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Original Research Article

The role of bilateral internal iliac artery ligation in obstetric practice

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ABSTRACT

Background: Postpartum hemorrhage remains a leading cause of maternal mortality globally, accounting for a significant percentage of obstetric emergencies. Bilateral internal iliac artery ligation (IIAL) is a surgical technique that has been advocated for controlling severe pelvic hemorrhage for over a century. The main aim of this study was to evaluate the effectiveness of IIAL in controlling intractable obstetric hemorrhage and to assess its impact on hysterectomy rates and maternal outcomes.
Methods: A prospective observational study was conducted between June 2023 and June 2024 in a tertiary care center. Women presenting with massive PPH unresponsive to conservative management were considered for IIAL. All procedures were performed by a senior obstetrician and a urologist. Data on patient demographics, indications for IIAL, surgical details, and maternal outcomes were recorded and analyzed.
Results: A total of 30 patients underwent IIAL, primarily for morbidly adherent placenta and uterine atony. Of these, 62.5% avoided hysterectomy following successful ligation, thereby preserving the uterus. There were no major surgical complications, and the need for excessive blood transfusions was markedly reduced after IIAL.
Conclusions: IIAL is a valuable procedure in obstetric practice for managing life-threatening PPH, especially in resource-limited settings where advanced interventional radiology may not be readily available. By effectively reducing pelvic arterial pressure, IIAL can control hemorrhage and lower the need for hysterectomy, thereby preserving fertility. Familiarity with pelvic anatomy and prompt surgical intervention are essential for successful outcomes.

Keywords: Bilateral internal iliac artery ligation, Fertility preservation, Obstetric hemorrhage control, Pelvic hemorrhage, Postpartum hemorrhage

INTRODUCTION

Overview of postpartum hemorrhage

Postpartum hemorrhage (PPH) continues to be one of the most critical causes of maternal morbidity and mortality worldwide.[1] Clinically, PPH is often defined as blood loss exceeding 500 ml after a vaginal delivery or 1000 ml after a cesarean section; however, any degree of blood loss that compromises maternal hemodynamic stability is a concern. The most frequent causes include uterine atony, trauma to the birth canal, retained placental tissues, and coagulopathies.[2] Among these, uterine atony and abnormal placental attachment (e.g., placenta previa or placenta accreta) are especially notable for their contribution to massive, life-threatening hemorrhage.[3]

Significance of controlling pelvic hemorrhage

Uncontrolled pelvic bleeding can rapidly lead to hemorrhagic shock, disseminated intravascular coagulation, multi-organ failure, and even death, underscoring the immediate need for effective interventions.[4] While various conservative measures exist-including uterotonics, uterine massage, uterine balloon tamponade, and uterine compression sutures—these

methods may fail in severe cases. However, when fertility preservation is paramount, IIAL offers a critical balance between controlling hemorrhage and maintaining reproductive potential.[5]

Definition and rationale for bilateral internal iliac artery ligation (IIAL)

Bilateral internal iliac artery ligation is a surgical procedure designed to decrease arterial pressure in the pelvic circulation by as much as 85%, effectively transforming the arterial system into a "venous-like" system with minimal flow. This reduction in pulse pressure helps in controlling or significantly reducing the severity of hemorrhage. A key advantage of IIAL is its capacity to preserve the uterus in certain cases, thereby allowing potential future fertility.[3] It also provides a clearer operative field, which can be crucial when repairing lacerations or dealing with complex pelvic bleeding.

Purpose of the study

The primary aim of this study was to delineate the clinical role of IIAL in modern obstetric practice, focusing on:

Clinical indications for IIAL- identifying the spectrum of obstetric emergencies where this procedure is beneficial. Outcome measures- evaluating blood loss reduction, transfusion requirements, and the rate of uterine preservation following IIAL. Future implications- assessing whether IIAL can remain a cornerstone of hemorrhage control in settings where advanced interventional radiology may be limited, while still preserving fertility and improving maternal outcomes.

