

Successful Management of Two Cases of Placenta Accreta and a Literature Review: Use of the B-Lynch Suture and Bilateral Uterine Artery Ligation Procedures

Maliheh Arab,^{1,2,*} Behnaz Ghavami,³ Samaneh Saraeian,¹ Samaneh Sheibani,¹ Fatemeh Abbasian Azar,¹ and Seyed-Mostafa Hosseini-Zijoud⁴

¹Department of Gyneco-oncology, Imam Hossein Medical Center, Shahid Beheshti University of Medical Sciences, Tehran, IR Iran

²Department of Medical Education, School of Medical Education, Shahid Beheshti University of Medical Sciences, Tehran, IR Iran

³Department of Obstetrics and Gynecology Shariati Medical Center, Tehran University of Medical Sciences, Tehran, IR Iran

⁴Nephrology and Urology Research Center, Baqiyatallah University of Medical Sciences, Tehran, IR Iran

*Corresponding author: Maliheh Arab, Department of Gyneco-oncology, Imam Hossein Medical Center, Shahid Beheshti University of Medical Sciences, Tehran, IR Iran. Fax: +98-2177543634, E-mail: drmarab@yahoo.com

Received 2015 November 24; Revised 2016 January 09; Accepted 2016 February 29.

Abstract

Introduction: Placenta accreta is an increasingly common complication of pregnancy that can result in massive hemorrhage.

Case Presentation: We describe two cases of placenta accreta, with successful conservative management in a referral hospital in Tehran, Iran. In both cases, two procedures were performed: compression suture (B-Lynch) and a perfusion-decreasing procedure (bilateral uterine artery ligation). We also present the results of a narrative literature review.

Conclusions: The double B-Lynch and uterine arterial ligation procedure in cases of abnormal placentation might be strongly considered in fertility preservation, coagulopathy, coexisting medical disease, blood access shortage, low surgical experience, distant local hospitals, and no help.

Keywords: Placenta Accreta, Postpartum Hemorrhage, Uterine Artery, Ligation

1. Introduction

Placenta accreta is described as deep adherence of placental villi to the myometrium. According to an epidemiological review, cases of placenta accreta have increased because of higher cesarean rates due to a greater number of accepted indications for cesarean sections, including maternal request (1). The reported incidence of placenta accreta was 1 in every 533 pregnancies in one report and 2% in another report (2). Strong risk factors for abnormal placentation include previous cesarean scars and placenta previa. Other known risk factors are multiparity, advanced maternal age, previous dilatation and curettage, a history of manual placenta removal, submucous myoma resulting in atrophy of the endometrium, recurrent abortions, gestational products implanted in the uterine diverticulum, and previous radium insertion. The main danger and most common complication of abnormal placentation is massive bleeding (2).

The conventional treatment for placenta accreta is a hysterectomy. However, in cases without massive bleeding and coagulopathy, a conservative approach may be considered (3). Conservative approaches, include the B-Lynch procedure, which involves the use of uterine compression

sutures, and perfusion-decreasing procedures. The first B-Lynch procedure, the aim of which is to control the bleeding via uterine compression, was performed in 1989 in severe postpartum bleeding that rejected hysterectomy (4, 5). The perfusion-decreasing procedures include nonsurgical and surgical procedures. In the former, uterine artery embolization is used, whereas surgical approaches involve bilateral uterine artery ligation and bilateral hypogastric artery ligation) procedures. Bilateral uterine artery ligation is an impermanent closure, which significantly decreases arterial system flow. Recanalization of vessels takes place, resulting in previous blood flow preserving fertility function (6).

Uterine artery ligation is favored in 92% of cases, with a complication rate of about 1%. A follow-up study (O'Leary) presented 90 patients of uterine artery ligation, including 84 successful performance avoiding hysterectomy. In another report, 14 patients underwent bilateral uterine artery ligation to control postpartum bleeding (3). In some cases, the surgeons removed parts of the placenta that had spontaneously separated from the uterus, without any active separation. Using gentle excision, the surgeons achieved a reduction in the placental mass.

Many situations, such as fertility preservation, medi-

cal disease, no access to enough blood, and nonexpert surgeon suddenly exposed to placenta accreta in a local hospital, are against radical and difficult operation like a total cesarean hysterectomy. We describe two cases of placenta accreta-increta that were successfully managed with conservative uterus-preserving therapy: bilateral uterine artery ligation and the B-Lynch procedure. The bilateral uterine artery ligation was performed with silk number zero suture material at the level of the internal ostium. The B-Lynch procedure was done with vicryl number one suture material. The placenta was reduced in size in nonadherent parts.

