

Emergency Bilateral Internal Iliac Artery Ligation In Massive Postpartum Hemorrhage.

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Abstract:

Background: Since long, massive postpartum hemorrhage (PPH) has been surgically treated by peripartum hysterectomy. Bilateral Internal Iliac Artery Ligation (BIIAL) is a technique by which we can control PPH efficiently and conserve the uterus. This study aims to estimate the effectiveness of BIIAL for conserving the uterus in managing PPH.

Materials and Methods: This retrospective observational study conducted at a tertiary care hospital of the Indian Army included patients with massive PPH that had undergone emergency BIIAL. Collected data were entered in MS Excel and analyzed using IBM SPSS version 23.

Results: Data from 10 patients with massive PPH that fulfilled the inclusion and exclusion criteria were analyzed in this study. 80% of patients in this study had given birth via caesarian section, and Atonic PPH (60%) was the most common cause of PPH. Hysterectomy following BIIAL had been done in 8 subjects, 6 because of uncontrolled bleeding and 2 due to ischemic uterine necrosis.

Conclusion: Although BIIAL is safe and practical for managing PPH refractory to medical management, allowing conservation of reproductive functions, further large-scale research is necessary to recommend the routine use of BIIAL in patients with massive PPH.

Key Word: Bilateral internal iliac artery ligation; postpartum hemorrhage; hysterectomy, ischemic uterine necrosis.

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I. Introduction

Postpartum hemorrhage (PPH) is the most common and dangerous complication of childbirth, involving 1-10% of pregnancies worldwide.¹ Traditionally, more than 1000 ml blood loss during a caesarean section and 500 ml in a vaginal delivery was regarded as PPH.² Coomb had suggested a clinical definition of PPH as 'need for blood transfusion'.³ As per the most recent definition by the American College of Obstetrics and Gynecology, PPH is defined as blood loss of more than 1000 mL with signs and symptoms of hypovolemia within 24 hours of the birth, regardless of the route of delivery.⁴ PPH can also be classified as primary and secondary, with blood loss within 24 hours of delivery defined as primary PPH and after 24 hours and up to 6 weeks from childbirth is deemed as secondary PPH.⁵

There is a lack of unanimity on the precise definition of massive PPH; however, most institutions define it as a blood loss of >1500 ml, a drop in hemoglobin of >4 g/dl or a need for transfusion of four or more units of blood within 24 hours of delivery.⁶ Other researchers have defined massive PPH as losing >2,500ml of blood, admission to critical care or surgical intervention.⁷ PPH may result from uterine atony, placental abnormalities such as placenta previa, placenta accrete and placental abruption, obstetric trauma or coagulation disorders.⁵ As described in previous reports, uterine atony is the most significant cause of PPH.⁸

Surgical intervention is the only lifesaving option if conservative measures such as bimanual compression, uterotonic drugs and intrauterine balloon tamponade fail to control blood loss. Hysterectomy is potentially useful in managing massive PPH⁷ and is the preferred intervention choice for most surgeons to halt blood loss, but it may not be appropriate for women who desire to preserve their reproductive potential. Hemostatic procedures other than hysterectomy that may preserve reproductive functions include uterine cavity tamponade, selective uterine artery embolization, uterine artery ligation and uterine base sutures.⁴

Ligation of the internal iliac artery was pioneered by Howard Kelly in 1893 for the management of intraoperative bleeding from cervical carcinoma. Burchell RC extensively investigated it in 1968 for the management of PPH.⁹ The primary indications for bilateral internal iliac artery ligation include the atonic uterus, traumatic PPH, adherent placenta, ruptured uterus, placenta previa, and abruption.⁹

BIIAL reduces pulse pressure by 85%, blood flow by 50% and mean arterial pressure by 25-50%.⁸ The hypogastric artery distal to the ligation has a rich anastomotic network and provides collateral blood supply after ligation.¹⁰ Although there is a lack of research regarding the effectiveness of BIIAL, previous research has reported the success rate of BIIAL varying from 40 to 100% in effectively controlling PPH.^{11,12} In contrast, it has also been reported to prevent hysterectomy in 50% of patients.¹³

This study aimed to evaluate the clinical outcome and efficacy of emergency bilateral internal iliac artery ligation to control bleeding and for averting hysterectomies in patients with massive PPH.

