) participants in the adjunctive tranexamic acid group as shown in **figure 2**. Nausea and vomiting were not seen in the misoprostol group. There was no recorded fever in the misoprostol group and diarrhea was absent in both groups.

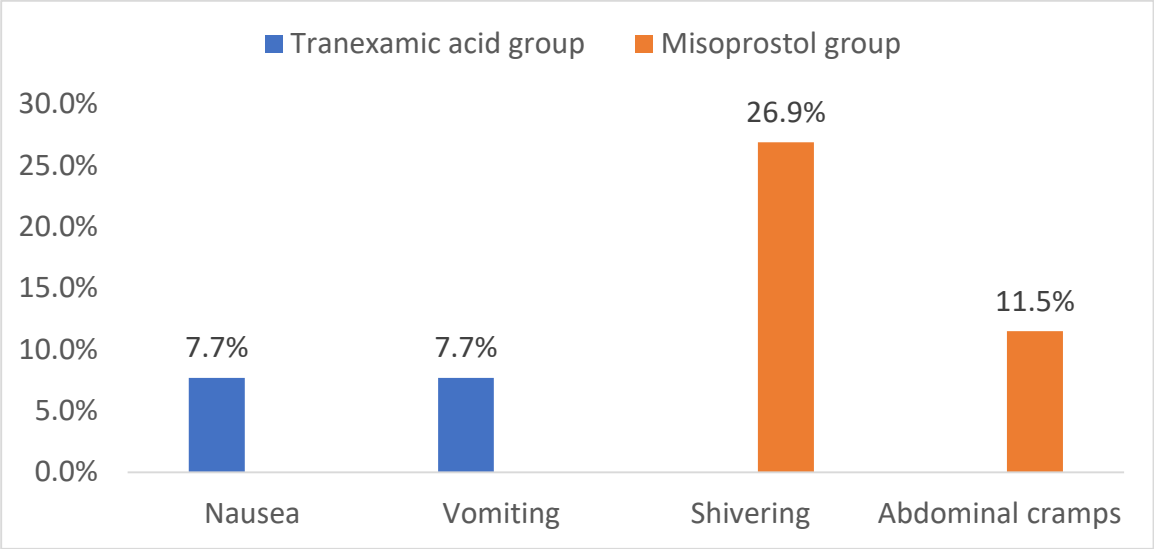

Figure 2: Side effects of Misoprostol and Tranexamic acid

Table 2: Comparison of mean intra-operative blood loss between women who received adjunctive tranexamic acid and misoprostol during abdominal myomectomy

	Misoprostol (Rroup I) **N =26**	Tranexamic acid (Group II) **N =26**	t-test	P value
	Mean ± SD	**Mean ± SD**		
Mean volume of intraoperative blood loss	825 ± 471.7	840 ± 514	0.103	0.918
Mean preoperative haematocrit	33.0 ± 2.9	33.8 ± 2.9	1.060	0.294
Mean postoperative haematocrit	27.8 ± 4.3	27.7 ± 3.0	0.153	0.879
Difference in preoperative and postoperative haematocrit	5.2 ± 2.7	6.2 ± 3.4	1.177	0.245

