

# Bilateral Ligation of the Anterior Branch of the Hypogastric Artery in Massive Obstetric Hemorrhage Secondary to Septic Abortion (Case Report)

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**Abstract:** Hemorrhage is the main cause of Maternal Mortality (MM) (27%) followed by hypertensive disorders and sepsis (12%). Septic abortion is considered an intermediate risk factor for the development of Massive Obstetric Hemorrhage (MOH). The algorithm for the management of postpartum hemorrhage due to uterine atony that includes systematic pelvic devascularization has been described, but this management is really planned for resolution of the pregnancy after the 20th week of gestation, since an HMO due to abortion is unusual. We present the case of a 21-year-old patient who self-medicates a prostaglandin analog at 2 months of pregnancy, achieving only a threat of abortion, goes to the emergency room 3 months later with a diagnosis of septic shock, USG and MRI are performed with altered results, only of hepatomegaly, delayed abortion of 8 weeks of evolution and gestational trophoblastic disease. Emergency MVA was performed due to profuse bleeding, placement of a Bakri balloon and clamping of the uterine arteries without results, for which an emergency exploratory laparotomy (LAPE) was performed with ligation of the anterior trunk of the internal iliac artery, being a successful procedure, without the need for Obstetric Hysterectomy (HO). The patient is managed in intensive care and in the end the diagnosis of TSG is ruled out. Bilateral Hypogastric Artery Ligation (BHAL) in the case of Massive Obstetric Hemorrhage (MOH) secondary to delivery or cesarean section is commonly used, however it is not a technique to report when bleeding is secondary to abortion. In these cases, it is also a viable, successful, fertility-preserving surgical procedure, and an alternative to Obstetric Hysterectomy (OH) when other less invasive methods such as uterine artery clamping or Bakri balloon have failed.

**Keywords:** Ligation, Hypogastric, Artery, Massive, Obstetric, Hemorrhage, Incomplete, Abortion, Preserve, Fertility

## 1. Introduction

The World Health Organization (WHO) indicates that approximately 810 women die every day worldwide as a result of complications related to pregnancy or childbirth, and hemorrhage is the leading cause of MM followed by

hypertensive disorders and sepsis [1, 2].

A woman dies from MOH approximately every 4 minutes, which represents approximately 27% of MM cases. MOH is defined as a blood loss > 2 L and/or a blood volume loss of 30% to 40% and/or > 10% in the hematocrit (Htc) value. It is generally associated with the need for HO, development of Consumption Coagulopathy (CC) and admission to Critical Care

Units in Obstetrics (CCUO) [2-4].

Septic abortion (SA) is responsible for approximately 12% of maternal deaths, it is defined as any loss of pregnancy after 20 weeks (spontaneous or induced) complicated by an infection of the upper genital tract. Approximately 8% to 12% of obstetric patient admissions to CCUO are due to sepsis. The case fatality rate for maternal sepsis is of 8% and up to 14% in septic shock [4, 5].

Both pathologies can occur together, SA is considered an intermediate risk factor for the development of an MOH. It is feasible to prevent MOH in these patients using uterotonic drugs such as oxytocin, however, oxytocin receptors appear from week 13 of pregnancy, so in abortions of 12 weeks or less it is not really useful. The use of ergometrine and carbetocin is ruled out in these patients from 13 to 20 weeks if there is liver failure, and ergometrine is contraindicated in sepsis. [4]

The algorithm for the management of postpartum hemorrhage due to uterine atony includes in the following order: uterine massage, oxytocics, bimanual compression, balloon tamponade, application of modified B-Lynch compression sutures, systematic pelvic devascularization (uterine/ovarian/quadruple/internal iliac), Uterine Artery Embolization (UAE) and finally OH. But this management is really planned for resolution of the pregnancy after the 20th week of gestation, since an MOH for an abortion is rare [2].

