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Original Research Article

Internal Iliac Artery Ligation- A Solution to Post-Partum Haemorrhage?

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Abstract:

Background: Postpartum haemorrhage is one of the leading causes of maternal death in India. One of the methods of surgical management of PPH involves step wise devascularisation of uterus. Internal iliac artery ligation is one such procedure which involves the ligation of the anterior division of the artery and thereby reducing significant blood loss, maternal morbidity and mortality.

Methodology: The study conducted over one year at Vani Vilas hospital, Bengaluru. All the women who underwent internal iliac artery ligation for postpartum haemorrhage over a period of one year were considered in the study.

Result: Twenty cases of internal iliac artery were done in 1 year. 8 cases underwent subsequent peripartum hysterectomy whereas 12 didn't need hysterectomy. There was reduction of maternal morbidity, blood loss and zero maternal morbidity when Internal Iliac Artery ligation was done for severe post-partum haemorrhage.

Keywords: Post-partum haemorrhage, Internal Iliac Artery ligation, maternal mortality.

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Introduction

According to the Sample Registration System office of the registrar general, India, the maternal mortality ratio (MMR) was 97 per 100000 live births between 2018-2020. MMR was maximum in Assam (197) and least in Kerala (19) for that statistical data. 32% of the maternal death were in the age group of 20-24 years of age.

Postpartum haemorrhage (PPH) is commonly defined as any blood loss >500 ml following vaginal delivery and >1000 ml after caesarean section [1]. WHO estimates that there are 14 million cases of PPH, causing 70,000 maternal deaths annually [2]. Approximately 47% of the maternal mortality in India can be attributed to PPH [3]. Atonic PPH was noted as the most common cause of PPH in India.

Now a days with the increasing rates of primary LSCS, the incidence of placenta accreta syndrome is also on the rise adding onto the pre-existing list of causes for post-partum haemorrhage. This intractable bleeding can be life threatening if not managed within the 'golden-hour' of PPH.

According to the FIGO 2022 recommendations for the management of PPH, oxytocin, ergometrine, misoprostol, and tranexamic acid are recommended for the medical methods. For temporary stabilisation bimanual uterine compression, balloon tamponade, external aortic compression and non-pneumatic antishock garment (NASG) are recommended. When all the medical measures fail, surgical interventions like – compression sutures, uterine artery ligation, hypogastric artery ligation and obstetric hysterectomy are recommended [4].

In 1893, Kelly first demonstrated internal iliac artery (hypogastric artery) ligation in a case of carcinoma cervix [5]. Since then, the procedure has had good results in controlling majority of the pelvic haemorrhage – including postpartum

haemorrhage (PPH), peritoneal bleeding. And it has become a life-saving procedure in massive intractable PPH and has reduced the need for obstetric hysterectomy in such cases. The main mechanism by which Internal iliac artery works is by reducing the pelvic arterial blood flow by 49% and pulse pressure by 85% in cases of bilateral ligation [6]. After the ligation, collaterals develop to maintain pelvic organ perfusion- with the deep femoral artery being the major vessel forming collaterals. The others forming collaterals include – medial femoral circumflex to obturator artery and lateral femoral circumflex to gluteal artery [7].

The two main techniques that are available for internal iliac artery ligation (IIAL) are – the anterior approach and the posterior approach. It mainly involves opening the layers of the broad ligament between round ligament and infundibulopelvic ligament (in posterior approach), identifying ureter on the medial leaf, locating the artery with respect to its surrounding structure (Figure 1)[8], tracing it till the bifurcation for confirmation of the anatomy, use of bipolar cautery and avoiding avulsion of the external iliac vein [5].

This study was conducted in order to stress on the effectiveness of the technique in controlling severe obstetric haemorrhage (of various causes) and its effect on maternal morbidity and mortality at a tertiary care centre.

