

Bilateral hypogastric artery ligation in emergency setting for intractable postpartum hemorrhage: a secondary care center experience

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Summary

Objective: To report the authors' experience in bilateral hypogastric (internal iliac) artery ligation which was performed for controlling intractable postpartum hemorrhage in a secondary care center. **Materials and Methods:** The patients that required bilateral hypogastric artery ligation for severe intractable postpartum hemorrhage from November 2007 to August 2009 were included in this retrospective study. Data were retrieved from patients' hospital records. **Results:** A total of 26 cases required hypogastric artery ligation during the study period. Causes of postpartum hemorrhage included uterine atony, placental abruption, uterine rupture, and placenta accreta. Hemorrhage was effectively controlled in 20 of 26 cases (76.9%) and hysterectomy was avoided. Iliac vein injury occurred in one patient (3.8%) as an operative complication. There was one maternal death. **Conclusion:** Hypogastric artery ligation is an effective therapeutic option for severe postpartum hemorrhage and should be kept in mind during obstetric emergency conditions.

Key words: Hypogastric artery ligation; Postpartum hemorrhage; Peripartum hysterectomy.

Introduction

Primary postpartum hemorrhage (PPH) is a common cause of maternal morbidity with sequel such as renal failure, acute respiratory distress, coagulopathy, and Sheehan syndrome. PPH is also one of the top five causes of maternal mortality in both developing and developed countries, where maternal mortality is both about one hundred times higher in developing countries [1].

Risk factors for PPH include: placental abruption, placenta previa, antepartum hemorrhage, previous PPH, preeclampsia, multiple pregnancies, induction of labor, augmentation of labor, instrumental deliveries, perineal tear, high birth weight, and retained placenta [2]. However, only a small proportion of women with any risk factors develop PPH and many women without risk factors experience hemorrhage after delivery; thus, knowledge of risk factors is not clinically very useful.

PPH treatment includes resuscitation and treatment of etiologic causes such as fundal massage, uterotonic agents, suturing tears, and removal of the placenta. If the patient does not respond to initial management, surgical interventions such as uterine tamponade procedures, uterine compression sutures, uterine artery ligation, bilateral hypogastric artery ligation (BHAL), X-ray guided artery embolisation and/or hysterectomy should be considered [3]. The choice will depend on future fertility desire of the patient and experience of the surgeon.

Bilateral hypogastric artery ligation was first described by Kelly in 1894 and has been advocated in the manage-

ment of intractable PPH and in the prevention of maternal death [4]. Hypogastric artery ligation does not lead to complete cessation of blood flow to pelvic organs. Bleeding from the uterus diminishes because arterial pressure or pulsation drops but pelvic circulation transforms into a venous system [5]. Venous bleeding can usually be controlled by temporary pressure, so that a blood clot could form at this site and has a good chance of remaining there [6].

In the case of intractable PPH, hypogastric artery ligation does not only save the life of the patient but also preserves fertility. Recent reports have shown that this procedure does not impair subsequent fertility and pregnancy outcomes [7, 8]. However, the success rate of this procedure ranges between 40-100% and the procedure prevents 50% of the patients from undergoing hysterectomy [9, 10]. Today, hypogastric artery ligation is performed less frequently than in the past years because practitioners are less familiar with this technique and clinicians fear using it in emergency settings due to possible complications. Additionally, some cultural factors may obligate clinicians not to perform the most effective therapy (such as hysterectomy) for PPH. In order to avoid related medico-legal problems, all clinician should have the ability to perform BHAL.

This study reports the indications and outcomes of 26 cases of bilateral hypogastric artery ligation performed at a secondary care hospital.

Materials and Methods

The study was carried out from November 2007 to August 2009 in Sanliurfa Maternity Hospital, which is a busy country



Figure 1. — Anatomical structures showing the isolated ureter.