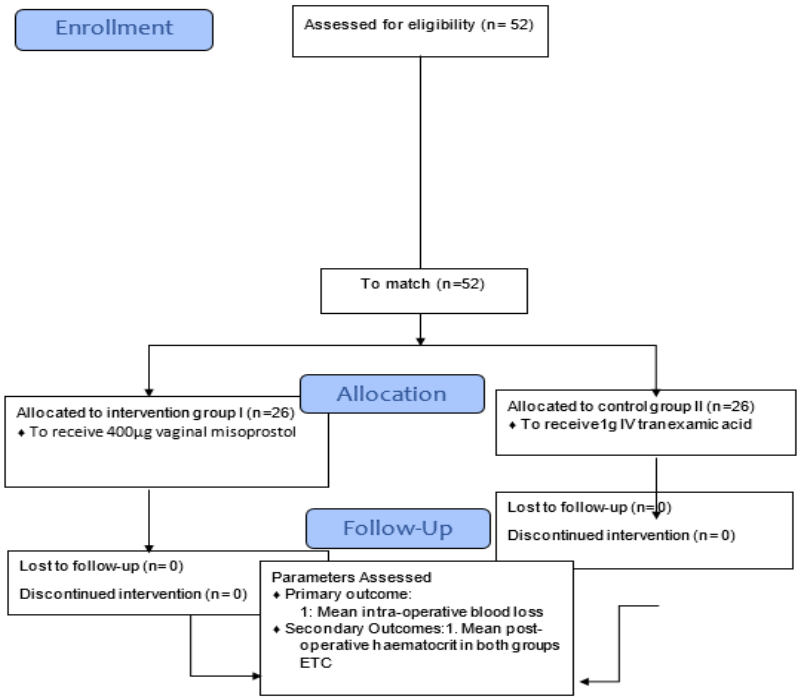

Fig 1. Flowchart of the participants in the study.

5. DISCUSSION

Mechanical occlusion of uterine arteries using a Foley catheter has almost become the standard method for preventing intraoperative blood loss during abdominal myomectomy in Nigeria.[4-6,9,19] Other techniques such as misoprostol[37-42] as well as tranexamic acid[43,44] have equally shown effectiveness across the globe in reducing haemorrhage during abdominal myomectomy. The side effects of the misoprostol and tranexamic acid just like intraoperative blood loss during myomectomy remains a challenge during the procedure. These side effects could influence the choice of these drugs during the procedure despite possible difference in their efficacies. The common side effects of misoprostol and tranexamic acid as documented according United States of America Food and Drug Administration (FDA) included fever, shivering, abdominal cramps, nausea, vomiting, diarrhea for misoprostol[27] and nausea, vomiting, diarrhea, hypotension, thromboembolism and seizures for tranexamic acid.[28]

In this study, shivering and abdominal cramps were the common side effects of misoprostol which were the similar findings to the reports in other studies where misoprostol was used in preventing haemorrhage during myomectomy.[14,37-41]Most of these side effects were transient and self-limiting with no adverse consequences. They required no intervention or simple interventions such as covering patient up with clothes in the case of shivering. The side effects were observed to be transient which is comparable to the previous reports. These transient and self-limiting side effects of misoprostol could probably be due to the use of single dose of 400µg of misoprostol as was similar in this study despite use of different route of administration. This single dose could have also accounted for absence of fever in this study which differed from a finding by Ragab and his study group where a significant rise in body temperature of 38.5 ± 0.7^0c in participants that received double dose of 400µg of rectal misoprostol[42]was recorded. This also means that higher doses of misoprostol produce more side effects.[27]Therefore, women who need misoprostol for reducing blood loss during an open abdominal myomectomy should be counseled on these treatable side effects before use.

The side effects of tranexamic acid such as nausea and vomiting in this study was similar in previous studies.[21,24,43] Though these findings are known side effects of tranexamic acid, they could also be explained by the fact that some of these participants received opioid analgesics (pentazocine), which are known to cause similar side effects, they were minimal and managed with promethazine. The most feared adverse effects of tranexamic acid, seizure[46] and thromboembolic event were not seen in this study.

