

Original Research Article

Management of obstetric hemorrhage; an observational study highlighting the efficacy of uterine artery ligation

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ABSTRACT

Background: Obstetrical hemorrhage is leading cause of maternal mortality. UAE is termed safe and effective method for resolving hemorrhage. Objective of this study was to determine efficacy of uterine artery ligation in management of obstetrical hemorrhage.

Methods: This cross sectional observational using non-probability convenient sampling technique was carried out for six months. After ethical approval, females between 18 to 35 years diagnosed with obstetrical hemorrhage, uterine atony refractory to medical treatment, having active bleeding from placental side or having normal coagulation profile were while females with post-partum hemorrhage because of retained products of conception, due to genital tract trauma or with disseminated intravascular coagulation were excluded. Analysis of data was done using SPSS version 23.0. Quantitative variables were reported as mean and standard deviation and for qualitative variables, frequency and percentages. Chi-square test was applied keeping p-value of <0.05 as statistically significant.

Results: From 109 females with mean age 47 ± 5.25 years. In comparison of parity distribution, 62 (56.88%) were multiparous and 47 (43.12%) were primiparous. Type of bleeding observed was antepartum 36(33.03%), peripartum 39 (35.78%) and postpartum in 34 (31.19%). Efficacy of uterine artery ligation in management of obstetric hemorrhage was observed to be 35 (32.11%). The efficacy of uterine artery ligation in management of obstetric hemorrhage in three categories of age groups reported significant association ($p=0.0005$) and type of bleeding ($p=0.025$).

Conclusions: Efficacy of UAE in different types of obstetrical hemorrhage reported in our study was lower than expected in about one-third of females.

Keywords: Ante-partum hemorrhage, Obstetric hemorrhage, Peri-partum hemorrhage, Post-partum haemorrhage, Uterine artery ligation

INTRODUCTION

Obstetrical hemorrhages are one of the most common and fatal complications that are observed by clinicians in routine practice, also being regarded as one of the most

severe cause of maternal morbidity and mortality.¹ Prevalence of hemorrhages tends to vary from country to country. Developed countries report an incidence of about 1 in 100,000 deliveries while among the developing countries, the incidence increases to 1 in

every 1,000 delivery.² The huge variations in rates of incidence are because of the differences in management of hemorrhage from according to each country-specific practice.³

Obstetrical hemorrhage is defined as an estimation of blood loss above 500 ml post-vaginal delivery, occurring with a rate of around 5%. Substantial obstetrical hemorrhage, i.e. above 1000 ml can lead to fatal consequences and survivors having long term morbidity, accounting to about 11% of all maternal fatalities.⁴

The initial and commonly used first line of management for obstetrical hemorrhage is the usage of uterine stimulants known as uterotonics and bimanual uterine compressions. Higher efficacy procedures normally recommended for managing obstetrical hemorrhage are repair of lower genital tract laceration through surgery, ligating uterine hypogastric artery or hysterectomy.⁵ Until recently, relative advantages of uterine artery embolization (UAE) versus other management procedures have been a matter of debate. UAE is normally a well-acceptable for its safety and reliability; nonetheless the rates of success as well as complications for UAE that have been reported in studies are only in a limited, small number of patients.⁶

UAE is a technique which uses vascular radiology for treating obstetrical hemorrhage and uterine myoma. It is designed as such to treat conservatively for keeping uterus intact.⁷ The most important aspect to keep in mind is to preserve fertility. This stage ought to be taken into account of the various different embolotherapy that are used such as pledgets of absorbable gelatin sponge or non-bovine sponge, and other therapies like definitive vascular occlusion, i.e. micro-particles of different sizes, coils etc. The differences of material used might put an impact on both uterine embolization and fertility.⁸

Obstetrical hemorrhage is the leading cause of maternal mortality. After mother's health is out of danger, yet if persistent bleeding is observed, the main goal is for stopping hemorrhage, at the same time preserving the uterus.⁹ The attending obstetrician may opt for surgical options that are conservative or go for UAE. Even though, no randomized trials to date have compared different methods of embolization of either uterine or other localized arteries appears to be highly effective in addition to being significantly beneficial as compared with surgery.

UAE requires a trained radiologist. Procedure involves unilateral right femoral entry point with a 4 or 5 French femoral arterial introducer being inserted. First, aortoiliac angiography is done for detecting location of hemorrhage from pelvic arteries or contra-lateral internal iliac arteries and uterine artery is catheterized using the same catheter through same puncture site. Highly selected vaginal or ovarian arterial catheterization is carried out when needed.^{10,11}

Main indication for UAE includes obstetrical hemorrhage post-vaginal deliveries, continuous mild bleeding post-caesarean and secondary bleeds and sometimes due to vaginal or cervical trauma after failure of localized surgery to stop bleeds. However, not all patients can benefit from embolization due to limited resources and vascular radiologist not being always present.¹²

Having a high success rate, it is rarely observed that a patient undergoes surgery after embolization while embolization after an operative procedure or after failure of conservative management is a regular secondary step. For such reasons, UAE is being promoted over other management or surgical procedures.¹³ The aim of this study was to determine the efficacy of uterine artery ligation in the management of obstetrical hemorrhage.

