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Emergency Bilateral Internal Artery Ligation in Control of Post-Partum Hemorrhage

Naila Yasmeen, Shahbaz Ahmad, Farzana Latif, Muhammad Asif

ABSTRACT

Objective: To study the role of emergency bilateral internal iliac artery ligation in the management of post-partum hemorrhage. **Study Design:** It was a retrospective study. **Settings:** This study was carried out in the department of obstetrics and gynae unit 2, Lahore General Hospital Lahore. **Duration:** From December 2014 to December 2016. **Methodology:** Twenty patients with massive postpartum hemorrhage were included in this study. In all cases other procedures were also performed before ligation of internal iliac arteries. Main out comes measure was the effectiveness to control hemorrhage which was assessed by the arrest of intraperitoneal or vaginal bleeding. Detailed characteristics of the patient were entered in the Performa. **Results:** During study period twenty patients under went internal artery ligation (IIAL). Sixteen patients (80%) were unbooked while four patients (20%) were booked. Mean age of these Patients ranged between 20-40years. 14(70%) patients having parity between 2-8 while 6(30%) patients were primipara – In 8 (40%) patients internal ilia artery ligation was carried out due to atonic postpartum hemorrhage followed by adherent placenta in 6(30%) patient, ruptured uterus in 3(15%) cases, coagulopathy in 2(10%) patients and lower genital tract injury in one (5%) patient. 4 (28%) patients needed hysterectomy following bilateral internal iliac artery ligation because of failure to control bleeding. While 6(30%) patients under went hysterectomy before bilateral internal ilia artery ligation. Over all efficacy of this procedure in terms of uterine salvage was 71.4% and in term of saving maternal life was 95%. **Conclusion:** In experienced hands bilateral internal iliac artery ligation is an effective method for controlling life threatening postpartum hemorrhage thus reducing mortality and morbidity with preservation of future fertility.

Keywords: Internal iliac artery ligations. (IIAL) Postpartum hemorrhage (PPH) uterine preservation.

Corresponding Author

DR. SHAHBAZ AHMAD, Assistant Professor, Surgery, Faisalabad Medical University, Allied Hospital, Faisalabad-Pakistan
Contact / Email: +92 321-7652747, drshahbaz1076@gmail.com

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INTRODUCTION

Postpartum hemorrhage (PPH) is one of the important obstetrical emergencies and leading cause of maternal morbidity and mortality. According to the World Health Organization, postpartum hemorrhage constitutes 25% of all maternal deaths worldwide.[1] PPH can result from several obstetrical conditions including uterine atony, placental disorders such a placenta accreta, obstetrical trauma, bleeding diathesis, and trauma to the abdominopelvic region.[2] Treatment of PPH consists of both medical and surgical treatment. On the basis of this WHO recommends intravenous Oxytocin for this first line management, with ergometrine (with or without Oxytocin) or a prostaglandin drug (including misoprostol, 800ug sublingually) as a second line.[3] Various surgical techniques have been described in PPH patient's refractory to massage and uterotonic therapy such as- uterine compression sutures, bilateral uterine artery or internal iliac artery (hypo gastric artery) ligation and as a last resort subtotal or total hysterectomy can be performed.[4]

The choice of the procedure will depend on the parity of the women and the desire for childbearing, the extent of hemorrhage and most importantly, the experience and judgment of the surgeon.[5] Among them, bilateral internal iliac artery, procedure is a surgical approaches which decrease pelvic and uterine perfusion at a rate of 75-80% and also preserves fertility.[6] It was first performed by Kelly in 1894 who said that prophylactic internal iliac artery ligation does not adversely affect the blood flow to pelvic viscera.[6] The rational for this is based on the hemodynamic studies of Burchell, which showed that internal iliac artery ligation reduced pelvic blood flow by 49% and Pule pressure by 85%, resulting in venous pressures in the arterial circuit thus promoting hemostasis.[7] Internal iliac artery ligation has been advocated as an effective means of controlling intractable PPH and preventing maternal death.[8] Pelvic ischemia due to IIAL was once a fear, but it has been show that little morbidity either short term or long term, results if procedure is performed appropriately.[9] Reported success rate of internal iliac artery ligation varies from 40% to 100%,[10] and procedure averts hysterectomy in only 50% of the cases.[11]

Procedure related important complications as inadvertent suturing of external iliac artery, potential injury to adjacent vascular structures, and a need for a certain amount of surgical experience.