2. Case Presentation

2.1. Case 1

A 43-year-old gravida 8 para 7 female presented at 42 weeks' gestation, with membrane rupture, which had occurred 6-7 hours earlier. The patient had presented to our tertiary care center at Imam Hossein hospital, a general, governmental, and referral medical center in Tehran, Iran, in May 2013 with an opium addiction and bilateral pulmonary wheezing. After medical consultation, antibiotic, methadone, and budesonide spray were prescribed. Due to Hb of 7.5, one unit of packed blood cells was transfused. The patient was a candidate for a cesarean delivery due to grand multiparity and ineffective contractions following the ruptured membrane. Under spinal anesthesia, a Pfannenstiel incision was made. A healthy female newborn was delivered, weighing 3750 g, with an Apgar score of 9-10. After delivery, the placenta was adherent in some parts of the posterior uterine wall. The placenta was excised in separated parts, and small 0.5×5 cm of placenta remained. The thickness of the residual placenta was reduced to 1 cm. To control bleeding, bilateral uterine artery ligation was done, followed by the B-Lynch procedure. A drain was applied. After tubal ligation, bleeding check for all packs below the surgical preparation sheets was done. There was no active bleeding. Two units of packed blood cells and fresh frozen plasma were transfused during the surgery. At the end of the operation, the estimated blood loss was 2400 mL, and the patient showed adequate urine output and stable vital signs. Over the course of the next two post-surgery days, four additional units of packed blood cells were transfused. The patient was discharged 5 days after the surgery, without any need for a hysterectomy.

2.2. Case 2

The patient was a 25-year-old gravida 3 para 1 at 34-35 weeks' gestation, with a history of one previous cesarean

section. In April 2015, she was admitted to our medical center in Tehran, Iran due to decreased fetal movement and a probable ruptured membrane. Her vital signs were stable, except for mild systolic blood pressure of 130-140, without proteinuria. In her medical history, ultrasonography indicated placenta previa and a suspicion of accreta. Due to uterine contractions, she was scheduled for a cesarean delivery. Under general anesthesia, a Pfannenstiel incision was made. Anterior placental invasion of the myometrium was seen, in addition to prominent vessels. After delivery of a male newborn, weighing 2200 g, with an Apgar score of 8-10, partially adherent placenta was separate in some parts. In the lower uterine segment, active and massive bleeding with the placenta in place occurred. Placenta was previa with a 5×7 cm of it increta. As a first step, manual compression of the uterus, especially the lower segment, was performed, followed by bilateral uterine artery ligation. In the second step, a B-Lynch suture was placed, followed by myometrial Kerr incision repair and tying of the B-Lynch suture. These steps significantly reduced the active bleeding, but it continued locally in the lower segment. Two compressive sutures in the lower segment were added, and two pieces of Surgicell were placed in the front of the lower segment of the uterus. A drain was placed in front of the uterus.

Six units of packed blood cells and fresh frozen plasma were transfused during surgery. At the end of the operation, the estimated blood loss was 4800 mL. Three additional units of packed blood cells, two units of fresh frozen plasma, and five units of platelets were transfused on post-surgery day 1. The patient was admitted to the intensive care unit for 3 days.

On day 3, the patient experienced dyspnea, tachypnea, and fever for 24 hour and then recovered, without additional treatment. Antibiotherapy, including clindamycin and gentamycin, was prescribed for 7 days. The patient was discharged on the 7th day, without a need for a hysterectomy.

In the present article, the management of the two cases appeared necessary to the responsible surgeon in their emergent condition, so there was no approval of an ethics committee, and informed consent was not received.

3. Discussion

According to a literature review of existing surgical management, several procedures are suggested. Among conservative nonsurgical procedures, embolization is more suitable for patients with stable vital signs, without excessive blood loss. A radiology team is needed to puncture catheter through the femoral arteries. In addi-

tion, special implements and expert operators are also necessary (6-9).

A case series reported a complication rate of 5%, with fever and postoperative pain the most common problems (10). The same series reported that pelvic infection and complications from embolus migration to the general blood circulation were rare. Uterus and bladder necrosis and ischemic uterine necrosis occurred in two cases after uterine artery embolization for postpartum hemorrhage.