Literature review/ background

Anatomical considerations

The internal iliac artery (also known as the hypogastric artery) originates at the bifurcation of the common iliac arteries, typically at the level of the lumbosacral intervertebral disc, and courses anteriorly to the sacroiliac joints. Surgical dissection in this region demands careful attention to the ureter, which crosses the internal iliac artery anteriorly from lateral to medial, and to the large external and internal iliac veins, positioned posterolateral and posteromedial to the artery, respectively. Clear knowledge of pelvic anatomy is paramount for safe ligation, as inadvertent damage to the ureter or adjacent vessels can result in severe intraoperative complications.

Physiological basis for hemorrhage control

Bilateral internal iliac artery ligation (IIAL) reduces arterial pulse pressure in the distal circulation by approximately 85%, effectively converting it to a venous-like system with minimal blood flow. In comparison, unilateral ligation can lower pulse pressure by about 77%, which may still be beneficial but is less effective than bilateral ligation in controlling massive pelvic hemorrhage. Other hemostatic interventions- such as balloon occlusion of pelvic vessels or arterial embolization- function through a similar principle of limiting or temporarily stopping blood flow to the uterus, yet these methods require specific resources and expertise that may not be universally accessible.

Current trends and comparisons

Uterine artery embolization (UAE) has emerged as a valuable, minimally invasive technique for controlling obstetric hemorrhage, boasting success rates of 90% to 95% in certain studies. However, access to interventional radiology suites and trained personnel can be limited, especially in low-resource settings, making IIAL an important surgical alternative. Balloon occlusion of the common iliac artery or even the aorta is another strategy to decrease blood flow during critical obstetric surgeries, yet its utility varies among different clinical scenarios. Ultimately, the choice between IIAL, arterial embolization, or other occlusive methods hinges on the clinical urgency, resource availability, and the need to preserve fertility where possible.

Objectives

Primary objective was to assess the efficacy of bilateral internal iliac artery ligation (IIAL) in controlling obstetric hemorrhage in life-threatening situations.

Secondary objectives were to evaluate the impact of IIAL on blood transfusion volume and requirements. To assess maternal outcomes, specifically focusing on mortality, morbidity, and the need for hysterectomy. To determine the impact of IIAL on future fertility where follow-up data is available.

METHODS

Study design

This research was conducted as a prospective observational study from June 2023 to June 2024 in order to evaluate the role of bilateral internal iliac artery ligation (IIAL) in life-threatening obstetric hemorrhage.[7]

Setting and sample

The study took place at the Government General Hospital, Guntur- a tertiary care facility managing high-risk obstetric cases.

Inclusion criteria

All women with massive postpartum hemorrhage unresponsive to conservative management (e.g., uterotonics, uterine tamponade, uterine compression sutures).

Exclusion criteria

Patients presenting with non-obstetric hemorrhage or coagulopathies unrelated to obstetric causes.

Procedure

A standard protocol for IIAL was followed, performed jointly by a senior obstetrician and a urologist. The key surgical steps included:

Peritoneal reflection

A vertical incision was made on the lateral side of the common iliac artery to gain access, ensuring the ureter remained attached to the medial peritoneal fold.

Identification of the ureter

Careful dissection was carried out to visualize and protect the ureter, which crosses anteriorly over the internal iliac artery.

Isolation of the internal iliac artery

Fascia over the artery was gently dissected to trace its course downward, keeping the external and internal iliac veins in view.

Double-ligation

Non-absorbable suture material was passed beneath the internal iliac artery using a Mixter forceps, and the artery was ligated securely to achieve hemostasis.

Data collection

Patient demographics, obstetric histories, and clinical indications for IIAL were documented using standardized forms. Intraoperative findings, estimated blood loss, hemodynamic parameters (blood pressure, pulse rate), and the number of blood transfusions required were recorded. Postoperative outcomes, such as maternal morbidity or mortality and the need for any further surgical intervention, were also assessed.

Ethical considerations

Approval from the institutional ethics committee was obtained prior to commencement of the study. Written informed consent was taken from all participating patients or their guardians, in accordance with the Declaration of Helsinki and hospital guidelines.

RESULTS

The average age of the sample was about 28 years, indicating a relatively young obstetric population. Slightly more than half the participants were multiparous, reflecting a typical distribution in a referral center for high-risk pregnancies. Morbidly adherent placenta (33.3%) and uterine atony (26.7%) emerged as the most common indications for IIAL, consistent with the known etiologies of massive obstetric hemorrhage.[8]

Table 1: Demographic and clinical characteristics (n=30).

