

Surgical Management of Postpartum Haemorrhage: Analysis of 14 Cases

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OBJECTIVE: The aim of this study was to present our experience with surgical management of postpartum haemorrhage (PPH).

STUDY DESIGN: Data of 14 cases with surgically managed PPH were retrospectively analyzed. Maternal characteristics, the indication for surgery, estimated blood loss, postoperative complications were recorded.

RESULTS: During the study period there were six postpartum hysterectomies, three hysterectomies together with internal iliac artery ligation (IHAL) and five women had IHAL in our unit. The incidence of peripartum hysterectomy due to PPH was 0.40/1000 deliveries and the incidence of IHAL due to PPH was 0.53/1000 deliveries. Three out of eight women where IHAL was performed also required hysterectomy to arrest bleeding, giving an overall uterine preservation rate of 62.5%. The main indications for postpartum hysterectomy and/or IHAL were uterine atony in 12 cases (85 %) and uterine rupture in two cases (15 %). Mean estimated blood loss was 2732.1±1080.5 mL (range 1200-4500). There was one maternal death (%7) due to hypovolemic shock during postpartum hysterectomy for uterine atony.

CONCLUSION: Uterine atony is the main indication for postpartum hysterectomy and/or IHAL. IHAL is an effective procedure to control PPH. In failed cases, emergency obstetric hysterectomy remains an essential life-saving procedure.

Key Words: Postpartum haemorrhage, Internal iliac artery ligation, Peripartum hysterectomy, Uterine atony

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Introduction

Postpartum hemorrhage (PPH) is an unpredictable and rapid cause of maternal morbidity and mortality in the world. The incidence of death due to postpartum hemorrhage is at least 100 times higher in developing countries than in developed countries.^{1,2} PPH is responsible for over 125 000 maternal mortalities annually and leads to morbidity in 20 million women per year.³ Postpartum hemorrhage accounts for 12.3% of maternal deaths in our country.⁴ Major PPH or loss of more than 1000 mL blood occurs in 1-5% of deliveries.⁵ The most common cause of PPH is uterine atony, which is responsible for 80% of cases.⁶ Other causes of PPH encompass lower gen-

ital tract lacerations, retained placental products, uterine rupture and coagulopathies.

First-line treatment of PPH involves administration of uterotonic agents such as oxytocin, ergotamine and prostaglandin as well as fundal massage, manual exploration of the uterus, and surgical repair of lacerations.⁷ When PPH continues despite aggressive medical treatment, surgical intervention should be considered. Traditional surgical treatment is to carry out an emergency hysterectomy.⁸ Most common indications for emergency postpartum hysterectomy are uterine atony and uterine rupture.^{9,10} However, recently placenta accreta has been reported as the most common indication and is most likely related to an increase in number of cesarean deliveries observed over the past two decades.^{11,12} Internal iliac artery ligation (IHAL) is an alternative to hysterectomy and has the advantage of preserving future fertility and normal pelvic function.¹³ Additionally other treatments, such as recombinant activated VIIa, uterine tamponade procedures, uterine artery embolisation, uterine artery ligation and uterine brace sutures, have been introduced to prevent severe PPH and hysterectomy.¹⁴ While risk factors for postpartum hemorrhage, like multiple pregnancies, macrosomia, previous PPH, operative vaginal deliveries, caesarean section (C/S), induction of

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labour and operative vaginal deliveries are well described, many patients who develop this complication have no known antenatal risk factors. Therefore, the attending physician must be prepared for possible PPH in every delivery.

The purpose of this retrospective study was to determine the incidence, indications, risk factors, maternal outcomes and complications associated with postpartum hysterectomy and IIAL for PPH at our institution.

