

Emergency internal iliac artery ligation (EIIAL): Still a uterus preserving as well as life saving procedure

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ABSTRACT

Objective: To find out the utility of emergency internal iliac artery ligation at tertiary care level in a busy obstetric and gynaecological set up. **Materials and Methods:** 45 cases of emergency internal iliac artery ligation were done in six years duration from January 2008 to January 2014 at Gauhati Medical College & Hospital, Guwahati (GMCH), Fakhruddin Ali Ahmed Medical College & Hospital, Barpeta (FAAMCH) and Silchar Medical College & Hospital, Silchar (SMCH) as life saving procedure along with bilateral ovarian artery ligation or subtotal hysterectomy as and when required. Analysis was done on the basis of complication developed. **Results:** Except 3 cases; of which one died of due to pulmonary oedema, one died of due to septicaemia, and another one died of due to late intervention; all other cases could be successfully treated without any major complication. **Conclusion:** Emergency internal iliac artery ligation still remains an important life saving procedure and each and every obstetrician and gynaecologist should be exposed to the procedure.

Keywords: Internal iliac artery ligation, pelvic haemorrhage, maternal mortality.
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The leading cause of maternal mortality in developing countries is haemorrhage which share almost one third of the portion all causes of maternal death [1]. Sometimes elective gynaecological surgery poses life threatening haemorrhage also. Pelvis is highly vascular specially during pregnancy and post partum. Obstetric haemorrhage management poses real threat to the managing obstetrician. As emergency internal iliac artery ligation is still a life saving procedure, and having experience in this surgery could help an obstetrician and gynaecologist to minimize maternal mortality. The operation was carried out by Sir Howard Kelly in 1893 and during 1968-69 it was

popularized by Mengert and Burchel.

Problems like tissue friability, poor exposure, retraction of vessels may be encountered in bleeding vessels isolation and ligation leading to failure of haemorrhage control during the management of PPH and operative hemorrhages. There, emergency bilateral internal iliac artery ligation may be the procedure of choice [2].

Following ligation of bilateral Internal iliac artery there is a reduction of 85% in pulse pressure and 48% in blood flow in the arteries distal to the ligation [3]. Thereby the arterial pressure approaches the venous pressure and is rendered to be amenable to haemostasis by a simple clot formation.

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The present study is aimed to find out the utility of emergency internal iliac artery ligation to control pelvic haemorrhage at tertiary care level in a busy obstetric and gynaecological setup.

Methodology

A retrospective, hospital based analytical study was carried out in the department of Obstetrics & Gynaecology , GMCH Guwahati; FAAMCH Barpeta, and SMCH, Silchar for a duration of six years from 1st January 2008 to 31st January 2014. A total of 45 nos. of emergency internal iliac artery ligation was performed; 32 nos. at GMCH, 7 nos. at FAAMCH, and 6 nos. at SMCH.

The procedure was done only as a life saving measure to control pelvic haemorrhage. All cases were performed by intra peritoneal route. If the pelvic anatomy is properly understood then ligation of the internal iliac artery is technically simple. On the lateral side of common iliac artery, the peritoneum is vertically opened in such a way that the ureter remains attached to medial fold of peritoneal reflection. The internal iliac artery is traced downwards. The fascia over the artery is dissected away. Internal iliac or hypogastric artery arises at the bifurcation of the common iliac arteries on either side at the level of the lumbosacral intervertebral disc and in front of sacroiliac joints, from where it descends to the upper margin of the greater sciatic foramen for 3-4 cms where it divides into an anterior trunk which continues in line with the parent vessel towards the ischial spine and the posterior trunk which passes backwards towards the foramen. First suture is tied firmly but gently at a level below the origin of posterior branch of internal iliac artery. Second suture is tied below the first to avoid postoperative recanalisation. Transfixation or division of the artery in between the two sutures is neither required nor desirable.

Associated operations like subtotal hysterectomy, ligation of bilateral ovarian vessels were done when indicated. For this study, data has been collected from records of IIAL operations performed and were analyzed in terms of death and associated major and minor complications.

Result and Observation

Indications for emergency bilateral internal iliac artery ligation are shown in Table 1. Most of the cases were of obstetrical origin, mainly rupture uterus with board ligament haematoma referred from outside. Six cases of atonic PPH and five cases of traumatic PPH were included in this study where the procedure was done. Two cases of atonic PPH were due to low lying placenta and another two cases were due to manual removal of placenta. One case of traumatic PPH was found following forcep application with a posterolateral tear in the lower segment of uterus with board ligament haematoma.