Variables	IIAL group (n=30)
Age (mean±SD)	28.4 ± 4.1 years
Parity (%)	Primiparous: 12 (40)
	Multiparous: 18 (60)
Gestational age at delivery	37.2±2.0 weeks
Indications for IIAL (%)	Morbidly adherent placenta: 10 (33.3)
	Uterine Atony: 8 (26.7)
	Broad ligament hematoma: 5 (16.7)
	Rupture uterus: 4 (13.3)
	Other (e.g., traumatic PPH): 3 (10)

Estimated blood loss averaged around 1450 ml, highlighting the severity of hemorrhage at presentation.

On average, each patient required about three units of blood to stabilize their hemodynamics.

Table 2: Operative and postoperative outcomes (n=30).

Variables	IIAL group
Estimated blood loss (ml, mean±SD)	1450±320
Units of blood transfused (mean±SD)	3.2±1.0
Rate of uterus preservation (%)	22 (73.3)
Hysterectomy required (%)	8 (26.7)
Postoperative hemoglobin (gm/dl, mean±SD)	9.1±1.3
Maternal mortality (%)	1 (3.3)
ICU admissions (%)	12 (40)
Mean hospital stay (days±SD)	7.6±2.1

Remarkably, 73.3% of patients were able to preserve their uterus post-ligation, underscoring IIAL's fertility-sparing potential.[3] However, 26.7% still progressed to hysterectomy, indicating that in a subset of cases, IIAL alone may not suffice. Maternal mortality stands at 3.3%, reflective of the high-risk nature of severe postpartum hemorrhage. Most patients needed ICU care (40%) and stayed an average of 7 to 8 days in the hospital, indicative of the complexity of management and recovery process

Demographic data

The average age of patients who underwent bilateral internal iliac artery ligation (IIAL) was 28.4±4.1 years, reflecting a predominance of women in their reproductive prime. Among the 30 patients included in the study, 40% were primiparous and 60% multiparous. The mean

gestational age at the time of delivery was 37.2±2.0 weeks, indicating that the majority of the cases occurred in term or near-term pregnancies.

Clinical characteristics

The most common clinical indication for IIAL was morbidly adherent placenta, accounting for 33.3% of the cases, followed by uterine atony (26.7%), broad ligament hematoma (16.7%), rupture uterus (13.3%), and traumatic postpartum hemorrhage (10%). In approximately 30% of cases, patients required additional interventions such as uterine compression sutures or uterine packing before IIAL was attempted, emphasizing the severity of hemorrhage prior to surgical intervention.

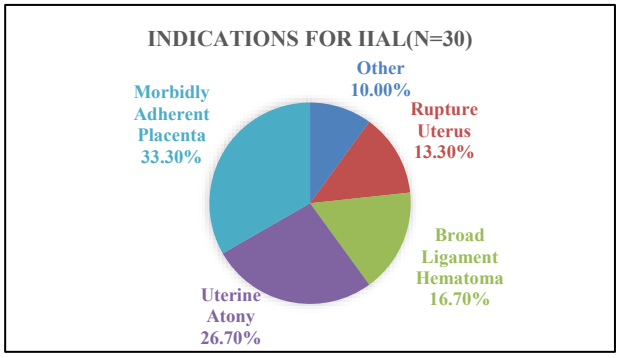

Figure 1: Indications for IIAL (n=30).

Operative findings

The average time taken to perform IIAL was approximately 15-20 minutes, depending on the anatomical clarity and the surgeon's expertise. Importantly, no major intraoperative complications such as ureteric injury or inadvertent vessel damage were reported, owing to careful dissection and adherence to pelvic anatomical landmarks.