Material and Methods

This retrospective study included the medical records of all patients who underwent postpartum hysterectomy and/or IIAL for PPH from January 1, 2005 to June 30, 2008 at the University of Erciyes, Faculty of Medicine, Department of Obstetrics and Gynecology. During the study period, 14 cases underwent emergency postpartum hysterectomy and/or IIAL. IIAL and/or postpartum hysterectomy was performed for hemorrhage which could be controlled with other conventional treatments defined as the bimanual massage of uterus, use of blood components and uterotonics. When these interventions failed to control PPH, surgical exploration was performed. A median infraumbilical incision was preferred when rapid access was necessary in high risk situations such as uterine rupture or shock. Otherwise a Pfannenstiel incision was employed. After abdominal entry the pelvic peritoneum was incised just lateral to the infundibulopelvic ligament. The ureter was identified and retracted medially. The fascia around the internal iliac artery was dissected and a right-angled clamp was passed below the internal iliac artery about 4 cm distal to the bifurcation. The internal iliac artery was ligated doubly

using an absorbable suture material (polyglactin no:1). Hysterectomy was performed if bleeding continued after IIAL. In some cases hysterectomy was carried out without attempting IIAL. Maternal characteristics such as age, parity, gestational age and mode of delivery were recorded. The indication for surgery, type of hysterectomy, additional procedures, estimated blood loss, postoperative complications and postoperative hospitalization days were extracted from the medical records. Seriously ill patients, who required intensive care, were transferred to the intensive care unit.

Results

There were a total of 7429 deliveries during the study period; there were six postpartum hysterectomies, three hysterectomies together with IIAL and five women had IIAL only. Six women delivered in our hospital, and IIAL (n=3), total abdominal hysterectomy (TAH) (n=2) and subtotal hysterectomy together with IIAL (n=1) were performed in these patients. The incidence of peripartum hysterectomy due to PPH was 0.40/1000 deliveries and the incidence of IIAL due to PPH was 0.53/1000 deliveries. The remaining eight women gave birth in other hospitals and were referred to our unit due to PPH. The referred patients were managed with IIAL (n=1), TAH (n=2), subtotal hysterectomy (n=2), uterine rupture repair together with IIAL (n=1), TAH + IIAL (n=1) and subtotal hysterectomy + IIAL (n=1). Three out of eight women, who were treated with IIAL also required hysterectomy to arrest bleeding, giving an overall uterine preservation rate of 62.5%. Characteristic features and follow-up of the patients were summarized in Table 1.

Table 1: Characteristic features and follow-up of the patients undergoing hysterectomy and/or IIAL

Case	Gestational age (week)	Mode of delivery	Cause of PPH	of Procedure	Blood transfusion (unit)	Admission to ICU (days)	Complications
1	39	C/S, prolonged labour	ATONY	STAH	15	3	-
2	29	C/S,ablation placenta	ATONY	IIAL	6	8	infection
3	38	SVD	RUPTURE	TAH	2	-	-
4	38	SVD	ATONY	TAH	8	EXITUS	-
5	42	SVD	RUPTURE	Primer repair + IIAL	7	-	-
6	40	SVD	ATONY	TAH	10	-	-
7	36	C/S, previous Myomectomy	ATONY	TAH	3	3	ileus
8	38	SVD	ATONY	TAH+IIAL	15	10	renal failure
9	39	SVD	ATONY	IIAL	8	-	-
10	37	SVD	ATONY	IIAL	6	-	-
11	38	C/S, previous C/S	ATONY	STAH	12	7	renal failure
12	37	SVD	ATONY	IIAL	15	5	ileus
13	37	C/S, placenta previa	ATONY	STAH+ IIAL	10	2	ileus
14	38	C/S, CPD	ATONY	STAH+ IIAL	21	10	infection

SVD: Spontaneous vaginal delivery, **C/S:** Cesarean section, **ICU:** Intensive care unit, **CPD:** Cefalopelvic disproportion, **TAH:** Total abdominal hysterectomy, **STAH:** Subtotal hysterectomy, **IIAL:** Internal iliac artery ligation

