



Suggested Protocol of Training Postgraduate Students of Obstetrics–Gynecology in Internal Iliac Artery Ligation

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ABSTRACT

Postpartum hemorrhage (PPH) is a common cause of maternal morbidity and mortality in developing countries. A large number of patients respond to standard medical and surgical treatment, but in some, these procedures fail to stop bleeding. As a last resort, the obstetrician has two options—hysterectomy or ligation of internal iliac arteries. Many patients want to retain uterus. Internal iliac artery ligation (IIAL) becomes the treatment of choice for them. This procedure needs to be taught to postgraduate (PG) students of Obstetrics–Gynecology. We suggest a structured teaching program so that students can learn the skills adequately. It consists of three steps: (1) IIAL on cadavers in anatomy lecture hall. (2) Exposure of internal iliac vessels during elective cesarean or abdominal hysterectomy. (3) Prophylactic IIAL in cases of placenta previa with antenatal diagnosis of placenta accreta. The inclusion of a vascular surgeon in the training faculty is of great help in learning the procedure properly, especially in preventing complications like an injury to an internal iliac vein or tackling the injuries, should these occur.

Keywords: Cadaveric dissection of the internal iliac artery, Internal iliac artery ligation, Postpartum hemorrhage, Structured program for learning the skill of internal iliac ligation.

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BACKGROUND

Postpartum hemorrhage (PPH) is the leading cause of maternal mortality. World Health Organization statistics suggest that 60% of maternal deaths in developing countries are due to PPH, accounting for more than 100,000 maternal deaths per year.¹ A practice bulletin from the American College of Obstetricians and Gynaecologists gives the estimate of 140,000 maternal deaths per year or one woman every 4 minutes.²

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There are various medical and surgical methods used for controlling the PPH. One of the effective surgical procedures is bilateral IIAL. This procedure is being underutilized because of lack of technical skill on the part of the surgeon in an emergency situation. Keeping this in mind, an attempt has been made to formalize a training protocol for 'Internal iliac artery ligation' for the gynecologists and the postgraduate students of Obstetrics and Gynecology.

HISTORICAL BACKGROUND

Sir Howard Kelly in 1883 pioneered the ligation of hypogastric (internal iliac) artery for the treatment of intraoperative bleeding from cervical cancer prior to its application in postpartum hemorrhage.³ In 1993, Allahbadia from Mumbai (India), published a series of patients in whom successful internal iliac ligation for postpartum hemorrhage was done.⁴ Joshi et al.⁵ in a retrospective study, carried from 1993 to 2006 at KEM Hospital Mumbai found uterine salvage rate of 68.8%. Fredrick et al.⁶ reported a success rate of over 90% with IIAL provided it was done quickly after other techniques for control of PPH failed.

PROCEDURE

Internal iliac artery ligation is done as a therapeutic procedure in PPH or as the prophylactic procedure to prevent PPH. It can be done with the placenta in situ or after the placenta is delivered. The uterus is delivered outside. The round ligament and infundibulopelvic ligaments are identified. A 5 cm incision is made between the infundibulo pelvic ligament and round ligament at the medial border of Psoas Major muscle. The retroperitoneal space is opened with gentle blunt dissection by fingers or by sponge on a holder. The ureter is identified and retracted medially to keep it out of harm's way. The internal and external iliac vessels are identified. Once bifurcation is exposed internal iliac artery is identified as it comes off at right angles coursing medially and inferiorly. Scissors, parallel to the artery divide the areolar sheath over the artery. Along blunt (right-angled artery forceps) is passed from lateral to medial side behind the internal iliac artery at a point about 3 to 5 cms distal to its origin. This helps in preventing injury to the internal

iliac vein. The artery is temporarily clamped, and femoral artery pulse checked to make sure that the external iliac artery is patent. After that internal iliac artery is ligated with silk in continuity. This procedure is carried out on both sides. This procedure is carried out on both sides. Haemodynamic studies by Burchell et al.⁷ shows that IIAL reduces pulse pressure by 85% in the arteries distal to ligation, resulting in venous pressures in the arterial circuit thus promoting haemostasis.

Success Rate in Controlling PPH

Joshi et al.⁵ conducted a retrospective study on 110 women undergoing Internal iliac artery ligation, prophylactically in 22 and therapeutically in 88. In the 22 patients who underwent prophylactic IIAL, uterine salvage rate was 100%. In the remaining 88 women who underwent therapeutic IIAL for PPH, uterine salvage rate was 68.8%.

