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Original Research Article

Efficacy of internal iliac artery ligation for control of post-partum haemorrhage

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ABSTRACT

Background: Pelvic hemorrhage is associated with a great degree of morbidity and mortality and has to be controlled immediately. Ligation of the internal iliac arteries is a method to achieve the goal. We conducted this study to assess the outcome, effectiveness and complications of internal iliac artery ligation (IIAL) in controlling postpartum haemorrhage.
Methods: This study was a retrospective study conducted in a rural tertiary referral centre from April 2015 to March 2018. IIAL was performed in women with PPH either at caesarean section or at laparotomy performed at a variable time after vaginal or caesarean delivery.
Results: Over the study period of 3 years, 29 cases of IIAL were performed. The most common indication for IIAL was atonic PPH. Uterine salvagability was 62% in this study.
Conclusions: All obstetric surgeons should be fully aware of the indications, timing and technical aspects of IIAL. Bilateral internal iliac artery ligation remains a safe, fast, effective and life saving salvage procedure which should be encouraged and used routinely by obstetricians when faced with cases of severe obstetric hemorrhage, especially in young women of low parity.

Keywords: Internal iliac artery ligation, Post partum hemorrhage

INTRODUCTION

An estimated 303 000 maternal deaths occurred globally in 2015, yielding an overall MMR of 216 maternal deaths per 100 000 live births. Out of which, Nigeria and India account for over one third of all estimated global maternal deaths in 2015, with an approximate 58,000 maternal deaths (19%) and 45,000 maternal deaths (15%) respectively.[1] Obstetric pelvic haemorrhage remains to be the leading cause of maternal mortality and morbidity globally.[2] Although various modalities like medical management, compression suture, stepwise devascularisation and hysterectomy are available to manage, Internal iliac artery ligation remains the choice for some condition like supralevator hematoma, torn retracted uterine vessels, refractory PPH and in pelvic haemorrhages where definitive bleeding point cannot be found.

Howard Kelly first pioneered the internal iliac (hypogastric) artery ligation (IIAL) in the treatment of intraoperative bleeding from cervical cancer prior to this technique being applied to postpartum hemorrhage.[3] Bilateral internal iliac artery ligation (BIIAL) controls haemorrhage by abolishing the trip-hammer effect of arterial pulsations and reduces pelvic flow by 49%, pulse pressure by 85% resulting in venous pressures in the arterial circulation.[4] The reported success rate of IIAL in controlling pelvic haemorrhage varies from 42 to 100%, and it averts radical procedures like hysterectomy in

substantial number of cases.[5] Although the indications for IIAL have been described as prophylactic and therapeutic in literature, it by no means absolute. Some of the common indications described are postpartum haemorrhage with intractable bleeding where all conservative measures have failed, broad ligament hematoma, uterine rupture and in extensive laceration of cervix and vagina.

Though, IIAL can be life-saving in patients with pelvic haemorrhage, it is seldom attempted due to of lack of training, technical difficulty and fear of complication. Complications which can occur include injury to the ureter, iliac veins and accidental ligation of the external iliac artery. Because of all these difficulties specialists like oncologist, vascular surgeon, and pelvic floor specialist are sought when internal iliac artery ligation is required. So the skill should be acquired by every obstetrician to tackle the situation when needed. We conducted this study to assess the outcome, effectiveness and complications of internal iliac artery ligation (IIAL).

METHODS

This study was conducted in a rural tertiary referral centre from April 2015 to March 2018. IIAL was performed in women with PPH either at caesarean section or at laparotomy performed at a variable time after vaginal or caesarean delivery.

Women with atonic PPH at vaginal delivery or caesarean section were initially treated with medical management and compression sutures, uterine and ovarian artery ligation; failure to restore the uterine tone and arrest blood loss despite these measures led to the decision to do IIAL. In placenta previa and accrete, failure to control bleeding from placental bed even after taking haemostatic stitches from bleeding site lead to the decision to do IIAL. Cervical and vaginal lacerations mostly following instrumental delivery where bleeding could not be controlled by repair and packing was taken up for IIAL. Increasing broad ligament hematoma either after vaginal delivery or after caesarean was taken directly for IIAL.

Surgical technique[6]

In cases of emergency, exploration was done by infraumbilical midline incision otherwise Pfannenstiel incision was used .Uterus was exteriorized and bowels packed. Para rectal space dissection and internal iliac artery was approached by one of the following methods.

Lateral approach[6]

Puerperal uterus lifted and pulled to opposite site, anterior leaf of Broad ligament opened between round ligament and infundibulo pelvic ligament, areolar tissue bluntly dissected inferiorly. First structure to visualise is external iliac artery, further dissection is continued deeper and medial to reach internal iliac artery. Ureter usually remains encase in posterior flap of peritoneum and are easily identified by peristalisis and palpation.

