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Original Research Article

Role of hypogastric artery ligation in obstetrics and gynaecology: a 20-year study at tertiary care center, Ahmedabad, western India

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ABSTRACT

Background: Hypogastric artery ligation (HAL) was first introduced by the end of the 19th century to control intractable haemorrhage from the uterus of women with advanced cervical cancer. Bilateral HAL is a lifesaving procedure in massive pelvic haemorrhage.
Methods: This is a retrospective study of 58 cases in which HAL was performed in the obstetrics and gynecology department at tertiary care center from January 2000 to December 2020. History, operative procedure findings, immediate and late postoperative complications, morbidity and mortality data were collected and reviewed from records.
Results: In this study, total of 58 women who underwent HAL s; 53 bilateral and 5 unilateral. Fifty-three women required HAL for obstetric indications, in 5 cases it was required for gynaecological indications. 20 cases (34.5%) underwent bilateral HAL for atonic PPH, 16 cases (27.6%) during obstetric hysterectomy for morbidly adherent placenta, 5 (8.6%) for colporrhexis, 2 (3.4%) for broad ligament hematoma, 1 (1.7%) for colporrhexis and left sided broad ligament hematoma, 2 cases (3.4%) for secondary PPH and 7 cases (12.1%) for the ruptured uterus. In gynecological cases 4 cases (80%) underwent after vaginal hysterectomy to control pelvic haemorrhage and 1 case (20%) underwent HAL after myomectomy.
Conclusions: HAL is an important surgical procedure and should be performed to reduce blood loss when conservation of the uterus is desired. It is also useful in controlling haemorrhage after major gynaecological surgeries and secondary hemorrhage following hysterectomy.

Keywords: HAL, PPH, Morbidly Adherent placenta

INTRODUCTION

Hypogastric artery ligation (HAL) was first introduced by the end of the 19th century to control intractable haemorrhage from the uterus of women with advanced cervical cancer.[1] Bilateral HAL is a lifesaving procedure in massive pelvic haemorrhage.[2] In obstetrics, massive bleeding due to atonic or traumatic postpartum haemorrhage, adherent placenta, colporrhexis and rupture uterus are the main indications for internal iliac artery ligation.[3] The main indications of the procedure in gynaecology include carcinoma of the cervix, inoperable cases of endometrial carcinoma with uncontrolled haemorrhage and in case of secondary hemorrhage after hysterectomy. Prophylactic bilateral HAL or uterine artery ligation at origin helps in decreasing intraoperative blood loss in case of huge cervical fibroid or broad ligament fibroid before proceeding for myomectomy/hysterectomy or in case of cesarean scar pregnancy (CSP).[3] Ligation of the hypogastric (internal iliac) artery can be performed either via an open approach (transperitoneal or extraperitoneal) or via laparoscopic approach. Bilateral HAL minimizes the pulse pressure by 85% and converts arterial system into the venous like system.[4] Unilateral

HAL reduces pulse pressure by 77% on same side of ligation and 14% on opposite side.[5]

The aim of this study is to find out the indications, to review the efficacy of HAL in obstetrics and gynecology and to study the effect of HAL on future fertility.

METHOD

This is a retrospective study of 58 cases in which HAL was performed in the obstetrics and gynecology department at Smt NHL municipal medical college VS hospital and SVP hospital from January 2000 to December 2020. History, operative procedure findings, immediate and late postoperative complications, morbidity and mortality data were collected and reviewed from records. Data were analysed in terms of indications that required HAL, requirement of unilateral or bilateral HAL, efficacy of procedure in controlling the haemorrhage and prevention of obstetric hysterectomy. The postoperative morbidity and mortality data were also analysed. As this is observational study no statistical tools were used.

Inclusion criteria

All cases of PPH and pelvic bleeding which were managed by internal iliac artery ligation included in the study.

Exclusion criteria

Cases of pelvic bleeding which were managed by alternate method were excluded from the study.

RESULTS

Among 58 cases 46 cases (79.31%) belonged to age group of 21-40 years.

Table 1: Age distribution of patients.

Age (Years)	No. of patients (%)
<20	7 (12.06)
20-40	46 (79.31)
>40	5 (8.62)

There were a total of 58 women who underwent HAL s; 53 bilateral and 5 unilateral. The indications are listed in (Table 1). Fifty-three women required HAL for obstetric indications, in 5 cases it was required for gynaecological indications.

Out of 53 cases with obstetric complications, 20 cases (34.5%) underwent bilateral HAL for atonic PPH refractory to medical management and did not respond to bilateral uterine and ovarian arteries ligation. Bilateral HAL resulted in control of bleeding in 18/20 cases (90%), and only 2/20 cases (10%) continued to bleed and required emergency obstetric hysterectomy. Re-laparotomy was not required in any case of HAL. Sixteen cases (27.6%) required HAL during obstetric hysterectomy for morbidly adherent placenta. Five cases (8.6%) required HAL for colporrhexis, 2 (3.4%) for broad ligament hematoma, 1 (1.7%) for colporrhexis and left sided broad ligament hematoma, 2 (3.4%) for secondary PPH and 7 (12.1%) for the ruptured uterus. After internal iliac artery ligation, 9 out of 33 women (27.3%) conceived and delivered successfully.