Figure 2. — Double ligation of the hypogastric artery.

maternity hospital. In the study period, there were 34,458 deliveries including 24,492 vaginal (71.1%) and 9,966 Cesarean (29.9%) deliveries. There were 26 BHAL for intractable primary PPH.

The cases were identified by searching operating room records. Patient files were then retrieved from the hospital records. Information regarding specific clinical variables such as age, gravidity, parity, obstetric history, any maternal complications during pregnancy, intrapartum care, delivery type, amount of blood loss, management of postpartum hemorrhage, indication for BHAL, and intraoperative and postoperative complications were obtained from operating room records and patient files.

Criteria for inclusion of patients in the study were: requirement of BHAL for intractable PPH and desire of fertility preservation. Patients who required BHAL after peripartum hysterectomy for PPH were excluded from the study.

Patients who required BHAL for uterine atony were initially treated with uterine massage and uterotonic agents (intravenous infusion of oxytocin up to 60 IU, intramuscular ergometrine 0.2 mg up to five doses and rectal 800 µg misoprostol).

The same technique, other than conventional technique, was used in all cases, as described below. A pfannenstiell incision was used for laparotomy. An incision was made to the posterior peritoneum and the anatomic structures were identified with special reference to the ureter (Figure 1). Fat and loose connective tissue around the hypogastric artery and vein were removed and a right-angle clamp was passed beneath the artery. Using a non-absorbable suture applied to the two cm distal end of the hypogastric artery origin and double-ligated (Figure 2). All of the cases were performed by three surgeons (K.B., İ.B., H.G.).

Results

In all 26 cases, the need for BHAL procedure was massive PPH. Mean age, gravida, and parity of the women were 25.6 ± 5.2 , 2.9 ± 1.9 , and 1.8 ± 1.8 respectively.

Fifteen of 26 cases of BHAL were performed after Cesarean section (C/S) and 11 of 26 BHAL were performed after vaginal delivery. Uterine atony was the most common indication for therapeutic BHAL (69.1%). In 11

of 18 cases, uterine atony was determined after vaginal delivery and seven had C/S. Other indications were placental abruption (6), placenta accreta (1), and uterine rupture (1) (Table 1).

In women with PPH, BHAL was performed primarily with C/S (14), at an interval after C/S (1) or at an interval after delivery [11]. Hemorrhage was effectively controlled in 20 of 26 cases (23.1%) and six women required a hysterectomy (76.9%) (Table 2).

An operative complication occurred in one of 26 women. Injury to the iliac vein occurred in one woman and was repaired by passing a figure-eight prolene 4-0 gauge suture around the defect.

Postoperatively six of 26 women were referred to a tertiary center. Disseminated intravascular coagulopathy occurred in five of these six women. Out of referred six patients, mean transferred packed red blood cells and fresh frozen plasma were 4.3 ± 1.9 and 3.2 ± 1.5 units, respectively.

There was one maternal death in this series. C/S was performed in the patient as indicated for labor dystocia. After the operation, severe PPH due to uterine atony occurred. Uterine massage was performed and uterotonic agents (intravenous infusion of oxytocin up to 60 IU, intramuscular ergometrine 0.2 mg up to five doses, and rectal 800 gr misoprostol) were given to the patient but hemorrhage could not be controlled. Relaparotomy for BHAL was performed after a 45-minute interval, but bleeding did not cease, and thus a hysterectomy was carried out. After the operation, disseminated intravascular coagulation (DIC) was revealed. The patient was referred to a tertiary center and she received a total of 12 units of red blood cells and 11 units of fresh frozen plasma but died 17 hours after the operation.

Twenty of 26 patients that were followed postoperatively in the present hospital, were admitted to the post-anesthesia care unit. The mean follow up and mean hospitalization period for these patients were 21.8 hours and 4.4 days, respectively.

Table 1. — Indication for BHAL.

Indication	Number of women (%)
Uterine atony	18 (69.2)
After cesarean section	7 (26.9)
After vaginal delivery	11 (42.3)
Placental abruption	6 (23.1)
Placenta accreta	1 (3.85)
Uterine rupture	1 (3.85)
Total	26 (100)

Table 2. — Hysterectomy in women undergoing BHAL for PPH.

