

Emergency Internal Iliac Artery Ligation in Control of Postpartum Hemorrhage: A Life-saving Procedure

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Abstract

Introduction: Hemorrhage during pregnancy and postpartum hemorrhage (PPH) is one of the leading causes of maternal mortality in developing countries. Although internal iliac artery is a life-saving procedure, it is not commonly performed by obstetricians and gynecologists. In this study, we emphasize the importance of internal iliac artery ligation (IIAL) in intractable pelvic hemorrhage.

Objectives: To find out the utility of emergency IIAL in intractable pelvic hemorrhage.

Materials and Methods: A retrospective study of women undergoing IIAL for PPH or prophylactic IIAL for risk of PPH in a tertiary care hospital, Cuttack between January 2014 and January 2016.

Results: Out of the 45 women who had undergone IIAL 21 patients had atonic PPH, 14 patients had undergone because of traumatic PPH (rupture uterus, lacerations of lower genital tract following vaginal delivery, and broad ligament hematoma), placenta previa (6) and abruptio placentae (4). Hysterectomy was performed in 12 cases. Hysterectomy was mostly required in cases of traumatic PPH rather than non-traumatic PPH. Except 4 deaths, the rest of the patients were treated successfully.

Conclusion: Internal iliac artery is an effective procedure in treatment and prevention of PPH. It is important to know this life-saving procedure as it is more conservative in young women with intractable PPH and gives a chance for preserving fertility.

Key words: Broad ligament hematoma, Internal iliac artery ligation, Intractable postpartum hemorrhage, Tertiary care hospital

INTRODUCTION

Postpartum hemorrhage (PPH) is a major cause of worldwide maternal mortality ranging from 13% in developed countries to 34% in developing countries.¹ When PPH continues despite aggressive medical management early consideration should be given to surgical intervention. The choice of the procedure will depend on the parity of the women and her desire for childbearing, the extent of hemorrhage and most importantly, the experience and judgment of the surgeon.²

Internal iliac artery ligation (IIAL) has been advocated as an effective means of controlling intractable PPH and preventing maternal death.² The rationale for this is based on the hemodynamic studies of Burchell,³ which showed that IIAL reduced pelvic blood flow by 49% and pulse pressure by 85%, resulting in venous pressures in the arterial circuit thus promoting hemostasis. However, the reported success rate of IIAL varies from 40% to 100%⁴, and the procedure averts hysterectomy in only 50% of cases.⁵ This study is aimed at emphasizing the usefulness of IIAL and its role as a life-saving procedure.

MATERIALS AND METHODS

This is a retrospective study conducted from January 2014 to January 2016 in Shri Ramachandra Bhanja (SCB) Medical College, Cuttack, Odisha which is a tertiary care hospital treating majority of the complicated and high-

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www.ijss-sn.com

Month of Submission : 01-2017

Month of Peer Review : 02-2017

Month of Acceptance : 02-2017

Month of Publishing : 03-2017

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risk obstetrical cases. During the study period of 2 years, 45 cases of IIAL were done. Maximum cases were that of atonic PPH ($n = 21$). The women who had atonic PPH during delivery either vaginally or during cesarean section were treated sequentially with uterine massage, oxytocin infusions, injection 0.2 mg IV methergine repeated every 15 min till a maximum of 5 doses (total 1.0 mg), injection carboprost 0.25 mg IM repeated every 15 min till a maximum dose of 2.0 mg and administering tablet misoprostol up to 1000 μ g per rectally. When still not controlled by bimanual uterine compression, compression of the aorta and uterine tamponade was tried. Meanwhile, blood transfusion is arranged assessing the approximate blood loss and antibiotics are administered. Then uterine tamponade was tried with Foley's catheter. When the blood loss was still not controlled, and the uterus remained flabby the patient was shifted to the theater for IIAL. The procedure is usually performed under general anesthesia after providing a central line.