Bakri balloon tamponade is the most common form of surgical treatment in up to 46% of cases, followed by compression sutures in 24% and OH in 4%. Actually, BLABHA is not considered a common technique in pre-term or full-term pregnancies, and less has been described performing it in the case of MOH due to abortion, hence the importance of presenting this case and giving it as a viable and successful option [6].

## 2. Case Report

A 21-year-old patient with a diagnosis of early pregnancy consumed 800 g of misoprostol, presented bleeding after 3 days and later presented transvaginal bleeding that she attributed to two normal menstruations. The patient was admitted to the Emergency Department (Emergencies) with sudden abdominal pain in the epigastrium and right upper quadrant, accompanied by intolerance to the oral route, acholia and choluria. Upon examination, blood pressure (BP) of 90/56 mmHg, jaundice in both scleras and integuments, congestive breasts, hepatomegaly, positive Murphy's sign, vulva and vagina with gestational changes, uterus 8 x 7 x 6 cm, cervix 3 x 2 x 2 cm, closed, with pain on mobilization, little transvaginal bleeding, fetid discharge, normal tendon reflexes. Laboratory studies are performed with altered reports of human chorionic gonadotropin (hCG- $\beta$ ) subunit of 56.48 mIU/ml, leukocytes (Leu) of  $23 \times 10^9$  at the expense of neutrophils 80%, hyperbilirubinemia at the expense of direct bilirubin (DB) with a value of 3.5 mg / dL, elevated liver transaminases with Alanine Amino Transferase (ALT) 2262 U / L and Aspartate Amino Transferase (AST) of 1019

U / L.

Abdominal Ultrasound (US) is requested, which reports a liver with preserved morphology, enlarged in size, homogeneous parenchyma without lesions, without evidence of bile duct dilation; normal gallbladder; both kidneys of normal characteristics (Figure 1). Obstetric USG with suspected invasive mole versus epithelioid trophoblastic tumor due to the presence of endometrium and myometrium of heterogeneous echogenicity with turbulence and increased vascularity, uterine cavity occupied by product with cranio-caudal length of 15.4 mm (8 weeks), without heartbeat; ovaries of normal characteristics and volumes (Figure 2). Magnetic Resonance Imaging (MRI) shows a uterus with an intracavitary mass due to probable trophoblast disease with focal loss of interface between myometrium and endometrium, hepatomegaly with 18 cm right hepatic lobe, congestion and / or hepatic inflammatory process, alithiasic cholecystitis (Figure 3).

During hospital surveillance, the patient was treated with a broad-spectrum antibiotic. On the third day, she presented profuse transvaginal bleeding that led to a state of shock. She was treated urgently with surgery. Manual Vacuum Aspiration (MVA) and Bakri balloon placement were performed, maneuvers with which bleeding persisted. It was decided to perform an EX LAP plus BLPBHA, with adequate control of the hemorrhage.

### Description of BLABHA

The sacral promontory is taken as a reference, three to four centimeters lateral to this reference, the retroperitoneum is incised, anatomically the surgeon positions himself on the bifurcation of the common iliac artery. It is worth mentioning that this surgical step results in risk since when prompting we can find the decussation of the ureter and cause an injury. Once the structures have been identified, the retroperitoneum is dissected parallel to the entire course of the hypogastric artery, as well as the surrounding tissue, until its bifurcation is seen in the anterior and posterior trunk, the peripheral tissue of the anterior trunk. It is safely dissected until it is free and it is ligation with 1-0 catgut absorbable suture. Haemostasis is verified and the same contralateral procedure is performed (Figure 4) [7, 8].

## 3. Results

A 2500 ml bleeding was quantified, 5 erythrocyte concentrates, and 3 packages of fresh plasma were transfused since the patient was undergoing Disseminated Vascular Coagulopathy (CVD) and the postoperative period continued in the intensive care unit.