Surgical perfusion-decreasing procedures include artery ligation, such as hypogastric and uterine artery ligation. The success rate of bilateral hypogastric ligation is about 40% - 100%, with a complication rate of 13% (10). One study reported a mortality rate of 2%. The complications of bilateral hypogastric ligation include blood loss, increased operating times, and increased perioperative morbidity (11). Some authorities do not favor hypogastric artery ligation in postpartum bleeding due to a waste of time, need for expert operators, failure in 60% of cases (12, 13), and interference with pelvic embolization, if later planned (14).

In pregnancy, the uterine arteries contain 90% of the uterine blood supply. Bilateral uterine artery ligation significantly reduces bleeding caused by uterine inertia and abnormal placentation. Thus, according to the literature, it seems reasonable to choose bilateral uterine artery ligation as a devascularization procedure instead of embolization and hypogastric ligation in acute postpartum bleeding.

According to the literature, the overall rate of hysterectomy in patients with placenta accreta who are treated conservatively is 19.3%. Uterine artery ligation and the B-Lynch procedure alone might fail. An overview of the failure rate in each of these procedures is provided in Table 1.

Table 1. Failure Rate of B-Lynch and Bilateral Uterine Artery Ligation Procedures

Author	Failure, %
B-Lynch procedure	
B-Lynch (15), Smith (16), Mazhar (17)	5.3
Vohlmuth (18)	2 - 9
Bilateral uterine artery ligation	
AbdRabbo (19)	8
O'Leary (20)	6.7

Following delayed recurrent bleeding, it appears that the best conservative treatment to avoid a secondary hysterectomy is a combination of the two procedures (21). In one study, two patients with placenta previa and accreta were conservatively managed by a combination of bilat-

eral uterine artery ligation and Bakri balloon compression (22). In another report of the conservative management of 46 patients with placenta accreta, six failures resulting in hysterectomies were reported (3). In 7 of these 46 cases, combination therapy was used, consisting of triple artery ligation with hypogastric ligation (n = 4), triple artery ligation with the B-Lynch procedure (n = 1), triple ligation with embolization (n = 1), and triple ligation with embolization, in addition to a B-Lynch suture (n = 1). In a case series, 57 postpartum bleeding cases underwent surgical devascularization (23). Devascularization involved bilateral uterine artery ligation, followed by bilateral utero-ovarian ligation. In that study, additional treatment was necessary in 16 of the 57 (28%) patients. This included hypogastric ligation in 1 (1.75%) patient, the B-Lynch procedure in 2 (3.5%) patients, and a hysterectomy in 10 (17.5%) patients (23). In a study of 26 patients with postpartum hemorrhage who were conservatively managed using a combination of the B-Lynch suture and bilateral uterine artery ligation, 2 of the 26 cases also required hypogastric ligation (6). These two patients were transferred to the intensive care unit, but they died 34 hour later from disseminated intravascular coagulopathy (6).

A conservative approach is recommended, even in women who do not want to preserve their fertility, considering the morbidity associated with a cesarean hysterectomy. A U.K. study suggested that the average transfusion requirement in cesarean hysterectomy operations was 10 units of packed red cells and four units of fresh frozen plasma (24). The emergent and sometimes massive transfusion needs of these women necessitate a large blood bank. Many hospitals cannot support blood component requirements of an emergent cesarean hysterectomy for abnormal placentation (25). A total cesarean hysterectomy is difficult and is not chosen in many cases. If extirpative surgery (hysterectomy) is performed for placenta accreta in the lower segment, technical difficulty of total instead of subtotal hysterectomy might result in urologic and hemostasis complications. A total hysterectomy is associated with an increased risk of significant hemorrhage and damage to the urinary and gastrointestinal tract (26, 27).

3.1. Conclusion

According to the American College of Obstetricians and Gynecologists, a cesarean hysterectomy is the treatment of choice for placenta accreta. The present report describes two cases of successful conservative management of placenta accreta, using a combination of the B-Lynch suture and uterine artery ligation. We recommend this approach in particular for unpredicted cases of placenta accreta, which occurs in 25% of abnormal placentation cases

when embolization is not possible (28, 29). Blood bank shortages in local hospitals and Rh-negative blood group leading to serious danger of hypovolemia might guide surgeons to procedures with less blood loss like these. Combination therapy with the B-Lynch procedure and uterine arterial ligation in cases of abnormal placentation might also be strongly considered in fertility preservation, coagulopathy, coexisting medical disease, blood access shortage, low surgical experience, distant local hospitals, and no help.

Two main considerations of these to case presentations are successful outcome in avoid of hysterectomy and use of double conservative therapy in placenta accrete.