During a cesarean section in cases of placenta previa ($n = 6$), prophylactic uterine artery ligation was done. However, when there is still bleeding from the placental bed even after applying pressure or hemostatic sutures in the placental bed, IIAL was done. In cases of abruptio placenta ($n = 4$), all the patients had atonic PPH during cesarean section which did not respond to oxytocics, and hence IIAL was proceeded.

In cases of traumatic PPH due to rupture uterus ($n = 10$), colporrhexis ($n = 2$), and broad ligament hematoma ($n = 2$), IIAL was done to salvage the uterus and as a life-saving measure.

The procedure is usually done under general anesthesia, and the abdomen is opened by midline infraumbilical incision in high risk cases and pfannenstiell incision in cesarean section. The uterus was eventrated and bowels were packed. Transperitoneal approach was used for IIAL. A vertical incision on the peritoneum is made, and the retroperitoneal space is entered bluntly with finger dissection in such a way that the ureter remains attached to the medial fold of peritoneum and away from the vessels. The internal iliac artery is traced downward. Then, the fascia over the artery is dissected. A right-angled clamp is passed from lateral to medial about 3-4 cm away from the division beneath the internal iliac artery with delayed absorbable sutures. The first suture is placed below the origin of the posterior branch of internal iliac artery. A second suture is placed below the first to avoid post-operative recanalization. The femoral artery is palpated for pulsations, and perfect hemostasis is secured. An intraperitoneal drain is given. If the bleeding is still not controlled decision for hysterectomy is taken. Repair of the rupture, colporrhexis and vaginal lacerations are done following IIAL.

RESULTS

About 45 cases of IIAL were done over a period of 2 years in SCB Medical College, Cuttack. Nearly 71.1% ($n = 32$) of the cases were referred from other hospitals. Atonic PPH was the most common indication for IIAL (46.6%), followed by traumatic PPH (31.1%), then placenta previa and abruptio placenta (Table 1).

Out of the 14 cases with traumatic PPH, 10 women had rupture uterus. IIAL was performed after assessing the stability of the patient and whether the rupture can be repaired. Hysterectomy was done in 7 women, and the repair of the uterus was done in remaining 3 women. However, performing IIAL helped reducing the amount of blood lost. With experienced surgeon, the time required for IIAL does not exceed 5-7 min after opening the abdomen. 2 women had colporrhexis and vaginal lacerations which were repaired after controlling the bleeding by IIAL. IIAL was done even after hysterectomy, and uterine repair in cases of broad ligament hematoma as the bleeding vessel had retracted into the hematoma.

Hysterectomy was done in 4 women who had atonic PPH. None of the women required relaparotomy after the initial procedure. Out of the 45 women for whom IIAL was done 12 women underwent hysterectomy, so the uterine salvage rate was 73.4%. Among 10 cases of rupture uterus, hysterectomy was performed in 7 cases giving a uterine salvage rate of 30% (Table 2). Prophylactic IIAL was done

Table 1: Indications for IIAL

Indication	Number of women undergone IIAL (%)
Uterine atony	21 (46.6)
Placenta previa	6 (13.3)
Abruptio placenta	4 (8.8)
Rupture uterus	10 (22.2)
Lower genital tract injury	2 (4.4)
Broad ligament hematoma	2 (4.4)
Total	45 (100)

IIAL: Internal iliac artery ligation

Table 2: Uterine salvage rate and hysterectomy in women undergoing IIAL

Indication	Number of women	Hysterectomy done (%)	Uterine salvage rate (%)
Uterine atony	21	3 (14.2)	85.8
Rupture uterus	10	7 (70)	30
Placenta previa	6	0	100
Abruptio placenta	4	1 (25)	75
Lower genital tract injury	2	0	100
Broad ligament hematoma	2	1 (50)	50
Total	45	12 (26.6)	73.4

IIAL: Internal iliac artery ligation

in 16 cases where none of the women needed hysterectomy. 31 women with non-traumatic PPH who underwent IIAL had a uterine salvage rate of 87.09% where hysterectomy was performed in 4 women.

