

Internal Iliac Artery Ligation in Refractory Pelvic Haemorrhage following Obstetric Surgery: A Life Saving Intervention

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Abstract: Postpartum haemorrhage (PPH) remains a major cause of maternal morbidity and mortality. Despite timely obstetric hysterectomy, postoperative bleeding may persist due to collateral pelvic circulation. Internal iliac artery ligation (IIAL) significantly reduces pelvic pulse pressure, promoting haemostasis without compromising pelvic organ viability. We present a case of a young woman who developed a massive pelvic haematoma following LSCS and obstetric hysterectomy, successfully managed with bilateral IIAL.

Keywords: Postpartum haemorrhage; Internal iliac artery ligation; Obstetric hysterectomy; Pelvic haematoma; Maternal morbidity

1. Introduction

Postpartum haemorrhage continues to be a leading contributor to maternal mortality worldwide (1). Obstetric hysterectomy remains a life-saving measure when conservative interventions fail. However, persistent postoperative bleeding due to extensive pelvic collateral circulation can lead to the formation of large haematomas and hemodynamic instability (2). Internal iliac artery ligation is a well-established haemostatic procedure that decreases pelvic arterial pressure by up to 85%, enabling clot formation while maintaining pelvic organ perfusion (3). This case report aims to highlight the role of internal iliac artery ligation in managing persistent postpartum haemorrhage when conventional interventions fail.

2. Case Report

A 24-year-old woman, on postoperative day 2 following lower segment caesarean section (LSCS) and day 1 following obstetric hysterectomy, was referred to our tertiary care centre with tachycardia, hypotension, and concern for impending disseminated intravascular coagulation (DIC). She had undergone emergency LSCS at a Rural hospital for previous LSCS with impending scar dehiscence. Postoperatively, she developed abdominal distension and hypovolemia. Ultrasonography revealed free intraperitoneal fluid, prompting surgical exploration. She was therefore referred to the District Civil Hospital.

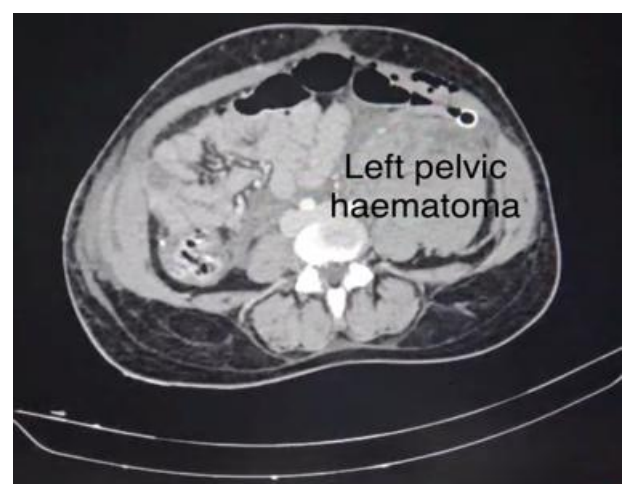
At District civil hospital, after initial resuscitation patient was taken for surgical exploration. Intraoperatively, a large left broad ligament haematoma was noted, necessitating a life-saving obstetric hysterectomy. 2 pints of packed red cells were given intra operatively. Two intraperitoneal drains were placed. Over the next 24 hours, she continued to have approximately 400 mL of blood-stained drain output and was referred to tertiary care centre.

Upon arrival at our institution, she was conscious and oriented, with pulse 108/min, blood pressure 90/60 mmHg, and oxygen saturation 99% on room air. Her Hb was 7.1 g/dL, TLC 13,000/mm³, and platelet count 2.37 lakh/mm³. CECT of the abdomen and pelvis revealed a large organised

haematoma along the left psoas and paracolic gutter extending into the pelvis (4).

The patient was aggressively resuscitated and taken for surgical re-exploration. Intraoperatively, haematoma beneath both infundibulopelvic ligaments (peritoneal fold suspending ovary from lateral pelvic wall) was identified. Persistent oozing continued despite conventional haemostatic techniques. A decision was made to proceed with bilateral internal iliac artery ligation. Retroperitoneum opened with blunt dissection, common iliac artery identified and confirmed. Internal and external iliac artery visualized. Internal iliac artery identified and separated from surrounding tissue using blunt dissection. A mixer forcep was passed under internal iliac artery from lateral to medial side and ligated 4 cm below bifurcation with vicryl no 1 suture material. Haemostasis was achieved. Intraperitoneal drain was placed.