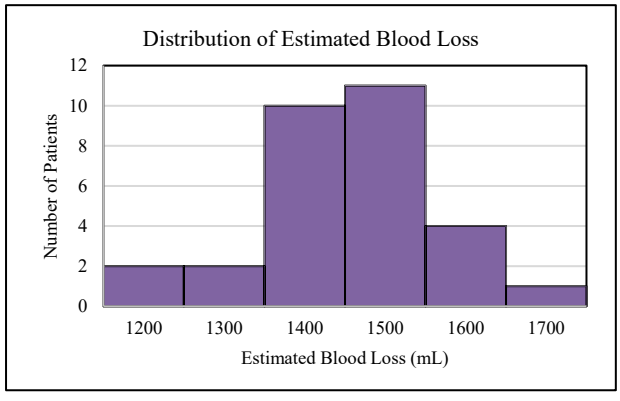

Figure 2: Distribution of estimated blood loss.

Blood transfusion requirements

The mean number of blood units transfused per patient post-ligation was 3.2±1.0. Notably, blood loss was significantly reduced following the procedure, demonstrating the effectiveness of IIAL in hemorrhage control. This aligns with the hemodynamic principle of converting high-pressure arterial flow into a low-pressure venous system by arterial ligation.

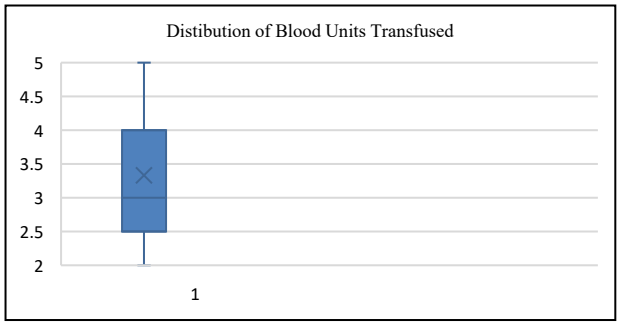

Figure 3: Distribution of blood units transfused.

Maternal outcomes

Among the 30 patients, 22 (73.3%) had successful uterine preservation, while 8 (26.7%) required subsequent hysterectomy due to persistent bleeding or irreversible uterine damage. There was one reported case of maternal mortality (3.3%) related to delayed referral and arrival in irreversible shock. Postoperative morbidity included mild febrile illness in 3 patients and wound infection in 2 cases, both managed conservatively.

Other observations

The mean hospital stay was 7.6±2.1 days, with 12 patients (40%) requiring ICU admission due to hemodynamic instability at presentation. No cases required re-operation for recurrent hemorrhage, highlighting the adequacy of IIAL when performed promptly and correctly. These findings underscore the importance of surgical preparedness and anatomical knowledge in emergency obstetric care.

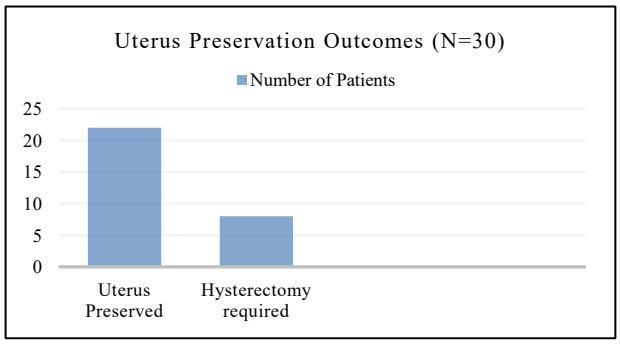

Figure 4: Uterus preservation outcomes.

Overall, the results of this study support the utility of IIAL as an effective, uterus-preserving intervention for managing life-threatening obstetric hemorrhage, especially in settings where advanced alternatives such as interventional radiology are unavailable or delayed.

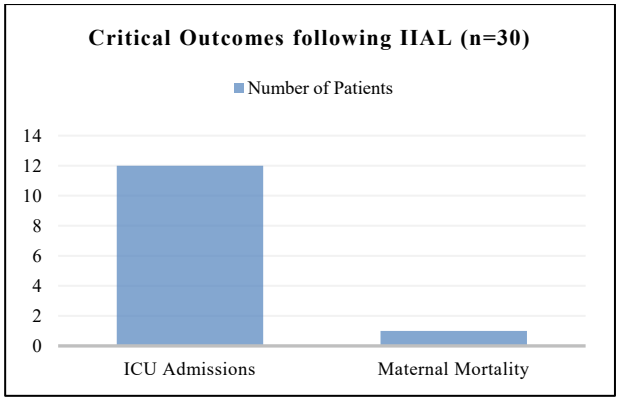

Figure 5: Critical outcomes following IIAL (n=30).