The mean maternal age, mean gestational age and mean parity were 28.1 ± 5.4 years (range 19-37), 37.6 ± 2.9 weeks (range 29-42) and 1.9 ± 1.2 (range 0-4), respectively. The route of delivery was vaginal in 8 (57%) and abdominal in 6 patients (43%). The main indications for postpartum hysterectomy and IIAL were uterine atony in 12 (85 %) and uterine rupture in two cases (15%). Induction of labour with oxytocin had been performed for postterm pregnancy in one case with uterine rupture. Primer repair and IIAL were performed successfully in this patient. Spontaneous uterine rupture occurred in one patient with an unscarred uterus. Subtotal hysterectomy was performed in four cases due to uterine atony. TAH was performed in five patients due to atony ($n=4$) or uterine rupture ($n=1$). Mean estimated blood loss was 2732.1 ± 1080.5 mL (range 1200-4500). The mean amount of blood transfusion was 9.9 ± 5.3 units (range 2-21). Eight patients were admitted to the intensive care unit for a mean of 3.4 ± 3.9 days (range 0-10). Post-operative complications included acute renal failure ($n=2$), infection ($n=2$) and ileus ($n=3$). All of these patients recovered with medical treatment. There was one maternal death (7%) due to hypovolemic shock during postpartum hysterectomy for uterine atony. No patient required a second surgery after initial operation. There were 13 live births and 1 stillbirth.

Discussion

PPH remains one of the major causes of maternal morbidity and mortality. One of the reasons that raise the rate of morbidity and mortality could be the delay in performing surgical techniques when medical measures have failed.^{15,16} Emergency postpartum hysterectomy is the most commonly preferred choice and a life-saving procedure in this situation. The most common indication for these procedures is severe uterine haemorrhage that cannot be controlled by conservative measures. Such haemorrhage may be due to an abnormally adherent placenta, uterine atony, uterine rupture, coagulopathy or laceration of pelvic vessels during vaginal delivery. The reported incidence of emergency hysterectomy varies in the literature from 0.2 to 1.5 per 1000 deliveries.^{17,18} Our results were in accordance with many of these studies. Guney et al.¹⁹ reported an incidence of emergency peripartum hysterectomy at 0.8 per 1000 deliveries during a nine year period. They performed 28 emergency hysterectomies for uterine atony in 18 cases (64%), uterine rupture in 6 cases (21%) and placenta accreta in 4 cases (14%).

Uterine atony constituted still the leading cause of primary postpartum hemorrhage and the main indication for emergency postpartum hysterectomy in this study. The combination of high parity, C/S, placenta previa, ablatio placenta, prolonged labour and cefolopelvic disproportion were identified as risk factors. Other risk factors for uterine atony are aug-

mented labour, retained placenta, placenta accreta, multiple pregnancy, polyhydramnios and precipitate labour. However, the rate of hysterectomies due to placenta accreta has been increasing recently. This is attributed to the increasing C/S rate (mainly with a previous C/S and increasing maternal age) and to a relative decrease of the hysterectomy rate due to the successful medical treatment of uterine atony.

This study identified surgical deliveries, uterine rupture and uterine atony as risk factors for emergency postpartum hysterectomy. The major indications for postpartum hysterectomy and IIAL were uterine atony. Uterine atony was detected in 85% of our patients. This rate is in concordance with those of others.^{10,20} In half of the cases uterine atony developed after C/S, whereas the other half occurred after vaginal delivery. At our institution, these patients were managed initially with bimanual uterine massage, intravenous oxytocin and/or ergometrine, replacement of blood volume with crystalloids, colloids and blood transfusion. Rectal misoprostol was also used for treatment if uterine atony persisted. Surgery was considered when these conservative treatments have failed.

Studies have suggested that subtotal hysterectomy is a preferable alternative to total hysterectomy, because it is safer, quicker and easier to perform and is indicated in cases in which the source of bleeding is from the upper uterine segment.²¹ Hence, it is not useful in cases of PPH due to placenta praevia or when cervical or upper vaginal tears are involved; in such cases, a TAH is necessary to arrest haemorrhage.^{20,22} Therefore, in our study, subtotal hysterectomy was performed in four patients (44%) and total abdominal hysterectomy in five patients (56%). Only one patient died during TAH due to uterine atony. There were no surgical complications occurred during hysterectomy. However, in our study, there were more intensive care unit admissions and blood transfusions in the subtotal hysterectomy group.

