Original Article

Use of bilateral internal iliac artery ligation for controlling severe obstetric haemorrhage

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ABSTRACT

Objective: To study the role of bilateral internal iliac artery ligation (BIAL) in arresting intractable postpartum haemorrhage.

Methodology: This study of case series was conducted in Civil Hospital, Karachi, Pakistan from July 2008 to December 2009 over a period of one and half years during which all the patients who needed BIAL for control of severe obstetric haemorrhage were included and their detailed characteristics were recorded on a proforma. Main outcome measure was the effectiveness to control haemorrhage, which was assessed by the per-operative assessment of arrest of intraperitoneal or vaginal bleeding and need of additional hysterectomy.

Result: During this period total eight patients underwent BIAL, three for PPH due to atony, two for placenta praevia and one each for placenta increta, ruptured uterus and coagulopathy. Three patients needed hysterectomy, out of which one followed BIAL because of failure to control bleeding (failure rate 16.66%). While two other patients underwent hysterectomy before BIAL. Failure to control bleeding was evident immediately and no patient needed re-laparotomy. Two women developed wound infection one maternal death occurred due to coagulopathy and its complications. None of the patient had iliac vein injury or any ischaemic complications during inpatient stay.

Conclusions: We conclude that BIAL is a safe and effective procedure for treating life threatening obstetric haemorrhage with preservation of future reproductive capacity.

KEY WORDS: Internal iliac artery ligation, Obstetric haemorrhage, Severe PPH.

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INTRODUCTION

Post Partum Hamorrhage (PPH) is a major cause of worldwide maternal mortality ranging from 13% in developed countries to 34% in developing countries.[1] It is responsible for over one lac twenty five thousand maternal deaths each year and is associated with morbidity in 20 million women per year.[2] Uterine atony is the commonest cause of life threatening obstetric haemorrhage.[3] Recently failure of medical treatment is managed by uterine balloon tamponade, uterine compression sutures, stepwise uterine devascularization and arterial embolization.[4,5] In women not responding to these treatment, the traditional surgical treatment is to perform an emergency hysterectomy, eliminating any possibility of future fertility. Bilateral internal iliac artery ligation (BIAL) is an alternative lifesaving operation which preserves reproductive capacity.[6] But because of lack of knowledge and expertise, only a few obstetric surgeons opt for this operation as opposed to emergency hysterectomy.

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American college of obstetrics and gynecology (ACOG) continues to advocate the use of BIAL in the management of intraoperative intractable haemorrhage during pelvic surgery or in cases of obstetric haemorrhage.[7] Other authors also believe in training all the oncall obstetric team in a tertiary referral centre.[8] It is mostly indicated in PPH due to uterine atony but has also been successfully used in patients with ruptured uterus and placenta praevia and accreta. The rationale for this is based on the haemodynamic studies of Burchell which showed that BIAL reduced pelvic flow by 49% and pulse pressure by 85% resulting in venous pressures in the arterial circuit thus promoting haemostasis.[9] Despite intensive search no locally published data was found on BIAL in controlling obstetric haemorrhage. The aim of this study was to describe the effectiveness of BIAL in controlling life threatening obstetric haemorrhage while preserving the future reproductive capacity.

METHODOLOGY

Women who underwent BIAL for obstetrics haemorrhage from July 2008 to December 2009 over a period of 1 ½ years in Gynae Unit-I of Civil Hospital Karachi were included in this study. The detailed data of all these patients were filled on a proforma and then reviewed. Two experienced consultants in the hospital performed these operations. Total eight patients underwent this surgery during this period. Their age, parity, duration of pregnancy, diagnosis, mode of delivery, cause of PPH, need of additional hysterectomy, number of blood transfused, recorded and complications noted were injury to iliac veins, postoperative development of fever, wound infection thrombophlebitis, paralytic ileus and ischemic complication and maternal death. Therapeutic BIAL was performed in women with PPH either at caesarean section or at laparotomy done at a variable time after vaginal or caesarean delivery. Women with atonic PPH at vaginal or caesarean section were initially treated with massage and uterotonics such as oxytocin infusion and carboprost injection. Failure to restore the uterine tone and arrest the blood loss by medical treatment uterine packing and brace sutures were applied. Uterine artery ligation was also tried before the decision of BIAL. During caesarean section for placenta previa failure to control bleeding from the placental bed by pressure or by under running the bleeding sites with absorbable sutures and uterine artery ligation led to the decision to do BIAL.