The aim of this study was to evaluate the indications and efficacy of clinical outcomes for bilateral internal iliac artery ligation as a lifesaving surgery along with preserving the future reproductive capacity.

METHODOLOGY

Study Design: This was retrospective study.

Settings: Department of obstetrics and gynecology unit II of Lahore General Hospital Lahore-Pakistan.
Duration: Two years form December 2014 to December 2016.
Methods: The detailed data of all these patients were filled on a proforma twenty patients who underwent IIAL their obstetrical and Demographic characteristic including age, parity, and gestational week's diagnoses mode of delivery causes of PPH, conservative management along with need of hysterectomy and number of bloods transfused. Indication for bilateral internal iliac artery ligation were analyzed and classified as atonic adherent placenta, traumatic and coagulopathy. Two experienced consultants in the hospital performed these operations.
Therapeutic IIAL was performed in women with PPH either at caesarean section or at laparotomy done at a variable time after vaginal or caesarean delivery.
All the patients in the study had IIAL by a trans peritoneal approach_ A right angled clamp was passed beneath the internal iliac artery from lateral to medial side about 4cm distal to its origin. The ligature placed under the artery was then tied doubly. Vicryl no 1 was used for ligation. Pulsation of the femoral artery was identified after placing the ligature. Efficacy of IIAL was determined in term of controlling obstetric hemorrhage with uterine salvage and saving maternal lives. Immediate intraoperative complications in the form of injury to adjacent organs, injury to iliac vein, pelvic hematoma formation or accidental ureteric ligation were recorded. Post-operative and remote complications fever, wound infection, paralytic ileus, claudication in posterior thigh, length of hospital stay, admission to intensive care unit, requirement of blood and component therapy were recorded and statistical analysis was done.

RESULTS

During the period December 2014 to December 2016, total number of deliveries conducted in gynecology and obstetrics unit 2 Lahore General hospital Lahore were sixteen thousand twenty patients under went bilateral internal artery ligation due to complicated post-partum hemorrhage (PPH) after vaginal or caesarean delivery in our hospital or on patients referred from other hospital 16(80%) patients were un booked while 4 (20%) patients were booked. Mean Age of these patients ranged b/w 20-40 years 14(70%) patients having parity been 2-8 Out of twenty women four (20%) were delivered virginally while made of delivery was through caesarean section in 16 (80%) of patients. while 6(30%) patients were primipara- out of 20 women who underwent bilateral internal artery ligation due to atonic PPH 40% leads the list followed by adherent placenta 30% ruptured uterus 15% coagulopathy 10% and lower genital tract injury in 5% cases (overall efficiency of this procedure In term of uterine salvages was 71.4% and in term of saving maternal life was 95% (19 cases)
Four patients (28%) needed hysterectomy following bilateral internal iliac artery ligation because of failure to control bleeding. Additional procedures besides IIAC, hysterectomy was application of Blynch suture and uterine ligation. Out of 20 patients 19 (95%) were successfully manage by BIAL and were discharged between 7-20 days. Mean blood loss, pre, and post-operative hemoglobin value and amount of blood transfused are shown in table (IV).

Table 1: Baseline characteristic in study of BIAL Total number 20

Characteristics	Number	Percentage %
Booked	4	**20**
Un Booked	16	**80**
Age (in years). Mean Range	20-40	
Parity	Primi Para (6)	**30**
	Multi para (14)	**70**
Mode of Delivery		
Vaginal	4	**20**
Caesarean section	16	**80**

Table 2: Indication of internal iliac artery ligation total number 20

Indications	Number of patients	Percentage
Atonic PPH	8	40
Adherent placenta	6	30
Uterine rupture	3	15
Coagulopathy	2	10
Lower genital tract injury	1	5

Table 3: Types of Childbirth delivery, Additional total Number 20

Sr	Operation performed	Number	Percentage
1	Types of vaginal delivery	4	20
	Childbirth caesarean section	16	80
2	Additional Operation performed		
	• Blynch saturation	4	20
	• uterine artery ligation	4	20