The result of the pathology describes trophoblastic remains with chorionic villi from the first trimester of gestation with moderate edema and hair necrosis, presence of trophoblast, membranes and decidua with acute and chronic intense chorioamnionitis, no histopathological characteristics of gestational trophoblastic disease are identified. (Figure 5)

During his surveillance, laboratories are requested with Hb of 11 g / dL, Leu  $8.7 \times 10^9$ , Neu 60%, BD 0.5 mg / dL, ALT

147 U / L and AST 39 U / L.

The patient was discharged 5 days after admission to the CCUO, and a subdermal implant is placed as a family planning method as the patient is in stable condition.

## 4. Discussion

SA is a life-threatening infection associated with unsafe abortion practices.

The physiological, immunological and mechanical changes that occur during pregnancy make women more susceptible to infections and the signs and symptoms of sepsis are mimicked, causing a delay in the recognition and treatment of sepsis [9, 10].

This patient explicitly presented with a motley pattern of sepsis secondary to retention of products of conception after misoprostol induction of abortion without careful follow-up. The age of the patient and the experience of the physicians in obtaining a quick and accurate diagnosis were favorable variables during her study and prognosis; however, the risk of MOH was present during hospital stay until the patient was confined to hypovolemic shock. In the emergency situation and given the risk of other complications (CVD and death), we decided to perform EX LAP and BLABHA as previously described, thus achieving containment of the hemorrhage and better still, preservation of fertility.

The Bakri balloon has a success rate of 87.5%, however this is in pre-term or full-term pregnancy, in the case of our patient with a delayed abortion of 8 weeks, it was not useful [2].

BLHA's requirement rate is estimated at 62 out of 10,000 births. The mortality rate among patients referred from a first or second level of care is 10.25%, while this rate is 1.11% among patients who were initially treated at a third level of care. In our case, the patient came from the beginning to our 3rd level institution [11].

BLHA in patients with uterine atony, placental abruption, vaginal/ cervical laceration, uterine rupture, and placenta accreta is effective on its own in 88.9% of cases. Conservative treatment of postpartum hemorrhage secondary to placenta previa-accreta with BLHA and endouterine hemostatic sutures in the lower uterine segment prevents OH in up to 84.3% of patients. We did not find in the literature a percentage of effectiveness of the technique in MOH due to abortion [12, 13].

The first to perform such a ligation was Kelly in 1894, the procedure is not widely used today; stated that BLHA completely cuts off the entire pelvic circulation and this is still the general belief. However, this is not true. There are three specific pairs of collateral arteries, these are: iliolumbar, lateral sacral, and middle hemorrhoidal. This technique is performed because it is known that only proximal ligation (2 cm from the common iliac bifurcation) decreases blood flow by up to 50% distal to the ligation; Because the collateral circulation provided by the posterior trunk of the internal iliac artery reperfuses the anterior trunk, the ischemic goal is not fully achieved. To date, we have

performed 31 procedures, 18 in proximal ligation with the posterior trunk, and thirteen with exclusively anterior trunk ligation, all for obstetric, gynecological and oncological, prophylactic and/or therapeutic indications; we have only observed 2 complications, and they have been resolved, consisting of laceration of the external iliac vein and lower limb paresthesias, without further complications [14, 15].

Patients who end up in OH due to percreta from the placenta, but if BLHA is performed, they have less blood loss and therefore require less transfusion of units of blood products, so it is also useful. [15]

UAE can be considered in the treatment of hemodynamically stable, unstable patients and even in patients with CVD. The fertility rate after this procedure is good at 60.9% with a live birth rate of 43.5%. The percentage of fertility after BLHA is also not described in the studies [16, 17].

If all attempts to stop the bleeding have failed, HO should be performed as a last resort and life-saving measure. The decision to perform a hysterectomy, while devastating for patients, should not be delayed in cases of hemodynamic instability [2].

MOH is a public health problem, for which the OB / GYN doctor must be prepared to prevent it by identifying risk factors from their first care, and must be trained to perform unusual techniques such as BLHA, which can mean life and the obstetric future of the patient, even being able to perform abortion from MOH.