Table 1. Indications for emergency bilateral IIAL.	
Indications	No. of cases (%) (n=45)
A. Obstetrical indications	
Rupture uterus	29 (64.4%)
Atonic PPH	6 (13.3%)
Traumatic PPH	5 (11.11%)
B. Gynaecological Indications	
Post operative haemorrhage in vaginal hysterectomy	2 (4.44%)
Myomectomy for multiple fibroid	1 (2.22%)
Removal of board ligament fibroid	1 (2.22%)
Radical hysterectomy	1 (2.22%)

This procedure had to be performed in five nos. of elective gynaecological cases. One case was due to uncontrolled haemorrhage following removal of large board ligament fibroid and another two cases of vaginal hysterectomy had to be reopened due to post operative intraperitoneal haemorrhage. Another case of myomectomy for multiple fibroid and prophylactic ligation in radical hysterectomy were also included in this study.

Types of haemorrhage and its primary causes are analyzed in Table no 2. Most of cases of ruptured uterus were found referred from outside and presented with haemorrhagic shock due to intra abdominal and vaginal bleeding. Around

Table 2. Types of haemorrhage and its primary causes.

Types of haemorrhage	Primary causes	No of cases (%)
Both abdominal and vaginal	Ruptured uterus	11 (24.44%)
	Traumatic PPH	3 (6.66%)
Abdominal	Ruptured uterus	18 (40.00%)
	Post operative case of vaginal hysterectomy.	2 (4.44%)
	Myomectomy for multiple fibroid	1 (2.22%)
Vaginal	Atonic PPH.	6 (13.33%)
	Traumatic PPH.	2 (4.44%)
Intra abdominal with board ligament haematoma.	Ruptured uterus	14 (31.11%)
	Traumatic PPH.	2 (4.44%)
	Post operative case of vaginal hysterectomy.	2 (4.44%)
Intra abdominal without board ligament haematoma.	Ruptured uterus	15 (33.33%)
	Traumatic PPH	1 (2.22%)
	Myomectomy for multiple fibroid	1 (2.22%)

50% cases of ruptured uterus and traumatic PPH were found with board ligament haematoma.

As the procedure was performed as a life saving procedure, associated operative procedure like subtotal hysterectomy, bilateral ligation of ovarian vessels were done as required. Subtotal hysterectomy had to be done in twenty one cases with ruptured uterus, in one case of atonic PPH and two cases of traumatic PPH. In some cases where uterus had preserved, bilateral ligation of ovarian vessels was done.

Most of the cases were found as referred from outside except the cases of gynaecological indications where IIAL procedure had to be performed. 96.55% of rupture uterus cases were referred from outside in a very compromised situation where internal iliac arteries ligation had to be performed even after subtotal hysteric-tomy or repair of injury to the uterus as the bleeding

Table 3. Associated operative procedures performed with emergency bilateral IIAL.

Types of operation	Primary causes	No of cases (%)
Subtotal hysterectomy	Ruptured uterus	21 (46.66%)
	Atonic PPH	1 (2.22%)
	Traumatic PPH	2 (4.44%)
Bilateral ligation of ovarian vessels.	Ruptured uterus	8 (17.77%)
	Atonic PPH	5 (11.11%)
	Traumatic PPH	3 (6.66%)
	Myomectomy	1 (2.22%)

vessels had retracted within the board ligament haema-toma.

In 41.5% of cases, uterus could be preserved along with haemorrhage control. We were able to preserve the uterus in 8 cases of ruptured uterus (27.58%), 5 cases of atonic PPH (83.33%), 3 cases of traumatic PPH (60%) and one case of myomectomy done for multiple uterine fibroid (100%). Due to extensive laceration of lower segment, in remaining cases of

ruptured uterus subtotal hysterectomy had to be performed.

In this present study, we are able to control haemorrhage in all the cases. In most of the patients post operative period was uneventful. One patient died due to pulmonary oedema and another one died due to septicaemia. Though one patient developed DIC at post operative period, we were able to save her by transfusion of blood and FFP. Another patient of ruptured uterus died at OT table due to haemorrhagic shock as the intervention was late.

All other patients were discharged satisfactorily from the hospital. Six patients did not come for check up and could not be followed up. All other patients were on follow-up after an interval of one month and all are found doing well without any major or minor complications. Amongst those patients who had attended hospital for regular follow up, two patients were found to be pregnant after an interval of two years.

