

## The Effectiveness of Uterine Arteries Ligation in Management of Refractory Postpartum Hemorrhage

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**Background:** The objectives of study were to see the effectiveness of uterine arteries ligation in cases of massive postpartum hemorrhage (PPH) which required surgical intervention and to determine the morbidity in these patients after uterine devascularization during their hospital stay.

**Material and Methods:** It was a descriptive study which was carried out in Obstetric and Gynecology Unit of Divisional Head Quarter Hospital, Faisalabad which is a tertiary care center. All patients booked or unbooked admitted in labour ward with PPH refractory to medical treatment were included in this study between January 2003 to December 2005. The main outcome measures were satisfactory homeostasis achieved in terms of control of PPH, length of operative time, post operative morbidity, re-exploration, total units of blood transfused and total hospital stay.

**Results:** There were 62 patients of PPH during study period of 2 years. Uterine artery ligation was done in 20 of these patients as 1st line surgical option; in 15 out of 20 (75%) it was done during caesarean section whereas in 5 (25%) it was applied after vaginal delivery. In 4 patients (20%) ovarian artery ligation was also done to control PPH & 2 patients (10%) ended up in peripartum hysterectomy. Uterine devascularization successfully controlled PPH in 99% cases. Failure of uterine devascularization was associated with disseminated intravascular coagulation and placenta accrete. Post operative morbidity was less in terms of anaesthetic complications (11%), pyrexia (33%), paralytic ileus (16.5), wound infection (22%).

**Conclusion:** Postpartum hemorrhage is a life threatening condition. Uterine devascularization has proved invaluable in the control of refractory PPH as an alternative to hysterectomy.

**Key Words:** Postpartum hemorrhage, Uterine devascularization, PPH

### Introduction

Obstetric hemorrhage is an important cause of maternal mortality and morbidity throughout the world. Hemorrhage that occurs within first 24 hours postpartum is termed as primary or 'acute' PPH while excessive bleeding after first 24 hours is termed as secondary or 'late.' Any blood loss greater than 750 ml could be termed PPH, however clinical estimation of blood loss is notoriously inaccurate.

The incidence of primary PPH in developed countries is between 3.7-8.6%. In contrast in developing countries leading cause of maternal mortality remains primary PPH, which accounts for 24-43% of all maternal deaths.<sup>7,8,9</sup>

There are certain contributing factors for this high incidence of maternal mortality due to PPH in the developing world. Lack of antenatal care, neglected labour, untrained midwives, non availability of drugs used in the active management of the third stage, poor blood transfusion services, non availability of anaesthesia services and operation capabilities all play their role. In Pakistan, hemorrhage is the

commonest cause of maternal mortality and accounts for more than 25% of all maternal deaths.<sup>5</sup>

There are various causes of PPH including atonic uterus, retained placenta, genital tract trauma, coagulation disorders, placenta chorioamnionitis and uterine inversion. Uterine atony, i.e. failure of uterus to contract and retract following delivery of the baby, is the leading cause of PPH, accounting for 75-90% of all cases of PPH.<sup>11,13</sup> Severe morbidity may arise from complications of massive PPH like hypovolemic shock, disseminated intravascular coagulation and renal failure. When postpartum hemorrhage is from a non traumatic cause and classic conservative measures fail to control it, the obstetricians usually resort to hysterectomy, a radical and sometimes unsuccessful procedure with the undesirable side effect of reproductive sterility. As an alternative to hysterectomy, especially for young and low parity women, certain conservative surgical procedures have been devised. These include the B lynch suture application, internal iliac artery ligation, uterine and ovarian artery ligation and angiographic

selective embolization. Bilateral uterine artery ligation is a simple, safe, effective and life saving alternative to hysterectomy in the management of uncontrolled PPH. It alone yields excellent results with 83.5% success.<sup>4</sup> If bleeding continues, bilateral artery ligation should be tried.<sup>15</sup> The relative ease of this procedure makes it preferable to hypogastric artery ligation. There are few associated complications like injury to ureters, broad ligament hematoma but these are rare in expert hands. So its application should be considered where necessary for both prophylactic and therapeutic purposes particularly in cardiac and eclamptic patients.