This study also showed that the use of 400µg vaginal misoprostol versus intravenous tranexamic acid administered 1 hour and 15 minutes respectively before myomectomy showed that both have comparable effectiveness in reducing intraoperative blood loss. This result is different from a report in Pakistan by Shafqat et al who demonstrated that intraoperative blood loss was significantly reduced in misoprostol group with mean difference of blood loss of 171.092 ml compared to tranexamic acid.[20]While this study tested the effectiveness of misoprostol and tranexamic acid independently, the current study was conducted on a population of women who also had tourniquet as additional intervention for reducing blood loss during abdominal myomectomy. Findings by Celik et al. in Turkey,[37] Abdel-Hafeez et al. in Egypt,[38] Vahdat et al.in Iran,[39] Rasheed et al. in Egypt,[40]also differed from this current study. In these studies, intraoperative blood loss was significantly reduced by misoprostol administered 1 hour before abdominal myomectomy. While these studies were misoprostol placebo-controlled studies, the current study was conducted on a population of women who also had tourniquet as adjunctive intervention for reducing blood loss during abdominal myomectomy. Shaaban et al in Egypt[43] and Cagla et al in Turkey[44] reported that intraoperative blood loss was significantly reduced by perioperative intravenous tranexamic acid administered before abdominal myomectomy. These studies were tranexamic placebo-controlled studies, while the current study was conducted on a population of women who also had tourniquet as adjunctive intervention for reducing blood loss during abdominal myomectomy. The implication of these finding is that giving vaginal misoprostol or perioperative intravenous tranexamic acid to women who would receive tourniquet during myomectomy can bring about a significant reduction in intraoperative blood loss. This was demonstrated in Enugu, Nigeria by Nnagbo et al[23] who showed that misoprostol plus tourniquet had a significant reduction in intraoperative blood loss compared with tourniquet alone. Similarly, Ishaq et al in Ilorin[21] and Asudo et al in Abuja[22] all in Nigeria reported that perioperative intravenous tranexamic acid plus tourniquet had a significant reduction in intraoperative blood loss compared with tourniquet alone. However, these studies differed from the current study because additional interventions were tested only on one group, hence determining which combination of techniques was better in reducing blood loss could not be compared.

This study also showed there was no significant difference in the mean haematocrit 24 hours postoperative in the misoprostol group compared with the tranexamic acid group. This finding was not surprising as the mean intraoperative

blood loss were comparable in the misoprostol group compared with the tranexamic acid group. This finding differed from the results from investigators in other countries[36-42] who demonstrated that perioperative administration of misoprostol or tranexamic acid caused less reduction in postoperative hemoglobin/haematocrit. However, it is worthy of note that these studies were misoprostol and tranexamic acid placebo-controlled studies where no other active intervention such as tourniquet was used unlike in this study. The implication of this finding is that vaginal misoprostol or tranexamic acid may be combined with another active intervention such as tourniquet to achieve a significant reduction in the mean postoperative haematocrit. This was demonstrated by Nnagbo et al in Enugu[23] Nigeria who showed that misoprostol plus tourniquet had a significant reduction in the mean hemoglobin 48 hours postoperative in the no-misoprostol group compared with the misoprostol group. Similarly, Ishaq et al in Ilorin[21] and Asudo et al in Abuja[22] all in Nigeria reported that perioperative intravenous tranexamic acid plus tourniquet had a significant reduction in postoperative haemoglobin compared with tourniquet alone. However, these studies differed from the current study because additional active interventions, misoprostol or tranexamic acid was tested only on one group, hence determining which combination of techniques was better in reducing postoperative haemoglobin could not be compared.

The strength of this study lies in the fact that it was a multi-centre study, hence, the findings can be generalized. The method of estimation of blood loss was by both gravimetric and volumetric methods which are reproducible, while it was limited by the fact that it was not a randomized trial and is a potential for bias in the study. Similarly, matching of the study group included the uterine sizes, location of the myoma and anaesthesia method. Intra-operatively, the findings were not absolutely as found in the preoperative ultrasonography. However, uterine size which was more easily measurable, correlated with the type of anaesthesia and skin incision was largely used to match participants to the groups.

6. CONCLUSION

Administration of 400µg peri-operative vaginal misoprostol when compared to that of perioperative intravenous 1g tranexamic acid in reducing intraoperative haemorrhage during abdominal myomectomy produced comparable tolerable, transient and self-limiting side effects with no significant difference in the intra-operative blood loss and postoperative haematocrit.

7. RECOMMENDATIONS

We recommend additional use of perioperative vaginal misoprostol or intravenous tranexamic acid with tourniquet during abdominal myomectomy to further reduce blood loss during this procedure in our environment especially when the fibroid mass is large as both have as both have tolerable, transient and self-limiting side effects with comparable side effects.

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