ORIGINAL ARTICLE CODEN: AAJMBG

Role of hypogastric artery ligation in pelvic haemorrhage - is still alive

Debasmita Mandal*, Sarbeswar Mandal, Tapan Kumar Maity, Sumit Parmanik, and Subhash Chandra Biswas

Department of Obstetrics & Gynecology, IPGME & R, SSKM Hospital, 244 AJC Bose Road, Kolkata-700020, West Bengal, India

Abstract: *Objectives:* Management of profuse pelvic hemorrhage remains a major challenge in obstetrics as well as gynecology. Bilateral internal iliac artery ligation(BIL) has been tried in this condition with varying success. The purpose was to review efficacy of the procedure in women with intractable pelvic hemorrhage. *Material and methods:*This observational analysis included all cases of internal illiac artery ligation done for pelvic hemorrhage between 2007 May to 2010 May in the department of Obstetrics and Gynecology, I.P.G.M.E&R, Kolkata. *Result:* We analyzed a total of 20 cases of BIL. The indications included atonic PPH (30.0%), traumatic PPH (10.0%), DUB (10.0%), post operative hemorrhage (15.0%) and prophylactic major (25.0%). Other surgical methods applied before BIL were compression sutures and stepwise devascularisation. Hemostasis was achieved successfully in 73.33% cases done for therapeutic purpose. One mortality was present in a case of advanced staged carcinoma cervix due to uremia. No complication observed related to BIL. *Conclusion:* Atonic PPH was better controlled by BIL. Other surgical methods were observed to have poor efficacy in combating pelvic hemorrhage. BIL was an effective way of controlling all postoperative gynecological hemorrhage cases. Though scope of BIL is reduced due to newer modalities to control hemorrhage, still it is choice of option in low resource countries.

Keywords: Bilateral internal iliac artery ligation, Hemorrhage, Efficacy, Atonic PPH.

Introduction

Massive pelvic hemorrhage is a potential complication while undergoing obstetric and gynecological surgery. Intraoperative, postoperative or postpartum hemorrhageoccur mainly as a result of unexpected vascular injury and inability to tackle excessive bleeding during surgical procedure. So knowledge of the anatomic distribution of blood supply to the pelvis as well as implementing the appropriate preventive measures at the occurrence of pelvic hemorrhage can significantly minimize life threatening morbidities. One of the effective methods of controlling sever pelvic hemorrhage is ligation of both hypogastric or internal iliac arteries ligation (IIAL) as these are the major arterial blood supply to pelvic viscera. In gynecological practice it was first used for control intractable hemorrhage secondary to carcinoma cervix in 1888 [1]. The first IIAL reported in United States was performed by Howard and Kelly in 1894 [2]. Bilateral internal iliac arteries ligation minimizes pulse pressure of the arterial system, converting into a venous like system and this reduces bleeding appreciably by facilitating clot formation distal to the site of ligation [3]. Bilateral internal iliac artery ligation (BIL) has been used in life threatening hemorrhagic conditions like placenta previa, postpartum hemorrhage, cervical and vaginal tear, cervical pregnancy, broad ligament haematoma and uterine rupture etc [4]. Apart from controlling hemorrhage IIAL conserves fertility, one of the important indications of the operation. Other advantages of this operative procedure include, it requires less operative time in experienced hands and is associated with less postoperative morbidity than the other alternative option i.e hysterectomy.

The purpose of this observational study is to review efficacy of BIL in women with intractable hemorrhage for gynecological and obstetrical indications.