II. Material And Methods

This retrospective study was carried out between January 2022 and December 2022 at a tertiary care teaching hospital of the Indian Army. This study included 10 patients with massive PPH, defined as losing more than 2500ml of blood, admission to ICU, or needing surgical intervention, in whom BIIAL was performed to achieve hemostasis.⁷ Patients with non-obstetric uterine hemorrhage were excluded.

Patients were initially treated with uterine massage, uterotonics such as oxytocin infusion and carboprost injections, along with fluid resuscitation and blood product transfusions as needed. BIIAL was performed in patients not responding to medical management. Patients were again assessed for the arrest of PPH, and in refractory cases, a hysterectomy was done as a last resort.

Operative technique

Adequate exposure was obtained by opening the peritoneum over the common iliac artery and dissecting it down to the bifurcation of the external and internal iliac arteries. Branches distal to the external iliac arteries were palpated to verify pulsations. Bilateral internal iliac arteries were ligated 5 cm distal to the common iliac bifurcation while avoiding posterior division branches. Vicryl number 1 sutures were used for the ligation, the artery was ligated at 2 places 0.5 cm apart, and distal pulsations were confirmed again after ligation. Surgeries were performed by the most experienced surgeon in the hospital.

Statistical analysis

Collected data were entered in MS Excel and analyzed using IBM SPSS version 23. The results were presented as mean \pm standard deviation (SD) for quantitative data and frequencies (n) for qualitative data.

III. Result

During the study period, documents of 1678 patients who had delivered at the study center were screened. 74 (4.41%) patients had PPH, of which 16 (0.96%) fulfilled the criteria for massive PPH. The present retrospective study included 10 patients with massive PPH who underwent emergency BIIAL to control bleeding when other conservative treatment modalities became ineffective. The demographic and clinical profile of subjects is summarized in Table 1. 8 out of 10 patients in this series had been delivered via LSCS, with the arrest of fetal descent being the most common indication for LSCS. Among these 8 subjects, BIIAL was done during the caesarean section for 6 patients, whereas relaparotomy was done in the other 2.

Uterine atony was the most common (60%) indication for BIIAL, followed by traumatic PPH (40%). The mean interval between the time of delivery and BIIAL was 81.6 (\pm 89.3) minutes, and the average time for stoppage of bleeding from the time of ligation was 8 minutes. Sustained hemostasis following BIIAL was achieved in 40% of patients. Hysterectomy was done in six patients due to persistent hemorrhage and two due to ischemic necrosis of the uterus following BIIAL. Thus, the success of BIIAL for uterine conservation in this study was 20%. Table 2 summarizes the data of patients undergoing BIIAL.

There was no maternal mortality in our study. Infection in the surgical site wound occurred in one patient and was treated by broad-spectrum antibiotics and secondary suturing.

The mean estimated blood loss was 3.45 \pm 0.37 liters, and the requirement of packed red blood cells for transfusion was 6.2 \pm 1.89 PRBC. The preoperative and postoperative mean hemoglobin was 10.8 \pm 1.27 g/dl and 8.74 \pm 1.67 g/dl, respectively. The average operative time was 82.4 \pm 20.89 minutes, and the duration of the average ICU stay of patients was 2.48 \pm 1.31 days.

Table 1: Clinical and demographic characteristics.