Preserving Future Fertility

Internal iliac artery ligation does not affect fertility even when it is combined with other uterus sparing techniques like the Bakri balloon and B-lynch suture.⁸ Be it unilateral or bilateral; internal iliac artery ligation does not interfere with future fecundity. Nizard et al. (2003) did a retrospective study on 17 women who had bilateral internal iliac artery ligation. Out of a total of 21 post-IIIA pregnancies, 13 were normal, three were miscarried, Three were terminated, and two were ectopic pregnancies. Internal iliac artery ligation is a uterus saving procedure and conserves future reproductive function.⁹

COMPLICATIONS

Internal iliac artery ligation is a safe procedure if done properly. However, a few complications can occur and have been reported:

Intraoperative Complications

Failure to control hemorrhage. Camuzcuoglu et al.¹⁰ performed Internal iliac artery ligation as the primary surgical intervention for atonic PPH in 24 patients. Control of bleeding was achieved in 18 women (75%). In 6 women (25%) bleeding persisted and had to be subjected to hysterectomy.

Injury to ureter can occur if ureter is not identified correctly and kept out of harm's way.

Injury to internal iliac vein. While passing artery forceps underneath the internal iliac artery, the internal iliac vein can get injured. Joshi et al.⁵ reported internal iliac vein injury in one patient out of 22 who underwent prophylactic IIAL during cesarean section. The vein was successfully repaired with no morbidity.

Ligation of wrong structure like an external iliac artery, external iliac vein, ureter.

Laceration of internal Iliac Artery: García de la Torre et al.¹¹ reported laceration of an internal iliac artery in one patient out of 13, in whom IIAL was done. There were no adverse consequences. Bilateral internal iliac artery ligation is only rarely associated with complications, which can result from damage to ureter, iliac veins and accidental ligation of the external iliac artery.¹²

Delayed Complications

Bladder atony, necrosis of bladder neck/bladder mucosa have been reported occasionally. Buttock and thigh claudication and necrosis of gluteal muscles. Gautham Chitragari et al.¹³ reported ischemic complication rate of 22.6%, with buttock claudication in 12.2% and buttock necrosis in 4.8%.

SUGGESTED 3-STEP PROTOCOL FOR TEACHING IIAL SKILLS

First Step: Pelvic Dissection Workshops

Took the students to anatomy dissection hall. Teach them to dissect internal iliac artery in a cadaver. Let them study the pelvic anatomy in detail. They should learn to hook the internal iliac arteries on an artery forceps without injuring the internal iliac vein.

Second Step: Routine Exposure of Internal Iliac Artery During Surgery

Dissection and exposure of internal iliac artery on one side during certain cases of C-section or abdominal hysterectomy will help the students get oriented to the retroperitoneal pelvic anatomy in live patients. Prior consent of the patient must be taken. Legation is not done.

Third Step: Prophylactic IIAL in Cases of Placenta Previa and Placenta Accreta

Placenta previa and placenta accreta are prone to PPH. These patients offer the opportunity to junior faculty members and PG students to do prophylactic elective IIAL in the presence of a senior skilled gynecologist or a vascular surgeon.

Inclusion of Vascular/Cardiovascular Thoracic Surgeon in teaching program

Many junior gynecologists are not confident in doing bilateral IIAL in emergency situations. Presence of a vascular or cardiovascular thoracic surgeon is of great help. They can teach and train the gynecologists and

PG students and help them in learning the skills of IIAL correctly and safely in prevention and management of complications. Moreover their presence itself can be a great morale booster.

Uterine Artery Embolization v/s Internal Iliac Artery Ligation

Uterine artery embolization is a minimally invasive procedure but it requires the patient to be shifted to a center with specialized imaging facility. It needs an interventional radiologist and costly disposable catheters. These facilities do not exist in most centers. Even in tertiary care health centers, it is more prudent to do internal iliac artery ligation which is a cost-effective, safe and successful procedure in the hands of an experienced surgeon.

Experience at MGM Kalamboli Hospital, Navi Mumbai, India

Being a tertiary care referral center, MGM Hospital Kalamboli, Navi Mumbai, India manages a large number of high-risk pregnancies and gynecologic cases throughout the year. To reduce maternal mortality rate due to PPH, we have implemented internal iliac artery ligation as a prophylactic protocol regimen for the high-risk cases after taking written consent from the patients and relatives. Over a period of 3 years from May 2015 to May 2018 we have carried out this procedure in 20 cases of placenta previa, placenta accreta syndrome, large fibroid with pregnancy and bleeding after hysterectomy. Cardiovascular-thoracic (CVTS) surgeons were requested to be stand-by and/or scrub. Two patients had internal iliac vein injury which was repaired by CVTS surgeon. In two cases IIAL failed to control the bleeding and hysterectomy had to be done. Therefore there was a success rate of 16/20 (80%). As far as training protocol is concerned, cadaveric dissection and exposure of IIA during cold surgery is an ongoing program.

CONCLUSION

Postpartum hemorrhage (PPH) kills thousands of patients worldwide, especially in developing countries like India. There are many medical and surgical methods of controlling PPH. Bilateral IIAL is a safe and effective procedure in treating PPH and can save many lives. Therefore a structured skill development program has been developed to teach this procedure to PG students. This program includes cadaveric dissection, exposure of internal iliac arteries during Caesarean section or

abdominal hysterectomy and finally IIAL in elective cases of placenta previa with accreta. However, the program can be undertaken only in teaching hospitals.

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