Material and Methods

We analyzed a total of 20 cases of hypogastric artery ligation. All cases were done for controlling pelvic hemorrhage between 2007 May to 2010 May in the department of Obstetrics and Gynecology of IPGME&R, Kolkata. Indications for BIL included both prophylactic and therapeutic measures. Ligation of both internal iliac arteries were done 5 cm distal from the common illiac bifurcation (mainly on anterior divison) [5]. Therapeutic pupose was for atonic PPH, traumatic PPH and postoperative gynecological cases etc. Prophylactic procedure was done in anticipation of sever pelvic hemorrhage in intraoperative cases . Before going for BIL obstetric cases had been tried with various medical as well as surgical methods like, oxytocin, prostaglandins, ergot alkaloids, compression sutures, uterine and ovarian artery ligation to control bleeding. All patients were resuscitated with blood transfusions. For BIL both transabdominal and retroperitoneal approaches were adopted. In transabdominal route the posterolateral peritoneum the ureter was dissected vigilantly. Keeping ureter medially common iliac artery bifurcation point was recognized. Then after identifying external iliac artery right angle forceps was insinuated deep to fascia below the internal iliac artery and subsequently it was ligated 5 cm distal to the bifurcation point. The procedure was repeated on the other side. Suture used was Merselene Silk to avoid recanalization. In retroperitoneal approach a small incision parallel to inguinal ligament commencing medial to the anterior superior iliac spine was made. The BIL was done by the above mentioned method. Associated operations were i.e B lynch stitches, step wise devscularisation- uerine and utero-ovarian artery ligation, emergency hysterectomy/ reopening with proceeds. Post operative hemorrhagic cases required blood transfusion from 2 to 8 units. The cases were analyzed in terms of failure rate, associated complications and death.

Results

Table-1 showed a total of nine cases (9/20 = 45.0%) with obstetrical indications for BIL. Six cases (6/9= 66.66%) had atonic uterus. Two (2/9=22.22%) indications were for traumatic post partum haemorrhage due to various causes i.e. lateral exetension of lower uterine segment cesarean scar and an uterine rupture following misoprostol induction. Successful management with BIL were done in four cases of atonic uterus, and two failed cases led to hysterectomy as life saving procedure. Before attempting for BIL, we went for medical management as well as step wise devascularization like, uterine artery ligation and ovarian artery ligation in postpartum haemorrhage cases.

Table-1: Obstetric Indications For BIL

Pt No	Age Yrs	Parity	Route of delivery	Causative factors	Blood transfusion required	Time before BIAL	Associated operations
1	32	P2L2	LUCS	Lateral extension of LUCS scar	4 units	2hours	Subtotal Hysterectomy
2	24	P2L2	LUCS	Atonic Uterus	5 units	3 hours	Uterine &Ovarian vessel ligation
3	25	P1L1	NVD	Retained products	2 units	72 hour	dilation &curettage
4	30	P2L1	LUCS	Atonic Uterus	4 units	1 hour	Brace suture with uterine artery ligation
5	22	P3L2	NVD	Ruptured uterus with misoprostol induction for IUFD	5 units	1 hour	Repair of the rent of the uterus
6	26	P1L1	LUCS	Atonic Uterus	4 units	2 hour	Ovarian &uterine vessel ligation
7	30	P2L2	NVD	Atonic uterus	2 units	1 hour	Blynch compression stich
8	25	P1L1	LUCS	Atonic uterus	3 units	1 hour	Blynch stich
9	27	P3L3	LUCS	Adherent placenta with atonic uterus	3 units	2 hour	Uterine and ovarian artery ligation, total hysterectomy

Table-2 depicted gynecological indications for BIL in a total of 11 cases (73.33%). Six cases were done as therapeutic measure in postoperative period and other five were done with prophylactic indications anticipating sever pelvic haemorrhage. Prophylactically BIL was done mostly in the intraoperative cases, who were having myomas with grade IV endometriosis and cases undergoing Wertheim hysterectomy. One of the atypical case in which BIL had proven its' efficacy, that was a young patient aged 20 years with intractable bleeding per vagina due to dysfunctional uterine bleeding not responding to any medical therapy. In another case with advanced staged carcinoma cervix, BIL was done via retroperitoneal route to control bleeding caused during cervical biopsy.