Characteristics	Data
Mean Age	26.9 \pm 2.59 years
Parity	
Primigravida	3 (30%)
Multigravida	7 (70%)
Gestational Age	
37-42 weeks	10 (100%)
Mode of Delivery	
Vaginal	4 (40%)

Caesarean	6 (60%)
Risk Factors	
Twin pregnancy	0
Malpresentation	1 (10%)
IUGR with Oligohydramnios	2 (20%)
Gestational Hypertension	2 (20%)
Anaemia	1 (10%)
Gestational Diabetes Mellitus	1 (10%)

Table 2: Data of patients with BIIAL and success of uterine conservation.

Timing Of PPH	Total no. of patients	Time interval before BIIAL (Mean ± SD)	Hysterectomy
During LSCS	6	16 ± 3.46 minutes	5
Laparotomy after LSCS	2	150 ± 42.4 minutes	2
After vaginal delivery	2	210 ± 42.4 minutes	1

IV. Discussion

Obstetric hemorrhage is one of the most common causes of maternal morbidity and mortality, and BIIAL is a useful technique to control bleeding in PPH and preserve women's fertility by conserving the uterus. The present retrospective study evaluated the efficacy of emergency BIIAL for averting hysterectomies in patients with massive, life-threatening PPH. This study recruited ten patients with massive PPH with an estimated loss of more than 2500ml of blood, need for surgical intervention, or ICU admission. With ongoing hemorrhage, clinical assessment of the volume of blood loss alone may not be accurate or representative of the severity of PPH. Thus, ICU admission and surgical intervention were utilized as inclusion criteria.

The overall incidence of PPH, as estimated in this study, was 4.4% (74/1668), comparable to the incidence of 1-10% reported by other researchers.^{1,14,15} Massive PPH, as defined above, was infrequent, with an annual incidence of less than 1%. Although there has been a paucity of global data regarding the incidence of massive PPH, various studies have described a similar incidence of massive PPH.^{16,17} In this study, the most common cause of massive PPH was an atonic uterus (60%), followed by trauma. In their nationwide survey, Bateman et al. also reported the atonic uterus as the underlying etiology in 79% of patients with PPH.¹⁴

In this study, a hysterectomy had to be performed in 80% of patients who had undergone emergency BIIAL to manage massive PPH; however, there was no maternal mortality. This high rate of hysterectomies following BIIAL is likely due to high average blood loss and high average packed red blood cell units transfused among the study participants signifying the severity of blood loss before the procedure. Previous authors have reported a high uterine salvage rate, such as 83.3% by Mukherjee et al., 60.7% by Joshi et al. and 75% by Darawade et al. However, these studies involved all patients with PPH, including stable patients and those in whom BIIAL was done as a prophylactic measure.^{2,11,18,19} Saleem et al. studied the efficacy of BIIAL in massive uterine hemorrhage and reported that 64% of patients did not need a subsequent hysterectomy. However, their study included both obstetric and gynaecological causes of bleeding.²⁰

BIIAL must be suggested to those women who have not yet completed a family or those who wish to conserve their uterus. Past publications also demonstrated that the BIIAL technique had no adverse effect on ovarian functions.²¹ Doumouchtsis et al. found no significant decrease in women's ovarian reserve or fertility potential after BIIAL or uterine devascularization surgery.²²

However, further large-scale, multi-center and prospective research is required to establish a conclusive role of BIIAL in managing massive or life-threatening PPH.

Limitations

The present study was a single-center retrospective analysis of patients with massive PPH undergoing BIIAL. Given the low incidence of massive PPH (<1%) and short study duration (1 year), only 10 eligible subjects could be involved in this study.

V. Conclusion

Internal iliac artery ligation is safe and practical for controlling intractable PPH. It is almost the last resort of the fertility-preserving method available for conserving the uterus in PPH management. Its efficacy in fertility preservation and bleeding control has been established in patients with PPH. However, the same cannot be confirmed for patients with massive or life-threatening PPH. Further large-scale research is necessary involving this sub-group of patients to recommend routine use of BIIAL before proceeding to hysterectomy in patients with massive PPH.

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