DISCUSSION

Interpretation of key findings

The present study highlights the effectiveness of bilateral internal iliac artery ligation (IIAL) in managing severe obstetric hemorrhage, demonstrating a uterine preservation rate of 73.3% and a significant reduction in blood transfusion requirements. These results are in line with earlier studies by Roth and Glynn, who established the anatomical and physiological foundation of IIAL for controlling pelvic bleeding.[2] Similarly, Madhubala et al showed that IIAL could prevent hysterectomy in cases of placenta previa and other causes of refractory postpartum hemorrhage (PPH), further affirming the procedure's clinical value.[3] In our study, the success of IIAL in preserving fertility adds to its relevance in young women with low parity, where conserving reproductive potential is a key objective. The length of hospital stay in present study was 7.6 days with 40% ICU admission rate compared to Joshi et al showing mean duration of stay was 6.9 days with 32% hospital stay.[7]

Comparison to existing literature

When compared to modern techniques such as balloon occlusion or uterine artery embolization (UAE), which boast success rates of 90-95% in controlling PPH, IIAL remains a viable alternative, particularly in resource-limited settings.[11] While UAE is minimally invasive and highly effective, it demands interventional radiology facilities and personnel, which are not always accessible. Balloon occlusion of the internal iliac or aortic arteries can be effective but is technically demanding and time-sensitive. In contrast, IIAL offers an immediate and definitive surgical option when bleeding must be controlled urgently, as emphasized in the findings of this study.

Importance of timely decision-making

One of the key determinants of IIAL success, as indicated by our results, is the timeliness of intervention. Delayed recognition of hemorrhage or hesitation to proceed with surgical ligation can lead to irreversible hypovolemic shock and organ failure. Prompt decision-making, aided by familiarity with pelvic anatomy and the ligation technique, plays a critical role in optimizing maternal outcomes.

Technical considerations and failures

Despite its advantages, IIAL is not without limitations. In this study, 26.7% of patients eventually required hysterectomy, indicating that the procedure may not always provide complete hemostasis compared to Clark et al 1985.[14] showed 25.1% patients required hysterectomy. Potential reasons for failure include delayed intervention, technical difficulty due to distorted pelvic anatomy, or operator inexperience. Additionally, the time taken to locate and ligate the arteries, especially in unstable patients, can impact outcomes if not executed efficiently.

A major strength of this study lies in its real-world application in a high-risk obstetric center, offering practical insights into the use of IIAL in emergency settings. The prospective design enhances data accuracy and minimizes recall bias. However, the study is limited by its relatively small sample size (n=30) and single-center scope. Furthermore, long-term follow-up data on fertility and menstrual outcomes were not captured, which restricts conclusions regarding the reproductive implications of the procedure.

Future directions

Future research should aim to conduct larger, multicenter trials to compare IIAL with newer techniques such as UAE and balloon occlusion, especially in varying clinical and geographic contexts. In addition, studies with extended follow-up periods are needed to assess the long-term effects of IIAL on fertility, menstrual health, and quality of life. These insights will help guide evidence-based decision-making for obstetricians managing critical PPH cases in both resource-rich and resource-constrained environments.

Clinical implications

Given its potential to prevent hysterectomy and maternal death, IIAL should be more widely adopted, especially in settings lacking access to advanced technologies such as interventional radiology or arterial embolization. Obstetricians must be well-versed in pelvic anatomy and surgical techniques to perform IIAL effectively. Encouraging a lower threshold for initiating IIAL in appropriate clinical scenarios may help reduce maternal morbidity and mortality associated with postpartum hemorrhage.

CONCLUSION

This study reaffirms the critical role of bilateral internal iliac artery ligation (IIAL) as a life-saving and uterus-

preserving surgical intervention in cases of intractable obstetric hemorrhage. With a uterine preservation rate of 73.3% and effective control of blood loss in most patients, IIAL proves to be both clinically efficacious and practically feasible in emergency scenarios. The procedure significantly reduces arterial pulse pressure and facilitates hemostasis, offering a reliable alternative where conservative methods fail or are insufficient.