### **Material and Methods**

This was a descriptive study which was conducted in Obstetrics and Gynecology Department (Unit -II) of Divisional Head Quarter Hospital, Faisalabad.

In this study, 20 patients underwent uterine devascularization during a period of two years i.e. from January 2003 to December 2005. It included all the patients delivered virginally or by L.S.C.S. and having massive PPH refractory to medical treatment. All booked and unbooked cases were included in the study.

#### **Exclusion Criteria:**

Patients with following problems were excluded from the study: genital tract trauma e.g. ruptured uterus, cervical or vaginal tears, inversion of uterus, established cases of coagulation disorders, haemodynamically unstable patients and secondary PPH i.e. PPH 24 hrs after delivery up to 6 weeks postpartum.

#### **Methods:**

All patients booked and unbooked admitted in labour ward with PPH refractory to medical treatment were considered as candidates for uterine and ovarian artery ligation under general anesthesia after initial resuscitation and exploration. Ample amount of fresh blood was made available to replace blood loss. An informed and written consent for hysterectomy was taken in all these patients before laparotomy.

#### **Description Of Surgical Technique:**

After opening the abdomen, uterus and tubes were elevated, exposing and flattening the broad ligament. After identification of uterine vessels on both sides of lower segment, the ligature (vicryl no. 2 absorbable suture) was placed around the ascending uterine artery and accompanying veins at a level 2 cm below the standard transverse uterine incision. Initially it was introduced into the myometrium from anterior to posterior, 2 cm medial to lateral

margin of uterus; subsequently it was removed from posterior myometrium and redirected from posterior to anterior through an avascular space in the broad ligament. Ovarian artery ligation technique involved the ligation of utero-ovarian anastomosis by identifying a vascular area of meso-ovarium ligament. Absorbable suture was used. Following the procedure the operation was considered successful if the hemorrhage was controlled within 20-30 minutes; when the patient was haemo-dynamically stable, the abdomen was closed. Effectiveness of this technique was assessed by the recording control of PPH, operative time, blood loss estimation (intra operatively). Maternal morbidity was assessed by post operative complications including injury to bladder, ureter, bowel, wound infection, thromboembolic complications and length of hospital stay.

#### **Statistical Analysis:**

Tests based on frequencies and proportions were executed on collected data. For this purpose SPSS version 10 was used.

### **Results**

During 2 year study period 20 patients with refractory PPH were selected for uterine devascularization. Out of 20 patients 17 (85%) were unbooked and 3 (15%) were booked. Ten patients (50%) were primigravide, 9 patients (45%) were in parity group 1-2 while one patient (5%) was grand multiparous. 15 patients (75%) had uterine atony ; in 66.7% (10/15) it was due to obstructed labour after prolonged and injudicious augmentation outside the hospitals by traditional birth attendants, twin pregnancy in 13% (2/15), macrosomic baby in 6.7% (1/15) & chorioamnionitis in 13.3%(2/15). Placenta praevia was documented in 20% (4/20) and placenta accreta 5% (1/20). 3 patients (15%) were delivered by normal vaginal delivery, 1 patient (5%) was delivered by forceps delivery, lower segment caesarian section (LSCS) was done in 15 (75%) & emergency LSCS in 13 (65%) patients. Bilateral uterine artery ligation was done in all 20 patients (100%). It was successful in controlling PPH & preserving uterus in 90% of cases (18 patients) while 2 patients (10%) ended up in hysterectomy as shown in **(Table-1)**. Uterine devascularization required shorter operative time (mean=60 min v/s 120 min) for hysterectomy and hospital stay (7 v/s 14 days). All patients required blood transfusion but it was less than hysterectomy (mean 4 units v/s 8 units).

Maternal outcome was assessed in terms of postoperative morbidity like anesthetic complications (11%), pyrexia (33%), paralytic ileus (16.5%) and

wound infection (22%) as shown in **(Table-2)**.

