

Four stitches in atonic postpartum haemorrhage: an experience in rural hospital

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Abstract :

Introduction : Postpartum haemorrhage continues to be leading cause of maternal mortality and morbidity, accounting for more than 125000 deaths per year across the world. Prompt identification of high risk cases and effective action are crucial to prevent postpartum haemorrhage.

Aims and objectives:

To evaluate the efficacy of uterine compression sutures and bilateral uterine artery ligation for the prevention of postpartum haemorrhage during Caesarean section in high risk women.

Material and Methods: This observational study was carried out at New Alma Hospital, Mannarkkad, Kerala, India. The study period was from 1st April 2005 to 31st March 2015. The hospital records of all patients in whom prophylactic uterine compression sutures and bilateral uterine artery ligation were performed during Caesarean section were collected.

Results:

Conclusion: Uterine compression sutures and bilateral uterine artery ligation shows that it is an effective method of preventing postpartum haemorrhage. It should be attempted as early as possible in order to maximize its success. Prophylactic application in patients at high risk for postpartum haemorrhage is valid. It does not require any extra skill and even a resident doctor or a junior doctor can perform it.

Keywords: Uterine compression sutures, uterine artery ligation, Postpartum haemorrhage(PPH), Caesarean section.

I. Introduction

Postpartum haemorrhage continues to be leading cause of maternal mortality and morbidity, accounting for more than 125000 deaths per year across the world. Prompt diagnosis and effective action are the cornerstones of management and are crucial to prevent maternal haemorrhage[1]. Primary PPH occurs within 24 hours of delivery. It is defined as a reduction in the patient's haematocrit level of more than 10% of the prenatal value or blood loss causing haemodynamic instability of sufficient seriousness to require blood transfusion(ACOG 1998). PPH complicates approximately 3.7% of vaginal and 6.4% of caesarean deliveries[2]. Uterine atony accounts for 75%-90% of primary PPH[3].

As the old proverb goes, "Prevention is better than cure", every obstetrician should be proficient with identification of risk factors for PPH and prevent it. The onus is on the practising obstetrician in rural areas where the blood bank facilities are not readily available. Identification of risk factors of PPH is of paramount importance.

Most cases of PPH are due to uterine atony. The causes of uterine atony are general anaesthesia, poorly perfused myometrium in shock, over distended uterus with multiple fetuses, excessive amniotic fluid, following rapid or prolonged labour, oxytocin induced or augmented labour, grand or high multiparity, history of prior uterine atony, chorioamnionitis, uterine fibroids, placenta praevia, following tocolytic therapy, following magnesium sulphate therapy[4]. Postpartum haemorrhage can also occur as the result of retained placental tissue in an avulsed cotyledon, a succenturiate or accessory lobe, an abnormally adherent placenta accrete, increta or percreta or a placental abruption[4]. Other causes of postpartum haemorrhage include uterine rupture, genital tract lacerations, uterine inversion or coagulopathies[4].

The traditional management of PPH begins with conservative methods such as bimanual compression, medical therapy with uterotonic agents, uterine tamponade with balloons and occasionally arterial embolisation[5]; the failure of which often mandates surgical intervention. Surgical measures such as ligation of major pelvic vessels demand a rarely used skill possessed by few registrars. In the event of intractable haemorrhage despite the above measures hysterectomy is usually the final resort[6].

However hysterectomy after primary PPH has appreciable drawbacks- not only does it result in infertility, there are technical difficulties in removing lower uterine segment and these increase the likelihood of injury to the bladder or ureter[7]. Surgical techniques offering conservative management of primary PPH have

developed over the past 10 years[7]. Some procedures involve compression by brace-like suturing to preserve the uterus after atonic bleeding (B-Lynch *et al.*, 1997; Hayman *et al.*, 2002; Bhal *et al.*, 2005; Nelson and Birch, 2006), also in combination with intrauterine balloon catheter (Nelson *et al.*, 2007). Other workers have described multiple square sutures and vertical penetrating sutures within the lower uterine segment combined with oblique penetrating corpus sutures or multiple vertical sutures (Cho *et al.*, 2000; Tjalma and Jacquemyn, 2004; Hwu *et al.*, 2005; Ouahba *et al.*, 2007)[7].

However, theoretical concerns have been raised on the potential risk of occlusion of the uterine cavity and blood entrapment, as the uterus is transfixed to back to place the suture[8].

