

Bilateral uterine and ovarian artery ligation in addition to B-Lynch suture may be an alternative to hysterectomy for uterine atonic hemorrhage

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Summary

Purpose of investigation: To evaluate the effectiveness of bilateral uterine arteries and ovarian artery ligation followed by B-Lynch compression suturing in controlling atonic postpartum hemorrhage. **Methods:** In this retrospective study, the data of eight patients that had uterine atony during cesarean section and treated by bilateral uterine and ovarian artery ligation followed by B-Lynch compression suturing during the period from February 2009 to September 2010 were collected and analyzed. **Results:** Eight cases were treated by the above protocol; the average age of the patients was 25.25 ± 5.09 years, and the mean gestational age was 35.75 ± 3.80 weeks. Seven of the patients were primiparous. They were hospitalized on average 5.25 ± 2.31 days. The mean operation time was 61.25 ± 24.60 minutes and mean estimated blood loss was 2787.5 ± 1573.38 ml. Internal iliac artery ligation was necessary in one patient only. Hysterectomy was not performed in any of the patients. Five patients had intraoperative or postoperative blood transfusion. **Conclusion:** The addition of uterine artery and ovarian artery ligation to the B-Lynch suture may be considered as a major hemostatic step before proceeding to hysterectomy in cases of uterine atony bleeding, and all gynecologic surgeons should be familiar with it.

Key words: Atonic postpartum hemorrhage; B-Lynch suture; Bilateral uterine and ovarian artery ligation.

Introduction

Early (primary) postpartum hemorrhage (PPPH) is the cause of high maternal morbidity and mortality. PPPH is defined by blood loss greater than 500 ml during the first 24 h after vaginal delivery or > 1,000 ml after cesarean section [1].

Uterine atony accounts for 75%-90% of primary PPH [2]. The traditional management of this condition begins with conservative methods such as bimanual uterine compression, medical therapy with uterotonic agents, uterine tamponade with balloons and occasionally, arterial embolization, the failure of which often mandates surgical intervention [2].

Surgical therapy is reserved for hospital settings, and is aimed at preventing uterine atony by compressive techniques or to achieve selective uterus devascularization, thus preventing hemorrhage (vascular ligation of uterine artery, ovarian artery, hypogastric artery; and selective transarterial embolization). According to current data, hysterectomy is only reserved for refractory PPH in multiparas [1].

Uterine compression sutures (B-Lynch) have proved to be valuable in the control of massive atonic postpartum hemorrhage as an alternative to hysterectomy [3, 4].

Bilateral UAL is the first step of a stepwise uterine devascularization approach that affords good control of postpartum hemorrhage [4, 5]. Performed with or without utero-ovarian ligament ligation, UAL does not appear to affect future fertility or obstetric outcomes [4-6]. Vascular

occlusion is only temporary, as recanalization soon ensures normal uterine circulation [4, 5].

The aim of the present study was to evaluate the effectiveness of bilateral uterine arteries and ovary artery ligation followed by B-Lynch compression suturing in controlling atonic postpartum hemorrhage.

Materials and Methods

In this retrospective study, we evaluated patients that had intraoperative uterine atony during cesarean section treated by bilateral uterine and ovarian artery ligation and B-Lynch procedure from February 2009 to September 2010.

Bilateral uterine and ovary artery ligation and B-Lynch procedure were performed in eight women only after uterine atony which was defined by persistent uterine relaxation that did not respond to measures such as uterine massage, bimanual compression and the use of uterotonics, i.e., oxytocin, ergometrine and misoprostol. All patients were delivered by cesarean section and were complicated by uterine atony during the operation. All cesarean deliveries were performed by the first author. A dose of 1 g of first-generation cephalosporin (Iespor, I. Ulagay, Istanbul) was administered intravenously 20 min prior to skin incision. The surgery was done under general anesthesia. The abdomen was opened by an appropriate-sized Pfannenstiel incision.

The inclusion criteria, intraoperative atonic postpartum hemorrhage, did not respond to conservative methods. Bimanual compression was first applied to assess the potential chance of success of the B-Lynch suturing technique. The vagina was swabbed to confirm adequate control of the bleeding. If vaginal bleeding was controlled, bilateral uterine and ovarian artery ligation and B-Lynch suture were performed. The B-Lynch compression suture was applied either starting from the right or the left corner of the lower segment of the incision, starting 3 cm

below the incision line, and brought out 3 cm over the upper side of the incision. This suture is taken over the uterine fundus and brought down symmetrically to the anterior incision at the posterior of the uterus, right over the sacrospinous ligaments. A horizontal bite is taken at the posterior segment of the uterus penetrating the whole uterine wall. The suture is then brought over the uterine fundus again to the anterior, and enters the uterine cavity again 3 cm above the anterior incision. Finally the suture is taken out of the uterine cavity passing 3 cm distally to the inferior segment of the incision. The ends are tied to compress the uterus [3]. The suture material used was No. 1 Vicryl (Pegesorb, Trabzon, Turkey).