Table 2: Indications for HAL.[6]

Indications	Present study, (%)	Maheshwari et al[6] (%)
Obstetric		
Atonic PPH	20 (34.5)	12 (34.3)
Morbidly adherent placenta	16 (27.6)	-
Uterine rupture	7 (12.1)	-
Colporrhexis	5 (8.6)	-
Broad ligament hematoma	2 (3.4)	2 (5.7)
Colporrhexis + Broad ligament hematoma	1 (1.7)	-
Secondary PPH	2 (3.4)	1 (2.8)
Vault tear	-	1 (2.8)
Torn uterine arteries	-	4 (11.4)
Scar rupture extending to cervix	-	2 (5.7)
Uterine angle extension till vagina	-	1 (2.8)
Following obstetric hysterectomy (relaparotomy)	-	9 (25.7)
Gynaecological		
Post hysterectomy primary haemorrhage	-	4 (11.4)
Secondary haemorrhage following vaginal hysterectomy	4 (6.9)	-
Myomectomy for huge cervical fibroid	1 (1.7)	-
Total	58	35

Table 3: Complication of HAL.[7]

Complications	Present study (%)	Nandanwar et al[7] (%)
Wound dehiscence	2 (3.4)	-
Febrile morbidity	4 (6.9)	-
Superficial injury to hypogastric vein	1 (1.7)	1 (2.17)
Failure to control haemorrhage	2 (3.4)	1 (2.17)
Ureteric injury	-	1 (2.17)
Death (Obstetric group)	2 (4.1)	1 (2.17)
Death (Gynaecology group)	-	-

Out of 5 cases with gynaecological complications, 4 cases (80%) underwent HAL after vaginal hysterectomy to control pelvic haemorrhage and 1 case (20%) underwent HAL after myomectomy of huge cervical fibroid measuring 17×16×14 cm due to bleeding from the sutured myometrium.

Post-operative complications included wound dehiscence in 2 (3.4%), febrile morbidity in 4 (6.9%), superficial injury to internal iliac vein in 1 (1.7%), failure to control hemorrhage in 2 (3.4%) cases. Two (4.1%) deaths were reported in obstetric group (n=53), one due to postoperative DIC and other due to septicaemia.

DISCUSSION

Bilateral HAL is a highly effective method to control massive pelvic haemorrhage. Previously atonic PPH was the most common indication for HAL but after development of uterine compression sutures, the need for the same is decreasing.[8] During the last 4 years of study period, no cases of atonic PPH required HAL or obstetrical hysterectomy and all cases of atonic PPH refractory to medical management were managed with bilateral uterine artery ligation and uterine compression sutures (CHO suture).[8] Stepwise devascularization of uterus and compression sutures of the uterus are found very much effective.[9] Angiographic directed hypogastric artery embolization has also been reported to be very effective in controlling hemorrhage but this modern facility is not available in most of the centers of our country.[10]

In present study, morbidly adherent placenta is the second most common cause which requires HAL. Blood supply of female genital tract can be divided in two clearly defined areas. One is S1 segment which includes uterine body and other is S2 segment which includes lower uterine segment, cervix and vagina. S1 segment is supplied by respective bilateral uterine and ovarian arteries; S2 segment is supplied by a series of sub peritoneal vessels originating primarily from internal pudendal arteries, secondarily from collaterals of posterior trunk of the internal iliac artery and, to a lesser extent, by the uterine arteries which forms collateral with external iliac and femoral arteries. So, when the placenta is implanted over the S1 segment HAL helps to prevent intraoperative bleeding but in case of S2 segment it is not of much help.[11] For S2 segment involvement, haemostasis can be achieved by temporary aortic balloon occlusion/ clamp application (aortic tamponade)/bilateral common iliac artery balloon occlusion/clamp during conservative surgery for PAS (placenta accreta spectrum) disorders and caesarean hysterectomy.[12]

HAL also helps to control bleeding in cases of uterine rupture involving deep portion of lower segment or lateral uterine wall, by decreasing the blood supply and thus reducing the amount of blood loss and the need for obstetrics hysterectomy thereby preserving the future fertility.

In case of huge cervical and broad ligament fibroid before proceeding for myomectomy/hysterectomy, HAL or uterine artery ligation at origin helps to decrease the bleeding.[13] In cesarean scar pregnancy grade 3 and grade 4 temporary occlusion of hypogastric artery or uterine artery at origin before hysterotomy helps to decrease bleeding.

In the present study 9 out of 33 (27.3%) women conceived after the ligation and successfully delivered which is comparable to the study conducted by Wagaarachchi et al in which 3 out of 10 (30%) women following HAL delivered their baby at term.[14] A study by Fatma et al suggested that bilateral uterine artery ligation does not compromise ovarian blood supply and ovarian reserve and also does not have any impact on future fertility.[15] So when fertility is desirable HAL is the treatment of choice in case of pelvic hemorrhage.

Majority of complications due to HAL in present study were due to febrile morbidity, followed by wound dehiscence in 2 (3.4%), superficial injury to the hypogastric vein and death in 2 cases. Superficial injury to the internal iliac vein occurred in one case which was repaired by a vascular surgeon. Whereas in a study conducted by Nandanwar et al out of 46 cases, superficial injury to internal iliac vein was seen in 1 (2.1%), failure to control hemorrhage in 1 (2.1%), ureteric injury in 1 (2.1%) as well as maternal mortality was noted in the one (2.1%) case.[7]

Mortality rate after HAL is 2/53 (3.7%) in this study which is higher than the study of Bangal et al which is 1/54 (1.8%).[16] One patient (1.8%) died due to postoperative DIC and 1 (1.8%) due to septicaemia. Nowadays pelvic artery embolization is the alternative available lifesaving procedure to HAL and hysterectomy.[17]

Limitations

Number of patients are less, so it is not adequate to determine efficacy of method. Outcomes of the patients managed with HAL were not compared with the results of the alternate method of the controlling pelvic haemorrhage.

CONCLUSION

HAL is an important surgical procedure and should be performed to reduce blood loss when conservation of the uterus is desired. It is also useful in controlling haemorrhage after major gynaecological surgeries and secondary hemorrhage following hysterectomy. The complications occurring are few if the procedure is performed carefully and with proper knowledge of retroperitoneal pelvic anatomy.

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