Table 4: Mean blood loss, pre and post-operative hemoglobin value amount of blood transfusion and hospitalizations period of the patients

Parameter	Values
Mean blood loss(ml)	1500(500-3000)
Preoperative hemoglobin values (g/dl)	7-4
Post-operative hemoglobin values (g/dl)	8
Intraoperative blood transfusion (unit)	4-10
Total blood transfusion (unit)	4-14
Hospitalization in intensive care (day)	2-7
Total hospitalization (day)	5-15

In none of the patients procedural complications were seen during and after IIAL. There was no ischemic complications gluteal muscle ischemia or bladder ischemia in the post-operative period either during inpatient stay or up to six months. None of the patients needed re laparotomy for persistent hemorrhage once IIAL done. There was 1 (5%) maternal death due to DIC. For all women in whom uterus could be preserved resumption of menstrual cycle were seen within six months of IIAL. Over all efficacy of this procedure in term of uterine salvage

was 71.4% Highest percentage (87.5%) uterine salvage was noted in patients whom IIAL was performed due to atonic PPH followed by adherent placenta 50% reputed uterine. 50%.and interm of saving maternal life was 95% (Case 1)

Table 5: Indication of IIAL in patient with intact uterus and percentage of success following PPH Total Number 14

Indications along with Number of the cases		hysterectomy	Percentage of Success (Uterine Salvage)
Uterine atony	8	1	87%
Adherent placenta	4	2	50%
Ruptured Uterus	2	1	50%

Table 6: Efficacy of procedure

Interm of uterine	Interm of saving
Salvages 71.4%	Maternal life 95%

DISCUSSION

Post-partum hemorrhage (PPH) continues to be one of the leading causes of maternal mortality and morbidity all over the world[12] including Pakistan where it is responsible for 21-31% of maternal mortality and morbidity.[13] It's on obstetric catastrophe leading to hemorrhagic shock and even death.[14]

For the arrest of hemorrhage medical and surgical measures are employed. Medical measures involved utrotonic infusion, use of prostaglandin analogues. When PPH continues despites aggressive medical management early consideration should be given to surgical intervention. The choice of the procedure will depend on the parity of the woman and her desire for child bearing, the extent of hemorrhage and most importantly the experience and judgment of the surgeon.[15] The various surgical interventions which would be required are uterine and internal iliac artery ligation, uterine compression sutures and peripartum hysterectomy. Internal iliac artery ligation (IIAL) has been advocated as an effective measure of controlling intractable PPH and preventing maternal death. Bilateral internal iliac artery ligation is not only saving the future fertility but also associated with less post-operative morbidity compared with emergency hysterectomy and required less operative time for those experienced with this technique.[16] IIAL does not result in complete blockage of blood supply to the female pelvic organ but contributes to a significant decrease.[17] Many national and international studies show that uterine atony is the commonest causes of PPH followed by retained placenta.[18] In our study twenty patients underwent IIAL. Total deliveries conducted during two years study period were twenty-six thousand. Most of the patient were un- booked having parity ranged b/w 2-8. Most of our patients who have PPH their bleeding was controlled with bimanual massage and uterotonic. However in 10% of the patients PPH was refractory to aggressive management and they required surgical treatment as shown in our study and study carried out by yavuz Simsk et al which showed higher because of increased number of multiparous patients population with uterine atony being referred to tertiary care and university hospital in our studies.[19] A study carried out by Ledee et al reported an incidence of 0.18% for postpartum hemorrhage refractory to aggressive treatment.[20] Out of 20 women who underwent IIAL due to PPH atonic uterus 40% leads the list followed by adherent placenta 30% ruptured uterus 15% coagulopathy 10% and lower genital tract injury in 5% cases.