During pregnancy 90% of the blood supply to the uterus comes from the uterine arteries and the rest from the ovarian and vaginal arteries. Occlusion of the uterine arteries reduce most of the uterine blood flow and produce uterine ischemia[9]. In uncontrollable haemorrhage the uterine arteries lose their ability to constrict because of an unidentified mechanism and their ligation seems to be justifiable treatment[9].

In the present study we have described our experience over last 10 years using uterine compression sutures and bilateral uterine artery ligation during Caesarean section as a preventive measure in high risk women who are at risk of PPH.

II. Aims And Objectives

To evaluate the efficacy of uterine compression sutures and bilateral uterine artery ligation for the prevention of postpartum haemorrhage (PPH) during Caesarean section in high risk women.

III. Material And Methods

This observational study was carried out at New Alma Hospital, Mannarkkad, Kerala, India. The study period was from 1st April 2005 to 31st March 2015. There were total of 39,107 deliveries during the study period. Of which there were 10,558 Caesarean sections. Of the total Caesarean sections, elective caesareans were about 3519 and emergency caesarean sections were 7039. Uterine compression sutures using No. 2 Chromic catgut threaded on a straight needle (modification of Hayman compression suture) and bilateral uterine artery ligation using Vicryl No-1 suture threaded on a straight needle were applied in all the high risk cases (causes of uterine atony causing PPH mentioned earlier) including all emergency caesareans and 1500 elective caesareans with valid indications for prophylactic suture application. cases.

After extraction of the baby, uterus was exteriorised. Uterine angles were sutured separately on both sides. Uterine incision was closed in a single layer using Vicryl No-1 by continuous locking sutures.

Routine uterotonics were given; 20IU Oxytocin infusion in 500ml of saline, 0.2mg of Methylergometrine intravenous injection (if not contraindicated) or 250 micrograms of Carboprost tromethamine intramuscular injection (if not contraindicated). In our study apart from the high risk cases, prophylactic uterine compression sutures and bilateral uterine artery ligation were performed in women with Rh negative pregnancy, anaemia complicating pregnancy, uterine angle extensions and who were Jehovah's witnesses.

Description of bilateral uterine artery ligation: Fig.1, Fig.2

The largest experience in the literature is O'leary's report of 30 years experience with 265 patients, with 96% success rate[10]. This technique uses a large curved needle with No-1 Chromic catgut suture. In our study we have used No-1 Vicryl suture threaded on to a straight needle. After closure of uterine incision and uterus still exteriorised,

- 1.1 Place a suture approximately 2 to 3 cms below the level of uterine incision. This is done by pulling the broad ligament laterally using the thumb and index and middle finger by the first assistant.
- 1.2 The uterine artery and vein are ligated by passing the needle 2-3 cms medial to the vessels including almost the full thickness of the myometrium and then bringing it through broad ligament in the avascular area lateral to the vessels. To identify the avascular area in the broad ligament, the main operation theatre light was switched off and a torch light can be shone from the anterior aspect by operation theatre personnel who hasn't scrubbed for the case. This will make the posterior to anterior entry through the avascular area in broad ligament easier.
- 1.3 In order to produce a mass ligation, avoid damaging uterine vessels and help obliterate intramyometrial ascending arterial branches, it is important to include 2-3cms of the myometrium in the suture[11].
- 1.4 A second stitch can be placed if above step is ineffectual and for cases with continued lower uterine segment haemorrhage.
- 1.5 While taking the stitch one has to be careful to avoid injury to bowel behind[13].
- 1.6 If the tear has extended laterally or downwards the bladder must be pushed down first, and this maneuver will help the ureter to drop down[13].
- 1.7 Repeat on the opposite side.

1.8 Needle tract bleeding at the point of entry of straight needle was controlled by simple sutures using Chromic catgut No-1-0.

Description of uterine compression suture technique: Fig.3, Fig.4

After completion of bilateral uterine artery ligation, a No-2 Chromic catgut threaded on a straight needle was used to transfix the uterus from front to back, 3cms medial to uterine angle and 2cms above the sutured uterine incision and was then tied above the fundus of the uterus like a brace; while an assistant applied bimanual compression. The procedure was repeated on both sides.

The point to be emphasized is to tighten the stitch at the fundus medial to the tubal insertion site so that the tube is not damaged[13].

A myometrium that is devoid of its oxygen supply will not contract[13]. This was the reason for us to perform bilateral uterine artery ligation first followed by uterine compression sutures.

The uterine compression suture in our study is a modification of Hayman suture[14] in which No.2 Chromic catgut suture was used.