Postoperatively, she was monitored in the intensive care unit. She received three units of packed red blood cells and was gradually weaned off inotropic support. Her haemoglobin improved to 9.6 g/dL. The drain was removed on postoperative day 6, and she had an uneventful recovery. She was discharged in stable condition on postoperative day 14 with no ischemic, neurological, or urological complications.





3. Discussion

Haematomas following lower-segment cesarean section (LSCS) represent an important but often under-recognized cause of postpartum morbidity. Their timely identification and appropriate management are essential to prevent life-threatening hemorrhage, sepsis, and prolonged recovery. The spectrum of post-cesarean accumulations varies depending on the anatomical plane involved, mechanism of bleeding, and extension into surrounding pelvic structures.

Types of Hematoma Following Cesarean Section

Post-cesarean hematomas may be broadly categorized into:

- 1) Subcutaneous and Rectus Sheath Hematoma – Formed due to injury to superficial epigastric or inferior epigastric vessels during skin and rectus muscle dissection. Though often self-limiting, large collections can cause significant pain, abdominal distension, and anemia, occasionally requiring evacuation.
- 2) Sub fascial Hematoma – Occurs beneath the rectus sheath, typically from inferior epigastric artery branches or inadequate hemostasis of muscle edges. These hematomas may be clinically occult but can lead to hemodynamic instability if large.
- 3) Bladder Flap Hematoma – Develops between the bladder and lower uterine segment following dissection of the vesicouterine fold. Small hematomas (<5 cm) are common and often benign. Larger ones may indicate uterine incision extension or vascular injury and require imaging evaluation.
- 4) Retroperitoneal Hematoma – A rare but severe entity caused by injury to uterine or pelvic vessels. These hematomas may dissect into the retroperitoneum and pelvis, posing diagnostic challenges and often associated with significant hemorrhage.
- 5) Broad Ligament Hematoma – One of the most clinically relevant hematomas after cesarean section, resulting from extension of lateral uterine incision tears or laceration of uterine, ovarian, or internal iliac artery branches.

Types of Broad Ligament Hematoma

Broad ligament hematomas are classified based on location and cause/origin.

A) Based on Location

- 6) Supravaginal / Upper broad ligament hematoma
 - Located above the level of the cervix
 - Usually due to injury of the uterine artery or its branches
 - Seen during cesarean section when the uterine incision extends laterally
- 7) Paracervical / Lower broad ligament hematoma
 - Located below the cervix and lower uterine segment
 - Caused by injury to:
 - Vaginal branches of uterine artery
 - Internal pudendal artery
 - Common after instrumental delivery, episiotomy extension, manual placenta removal

B) Based on Spread

- 1) Intraperitoneal broad ligament hematoma
 - Hematoma extends upward into the retroperitoneal space
 - May reach kidney level (renal region)
 - Can spread along psoas muscle
 - This can be dangerous as it may lead to massive concealed hemorrhage
- 2) Extraperitoneal broad ligament hematoma
 - Confined to the pelvis below the peritoneal reflection
 - Usually limited and manageable conservatively

C) By vessel type

- 1) Arterial Broad Ligament Hematoma: Caused by laceration of the uterine artery or its branches, often following lateral extension of the uterine incision during cesarean section or instrumental delivery. Rapid expansion and hemodynamic instability are characteristic of arterial bleeds.
- 2) Venous Broad Ligament Hematoma: Typically originates from injury to the uterovaginal venous plexus. These hematomas expand more slowly, may remain stable for extended periods, and can sometimes be managed conservatively.
- 3) Retroperitoneal Extension Hematoma: Hematoma that dissects into the retroperitoneal space, involving pararectal, paravesical, or presacral compartments. These are often difficult to access surgically and may require interventional radiology or vascular control procedures.

Management of Broad Ligament Hematomas

Management depends on the etiology, size, rate of expansion, and patient's hemodynamic status:

- 1) Conservative Management

Small, non-expanding venous hematomas with stable vital signs may be managed expectantly with close monitoring, serial hemoglobin checks, and broad-spectrum antibiotics.
- 2) Surgical Evacuation and Hemostasis

Indicated for expanding, arterial, or symptomatic hematomas. Surgical exposure of the broad ligament may require opening the peritoneum, evacuating the clot, identifying bleeding points, and securing

hemostasis with sutures, electrocautery, or vessel ligation.