All the patients in the study had BIAL by a transperitoneal approach. A sound knowledge of pelvic anatomy was essential prior to the procedure. 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 without cutting the vessel. Vicyl no.1 was used for ligation. Pulsation of the femoral artery and dorsalis pedis were identified after placing the ligature. Once BIAL was performed the control of bleeding was confirmed by improvement in vital signs as well as decrease in amount of vaginal bleeding. If bleeding continued then decision of hysterectomy was taken.

RESULTS

During the study period eight patients underwent BIAL in our department. Detailed characteristics of these patients are shown in Table-I. The mean age of these patients was 28 years and ranging from 23 to 37 years while mean parity was three with a range from nulliparity to para 8.

The commonest indication were uterine atony in three cases (37.5%) and placenta praevia in three cases (37.5%). One patient had placenta increta, one had traumatic PPH and one placenta previa case also developed coagulopathy. Except one all the patient had caesarean section while the vaginally delivered patient developed PPH due to uterine atony which was not controlled by medical treatment, uterine packing and uterine artery ligation thus needed BIAL. Hysterectomy was performed in three cases. One patient had placenta increta and the other had placenta previa with grandmultiparity and intractable haemorrhage therefore hysterectomy was performed by registrar on duty in emergency, despite this bleeding continued which were controlled by BIAL.

The third hysterectomy case had ceasarean section elsewhere followed by haemoperitoneum and BIAL done but she needed additional hysterectomy as bleeding could not be arrested by BIAL. One multiparous patient needed BIAL following hysterectomy as she was bleeding from pedicles due to coagulopathy while the other patient had placenta increta who also had pelvic oozing following hysterectomy which was arrested by BIAL. One of the nulliparous patient had uterine rupture which was repaired but because of oozing from lower end of repair BIAL carried out to salvage the uterus.

In six of our patients BIAL was performed primarily at caesarean section while in one after two hours of vaginal delivery by laparotomy and one under-

Table-I: Detailed Characteristics of Cases.

Sr. No.	*Age*	*Parity*	*Diagnosis (including duration of pregnancy)*	*Cause of PPH*	*Hysterectomy done*	*Mode of delivery*	*No. of Blood & FFP transfused*	*Outcome complications*
1	30	3^{+1}	30 wk pregnancy with P.P. & 2 previous LSCS	Placenta increta	Yes	LSCS	9 Blood, 8 FFP	Wound infection, Fever
2	25	1^{+1}	32 wks pregnancy with P.P. type – II	Placenta previa	No	LSCS	8 Blood, 6 FFP	Fever
3	37	8^{+2}	34 wk pregnancy with P.P. type – IV	Placenta previa and Coagulopath	Yes	LSCS	8 Blood, 4 FFP	Wound infection, Fever
4	26	1^{+0}	38 wks pregnancy with prolong labor	Atony of uterus	No	Vaginal Delivery	6 Blood, 4 FFP	Paralytic ileus
5	28	2^{+0}	Post cesarean haemoperitoneum	Atony of uterus & oozing from C.S. wound	Yes (Post BIAL)	LSCS	14 Blood, 10FFP	Paralytic ileus. Expired after 18 hr in SICU
6	26	1^{+0}	37 wks pregnancy with BOH	Uterine atony	No	LSCS	7 Blood, 5 FFP	
7	25	1^{+0}	38 wks pregnancy with type-III placenta previa	Placenta previa	No	LSCS	8 Blood, 6 FFP	Fever, Paralytic ileus
8	23	Primi gravida	40 wks pregnancy with ruptured uterus & vaginal tear	Trauma to uterus	no	LSCS	10 Blood, 8 FFP	Wound infection, Fever

went BIAL after 48 hours of caesarean section performed at some peripheral hospital who presented in shock with haemoperitoneum. After successful control of haemorrhage with BIAL no women had delayed haemorrhage requiring re-laparotomy. However failure of BIAL to arrest uterine bleeding was evident immediately (as in one case) before closure of abdomen, thus enabling a timely decision to proceed to hysterectomy. All patients received liberal (more than 5 units) blood transfusions and antibiotics.

None of our patients developed internal iliac vein injury or ischaemic complications in postoperative period. But all the patients needed intensive care unit admission. Five patients developed fever, three developed paralytic ileus and three developed postoperative wound infections and one maternal death occurred due to irreversible damage as she was referred late in a state of shock and despite BIAL and hysterectomy she succumbed to dissemination intravascular coagulation and massive transfusion and its complications.