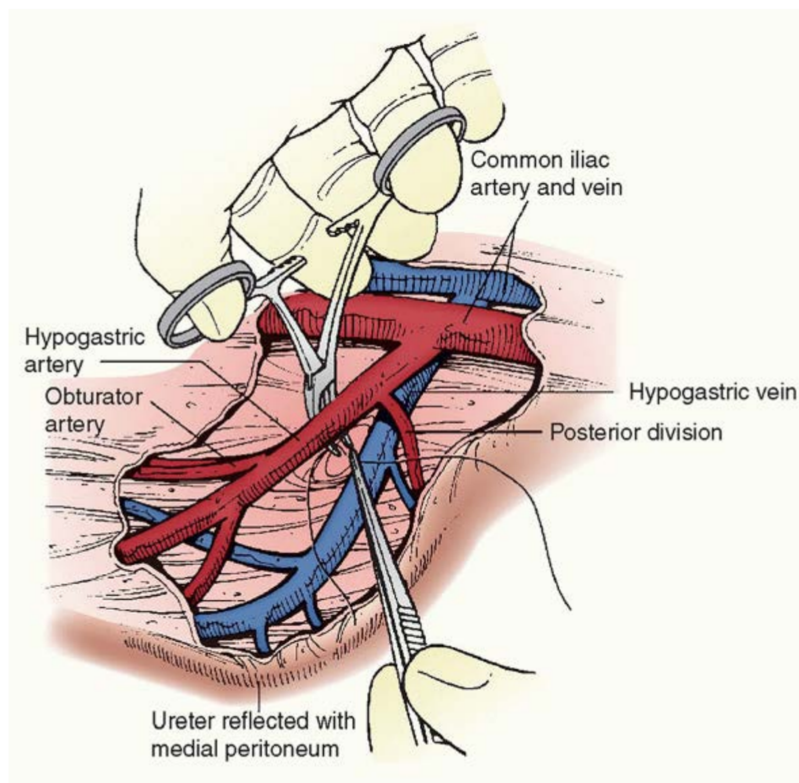

Figure 1: Ligation of the right IIA [9]

Objectives

To analyse the efficacy of IIAL in the management of PPH and to assess the maternal outcomes

Materials and Methods

It is a retrospective study conducted on the women admitted at Vani Vilas Hospital, BMCRI, Bangalore, Karnataka and who have had PPH (post vaginal delivery or caesarean section) which has been managed by IIAL, was considered in the study conducted over a period of 12 months.

After obtaining written informed consent, the women were assessed for their pre-existing antenatal comorbidities like hypertension in pregnancy, gestational diabetes mellitus, multifetal gestation, placenta previa, abruption and others, the mode of delivery, the medical methods of PPH management performed and other surgical interventions like – uterine artery ligation, utero-ovarian artery ligation, compression sutures were documented and also the blood loss during delivery and the procedure were assessed. The maternal outcomes post procedure were assessed accordingly. The data was entered in Microsoft excel and analysed using SPSS software.

Results

A total of 20 cases of bilateral internal iliac artery ligation for obstetric patients were done over a period of one year at Vani Vilas Hospital, Bangalore. The mean age of the women was 28.05

years (max – 39y; min-20y). Out of 20, 15 cases (75%) were antenatal cases who underwent delivery (vaginal/ caesarean) at our hospital whereas 5 cases (25%) underwent IAL postnatally. A total of 12 cases (60%) underwent bilateral IIAL, while 8 cases (40%) underwent bilateral IIAL with peripartum hysterectomy. So, bilateral IIAL (BIIAL) proved to be a uterus saving as well as lifesaving procedure in majority of the women in the study. 85% of the women in the study were multiparous, indicating the significance of obstetric haemorrhage in them. 11 cases (55%) of them were preterm deliveries which required BIIAL. While 4 of the cases i.e 20% were completed under sub-arachnoid block (SAB), 2 of the cases had to be converted from SAB to general anaesthesia and majority of the cases [14] were induced with general anaesthesia at the beginning of the surgery. BIAL was done as a measure of obstetric haemorrhage control. The maximum blood loss was 4.8 L whereas the least was 600ml intraoperatively, this included the blood loss due to PPH and the procedure related blood loss.