METHODS

This cross sectional observational using non-probability convenient sampling technique was carried out at the gynecological unit II of Liaquat University Hospital, Hyderabad for a period of six months from 1st January 2019 to 30th June 2019. After ethical approval from the ethical review committee of the hospital, females between 18 to 35 years of age diagnosed as a case of obstetrical hemorrhage, with uterine atony refractory to medical treatment, having active bleeding from placental side or females having a normal coagulation profile were included in the study. Females with post-partum hemorrhage because of retained products of conception, due to genital tract trauma or with disseminated intravascular coagulation were excluded from the study.

Data collection procedure

Females admitted in the gynecology unit III of Liaquat University Hospital, Hyderabad that came under the inclusion criteria and after applying exclusion criteria were included in the study. After explaining about the procedure and taking informed consent, the study was carried out. With all aseptic measures, UAQ among females having obstetrical hemorrhage which was not resolved on conservative medical management was done by a consultant with above 5 years of post-fellowship experience. Females were followed up 24 hours after the procedure. No complication or observed bleeding till 24 hours or bleeding less than 50 ml in 24 hours was considered as a successful and efficacious UAE. All the details along with patient's demographics were recorded and kept confidential.

Statistical analysis

Analysis of data was done using SPSS version 23.0. Quantitative variables were reported as mean and standard deviation with for qualitative or categorical variables, frequency and percentages were calculated. Patients were divided according to the age, parity and type of bleed. To test for significant, chi-square test was

applied keeping p-value of <0.05 as statistically significant.

RESULTS

Out of total of 109 women who presented with obstetric hemorrhage the mean age of the patients was observed to be 25.47±5.25 years. In comparison of parity distribution, 62 (56.88%) were multiparous and 47 (43.12%) were primiparous females. Type of bleeding observed was antepartum 36 (33.03%), peripartum 39 (35.78%) and postpartum in 34 (31.19%) females (Table 1).

Table 1: Descriptive analysis of age, parity and type of bleeding (n=109).

Variable	Mean±SD/ frequency (%)
Age (years)	25.47±5.25
Parity distribution	Multiparous 62 (56.88%)
	Primiparous 47 (43.12%)
Type of bleeding	Antepartum 36 (33.03%)
	Peripartum 39 (35.78%)
	Post-partum hemorrhage 34 (31.19%)
Efficacy	Yes 35 (32.11%)
	No 74 (67.89%)

The efficacy of uterine artery ligation in management of obstetric hemorrhage in a total of 109 patients was observed to be 35 (32.11%) (Figure 1).

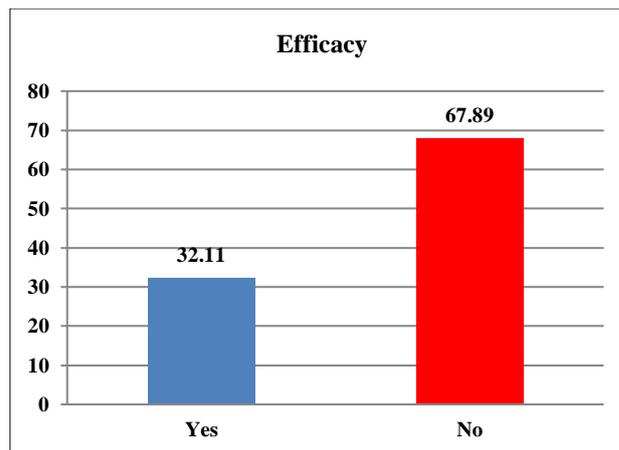


Figure 1: Efficacy of uterine artery ligation in females with obstetric hemorrhage.

The efficacy of uterine artery ligation in management of obstetric hemorrhage in three categories of age groups of ≤20 years, 21 to 30 years and 31 to 40 years was noted to be 27 (93.1%), 41 (69.5%) and 6 (28.6%) respectively with significant association (p=0.0005). In contrast to parity the efficacy noted in primipara and multipara was 34 (72.3%) and 40 (64.5%) respectively with insignificant association (p=0.38). The efficacy reported in antepartum hemorrhage, peripartum hemorrhage and post-partum hemorrhage was 28 (77.8%), 29 (74.4%) and 17 (50.0%) respectively with significant association (p=0.025) (Table 2).