Indication	Total number of women	Hysterectomy carried out n (%)	Uterine salvage rate (%)
Uterine atony	18	4 (22.2)	77.8
Placental abruption	6	2 (33.3)	66.7
Placenta accreta	1	0 (0)	100
Uterine rupture	1	0 (0)	100
Total	26	6 (23.1)	76.9

In 26 cases there was no postoperative buttock claudication or necrosis. Two of the 26 patients had wound infection and one of the 26 patients had postoperative ileus. All of these patients did not have systematic follow-up for fertility results after BHAL.

Discussion

BHAL is not only a life-saving procedure but also has the advantage of preserving fertility with no complication in subsequent pregnancy as described in large case series [7]. A major proportion of the blood supply to the pelvic viscera is by the branches of the hypogastric artery. BHAL diminishes the pulsatile pressure of the arterial system and converts it to a venous-like system. This facilitates clot formation and reduces bleeding [10].

The authors believe that BHAL was under-utilized in the management of PPH due to the fear of injury to the iliac veins. The internal iliac vein lies directly posterior to the hypogastric artery. If a controlled manner is performed while passing the right-angled clamp, perforating the underlying internal iliac vein should be prevented. Dissecting the surrounding fascia of the hypogastric artery for passage of the right-angled clamp diminishes the risk of injury to the internal iliac vein. Joshi *et al.* believe that passing the clamp from lateral to medial side is safer [11]. In this case series, only one internal iliac vein injury occurred. In this case, internal iliac vein was postero-medial to the hypogastric artery and the tip of the clamp injured the vein. Anatomic variations should be considered and more attention should be paid.

The reported success rate of BHAL varies from 40% to 100%, and the procedure averts hysterectomy in only 50% of cases [9, 10]. Failures were more commonly reported in the atonic PPH than in other causes of PPH [12]. In this case series, the uterine salvage rate was 76.9%. Among 18 women with uterine atony who under-

went BHAL, four required hysterectomy, resulting in a salvage rate of 77.8%. An early resort to BHAL is thought to be the key to prevent hysterectomy in women with uterine atony [11].

Alternative procedures such as uterine compression sutures, uterine artery ligation, and X-ray guided artery embolisation have some limitations. Selective artery embolisation is an option in managing PPH if the patient is hemodynamically stable but skilled interventional radiologist and the radiologic set-up in proximity is requested [13]. Uterine artery ligation is a promising technique in the management of PPH as occlusion of the 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 a hematoma, it is difficult to perform a uterine artery ligation and salvage the uterus. In cases of deep forniceal tears and placenta previa, a significant proportion of bleeding occurs from descending cervical and vaginal artery [11, 14]. In these circumstances, BHAL is more effective by diminishing the blood flow in the uterine, cervical, and vaginal vessels [11]. The B-Lynch suture has been reported to successfully control refractory uterine bleeding in several case series [15]. It can only be used to achieve haemostasis in atonic PPH and is less useful in placenta previa. It finds no application in uterine rupture or bleeding from vaginal lacerations.

The neonatal mortality rate and total fertility rate (births per woman between the ages of 15-49) in South-east Anatolian region were around 21 per 1,000 and 4.19, respectively. Fifty-seven percent of women received antenatal care from a physician in this region [16]. According to these statistics, this population is at risk for obstetrical complications. Also fertility-saving is very important for this population, therefore BHAL is a good alternative for these patients. This study determined that intraoperative complication rate is low (only one in 26 patients) and it can be feasible for a secondary care center.

In conclusion, BHAL is an effective procedure for PPH and has the advantage of preserving fertility. It can be used in all causes of PPH. Complications related to the procedure are rare and a controlled manner can minimize them. An understanding of retroperitoneal structures and topography should be an integral part of obstetric and gynecological training.

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