As the uterus involutes to a non pregnant size, delayed absorption sutures may result in long “rabbit ear” loops separated from the uterus that theoretically could trap intraabdominal tissue[15]. So No.2 Chromic catgut suture was used in this study.

After completion of the sutures abdomen was closed in layers after achieving adequate haemostasis and after verification of mop and instrument count.

Post procedure the patients were discharged after 5days. Till date all patients were examined daily by the Obstetrician’s team on daily ward rounds. After that patients were called for follow up after 6 weeks. In the follow up visit women were interviewed and examined for any complications and side effects.

It is worth mentioning that our sutures for prevention of PPH were also carried out in 8 cases after vaginal delivery. In all those cases we were able to save the uterus. In those cases the lower uterine segment was opened by transverse hysterotomy incision and uterus was evacuated to remove any blood clots and placental bits. The hysterotomy wound was closed and bilateral uterine artery ligation with uterine compression sutures were applied as mentioned above.

IV. Results

There were 39,107 deliveries during our study period. Of these there were 10,558 Caesarean sections. The incidence of caesarean section was 26.99%. Total number of elective caesareans were 3519 and total number of emergency caesareans were 7039. The prophylactic sutures were applied in all the cases of emergency caesareans and 1500 of elective caesareans. Therefore total number of patients in our study were 8539.

TABLE 1: Profile of patients

Age of patients	Number of patients(n= 8539) (%)
< 20years	2586 (30.28%)
20 to 25 years	3886 (45.51%)
26 to 30 years	1448 (16.96%)
>30 years	619 (7.25%)

TABLE 2: Patient profile

Parameters	Number of patients(n) (%)
Parity:	
Primigravida	5260 (61.6%)
Secondgravida	2100 (24.6%)
Thirdgravida and above	1179 (13.8%)
Timing of Caesarean:	
Emergency Caesarean	7039 (82.43%)
Elective Caesarean	1500 (17.54%)

TABLE 3: Follow up of patients.

Period of follow up	Number of patients(n) (%)
Followed up to 5days	8539 (100%)
Followed upto six weeks	8130 (95.2%)
Women with subsequent pregnancy for regular antenatal checkups at our hospital	6831 (79.9%)
Women with subsequent pregnancy delivered at our hospital	5123 (59.9%)

V. Discussion

This study was done in a rural secondary centre with approximate 4200 annual deliveries.

Postpartum haemorrhage remains as one of the most common causes of maternal morbidity and mortality both in developing and the developed world. It is a common obstetric emergency which can lead to emergency hysterectomy in patients with life threatening bleeding.

Failure of all the conservative treatment requires emergency postpartum hysterectomy and its incidence is 1-3 per 1000 deliveries[16][17]. However, emergency postpartum hysterectomy is associated with loss of fertility and technical difficulties while removing lower uterine segment may lead to injury to the urinary bladder or ureter.

In the present study,61.6% of women were primipara. The high maternal morbidity and loss of future fertility particularly in women having their first pregnancy, means that all obstetric units should have clear guidelines in place to deal PPH and where possible apply techniques that allow preservation of uterus[18]. Due to this background there is a constant demand and scope of improvement in the field of conservative managements of primary PPH.

In this study we have evaluated the efficacy of uterine compression sutures with bilateral uterine artery ligation as preventive and curative measure for PPH for high risk women. This is more apt in rural setup where blood bank facilities are not readily available. Moreover time and transport facility are major constraints in referring the patient with PPH to a tertiary centre. So the present technique was adapted. We have found that this procedure very safe and less time consuming.

The Hayman technique involves crossing the uterine cavity to appose the anterior and posterior uterine wall above the bladder reflection, theoretical concerns on the potential risks of cavity occlusion and infections have been raised[19][20]. In comparison with conventional B Lynch and other techniques this simple procedure can easily be mastered by every obstetrician. None of the patients in our study suffered from the documented complication of this procedure like pyometra, uterine necrosis or re-laprotomy. Normal menstrual patterns returned in five patients out of seven after having U suture done by Hackelthal et al. Quahba et al. reported that all women recovered normal menstrual cycles. Even in Cho's study all patients recovered normal menstruation. Although there is no reported cases of amenorrhoea or oligomenorrhoea after compression suture, detailed follow up of these patients have not been documented completely. Api from Turkey reported a case of successful pregnancy after hypogastric artery ligation and B-Lynch suturing technique[21]. Tsitlakidis reported a follow up of a case with successful pregnancy 10 yerats after PPH was managed with B-Lynch suture. This case is the longest follow up till now after B-Lynch suture application[22]. Habek Croatia reported a successful term pregnancy in a 28year old patient after previous Caesarean section and B-Lynch compression suture[23].