DISCUSSION

Bilateral internal iliac artery ligation in PPH was intended to conserve the uterus for future fertility but sometimes the bleeding may be so severe that caesarean hysterectomy may be indicated as a life-saving alternative. BIAL was performed on 8 patients during this period to control severe haemorrhage while no prophylactic BIAL was carried out although reports show its role in reducing blood loss in women at high risk of PPH during caesarean section, like placenta praevia, placental abruption, HELPP syndrome, ITP and infective hepatitis.[3]

After successful control of haemorrhage with BIAL no women had delayed haemorrhage requiring re-laparotomy. In our study three patients had hysterectomy, two prior to BIAL and one after BIAL. The failure rate in our experience was one out of six (16.66%) while others reported 68.8% and 29%.[3,10] This may be because of less number of cases of atony of uterus and early decision of performing BIAL in our study. It is very effective in controlling massive obstetric haemorrhage and only rarely is subsequent emergency hysterectomy needed if performed in time. It is important to emphasize that treatment of severe haemorrhage requires not only the technical ability to carry out an appropriate surgical procedure but the ability to make a timely decision that this operation is necessary (Report on confidential enquiries into maternal deaths in the United Kingdom 1998).[11]

Placenta praevia as a cause of severe haemorrhage was found in three cases and one had placenta increta. In complete placenta praevia, the placental site receives a significant proportion of its arterial blood supply from the descending cervical and vaginal arteries. These arteries continue to perfuse the lower segment even after uterine artery ligation, which fails to control haemorrhage. The uterine brace compression sutures can be used only for achieving haemostasis in atonic PPH and are less useful in placenta praevia.[3] Thus BIAL is more effective in such cases as it diminishes the blood flow in the uterine, cervical and vaginal vessels. The basic mechanism is

to create pelvic compartment hypotension without causing ischaemia and tissue necrosis as three specific collateral arteries maintain the blood flow: Lumbar – iliolumbar, middle sacral – lateral sacral, and superior – middle haemorrhoidal arteries.[9] Some surgeons combine this BIAL with bilateral ovarian artery ligation to improve the haemostatic effect. We did not perform this operation in our series of BIAL.

During this period almost four times emergency hysterectomy was performed for life threatening obstetric haemorrhage in our department and many of them could be avoided if the expertise would have been available at right time. BIAL is not only saving the future fertility but also associated with less postoperative morbidity compared with emergency hysterectomy and required less operative time for those experienced with this technique.[6] It not only contributes to prevention of hysterectomy but it also facilitates hysterectomy by reducing blood loss where it can not be prevented as in cases of uterine trauma as seen in one of our case.

BIAL is only rarely associated with complications which can result from damage to uterine, iliac veins and accidental ligation of the external iliac artery. These complications can be avoided by appreciation of important surgical anatomy and meticulous dissection as fortunately we did not have any such complications perhaps surgery being performed by experienced consultants only. One study suggest that measuring a point approximately 4-4.5 cm from the sacral promontory or common iliac bifurcation and 3.5 cm away from the pelvic midline the accidental ligation of posterior division can be avoided.[12] Rarely internal iliac artery aneurysm can develop therefore these patients need follow up by Doppler ultrasound in future.[13]

We observed that once the uterine bleeding was controlled during surgery, it did not recur in the postoperative period in any woman in whom the uterus was conserved. Similarly there was no reactionary haemorrhage from the pedicles in any woman where hysterectomy was carried out after BIAL. The type of suture material used for BIAL does not seem to affect either the effectiveness of the technique or subsequent fertility although greater recanalization rates may be seen with absorbable suture materials.[6]

Although the study has limitations because of small numbers but international data also reveals similar number of cases over this duration. This reiterates the need of more familiarization with this technique especially to the first emergency oncall obstetricians.

CONCLUSION

Although BIAL is found to be safe and effective procedure in our study for treating life threatening obstetric haemorrhage with preservation of future fertility by reducing rate of hysterectomy, further large randomized control trials and comparative studies are required to prove its effectiveness. It should be the operation of choice to control severe bleeding in young woman of low parity. There is an urgent need to train and familiarize the younger generation of obstetricians to perform BIAL and in a tertiary referral centre at least one experienced specialist in every team on call should be trained for this procedure.

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