The technique used for bilateral uterine artery ligation was the following: the peritoneum over the vesicouterine pouch was incised horizontally, the peritoneum over the uterine isthmus and cervix was bluntly dissected downwards, and this dissection was then extended laterally. To avoid including the ureter in the ligation of the ascending branch of the uterine artery, the peritoneum was carefully mobilized at the uterine angles to expose both. Uterine artery pulsations were palpated digitally at the level of the internal os. A 1.0 vicryl suture attached to a round-bodied needle was passed from posterior to anterior through the cervical tissues. The vaginal bleeding was controlled by vaginal examination. When bleeding stopped, the uterine incision was then closed in the normal way, in two layers with or without closure of the lower uterine segment of the peritoneum. Finally, the abdomen was closed using a regular technique.

Monitoring of maternal hematologic parameters 24 hours before cesarean delivery and two hours after the procedure is a requirement of the protocol. Blood transfusion was performed if the hemoglobin level was less than 7 g/dl and the hematocrit value was less than 21%. The following data were extracted from the hospital charts: age, parity, indication for cesarean delivery, weeks of gestation, newborn weight, cause of postpartum hemorrhage, method of anesthesia, operation time, amount of blood loss, and postoperative stay.

Results

The B-Lynch procedure, uterine artery and ovary artery ligation were performed in a total of eight cases from February 2009 to September 2010. The results are summarized in Table 1. The average age of the patients was 25.25 ± 5.09 years (age ranged from 19 to 33 years) and mean gestational age was 35.75 ± 3.80 weeks. Seven of the patients were primiparous. They were hospitalized on average 5.25 ± 2.31 days. Mean operation time was 61.25 ± 24.60 minutes. All patients received a high dose of oxytocin (more than 20 U/l) and prostaglandin E2. All sutures were placed due to hemorrhage, and none were placed prophylactically. Internal iliac (or hypogastric) artery ligation was necessary in one patient only. Bleeding stopped following bilateral uterine and ovarian artery ligation and B-Lynch suture. The mean estimated blood loss was 2787.5 ± 1573.38 ml (range 1000-4000 ml). Five patients had intraoperative or postoperative blood transfusions. Hysterectomy was not performed in any of the patients.

Discussion

Postpartum hemorrhage (PPH) is one of the main causes of maternal death. The management of PPH includes mechanical, medical, and surgical procedures.

Table 1. — Patient characteristics.

Characteristics	Value
Age	25.25 ± 5.09 (19-33)
Parity	87.5% (n: 7)
Primipara	12.5% (n: 1)
Para 1 or 2	
Gestational age (weeks)	35.75 ± 3.80
Units of blood transfused	2.37 ± 2.82 (range 0-5 units)
Postoperative stay (days)	5.25 ± 2.31
Operation time (min)	61.25 ± 24.60

Mechanical procedures include compression of the uterus and medical therapy includes uterotonics to induce uterine contraction, e.g., oxytocin, methylergometrine, or prostaglandin preparations that can be administered via intra-myometrial injection by the transabdominal, intracervical, or intracavitary route with the use of a Foley catheter [1, 7].

Uterine compression suture techniques such as the B-Lynch brace suture technique were first described in 1997 by B-Lynch *et al.* and since then many publications of successful application of the technique have appeared in various journals [3, 7].

Subsequently, there have been a total of 16 publications on the technique from 2000 to 2005, reporting an 80%-100% success rate of the B-Lynch procedure in controlling PPH with uterine preservation. Since 1997, more than 1,000 procedures have been performed worldwide [2]. They described a technique of oversewing the uterus with a continuous suture to apply ongoing compression. This procedure is much quicker and simpler than hysterectomy or internal iliac ligation, and the reported series suggest that it is very effective [8]. Other surgical methods used in combination with the B-Lynch suture with variable results have also been described, including uterine artery ligation, ovarian vessel ligation and oversewing of the placental bed [9].

Bilateral uterine artery ligation (UAL) is the first step of a stepwise uterine devascularization approach that affords good control of postpartum hemorrhage. The technique decreases blood perfusion through a temporary vascular occlusion. This effect may be combined with that of a B-Lynch compression suture, which probably also decreases blood flow. As recanalization occurs and normal uterine circulation resumes, no interference with future reproductive performance is expected [4, 5].

Sentilhes *et al.* [10] were the first to report on a woman who underwent stepwise uterine devascularization and B-Lynch compression suturing who became pregnant again, and showed no signs of the B-Lynch procedure on cesarean delivery. In our cases, in addition to B-Lynch suture we ligated the uterine and ovarian vessels that supply the uterus. Thus we applied an alternative treatment method in patients that might have a risk of hysterectomy in spite of a B-Lynch suture. There was no need for hysterectomy in any of our patients who were treated by this protocol.