In our study all women returned with normal menstrual cycles. About 79.9% are undergoing ANC. 59.9% of them have delivered in our institution during subsequent pregnancy.No complication like pyometra, amenorrhoea/oligomenorrhoea ,uterine ischemic necrosis were encountered in follow up period.

Apart from compression sutures and balloon tamponade technique, various fertility preserving methods have been employed. They are internal iliac artery ligation and radiographic arterial embolisation. Reported complications of internal iliac artery ligation include nerve injury, indverent ligature of the common iliac artery, prolonged blood loss and prolonged operative time. It has also been reported that there is a high rate of complication and low rate of success for haemostasis if the procedure is not done correctly[24]. Therefore , this procedure should be reserved for haemodynamically stable patients of low parity in whom future child-bearing r retroperitoneal space and should never be attempted by first timers.

Radiological embolisation of the uterine artery warrants facilities and expertise in interventional radiology which may not be readily available in some obstetric units. In addition, in cases of massive ongoing PPH, it may be difficult to transfer patients to such radiological facilities[25].

It is worth mentioning that our prophylactic sutures were applied in 8 cases of PPH after vaginal delivery. In all those cases uterus was opened by hysterotomy incision and uterus was explored for any retained bits of placenta. Uterine incision was closed. Bilateral uterine artery ligation and uterine compression sutures were applied. These cases were not included in the present study.

For the above mentioned reasons and our's being a rural secondary centre we have developed this technique of prophylactic sutures for prevention of PPH.

VI. Conclusion

Our series of cases treated with prophylactic uterine compression sutures and bilateral uterine artery ligation shows that it is an effective method of preventing PPH. It should be attempted as early as possible in order to maximize its success in high risk women. Its relative simplicity and ease of application, its life saving potential, relative safety, and above all, its capacity for preserving the uterus, makes it recommended procedure of choice for prevention of PPH. It does not require any extra skill and even a resident doctor can perform it.

The current technique of prophylactic uterine compression sutures with bilateral uterine artery ligation may be a valuable addition to the current armamentarium of conservative treatment of PPH, particularly for obstetricians who are working in rural setup with minimal facilities striving hard to save lives of women who are at high risk for developing PPH.

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Fig.1. Steps of Uterine artery ligation.

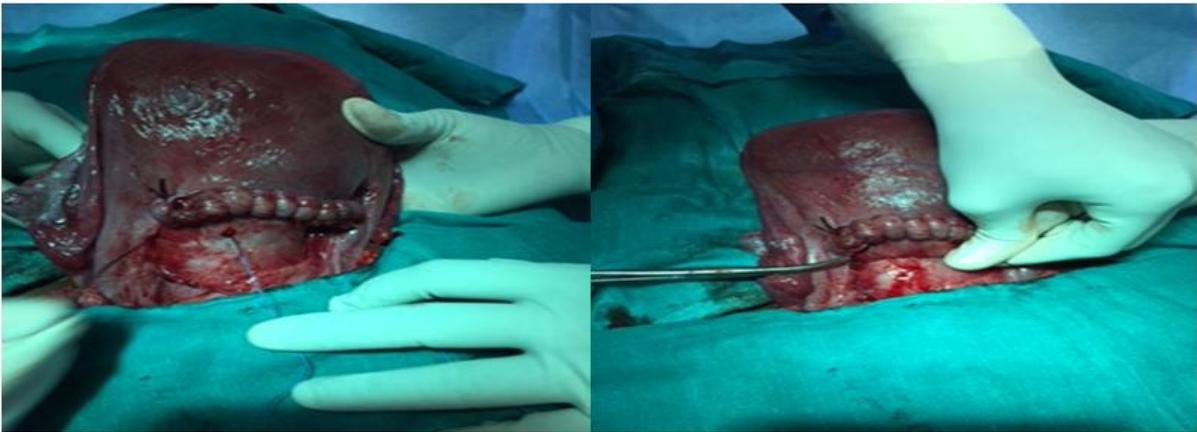


Fig.2. Steps of Uterine artery ligation.



Fig.3. Steps of Uterine compression suture application.



Fig.4. Steps of Uterine compression suture application.



Fig.5. Bilateral Uterine arteries ligated and Uterine compression sutures.