Acknowledgments

We thank the clinical research development unit, Imam Hossein hospital, Shahid Beheshti University of Medical Sciences, Tehran, Iran for its support in the submission and revision of the final copy of this manuscript.

References

- Warshak CR, Ramos GA, Eskander R, Benirschke K, Saenz CC, Kelly TF, et al. Effect of predelivery diagnosis in 99 consecutive cases of placenta accreta. *Obstet Gynecol.* 2010;**115**(1):65-9. doi: [10.1097/AOG.0b013e3181c4f12a](https://doi.org/10.1097/AOG.0b013e3181c4f12a). [PubMed: 20027036].
- Wu S, Kocherginsky M, Hibbard JU. Abnormal placentation: twenty-year analysis. *Am J Obstet Gynecol.* 2005;**192**(5):1458-61. doi: [10.1016/j.ajog.2004.12.074](https://doi.org/10.1016/j.ajog.2004.12.074). [PubMed: 15902137].
- Provansal M, Courbiere B, Agostini A, D'Ercole C, Boubli L, Bretelle F. Fertility and obstetric outcome after conservative management of placenta accreta. *Int J Gynaecol Obstet.* 2010;**109**(2):147-50. doi: [10.1016/j.ijgo.2009.12.011](https://doi.org/10.1016/j.ijgo.2009.12.011). [PubMed: 20152971].
- B-lynch C. B-lynch brace suture (Te clinical details) [cited 2003 September 25]. Available from: <http://www.cblynch.com/HTML/technique.html>.
- Hayman RG, Arulkumaran S, Steer PJ. Uterine compression sutures: surgical management of postpartum hemorrhage. *Obstet Gynecol.* 2002;**99**(3):502-6. [PubMed: 11864681].
- Shahin AY, Farghaly TA, Mohamed SA, Shokry M, Abd-El-Aal DE, Youssef MA. Bilateral uterine artery ligation plus B-Lynch procedure for atonic postpartum hemorrhage with placenta accreta. *Int J Gynaecol Obstet.* 2010;**108**(3):187-90. doi: [10.1016/j.ijgo.2009.08.035](https://doi.org/10.1016/j.ijgo.2009.08.035). [PubMed: 19944417].
- Acog Committee on Obstetric Practice . ACOG Committee opinion. Number 266, January 2002 : placenta accreta. *Obstet Gynecol.* 2002;**99**(1):169-70. [PubMed: 1177527].
- American College of Obstetricians and Gynecologists . ACOG Practice Bulletin: Clinical Management Guidelines for Obstetrician-Gynecologists Number 76, October 2006: postpartum hemorrhage. *Obstet Gynecol.* 2006;**108**(4):1039-47. [PubMed: 17012482].
- Soncini E, Pelicelli A, Larini P, Marcato C, Monaco D, Grignaffini A. Uterine artery embolization in the treatment and prevention of postpartum hemorrhage. *Int J Gynaecol Obstet.* 2007;**96**(3):181-5. doi: [10.1016/j.ijgo.2006.12.010](https://doi.org/10.1016/j.ijgo.2006.12.010). [PubMed: 17286979].
- Cottier JP, Fignon A, Tranquart F, Herbreteau D. Uterine necrosis after arterial embolization for postpartum hemorrhage. *Obstet Gynecol.* 2002;**100**(5 Pt 2):1074-7. [PubMed: 12423810].
- Badawy SZ, Etman A, Singh M, Murphy K, Mayelli T, Philadelphia M. Uterine artery embolization: the role in obstetrics and gynecology. *Clin Imaging.* 2001;**25**(4):288-95. [PubMed: 11566093].
- Unal O, Kars B, Buyukbayrak EE, Karsidag AY, Turan C. The effectiveness of bilateral hypogastric artery ligation for obstetric hemorrhage in three different underlying conditions and its impact on future fertility. *J Matern Fetal Neonatal Med.* 2011;**24**(10):1273-6. doi: [10.3109/14767058.2011.574751](https://doi.org/10.3109/14767058.2011.574751). [PubMed: 21557692].
- Washecka R, Behling A. Urologic complications of placenta percreta invading the urinary bladder: a case report and review of the literature. *Hawaii Med J.* 2002;**61**(4):66-9. [PubMed: 12050959].
- Resnik R, Lockwood C, Levine D. Management of placenta accreta, increta and percreta. Uptodate; 2014.