Out of the 20 cases, there was one case of uterine rupture, 2 cases of placenta percreta, 1 case of focal adherent placenta, one case of haemorrhagic shock (post-partum) and 13 cases of post-partum haemorrhage (atonic and traumatic included). So, IIAL proved to be an effective method to control all forms postpartum haemorrhage. Post-operative monitoring of all these cases were in the obstetric ICU. All the cases were extubated on day 1 of surgery. Only one of the cases needed massive transfusion protocol, while the rest of the cases didn't, signifying the reduced need for post-operative blood transfusion in cases of IIAL.

None of the cases had any complications associated with IIAL like, ureteric injury and lower limb ischaemia (due to accidental external iliac artery ligation). In all these cases, the complications of massive obstetric haemorrhage- like AKI, DIC, maternal morbidity and mortality were prevented by IIAL. There was no differences in the outcomes of IIAL in management of PPH between the different operating surgeons, indicating that under well—trained hands, IIAL is efficient in reducing maternal morbidity and mortality. All the patients had commendable recovery in the postop period, with zero maternal mortality during the study period. IIAL turned out to be a method to control PPH, as well as to save uteruses and maternal lives.

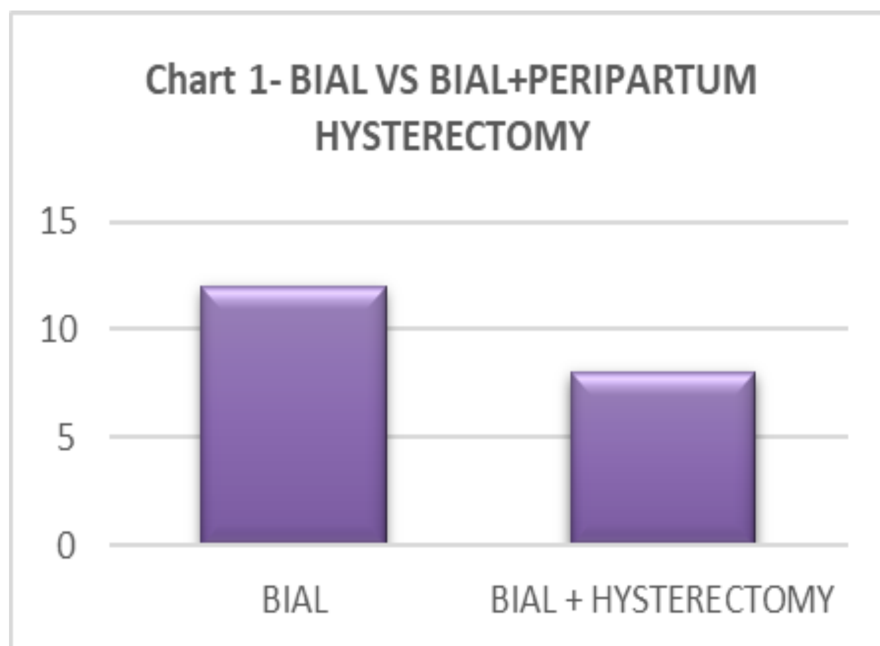

Chart 1: BIAl vs BIAL+PERIPARTUM HYSTERECTOMY

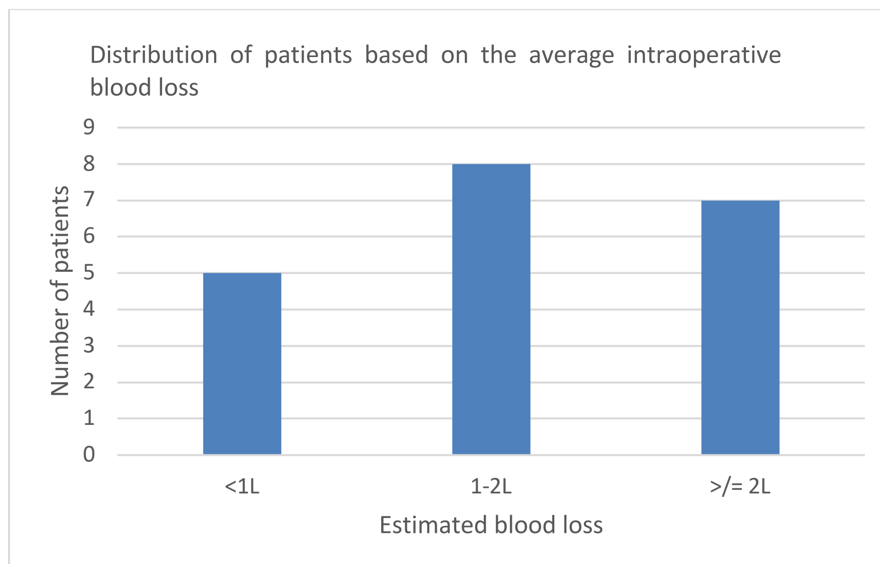

Chart 2: Distribution of patients based on the average intraoperative blood loss

Table 1: Distribution of patients based on details, intraoperative findings and postop periods.

Details	No. of patients
Nulliparous	3
Multiparous	17
Term	9
Preterm	11
ANC	15
PNC	5
GA	14
SAB	4
SAB -> GA	2
BIIAL	12
BIIAL + Peripartum Hysterectomy	8
PPH	18
Others	2
Postop Ward Shift	8
ICU Shift	12

Discussion

IIAL is an upcoming procedure which has shown outstanding outcomes in obstetric and gynaecological cases of pelvic haemorrhage. Multiple studies have showcased good post-operative outcomes for various indications in times of dire emergency, while saving the uterus and the patient at the same time. It's a time-tested procedure which is now reviving as a landmark in critical care in obstetrics.

A Study by Kaur AP et al, in Amritsar, in which stepwise devascularisation of the uterus was done for PPH management, only 11.43% of the patients needed internal iliac artery ligation and all of them had their uterus preserved with zero mortality noted in the study [9]. The outcomes were similar to that in our study where zero maternal mortality was seen. But in our study, 8 cases underwent peripartum hysterectomy.