Table-2: Gynecological Indications For BIL

Pt No	Age in years	Parity	Diagnosis	Time before BIAL	Blood transfusion required	Associated Operation
Therapeutic Indications						
1	41	P2L2	DUB	4 hours	4 units	TAH & BSO
2	37	P3L3	B/L ovarian tumor	3hours	5 units	TAH &BSO
3	48	P3L3	Prolapse Uterus	6 hours	4units	VH &PFR
4	20	P1L1	DUB	4hours	5units	LUCS 7 months back
5	35	P2L2	DUB	24hours	6units	D&C , Uterine distention with thermal balloon, TAH
6	57	P5L5	CA Cervix stage II B	1hour	4units	Cervical Biopsy
Prophylactic Indications						
1	42	P1L1	Gr IV endometriosis	TAH& BSO	---	---
2	40	P2L2	Gr IV endometriosis & Fibroid	TAH&BSO	---	---
3	35	Nulliparous	Myoma & Gr IV endometriosis	Myomectomy & adhesinolysis	---	3 units
4	60	P2L2	Ca Cervix stage IIa	Wertheim's hysterectomy	---	2 units
5	52	P5L5	Ca Cervix stage IIa	Wertheim's hysterectomy	---	---

Table-3: Efficacy Of Bil In Different Indications

Indications	No. Successful N=15	No. Unsuccessful N=15	Total N=15
Atonic PPH	4 (26.66%)	2(13.33%)	6(40.0%)
Truamatic PPH	1(6.66%)	1(6.66%)	2(13.33%)
Intractable bleeding per vagina due to retained products	1(6.66%)	0	1(6.66%)
Intractable bleeding in DUB cases	1(6.66%)	1(6.66%)	2(13.33%)
Postoperative hemorrhagic shock	3(20.0%)	0	3(20.0%)
Bleeding post cervical biopsy	1(6.66%)	0	1(6.66%)
*Prophylactic indications were excluded in this table			

Table-3 showed the efficacy of BIL in various indications. It was successful in 11(73.33%) cases out of 15 after excluding prophylactic indications. In our study no patients had postoperative complications related to BIL.

Discussion

Bilateral internal iliac arteries ligation is a highly effective method of stemming pelvic hemorrhage. Previously in sever PPH or in any other surgical procedure leading to postoperative bleeding, the traditional surgical treatment is to perform an emergency hysterectomy and eliminating possibility of future fertility. But IIAL is an alternative life saving operation which preserves the reproductive capacity. Nizard J et al states that BIL for postpartum hemorrhage is not responsible for secondary infertility, utrine contractility disorders, placental perfusion insufficiency, fetal anomalies or IUGR. They reported 21 pregnancies, 13 term deliveries and one ectopic pregnancy after performing BIL in 68 patients with intractable postpartum hemorrhage [6]. Wagaarachchi PT et al studied 12 women who had undergone BIL for PPH and described that it was a safe and effective procedure for life threatening obstetric hemorrhage with preservation of future fertility [7]. Yildirim Y et al compared doppler blood flow characterstics of uterine, arcuate and ovarian arteries of women who underwent BIL with those of controls and concluded pelvic circulation did not compromise after BIL [8].

This is possible due to maintenance of blood supply by three specific collateral arteries after BIL: lumber-iliolumbar, middle sacral-lateral sacral, superior haemorrhoidal- middle haemorrhoidal [5]. For this phenomena ischemia and tissue necrosis is also prevented. However complications of this technique with proximal ligation of the internal iliac arteries i.e. buttock claudicaton, impotence, bladder and bowel necrosis etc had been reported in an artherosclerotic patient [6]. BIL is mainly indicated in PPH due to uterine atony rather than due to obstetric trauma [7]. In our study nine patients underwent BIL for obstetric hemorrhage. These included six atonic and two traumatic PPH. We found the similar observation showing good response of atonic PPH to BIL. We observed BIL was associated with less postoperative morbidity in comparison to emergency hysterictomy and required less operating time for those experienced with the technique. In pregnancy tissue planes are easier to dissect and larger structures make easy approach towards the anatomy of internal iliac arteries. Mostly in all postoperative hemorrhages , one case of intractable vaginal bleeding for DUB and a case of advanced staged carcinoma of cervix , BIL was performed as a therapeutic option for combating sever pelvic hemorrhage. Young women with DUB not responding to any medication and where no other newer therapeutic modalities like uterine emboli, other minimal invasive techniques are not available; BIL is a good option of treatment. Major advantage in gynecological indications is, BIL can be used as prophylactic procedures where we anticipate sever pelvic hemorrhage. In our study five cases underwent BIL as prophylactic measure for controlling bleeding. Prophylactic ligation to reduce blood loss has been used in radical procedures like Wertheim hysterectomy, radical vulvectomy and abdo-minoperineal resection of carcinoma of the rectum [9]. We performed BIL by retroperi-toneal approach for sever vaginal bleeding in the above mentioned case of advanced staged carcinoma cervix and found this to be less invasive method and a good option for morbid patients when done in skilled hand.