- B. Lynch C, Coker A, Lawal AH, Abu J, Cowen MJ. The B-Lynch surgical technique for the control of massive postpartum haemorrhage: an alternative to hysterectomy? Five cases reported. *Br J Obstet Gynaecol.* 1997;**104**(3):372-5. [PubMed: 9091019].
- Smith KL, Baskett TF. Uterine compression sutures as an alternative to hysterectomy for severe postpartum hemorrhage. *J Obstet Gynaecol Can.* 2003;**25**(3):197-200. [PubMed: 12610671].
- Mazhar SB, Yasmin S, Gulzar S. Management of massive postpartum hemorrhage by "B-Lynch" brace suture. *J Coll Physicians Surg Pak.* 2003;**13**(1):51-2. [PubMed: 12685978].
- Wohlmut CT, Gumbs J, Quebral-Iviev J. B-Lynch suture: a case series. *Int J Fertil Womens Med.* 2005;**50**(4):164-73. [PubMed: 16405101].
- AbdRabbo SA. Stepwise uterine devascularization: a novel technique for management of uncontrolled postpartum hemorrhage with preservation of the uterus. *Am J Obstet Gynecol.* 1994;**171**(3):694-700. [PubMed: 8092217].
- O'Leary JL, O'Leary JA. Uterine artery ligation for control of postcesarean section hemorrhage. *Obstet Gynecol.* 1974;**43**(6):849-53. [PubMed: 4597790].
- Bretelle F, Courbiere B, Mazouni C, Agostini A, Cravello L, Boubli L, et al. Management of placenta accreta: morbidity and outcome. *Eur J Obstet Gynecol Reprod Biol.* 2007;**133**(1):34-9. doi: [10.1016/j.ejogrb.2006.07.050](https://doi.org/10.1016/j.ejogrb.2006.07.050). [PubMed: 16965851].
- Bakri YN, Amri A, Abdul Jabbar F. Tamponade-balloon for obstetrical bleeding. *Int J Gynaecol Obstet.* 2001;**74**(2):139-42. [PubMed: 11502292].
- Sentilhes L, Trichot C, Resch B, Sergeant F, Roman H, Marpeau L, et al. Fertility and pregnancy outcomes following uterine devascularization for severe postpartum haemorrhage. *Hum Reprod.* 2008;**23**(5):1087-92. doi: [10.1093/humrep/den049](https://doi.org/10.1093/humrep/den049). [PubMed: 18321892].
- Knight M. Peripartum hysterectomy in the UK: management and outcomes of the associated haemorrhage. *BJOG.* 2007;**114**(11):1380-7. doi: [10.1111/j.1471-0528.2007.01507.x](https://doi.org/10.1111/j.1471-0528.2007.01507.x). [PubMed: 17877772].
- Wright JD, Pri-Paz S, Herzog TJ, Shah M, Bonanno C, Lewin SN, et al. Predictors of massive blood loss in women with placenta accreta. *Am J Obstet Gynecol.* 2011;**205**(1):38 e1-6. doi: [10.1016/j.ajog.2011.01.040](https://doi.org/10.1016/j.ajog.2011.01.040). [PubMed: 21419387].
- Kayem G, Davy C, Goffinet F, Thomas C, Clement D, Cabrol D. Conservative versus extirpative management in cases of placenta accreta. *Obstet Gynecol.* 2004;**104**(3):531-6. doi: [10.1097/01.AOG.0000136086.78099.0f](https://doi.org/10.1097/01.AOG.0000136086.78099.0f). [PubMed: 15339764].
- Kwee A, Bots ML, Visser GH, Bruinse HW. Emergency peripartum hysterectomy: A prospective study in The Netherlands. *Eur J Obstet Gynecol Reprod Biol.* 2006;**124**(2):187-92. doi: [10.1016/j.ejogrb.2005.06.012](https://doi.org/10.1016/j.ejogrb.2005.06.012). [PubMed: 16026917].
- Comstock CH. Antenatal diagnosis of placenta accreta: a review. *Ultrasound Obstet Gynecol.* 2005;**26**(1):89-96. doi: [10.1002/uog.1926](https://doi.org/10.1002/uog.1926). [PubMed: 15971281].
- Comstock CH, Love JJ, Bronsteen RA, Lee W, Vettraino IM, Huang RR, et al. Sonographic detection of placenta accreta in the second and third trimesters of pregnancy. *Am J Obstet Gynecol.* 2004;**190**(4):1135-40. doi: [10.1016/j.ajog.2003.11.024](https://doi.org/10.1016/j.ajog.2003.11.024). [PubMed: 15118654].