Complications like injury to external iliac vein or internal iliac vein did not occur intraoperatively. Bladder atony or ischemia of the gluteal muscles did not occur in any of the cases followed up to a 6 weeks post-operative period. There were four deaths of which one died because of HELLP syndrome on post-operative day six and three because of hepatorenal dysfunction and sepsis.

DISCUSSION

Bilateral IIAL is a life-saving method which every pelvic surgeon should know to control obstetrical hemorrhage to salvage the uterus. Ligation of internal iliac artery was first performed by Sir Kelly in 1893 in control of hemorrhage during hysterectomy for uterine carcinoma.⁶ The procedure was later introduced by Mengert *et al.*⁷ in 1969 and extensively investigated by Burchell³ in 1968. Pelvis is highly vascular during pregnancy. Obstetric hemorrhage management poses a real threat to the managing obstetrician. Problems like poor exposure/tissue friability/retraction of vessels may be encountered in isolation and ligation of bleeding vessels during the management of PPH or operative hemorrhage. This leads to failure of the conventional methods to control hemorrhage. Hence bilateral/unilateral IIAL may be the procedure of choice.⁸

Uterine artery ligation is a promising technique in the management of PPH as occlusion of uterine artery reduces 90% of the blood flow. It is useful in uterine atony but in uterine trauma, when the avulsed uterine artery retracts into the broad ligament forming hematoma, it is difficult to do the uterine artery ligation and salvage the uterus. IIAL in such situations is helpful as the pressure and flow of circulation decrease distal to the ligation and readily enabling one to locate the bleeder and ligate it securely. Similarly, in cases of deep forniceal tears and hematomas, uterine artery ligation or even hysterectomy does not stop the hemorrhage. In such cases, blood loss could be arrested after IIAL as vaginal artery is a direct branch of anterior division of internal iliac artery.²

In complete placenta previa, the placental site receives a significant proportion of its arterial supply from descending cervical and vaginal arteries. These arteries continue to perfuse the lower segment even after uterine artery ligation, which fails to control hemorrhage.⁹ In these circumstances, IIAL is more

effective by diminishing blood flow in the uterine, cervical, and vaginal vessels. This technique of stepwise devascularization of uterus which includes bilateral uterine and ovarian artery ligation is effective in decreasing the blood loss, but uterine ischemia followed by synechiae formation, premature ovarian failure, and secondary amenorrhea has been reported subsequent to this procedure.¹⁰

Angiographically directed arterial embolization has also been reported to be very effective in controlling hemorrhage, but this modern facility is not available in most of our country. We were able to control the hemorrhage in all 45 cases. However, even when the uterus is preserved, ligation of these arteries does not hamper future reproductive function.¹¹ Wagaarachchi and Fernando observed future pregnancy in 50% of the cases following bilateral ligation of internal iliac artery.¹²

In this study, we have analyzed 45 cases of IIAL over a period of 2 years with a uterine salvage rate of 73.4%. Bangal *et al.* had done an analysis of 54 cases over a period of 15 years in a tertiary care center, Loni.¹³ Mukherjee *et al.* performed 36 cases of IIAL with a success rate of 83.3% in 6 years.¹⁴ Joshi *et al.* did a study on 110 women who had undergone bilateral IIAL over a period of 13 years with a uterine salvage rate of 60.7%.²

CONCLUSION

Bilateral IIAL is an effective, safe and fast method to control obstetrical hemorrhage. With proper training and experience the procedure hardly takes 5-7 min and it is an efficient technique for uterine salvage. Hence, exposure to this technique is a must for all pelvic surgeons in the coming days.

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How to cite this article: Nayak AK, Dhivya S, Nayak R, Mandpe P. Emergency Internal Iliac Artery Ligation in Control of Postpartum Hemorrhage: A Life-saving Procedure. Int J Sci Stud 2017;4(12):183-186.

Source of Support: Nil, **Conflict of Interest:** None declared.