A study by Prajapati AR et al [10] at Ahmedabad, Gujarat, had 53 women who underwent IIAL for various causes of PPH. Out of that only 27.6% underwent obstetric hysterectomy (mostly for adherent placenta) while for the rest of them, IIAL proved to be a uterus-saving procedure, in addition to life-saving procedure. Out of the 53 women, the study documented two maternal deaths due to septicaemia and DIC. The rates of obstetric hysterectomy in this study was lower than in our study (27.6% vs 40%) and even the study sample size was higher (53 vs 20).

Another study conducted in Dehradun by V. Gupta [11], had 89 cases of IIAL, in which 76 were done for obstetrical indications with morbidly adherent placenta and uterine atony as the main obstetrical indications for the procedure. 100% of the patients in whom IIAL was done as an emergency procedure required blood transfusions. 65.8% of their patients had their uteruses saved and 34.2% of them required hysterectomy as a lifesaving option

despite IIAL, which was comparable to the peripartum hysterectomy rates in our study. None of their patients had intraoperative procedure related complications, indicating safety of the procedure.

Similar studies by Madhubala et al. [12], Mehmet Sait İçen et al [13], Darawade et.al [14] had similar outcomes where most of the indication for IIAL was uterine atony with women needing post-operative blood transfusions.

A study conducted at KEM hospital, Pune, revealed 110 cases of IIAL with obstetric hysterectomy done for 33 cases. Only one of the cases had had internal iliac vein injury which needed repair [15]. Even in this study, the most common cause for massive obstetric haemorrhage had been

In most of the studies, the blood loss had significantly reduced despite the risk factors for major obstetric haemorrhage noted. The need for blood transfusion was still noticed post procedure but the other significant morbidities associated with major obstetric haemorrhage were avoided.

IIAL proved to be a live-saving and uterus-saving procedure in many of these women.

Conclusion

IIAL is an efficient and life-saving procedure in cases of dire obstetric emergencies. With the right approach, practice and early resort to IIAL, the incidences of peripartum hysterectomy, maternal morbidity and maternal morbidity can be substantially reduced. Even though it seems difficult at first, with proper anatomical considerations, IIAL can save uteruses and lives with good outcomes.

Furthermore, the same approach can be extrapolated and the efficacy of aortic clamp in the management and control of PPH has to be studied and is in the process at the Institute.

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