Table 2: Association of efficacy with age, parity and type of bleeding (n=109).

Variable	Efficacy		p-value
	Yes, n (%)	No, n (%)	
Age groups	≤20 years 27 (93.1%)	2 (6.9%)	0.0005
	21 to 30 years 41 (69.5%)	18 (30.5%)	
	31 to 40 years 6 (28.6%)	15 (71.4%)	
Parity	Primiparous 34 (72.3%)	13 (27.7%)	0.38
	Multiparous 40 (64.5%)	22 (35.5%)	
Type of bleeding	Antepartum 28 (77.8%)	8 (22.2%)	0.025
	Peripartum 29 (74.4%)	10 (25.6%)	
	Post-partum 17 (50.0%)	17 (50.0%)	

DISCUSSION

Approximately 50-90% success rates with UAE have been reported in the published literature where UAE has been effective in stopping bleeding in women with hemorrhage.¹⁴ Conservative management or surgery has been largely replaced by UAE, having only proximal action in ligating hypogastric arteries or semi-distal ligatures with other techniques employed for ligating.

Fibroid surgeries can lead to weakness in uterine wall, while UAE for fibroids is effective as well as efficacious.¹⁵

The first and foremost use of UAE successfully was performed by Brown et al for controlling intractable post-partum bleeding after patients underwent hypogastric artery ligation as well as hysterectomy.¹⁶ Similarly, UAE was reported in another study to successfully resolve

post-partum hemorrhage. Even though hysterectomy cannot be ruled out in some cases, however the researches supporting the fact that UAE is efficacious in controlling severe post-partum hemorrhage prior to any surgical intervention.¹⁷ Nonetheless, even with these reassurances, obstetricians are posed with a challenge in considering UAE.¹⁸ Likewise, in this study as well, the efficacy of UAE that was reported was only 32.11% which was far less than that reported in other studies. Possible reason for this low rate of success might be due to the fact that hemorrhagic patients that were included in the study were included due to anter-partum, peri-partum as well as post-partum hemorrhage. In addition, higher frequency of multi-parous women might also have been a possible reason for this low rate of success. However, in this study, a significant difference of efficacy in terms of age ($p < 0.005$) and type of bleeding ($p = 0.025$) was observed.

Nonetheless, studies have preferred UAE in prim gravid women having stable blood pressure and heart rate.¹⁹ In addition, UAE is reported to be an effective alternate method for managing intractable bleeding after a failed medical management and due to uterine artery pseudo aneurysm or arteriovenous malformation.²⁰ The studies reporting high rates of success have mostly been case reports of series where in one study, UAE was reported successful in 09 cases, while in another study there were 16 cases and yet in another, 8 cases in total.²¹⁻²³ In severe hemorrhages, i.e. blood loss > 1500 ml, UAE reported a success rate of 51%. Some researchers have recommended bilateral hypogastric artery ligation to be more cost-effective treatment as compared with UAE.²⁴

In yet another research, UAE success rate was reported at 79% while. Touboul et al reported an efficacy at 71.5% and Singhalet al also reported a successful report of 3 cases undergoing UAE for obstetric hemorrhage.²⁵⁻²⁷

In the studies that have been carried out reporting higher success rates of UAE, most of the studies were done on post-partum hemorrhage females while out study recorded the data of females having anter-partum, peri-partum as well as post-partum hemorrhage. The efficacy of UAE on ante-partum and peri-partum is a matter of debate while only post-partum hemorrhage has shown high efficacy with UAE. Another very important aspect of UAE is that the procedure is recommended to be performed by a specially trained interventional radiologist and not by the obstetrician. It is even said that the procedure must be carried out in a properly equipped radiological suite. Furthermore, the immediate availability of such resources is very limited not only in rural but urban areas, especially in the developing world. In such cases perinatal nurses or the attending obstetrician tends to consider UAE and under take it, while decreasing the chances of success rate.²⁸

Although the study reported the efficacy of UAE in patients with obstetrical hemorrhage, however the study

might not be immune from observer, selection bias in addition to the limited sample size and the study being a single-centered study where a single consultant carried out all the procedures in the research. The procedure of UAE was carried out by an obstetrician while the recommended personnel for such procedure are an interventional radiologist, but due to lack of resources and personnel, obstetrician performed UAE these were the few limitations of the study.

CONCLUSION

According to the results of the study, the efficacy of UAE in different types of obstetrical hemorrhage reported in this study was lower than expected and as has been reported in the published literature. However further studies are needed to ensure the findings of this study.

Recommendations

Further multi-centered studies with higher sample size including females of the different types of bleeding and UAE being performed by radiologist shall be enlightening in determining the efficacy of UAE in obstetrical hemorrhage with more perfectness.

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