3) Stepwise Uterine Devascularization

In cases related to uterine artery bleeding, uterine artery ligation, utero-ovarian ligament ligation, or bilateral descending cervical branch ligation may be effective.

4) Internal Iliac Artery Ligation (IIAL)

A key surgical option when bleeding source is inaccessible or uncontrolled. This reduces pelvic arterial pulse pressure by nearly 85%, transforming high-flow arterial bleeding into a low-pressure system conducive to clot formation.

5) Interventional Radiology

Uterine artery embolization may be considered when available, particularly for stable patients with persistent arterial flow demonstrated on imaging.

Internal iliac artery ligation plays a pivotal role in managing pelvic hemorrhage following lower segment cesarean section and in cases of obstetric hysterectomy, especially when a post-operative pelvic or retroperitoneal hematoma forms. Post-obstetric hysterectomy hematomas often arise from bleeding at the raw pedicles uterine artery stump, vaginal vault, or parametrial tissues. Due to tissue edema, distorted anatomy, and dense adhesions after multiple surgeries, localizing the exact bleeding point becomes challenging.

In such scenarios, bilateral internal iliac artery ligation offers an effective, life-saving intervention by:

- Reducing pelvic arterial pressure, allowing spontaneous hemostasis.
- Controlling diffuse ooze from parametrial vessels.
- Preventing further expansion of retroperitoneal or broad ligament hematomas.
- Minimizing the need for repeated laparotomies or pelvic packing.

In cases where the patient undergoes multiple surgeries within a short interval, as seen in difficult cesareans or post-hysterectomy hemorrhage, IIAL significantly reduces morbidity. When performed early by trained surgeons, it has a high success rate with minimal long-term pelvic ischemic complications due to extensive collateral circulation.

This case underscores the continued relevance of internal iliac artery ligation as a viable, accessible, and life saving option, especially in resource limited settings lacking interventional radiology.

4. Conclusion

Broad ligament hematoma is a rare but potentially life-threatening obstetric complication, resulting from injury to uterine or vaginal vessels, venous plexus, or extension of uterine rupture. It may occur after cesarean section, vaginal delivery, instrumental delivery, or obstetric hysterectomy. Because the hematoma is concealed within the broad ligament, diagnosis is often delayed until the patient presents with hemodynamic instability, pelvic pain, distension, or persistent postoperative bleeding.^{1,2}

Broad ligament hematomas can range from small, self-limiting collections to massive hematomas causing rapid maternal collapse. The pelvic vasculature with rich anastomoses between uterine, ovarian, and internal iliac branches makes surgical control challenging.³ Direct suturing is often difficult due to the deep pelvic location, engorged vessels, and limited visibility in the postpartum period. When the hematoma expands or the patient becomes hemodynamically unstable, urgent surgical intervention is essential.^{4,5}

Internal Iliac Artery Ligation (IIAL) plays a critical role in such situations. By ligating the anterior division of the internal iliac artery, pelvic arterial pulse pressure is reduced by nearly 85%, converting high-pressure arterial bleeding into low-pressure venous oozing.⁶ This transformation significantly enhances the effectiveness of pelvic packing and compression, allowing stabilization of even large hematomas. Despite being major vascular intervention, IIAL rarely compromises tissue viability.

In cases of persistent or recurrent broad ligament hematoma after obstetric procedures, such as cesarean section or obstetric hysterectomy, IIAL serves as a definitive life-saving step. When re-exploration fails to identify a specific bleeding point or when suturing raw areas is impossible, IIAL provides rapid and reliable hemostasis.^{8,9} Its value is particularly high in settings where interventional radiology or uterine artery embolization is unavailable or delayed.⁵

Several studies and clinical reviews affirm the success of IIAL in controlling pelvic hemorrhage refractory to conventional measures.^{6,9,11} The procedure is especially effective in complex postpartum hemorrhage, uterine rupture, placenta accreta spectrum, and pelvic vessel injuries. Early decision-making to proceed with IIAL has been shown to reduce maternal morbidity, transfusion requirements, and repeated laparotomies.^{10,1}

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