Discussion

Emergency bilateral internal iliac artery ligation is an effective life saving measure to control obstetric and gynaecological haemorrhage and in some cases hysterectomy can also be avoided. Unfortunately, the procedure is not popularly performed due to

Table 4: Distribution of cases according to place of onset.

Primary causes	Referred from outside	Hospital (tertiary centre) onset	Total cases
	No. of cases (%)	No. of cases (%)	
Ruptured uterus	28 (96.55%)	1 (3.44%)	29
Atonic PPH	3 (50.00%)	3 (50.00%)	6
Traumatic PPH	3 (60.00%)	2 (40.00%)	5
Post operative case of vaginal hysterectomy	0 (00.00%)	2 (100%)	2
Myomectomy	0 (00.00%)	1 (100%)	1
Radical hysterectomy	0 (00.00%)	1 (100%)	1

lack of confidence in doing the procedure and fear of complications.

We had a large series of 45 cases in 6 years mostly ruptured uterus with a few number of cases of atonic and traumatic PPH. Few cases with gynaecological indication had been performed and included in our study. Out of 45 cases of bilateral internal iliac artery ligation, all

Table 5: Analysis of preservation of uterus in relation to primary causes.

Primary causes	Total cases	Number of cases	% of cases
Ruptured uterus	29	8	27.58%
Atonic PPH	6	5	83.33%
Traumatic PPH	5	3	60.00%
Myomectomy	1	1	100%

Table 6: Analysis of complications.

Complications	No. of cases (%)
Death	03 (6.66%)
Pulmonary oedema	01 (2.22%)
ARF	00 (0.00%)
Irreversible haemorrhagic shock	01 (2.22%)
Septicaemia	01 (2.22%)
Thrombo embolism	00 (0.00%)

other cases could be successfully treated without any major complication except 3 cases; of which one died of due to pulmonary oedema, one died of due to septicemia, and another one died of due to late intervention. So, it is important to emp-

Table 7: Comparison of Complication Rates of Internal Iliac Artery Ligation [7]

	Total	Obstetrics indications	Gynaecological indications	Complication rate (%)
Dalvi et al	16	12	4	4.2
Chattopadhyay SK	29	29	-	15.7
Nandanavar YS et al	46	46	-	8.69
KalBurgi EB et al	18	13	5	Nil
Present study	45	40	5	Nil

hasize that treatment of severe haemorrhage requires not only the technical ability to carry out an appropriate surgical procedure but the ability to make a timely decision

that this operation is necessary. In our study, the success rate of this procedure is 93.33%. Sir Howard Kelly performed with a success rate of 95% without any major complications [4]. Mukherjee et al performed 36 cases of internal iliac artery ligation with a success rate of 83.3% in 6 years [5].

After successful control of haemorrhage with bilateral internal iliac artery ligation (BIAL) no women had delayed haemorrhage requiring re-laparotomy. BIAL is only rarely associated with complications which can result from damage to uterine, iliac veins and accidental ligation of the external iliac artery. These complications can be avoided by appreciation of important surgical anatomy and meticulous dissection as fortunately we did not have any such complications. One study suggests that measuring a point approximately 4-4.5 cm from the sacral promontory or common iliac bifurcation and 3.5 cm away from the pelvic midline the accidental ligation of posterior division can be avoided [6]. In the present study there were no major complications noted as compared to some of the previous studies as mention in table 6.

Nowadays internal iliac artery ligation is not required for atonic PPH as other simple and effective methods like stepwise devascularization of uterus, compression sutures of uterus and

embolization of uterine arteries were found very effective [8]. Angiographically directed arterial embolization has also been reported to be very effective in controlling hemorrhage but this modern facility is not available in most of the institution of our country. Again, this embolization procedure can not be done in hemodynamically unstable patient.

In our study, we are able to control haemorrhage effectively. In half of patients, uterus could be preserved and few cases also reported pregnancy within two years. Wagaarachchi and Fernando et al observed future pregnancy rate of 50% of the cases of bilateral emergency internal iliac artery ligation [9].

Conclusion

Emergency internal iliac artery ligation is a safe, rapid and effective way to control pelvic haemorrhage in a busy obstetric and gynaecological set up at tertiary care level. Although, it may not always be effective in control of pelvic haemorrhage, it is more conservative procedure than obstetric hysterectomy in young women with intractable pelvic haemorrhage, involving lesser morbidity and giving chance of future fertility. So, every obstetrician and gynaecologist should be exposed to the procedure.

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