Recommendations

To improve maternal outcomes, it is essential to emphasize structured training in pelvic surgical anatomy and the technique of internal iliac artery ligation during obstetric and gynecologic surgical education. Furthermore, hospitals and maternity units, particularly in low-resource settings, should establish clear protocols for rapid decision-making in postpartum hemorrhage management. These measures will ensure that IIAL is considered promptly and executed effectively when needed, thereby enhancing both the quality and timeliness of obstetric care.

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Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Kelly H. Ligation of both internal iliac arteries for hemorrhage in hysterectomy for carcinoma uteri. Bull Johns Hopkins Hosp. 1984;5:53.
2. Roth E, Glynn R. Internal iliac artery ligation. Obstet Gynecol. 1964;24(1):49-55.
3. Madhubala M, Rani A, Aggarwal R. Bilateral internal iliac artery ligation: a rational choice of surgery in placenta previa- a hospital-based retrospective study. J Obstet Gynecol India. 2019;69(6):535-40.
4. B-Lynch C, Coker A, Lawal AH, Abu J, Cowen MJ. The B-Lynch surgical technique for the control of massive postpartum hemorrhage: an alternative to hysterectomy? BJOG. 1997;104(3):372-5.
5. Doumouchtsis SK, Papageorghiou AT, Arulkumaran S. Systematic review of conservative management of postpartum hemorrhage: what to do when medical treatment fails. Obstet Gynecol Survey. 2007;62(8):540-7.
6. Sathe NA, Likis FE, Young JL, Morgans A K, Hartmann KE. (2016). Procedures and uterine-sparing surgeries for managing postpartum hemorrhage: a systematic review. Obstet Gynecol. 2016;128(4):823-35.
7. Joshi VM, Otiv SR, Majumder R, Nikam YA, Shrivastava M. Internal iliac artery ligation for arresting postpartum haemorrhage. BJOG. 2007;114(3):356-61.
8. O'Leary JA. Uterine artery ligation in the control of postpartum hemorrhage. J Reprod Med. 1995;40(3):189-93.
9. Dildy GA. Postpartum hemorrhage: new management options. Clin Obstet Gynecol. 2002;45(2):330-44.
10. Bhatti AF, Rauf M. Internal iliac artery ligation: a lifesaving procedure in obstetrics. Pak J Med Sci. 2013;29(1):178-82.
11. Salim R, Tulandi T. Uterine artery embolization for postpartum hemorrhage: indications and limitations. J Obstet Gynaecol Canada. 2017;39(6):496-500.
12. Kim TH, Lee HH, Kim JM. (2011). Pelvic arterial embolization for intractable postpartum hemorrhage: outcome in 251 cases. Obstet Gynecol. 2011;118(6):1368-75.
13. Bodner LJ, Nosher JL, Gribbin C, Siegel RL, Beale S. (2006). Balloon occlusion and embolization for placenta accreta: technical factors and outcomes. Obstet Gynecol. 2006;108(3 Pt 2):873-8.
14. Clark SL, Phelan JP. Strategies for management of obstetric hemorrhage. Clin Obstet Gynecol. 1985;28(1)135-48.
15. Clark SL, Yeh SY, Phelan JP, Bruce S, Paul RH. Emergency hysterectomy for obstetric hemorrhage. Obstet Gynecol. 1985;66(3):353-6.
16. World Health Organization (WHO). WHO recommendations for the prevention and treatment of postpartum haemorrhage. Geneva: WHO Press; 2012.
17. Royal College of Obstetricians and Gynaecologists (RCOG). Postpartum haemorrhage, prevention and management (Green-top Guideline No. 52). 2016.
18. American College of Obstetricians and Gynecologists (ACOG). Practice Bulletin No. 183: Postpartum hemorrhage. Obstet Gynecol. 2017;130(4):e168-86.
19. Awan N, Bennett MJ, Walters WAW. Internal iliac artery ligation for obstetric hemorrhage. Aust N Z J Obstet Gynecol. 2007;47(6):511-5.
20. Anderson JM, Etches D. Prevention and management of postpartum hemorrhage. Ame Fam Phys, 2007;75(6):875-82.

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