Posterior approach[6]

Puerperal uterus moved anteriorly, longitudinal incision is made into the posterior parietal peritoneum medial to infundibulopelvic ligament. Once the peritoneum is opened, loose areolar tissue is separated from it by blunt dissection parallel to the vessels. The ureter is usually beneath the medial flap and is visualized and reflected. Common iliac artery bifurcating into external and internal can be seen as an inverted Y.

Once the pararectal space is dissected and internal iliac artery exposed, a plane is developed by using Mixter between inter iliac artery and vein at a distance of 3 cms from bifurcation. The artery was ligated using 1-0 vicryl using two ties placed firmly and gently 0.5cm apart. Femoral arteries were palpated for pulsations to rule out inadvertent ligation of External iliac artery.

RESULTS

Over the study period of 3 years, 29 cases of IIAL were performed (Table 1). The most common indication for IIAL was atonic PPH. Patients with atonic PPH were initially tried medical management, compression sutures, step wise devascularisation and IIAL, if unresponsive then proceeded finally to hysterectomy. IIAL ligation was done bilaterally in all except 3 cases (2 cases of traumatic PPH and 1 case of Broad ligament hematoma) were unilateral ligation was sufficient to arrest bleeding.

Table 1: Indications of IIAL.

Indications	Number of cases (%)
Atonic PPH	13 (44.82)
Placenta previa	5 (17.24)
Abruptio placenta	3 (10.34)
Morbid adherent placenta	2 (6.89)
Uterine rupture	2 (6.89)
Cervical and vaginal laceratio	3 (10.34)
Broad ligament hematoma	1 (3.44)
Total	29

Along with IIAL, associated procedures were required either before or after to achieve hemostasis. Out of 29 cases of PPH, IIAL alone was sufficient in 9 cases to achieve haemostasis. Out of 19 cases of Atonic PPH, compression suture with stepwise devascularisation followed by IIAL was sufficient in 9, whereas additionally Subtotal Hysterectomy was needed in another 4 cases. Other than atonic PPH cases, Subtotal Hysterectomy was done in 3 cases (Abruptio placenta, morbid adherent placenta, uterine rupture) and Total Hysterectomy in 4 cases (2 cases of Placenta previa, one each in uterine rupture and lower genital laceration).

During caesarean section for placenta previa, failure to control bleeding from the placental bed by pressure or by suturing the bleeding sites with sutures led to the decision to do IIAL. Out of 5 women undergoing caesarean for placenta previa, IIAL alone was sufficient in 3 cases whereas another 2 case required total hysterectomy.

Three women with placental abruption had undergone caesarean section and developed atonic PPH that failed to respond to uterotonics and hence were subjected to IIAL. Out of 3 women, one had progressed to DIC and required subtotal hysterectomy for homeostasis.

Table 2: Associated procedure with IIAL.

Associated procedure with IIAL	Cases
Compression sutures with Step wise devascularisation	9
Subtotal Hysterectomy	3
Total Hysterectomy	4
Compression sutures with stepwise devascularisation followed by subtotal Hysterectomy	4
IIAL alone	9
Total	29

Table 3: Hysterectomy in women undergoing IIAL.

Indication for IIAL	Total cases	Hysterectomy (Total and Subtotal)	Uterine salvage rate
Atonic PPH	13	04 (30.76%)	09 (69.23%)
Placenta previa	05	02 (40%)	03 (60%)
Abruption placenta	03	01 (33.33%)	02 (66.66%)
Morbid adherent placenta	02	01 (50%)	01 (50%)
Uterine rupture	02	02 (100%)	00
Cervical and vaginal laceration	03	01 (33.33%)	02 (66.66%)
Broad ligament hematoma	01	00(00)	01 (100%)
Total	29	11 (37.93%)	18 (62.06%)

Table 4: Timing of IIAL.

Indications	At caesarean section	Laprotomy after vaginal delivery	Relaprotomy after caesarean	Total
Atonic PPH	06	06	01	13
Placenta previa	04	00	01	05
Abruptio placenta	03	-	-	03
Morbid adherent placenta	02	-	-	02
Uterine rupture	02	-	-	02
Cervical and vaginal laceration	-	02	01	03
Broad ligament hematoma	-	01	-	01
Total	17	09	03	29

IIAL was performed initially in 2 cases of morbid adherent placenta diagnosed during caesarean, bleeding continued unabated in one women and subtotal hysterectomy was required.

There were 2 women with uterine rupture underwent IIAL, decision to repair the laceration or resort to hysterectomy was influenced by the extent and location of injury as well as by control of haemorrhage. In both the case of uterine rupture, the injury was beyond repair and had to be subjected to hysterectomy. However, performing IIAL helped in providing a clear operative field while attempting uterine repair or during hysterectomy. One woman undergoing forceps delivery developed colporhexis and initial IIAL followed by hysterectomy had to be done to achieve hemeostasis.