## Discussion

PPH is a life threatening complication of labour. It has been estimated that worldwide, over 125,000 women die of PPH each year. In developed countries where the level of obstetric care is adequate, its occurrence is rare. These countries have institutions that have in-house obstetric anesthesia and surgical staff where close monitoring of maternal and fetal well being is available.<sup>10</sup>

The situation is worse for underdeveloped countries of South East Asia like Pakistan where poverty, ignorance, illiteracy, aversion to abdominal delivery, traditional practices and grand multiparity make this serious complication a common occurrence and it stands as one of the leading factors in maternal morbidity and mortality.<sup>9</sup>

The frequency of PPH is a reflection of level of health care delivery services available in a community as well as utilization of these facilities. Although there has been an increase in the number of medical facilities available in rural areas drained by DHQ hospital, Faisalabad this has not produced a fall in frequency of PPH. Possible explanation for this includes the declining economic status of individuals, the increasing cost of medical care and major role played by traditional birth attendants in management of high risk pregnancies.

The objective of the current study was to see the effectiveness of uterine devascularization in refractory PPH especially in young and low parity women and to evaluate post operative morbidity in these patients. In this study, 85% patients did not receive antenatal care. The majority of patients were young and low parity and the preservation of uterus was required. The mean age of presentation was 24 and 50% patients were primigravidae.

In this study uterine atony was found to be the main cause of PPH in 75% of patients and was similarly observed by many other authors.<sup>1,4,6</sup> Though with the advent of newer medical agents like PGF-2 alpha and misoprostol E-1, the trend in modern obstetrics has changed. This percentage of uterine atony was due to unbooked status of patients (85%) obstructed labour (66.7%) after prolonged & injudicious augmentation outside the hospital by the TBAs, chorioamnionitis (13.3%) twin pregnancies (13.3%) and macrocosmic babies (6.7%). Moreover DHQ hospital which is a tertiary care unit where the cases are referred from maternity units of rural centers and city, majority of the patients were already

anemic and became compromised even with a small amount of blood loss.

In our study, delivery by cesarean section was also a significant risk factor for PPH (75%); this was comparable to the study of Deborah<sup>9</sup> (C-section in 70% of cases). Deborah reported that the most frequent indication for obstetric hysterectomy is now hemorrhage at caesarean section complicated by abnormal placentation, in contrast to the earlier series which identified uterine rupture and uterine atony as the commonest cause. According to the Pithchard JA et al the normal loss during cesarean section amounts to 1000 ml. Secondly, the cesarean section were done for those patients who were high risk, e.g. cases of placenta previa, those with prolonged labour, obstructed labour, multiple gestation and macrosomic babies (relative CPD). So the blood loss of major surgery along with any risk factor resulted in greater blood loss.

Our data revealed that the success rate of the uterine devascularization was 90%. This is comparable with success rate (96%) reported by O Leary after 30 years experience with 265 patients. This is slightly less than the success rate (100%) of stepwise uterine devascularization reported by the AbdRabbo. The success rate of our study (90%) is more than that reported by Fahmy K (80%). The success rate of bilateral uterine and ovarian artery ligation (90%) to

**Table-1:** Success of uterine devascularization.

	Yes%	No %
PPH Controlled	90% (n=18)	10% (n=2)
Uterus preserved	90% (n=18)	10% (n=2)
Hysterectomy	10% (n=2)	90% (n=2)

**Table-2:** Post-operative complications after uterine devascularization (Percentage distribution).

Maternal Morbidity	Frequency (n=18)	Distribution
Anesthetic complications	2	11%
Pyrexia	6	33%
Paralytic ileus	3	16.5%
Wound infection	4	22%
Re-exploration	Nil	0
Visceral injury	Nil	0
Secondary PPH	Nil	0
ATN	Nil	0

control refractory PPH is more than reported by S.K Chattopadhyay for HAL (65%)<sup>1</sup> and for B-Lynch Brace suture (85.7%) in a local study conducted at DHQ Hospital Faisalabad in year 2000-2002.