## 5. Conclusions

BLABHA in case of MOH secondary to childbirth or cesarean section is commonly used, however, it is not a technique that reports when bleeding is secondary to abortion. In these cases, it is also a viable, successful, fertility-preserving and alternative surgical procedure to HO when other less invasive methods such as uterine artery clamping or the Bakri balloon have failed.

## Abbreviations

Bilateral Ligation of the Anterior Branch of the Hypogastric Artery (BLABHA)

Bilateral Ligation of the Hypogastric Artery (BLHA)

Massive Obstetric Hemorrhage (MOH)

Maternal Mortality (MM)

Uterine Artery Embolization (UAE)

Exploratory Laparotomy (EX LAP)

Obstetric Hysterectomy (OH)

Critical Care Unit in Obstetrics (CCUO)

Hemoglobin (Hb)

Hematocrit (Htc)

Consumption Coagulopathy (CC)

Blood Pressure (BP)

Emergency Room (ER)

Human chorionic gonadotropin  $\beta$ -subunit (hCG- $\beta$ )

Blood Pregnancy Test (BPT)

Leukocytes (Leu)  
 Direct Bilirubin (DB)  
 Alanine Amino Transferase (ALT)  
 Aspartate Amino Transferase (AST)  
 Ultrasound (US)  
 Manual Vacuum Aspiration (MVA)  
 Disseminated Vascular Coagulopathy (CVD)

## Conflict of Interests

All authors have no potential conflict of interest.

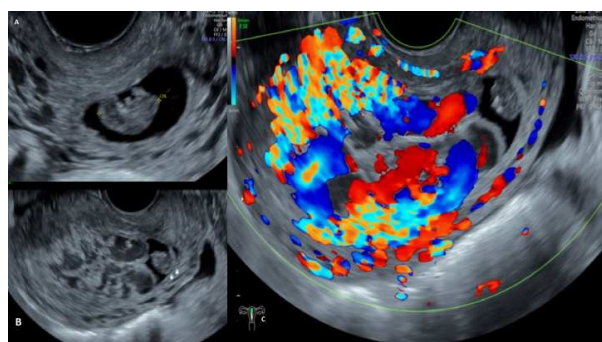
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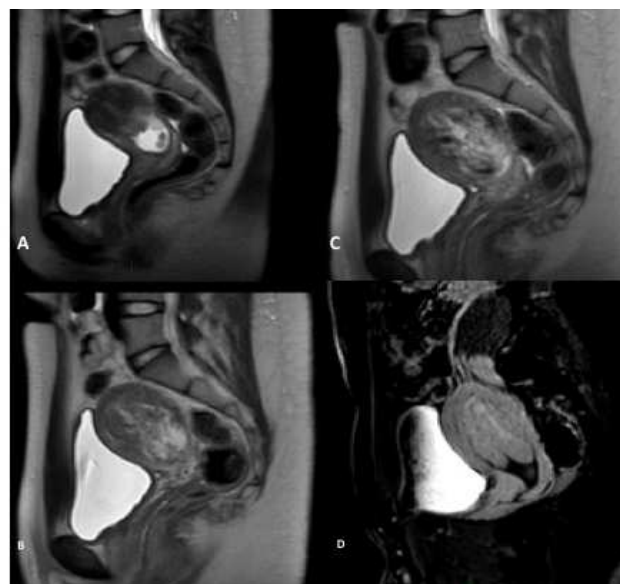
## Appendix