Today pelvic arterial embolization is the alternative available life saving procedure to BIL and hysterectomy [10]. Collins C.D et al reported a case of successful arterial embolization following hysterectomy and BIL and concluded that embolization could still be successful even when performed after surgery [11].

Conclusion

Stepwise devascularisation and other surgical procedures applied during obstetric hemorrhage were observed to require ultimately BIL for controlling hemorrhage. Atonic PPH had responded well to this method of controlling hemorrhage. BIL is an effective way of controlling pelvic hemorrhage especially following gynecological surgeries if executed properly, timely and successfully. Nowadays obstetrical indications are becoming less due to use

of newer modalities to control atonic postpar-tum hemorrhage, in this scenario scope of BIL in obstetric practice is much reduced than previous days. Still in low resource country where these modalities are either unavailable or unaffordable by patients, BIL is a better option for controlling pelvic hemorrhage.

References

1. Tajes RV. Ligation of the hypogatric arteries and its complications in resection of the cancer of the rectum. *Am J.Gastroenterol,* 1956;26: 612-616.
2. Kelly H. Ligation of both internal iliac arteries for hemorrhage in hysterectomy for carcinoma of uteri. *Bull John Hopkins,* 1894;5:53.
3. Burchell RC. Physiology of internal iliac artery ligation. *J Obstet Gynaecol Br commonwealth.* 1968; 75:642-51.
4. Bleich AT, Rahn DD, Wieslander CK , et al. Posterior divison of internal iliac artery: anatomic variations and clinical applications. *AJOG,* 2007; 197(6): 658.e1-658.e5.
5. Sheikh MAAE, Fadul BHE. Bilateral internal iliac artery ligation in obstetric hemorrhage. *Yemen Medical Journal*, 2000; 3(2):106-114.
6. Nijard J, Barrinque L, Frydman R, et al. Fertility and pregnancy outcomes following hypogastric artery ligation for sever post-partum haemorrhage. *Human Reproduction*; 2003; 18(4):844-848.
7. Wagaarachchi PT, Fernando L. Fertility following ligation of internal iliac arteries for life threatening obstetric haemorrhage: Case report. *Human Reproduction* 2000; 15(6)1311-1313.
8. Yildirim Y, Gultekin E, Kocyigit A, et al. Color doppler análysis of pelvic arteries following bilateral internal iliac artery ligation for sever postpartum hemorrhage. *International Journal of Gynecology and Obstetrics*, 2009; 104(1): 22-24.
9. Paraskevaides E, Noelke L, Afrisibi M. Internal iliac ligation (IIAL) in obstetrics and gynecology. *Eur J. Obstet Report Biol*, 1993; 52:71-75.
10. Pelage JP, Dref O, Mateo J, et al. Life threatening primary postpartum hemorrhage: treatment with emergency arterial embolisation. *Radiology,* 1998; 208:359-362.
11. Collins CD, Jackson JE. Pelvic arterial embolization following hysterectomy and bilateral internal iliac artery ligation for intractable primary postpartum haemorrhage. *Clinical Radiology.* 1995; 50(10):710-714.

*All correspondences to: Dr. Debasmita Mandal, QTR. NO.C/11, SSKM Hospital Campus, 242, AJC Bose Road, Kolkata-700020 West Bengal, India. E-Mail: drdebasmitamondal@yahoo.com