Out of 29 women undergoing IIAL, 11 women required hysterectomy with a uterus salvagability of 62%. Traumatic PPH (uterine rupture) had high rate of hysterectomy. Non traumatic PPH had better salvagability (>60%).

Other than cause of PPH even the timing of IIAL also influenced uterus salvagability. IIAL was done at the time of caesarean section in 17 women, out of which 6 women required hysterectomy. Laprotomy and IIAL were done in 9 women after vaginal delivery for control of PPH and hysterectomy was required in 2 cases. Relaprotomy after caesarean had to be done in 3 cases and all 3 required hysterectomy along with IIAL for hemostasis. So, salvagability of uterus and hence the morbidity and mortality is less when IIAL is performed at the earliest.

DISCUSSION

As in other studies, even in our study of 29 cases the most common indication for IIAL was atonic PPH (n = 13, 44%). Internal iliac artery ligation is an effective fertility preserving, lifesaving method to control obstetric hemorrhage.

The reported success rate varies from 40 % to 100% and varies on numerous factors such as indications, hemodynamic status of patient, time taken for intervention, associated co morbidities, expertise of surgeon and the clinical setting. Major pitfall for failure is said to be surgeon's hesitation and waiting too long to perform it. Success rate in our study was 62%.

Table 5 efficacy of IIAL.

Study	Efficacy
Abha Singh et al[5]	96.87%
Yavuz Simsek et al[7]	84.7%
Patil et al[8]	93%
This study	62%
Joshi et al[9]	60.7%

Since ours is a rural tertiary teaching hospital with large number of patient being delivered in external health care centre and later referred with impaired hemodynamic status, our uterus salvagability is lower compared to other studies. Other reasons could be inclusion of traumatic PPH (uterine rupture) and exclusion of prophylactic IIAL from our study group.

Maximum number of IIAL was performed for atonic PPH (n=13, 44%). Even in other studies the major indication was atonic PPH (Kabade et al, 60%, Joshi et al, 63.8%, Perveen et al, 37.5%).[6,9,10] Traumatic PPH (uterine and genital laceration) although contributes less to the overall cause of PPH ,were the major contributors for performing hysterectomy (3 out of 5 cases). Authors did not include (prophylactic) IIAL done in anticipation of bleeding in our study. None of the cases needed relaprotomy after IIAL was done. Author had one case of internal iliac vein injury during the process of dissection which was controlled with pressure packing. There were no incidences of uretric injuries or accidental ligation of external iliac artery, post-procedural vesical necrosis, development of perineal and gluteal necrosis in our case series. There were 3 maternal deaths out of 29 patients. One patient developed transfusion related acute lung injury after massive blood transfusion and 2 women succumbed to DIC.

CONCLUSION

All obstetric surgeons should be fully aware of the indications, timing and technical aspects of IIAL. Bilateral internal iliac artery ligation remains a safe, fast, effective and life saving salvage procedure which should be encouraged and used routinely by obstetricians when faced with cases of severe obstetric hemorrhage, especially in young women of low parity.

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REFERENCES

1. Trends in Maternal Mortality: 1990 to 2015 Estimates by WHO, UNICEF, UNFPA, World Bank Group and the United Nations Population Division: available at; https://afro.who.int/sites/default/files/2017-05/trends-in-maternal-mortality-1990-to-2015.pdf.
2. Say L, Chou D, Gemmill A, Tunçalp Ö, Moller AB, Daniels J, et al. Global causes of maternal death: a WHO systematic analysis. Lancet Global Health. 2014;2(6):e323-33.
3. Kelly HA. Ligation of internal iliac arteries for haemorrhage in hysterectomy for carcinoma uteri. Bull Johns Hopkins Hosp. 1894;5:53.
4. Burchell RC. Internal iliac artery ligation: hemodynamics. Obstet Gynecol. 1964;24:737.
5. Singh A, Kishore R, Saxena SS. Ligating Internal Iliac Artery: Success beyond Hesitation. J Obstet Gynecol India. 2016;66(S1):S235-S241.
6. Kabadi YM, Harsha B. Emergency internal iliac artery ligation: a conservative lifesaving procedure. IJRCOG. 2015;4:1364-6.
7. Simsek Y, Yilmaz E, Celik E. Efficacy of internal iliac artery ligation on the management of postpartum hemorrhage and its impact on the ovarian reserve. J Turk Soc Obstet Gyn. 2012;9(3):153-8.
8. Patil Y, Kathiriya D, Kshirsagar NS. Role of Internal Iliac Artery Ligation in Control of Pelvic Haemorrhage. Int J Recent Trends Sci Technol. 2014;9(3):461-4.
9. Joshi V, Otiv S, Majumder R. Internal iliac artery ligation for arresting postpartum haemorrhage. BJOG. 2007;114:356-61.
10. Perveen F, Memon GU, Rabia S. Use of bilateral internal iliac artery ligation for controlling severe obstetric haemorrhage. Pak J Med Sci. 2011;27(1):94-7.

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