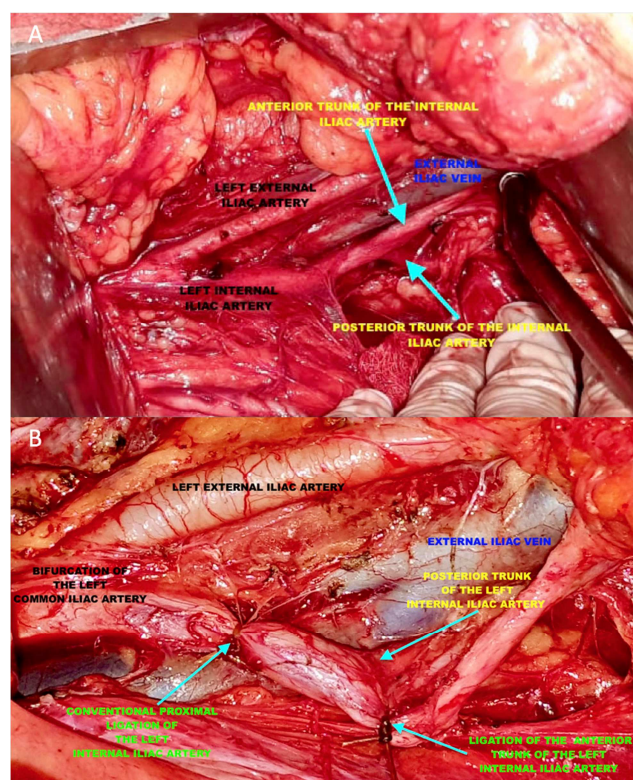
**Figure 1.** Liver ultrasound: A) Image showing hepatic medial-lateral diameter of 19 cm, in relation to hepatomegaly; liver echogenicity is homogeneous, preserved, without focal or diffuse lesions inside. B) Color Doppler application, where adequate vascularity of the hepatic vessels is shown; no focal or diffuse lesions inside; the intrahepatic bile structures of conserved caliber and morphology.



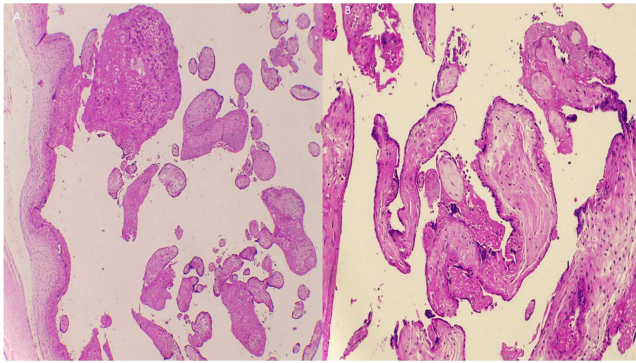
**Figure 2.** A) Transvaginal ultrasound showing intrauterine pregnancy with cephalocaudal diameter of 15.4 mm, compatible with 8 weeks of gestation, with normal morphology and characteristics, gestational sac and amniotic fluid without alterations. B) Transvaginal ultrasound showing intrauterine pregnancy, located at the level of the uterine body; embryo and gestational sac with normal characteristics; Heterogeneous, thickened placental implantation site occupies the entire uterine fundus and shows loss of the interface with the myometrium. C) Transvaginal ultrasound shown in B), with color Doppler application that shows an important placental venous and diffuse arterial vascular signal, with a predominance at the myometrial interface site.



**Figure 3.** MRI of the pelvis where it is observed: A, B, C) Sagittal T2: Intrauterine pregnancy located at the level of the body region; embryo and gestational sac with normal characteristics; Heterogeneous placental implantation site, thickened, occupies the entire uterine fundus with multiple vascular images in its interior; shows loss of interface with the myometrium. D) Sagittal T2 fat sat: Intrauterine pregnancy located at the level of the body region; embryo and gestational sac with normal characteristics; Heterogeneous placental implantation site, thickened, occupies the entire uterine fundus, shows the interface with the myometrium.



**Figure 4.** Ligation technique of the anterior trunk of the Internal Iliac Artery: A) Dissection of the pelvic structures. B) Ligation of the anterior trunk.



**Figure 5.** Definitive histopathological report. A) Amnion, Decidua with necrosis and B) Chorionic villi of the first trimester.

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