The technique of IIAL has been used in patients with uterine atony and abnormal placentation.[21] Our study showed success rate of 87% in patients with atonic uterus 50% patients' adherent placenta 50% in ruptured uterus and is consistent with a study carried out by Fouzia parveen etal,[22] and they reported a total eight patients undergoing IIAL: three for atonic uterus, two for placenta accrete, rupture uterus and coagulopathy. Which was also consistent with a study carried out by KabediyM etal and Nayak, etal showed that atonic PPH was the most common indication for IIAL (46.6-60%) followed by placenta previa and abruption placenta 31 and 20% traumatic PPH (22.2% - 13.3%).[23,24]

Efficacy of IIAL reported in our study in term of uterine salvage was 71.4% and maximum success was reported in cases of atonic PPH (87%) and in adherent Placentas (50%). Iwata/t, et al reported that success for IIAL was between 40% and 100% and it prevents hysterectomy by 50%. IIAL is reported to be less successful in hysterectomy prevention in cases with uterine atony, when compared to other causes of PPH.[25] In our study the efficiency of IIAL in terms of uterine salvage was 71.4% and maximum was reported for atonic PPH (87%). However, this rate was higher than most other studies.

Due to fact that additional procedures like compression sutures and uterine and ovarian artery ligation had already been performed. This was also supported by Evsen Mehmet Siddik et al, noted uterine salvage in 9 of 16 (56.2%) cases with uterine atony, and it was determined that an additional procedure, the ligament propriumovariae or B Lynch suture was needed in the atony group for the preservation of uterus.[26]

Jeshi et al all pointed out that IIAL not only contributes to the prevention of hysterectomy but also in cases where hysterectomy cannot be prevented, it facilitates hysterectomy as in case of uterine trauma.[15]

Debasmita Mondal et al, reported a good response of atonic PPH to IIAL, and observed less postoperative morbidity in comparison to emergency hysterectomy, requiring less operating time for those experienced surgeons.[16]

In studies carried out by Mulcharjee et al and Chelli et al noted uterine salvage rate between 60.7% to 87.9% as too noted our studies.[27,28]

Though IIAL is lifesaving procedure, it also has some complications which one should know, while performing this procedure such as inadvertent external iliac artery ligation, injuring of the internal iliac vein or the ureter.

Kalburgi E-B. Et al reported no complications followed by IIAL.[29]

To avoid these complications before ligation of the artery, observation of external and common iliac arteries, retraction of the ureter medically from operation field and ligation of the artery destroy to its posterior branches are recommended. In our study

we did not encounter any serious compilation this is consistent of the study carried out by fouzia parveen et al.[22]

No complications were reported, perhaps due to the surgery being performed by experienced consultants. Reich and Nechtow have emphasized that the biggest pitfall with IIAL was too long to perform it.[30] Nizard J et al, stated that IIAL for postpartum hemorrhage was not responsible for secondary infertility, uterine contractility disorders, placental perfusion insufficiency, fetal anomalies or IUGR.[31] In our study there were no such complication noted, as in the study carried out by wagaarachchi P.T et al, in 12 women which had undergone IIAL for PPH and concluded that it was a safe and effective procedure for life threatening obstetric hemorrhage, along with the preservation of fertility.[32]

The efficacy of IIAL in saving maternal life in our study was 95%. This is consistent with a study carried out by Shrinivas etal.[33]

CONCLUSION

Ligation of anterior division of internal iliac artery is an effective and a safe method to arrest severe and refractory PPH. This procedure may also be useful to arrest persistent hemorrhage after hysterectomy and thus reducing the mortality, morbidity and preserving uterus and future fertility. Increased understanding of retroperitoneal anatomy is needed to reduce the risk of intraoperative and post-operative serious complications. Furthermore, there is an urgent need to train the younger obstetricians to perform this technique of IIAL.

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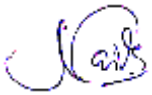
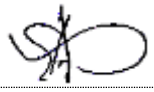
AUTHORSHIP AND CONTRIBUTION DECLARATION

AUTHORS	Contribution to The Paper	Signatures
Dr. Naila Yasmeen Assistant Professor, Gynae and Obstetrics, Uni-II Post Graduate Medical Institute (PGMI) Lahore General Hospital Lahore	Data Collection, Editing, Composing results and Reference	
Dr. Shahbaz Ahmad Assistant Professor, Surgical Unit III FMU / Allied Hospital, Faisalabad	Data collection, Drafting of the article, Corresponding author	
Dr. Farzana Latif Assistant Professor, Gynae and Obstetrics, Uni-II Post Graduate Medical Institute (PGMI) Lahore General Hospital Lahore	Reviewing and writing references, help in data collection and composing	
Dr. Muhammad Asif Post Graduate Resident, Surgical Unit-III Allied Hospital, Faisalabad	Literature Review