Failure rate was 10%. In one patient (5%) it was due to placenta previa accrete and in 2<sup>nd</sup> patient it was due to subclinical DIC. It is important to remember; however, that some cases of postpartum hemorrhage due to placenta praevia or accrete may be successfully managed by uterine artery ligation. It is impossible to predict which of such case will respond, but nothing will be lost by attempting ligation in every case. Moreover, uterine artery ligation might succeed in cases of hypo or afibrinogenemia. Post operative complications were analyzed which were minor and included anesthetic complications (delayed recovery from anesthesia) 11%, pyrexia 33%, paralytic ileus 16.5% and wound infection 22% (more in cases of obstructed labour and chorioamnionitis). Hospital stay was increased in patients who suffered from wound infection. Beside PPH management, the cause of prolonged hospital stay was the management of medical disorders associated with pregnancy like pre-eclampsia, abruption placentae, HELLP syndrome and limited resources. It was easy to perform in caesarean section and adopted in cases of PPH after vaginal deliveries. Moreover no adverse effects were reported for subsequent pregnancies.

As observed in this study majority of patients arrived at the hospital with long neglected labour, often in the moribund condition. Obviously our primary objective in such situation is to prevent death to provide proper care for a high risk labour in a hospital setting but this is not well accepted by our population. Although limited facilities are a problem, patients do not make use of available services. There is no doubt that education does make

a difference. The economic recession and poor funding of hospitals by the government will continue to hamper the adequate provision of the supervisory services and prompt intervention. Public education and training of midwives and TBAS is very important. As majority of population lives in rural areas where proper maternity clinics are not available, free medical facilities should be provided to these areas.

## Conclusion

Postpartum hemorrhage is a life threatening condition. Uterine devascularization has proved invaluable in the control of refractory PPH as an alternative to hysterectomy. Ligation of uterine arteries is anatomically sound, physiologically rational and surgically possible and its haemostatic effect is due to the fact that it shuts off 90% of the blood supply to the pregnant uterus. This is less complicated than either internal iliac ligation or hysterectomy. The operative time is shorter and it allows conservation of uterus and fertility. Moreover postoperative outcome is also very satisfactory with no major complication as evidenced in current study. Provided the prerequisites for its application are fulfilled, satisfactory homeostasis can be seen immediately after its application and because of its life saving potential, relative safety and conservation of fertility it is suggested as first line surgical procedure.

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### Answer Picture Quiz

- The most likely diagnosis is dengue fever. The history and rash are classical. Other conditions to be considered are drug rash, measles, infectious mononucleosis.
- CBC, LFTs, PT/APTT should be done immediately. Serological tests for dengue (IgM-dengue antibodies ) should be performed after the 7th day of onset of illness.
- This infection is transmitted through mosquitoes *Aedes aegypti* . The community should organize themselves to remove all possible breeding places of mosquitoes inside and outside of houses such as tin cans, rubber tyres, bottles or drain accumulated water from trees and plants, cover water storage containers to prevent breeding of mosquitoes, clean house gutters to prevent stagnation of rain water, isolate patients suffering from Dengue H-Fever for at least 5 days and report to the nearest health center any suspected case of Dengue H-Fever in the neighborhood.
- Because Dengue hemorrhagic fever is caused by a virus for which there is no known cure or vaccine, the only treatment is to treat the symptoms.
  - Rehydration with intravenous (IV) fluids is often necessary to treat dehydration.
  - IV fluids and electrolytes are also used to correct electrolyte imbalance.
  - A transfusion of fresh blood or platelets can correct bleeding problems.
  - Oxygen therapy may be needed to treat abnormally low blood oxygen.
- Dengue haemorrhagic fever and dengue shock. The former is due to severe thrombocytopenia. This results from immune destruction of platelets when the individual gets repeat infection with different strain of virus. Shock results from massive leakage of plasma proteins into tissues as a result of vasodilatation.