There have been isolated reports of adverse conse-

quences after B-Lynch application. Grotegut *et al.* reported one case of erosion of a B-Lynch suture through the uterine wall and partial ischemic necrosis of the uterus occurring 24 hours after the procedure. This complication was also reported in a 26-year-old primigravida [11, 12]. Long-term complications include the formation of bowel adhesions which was described in a patient who delivered by cesarean section [2]. In our patients, no complication was encountered on physical examination and ultrasonography in the postoperative control visits, and the patients had no complaints.

The compression B-Lynch suture is a successful, safe, inexpensive, and simple method for the treatment of PPH during cesarean section, which reduces the incidence of mutilating urgent peripartum hysterectomy due to uterine atony or coagulopathy, and preserves subsequent patient fertility [1].

In women who desire to have their fertility preserved, bilateral UAL and ovarian artery ligation followed by B-Lynch compression suturing represents an effective and safe combination for controlling atonic postpartum hemorrhage, and an alternative to hysterectomy.

Shahin *et al.* [4] found that their protocol did not impair fertility. When compared with other surgical interventions for uterine bleeding which are technically harder, have a slower learning curve and high complication rates, B-Lynch suturing is a rather easy and quick technique to learn and apply [3]. Some studies have reported that the B-Lynch suture is not always successful and hysterectomy may be needed in some cases. The addition of uterine devascularization to B-Lynch suturing is a simple, easy, and less time consuming technique, and we think that it is a good alternative to hysterectomy, especially in societies where hysterectomy forms a medicolegal problem. We certainly believe all gynecologic surgeons should be familiar with it.

In conclusion, we also believe that bilateral uterine and ovarian artery ligation plus B-Lynch suturing should be considered a major hemostatic step before hysterectomy in case of uterine atony bleeding. We have suggested the addition of uterine and ovarian artery ligation to the B-Lynch suture to make it more effective and eliminate the need for hysterectomy [8]. Our protocol seems promising as none of our patients needed a hysterectomy and there have not been any complications.

References

- [1] Habek D., Kulas T., Bobi -Vukovi M., Selthofer R., Vuji B., Ugljarevi M.: "Successful of the B-Lynch compression suture in the management of massive postpartum hemorrhage: case reports and review". *Arch. Gynecol. Obstet.*, 2006, 273, 307.
- [2] Koh E., Devendra K., Tan L.K.: "B-Lynch suture for the treatment of uterine atony". *Singapore. Med. J.*, 2009, 50, 693.
- [3] B-Lynch C., Coker A., Lawal A., Abu J., Cowen M.: "The B-Lynch surgical technique for the control of massive postpartum hemorrhage: an alternative to hysterectomy? Five cases reported". *Br. J. Obstet. Gynaecol.*, 1997, 104, 372.
- [4] Shahin A.Y., Farghaly T.A., Mohamed S.A., Shokry M., Abd-El-Aal D.E., Youssef M.A.: "Bilateral uterine artery ligation plus B-Lynch procedure for atonic postpartum hemorrhage with placenta accreta". *Int. J. Gynaecol. Obstet.*, 2010, 108, 187.
- [5] AbdRabbo S.A.: "Stepwise uterine devascularization: a novel technique for management of uncontrolled postpartum hemorrhage with preservation of the uterus". *Am. J. Obstet. Gynecol.*, 1994, 171, 694.
- [6] Sentilhes L., Trichot C., Resch B., Sergent F., Roman H., Marpeau L. *et al.*: "Fertility and pregnancy outcomes following uterine devascularization for postpartum haemorrhage". *Hum. Reprod.*, 2008, 23, 1087.
- [7] El-Hamamy E., B-Lynch C.: "A worldwide review of the uses of the uterine compression suture techniques as alternative to hysterectomy in the management of severe post-partum haemorrhage". *J. Obstet. Gynaecol.*, 2005, 25, 143.
- [8] Hayman R.G., Arulkumaran S., Steer P.J.: "Uterine compression sutures: surgical management of postpartum hemorrhage". *Obstet. Gynecol.*, 2002, 99, 502.
- [9] Wohlmuth C.T., Gumbs J., Quebral-Ivie J.: "B-Lynch suture: a case series". *Int. J. Fertil. Womens Med.*, 2005, 50, 164.
- [10] Sentilhes L., Gromez A., Trichot C., Ricbourg-Schneider A., Descamps P., Marpeau L.: "Fertility after B-Lynch suture and stepwise uterine devascularization". *Fertil. Steril.*, 2009, 91, 934.
- [11] Joshi V.M., Shrivastava M.: "Partial ischemic necrosis of the uterus following a uterine brace compression suture". *BJOG*, 2004, 111, 279.
- [12] Grotegut C.A., Larsen F.W., Jones MR, Livingston E.: "Erosion of a B-Lynch suture through the uterine wall: a case report". *J. Reprod. Med.*, 2004, 49, 849.

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