The use of hysterectomy to control bleeding in young women of low parity is undesirable and other methods may be used in selected cases to control PPH. Uterine tamponade can be attempted by applying pressure to the placental site and to arrest bleeding with the aid of uterine packs or various balloons, if bleeding persists despite conservative measures. This procedure successfully controls bleeding in approximately 70-80% of the cases. These balloons include Foley's catheter, Sengstaken-Blakemore tube, Bakri SOS' balloon.²³ However, if uterine tamponade fails to control the haemorrhage, then the patient often needs further surgical intervention like IIAL or pelvic arterial embolization.

Compression sutures include the 'B-Lynch' suture, horizontal and vertical brace sutures and various modifications including Cho's multiple square technique.²⁴⁻²⁶ The main aim of these compression sutures is to control bleeding from the pla-

central site, by apposing the anterior and posterior uterine walls together. The rate of successfully control of bleeding is approximately 85%. Uterine necrosis, intrauterine fibrous bands, abdominal adhesions and pyometria are noted complications of these procedures.

If bleeding persists, systematic pelvic devascularization can be attempted by ligation of uterine and internal iliac arteries. The physiology of the procedure is explained by the fact that the major proportion of the blood supply to the pelvic viscera is via branches of the internal iliac artery. Bilateral IIAL minimizes the pulse pressure of the arterial system, converting it to a venous-like system. This reduces bleeding by facilitating clot formation distal to the site of ligation.^{8,27} Bilateral iliac artery ligation is an alternative to hysterectomy, a life-saving procedure, which has the advantage of preserving fertility and normal pelvic function. It is reported to be effective in up to 75% of cases. It has the advantage that it preserves fertility, which is particularly important in young women of low parity. Therefore, we performed this procedure in seven young patients for treatment of PPH due to uterine atony who had also low parity. Primer uterine repair and hypogastric arter ligation were also performed in one patient for treatment of uterine rupture. However, three women required hysterectomy after IIAL to control hemorrhage. Joshi et al.⁵ performed IIAL in 84 patients with PPH and their uterine salvage rate was 60.7%. Our uterine preservation rate was 62.5%. IIAL requires the attendance of a skilled surgeon and may not be the procedure of choice in the setting of massive haemorrhage and an unstable patient as it may be associated with a substantial failure risk. No surgical complication occurred after hypogastric arter ligation in our series.

Maternal complications occurred in seven patients in our series. All of these patients needed postoperative intensive care admission. Ileus, acute renal failure and infection were the most important complications. Hypovolemia, massive blood transfusion and admission of intensive care unit were adopted most important risk factors for developing these medical complications. However, all of these complications were treated successfully. Only one woman, who was operated for uterine atony, died intraoperatively. Our maternal mortality rate was 7%, which is comparable with that of other studies.^{28,29}

Finally, our study found that uterine atony is the main indication for postpartum hysterectomy and IIAL. Emergency obstetric hysterectomy remains an essential life-saving procedure for treatment of uterine atony. All obstetricians should be adequately trained to perform the B-Lynch procedure, emergency hysterectomy and other complicated procedures such as IIAL to control PPH. Effective antenatal care, identification of patients at risk, enhancement of blood transfusion facilities, together with improvement of surgical skills are important to

reduce the morbidity associated with PPH. The most important step in prevention of major postpartum hemorrhage is early recognizing and assessing women's risk.

Postpartum Kanamanın Cerrahi Yönetimi:

14 Olgunun Analizi

AMAÇ: Bu çalışmanın amacı, postpartum kanamanın (PPK) cerrahi yönetimi ile ilgili tecrübelerimizi sunmaktır.

GEREÇ VE YÖNTEM: PPK nedeni ile cerrahi uygulanan 14 hasta çalışmaya dahil edildi. Maternal özellikler, cerrahinin endikasyonu, tahmini kan kaybı miktarı ve operasyon sonrası komplikasyonlar kaydedildi.

BULGULAR: Hastalardan altısında postpartum histerektomi, üçünde postpartum histerektomi ile birlikte internal iliak arter ligasyonu (IIAL) ve beşine IIAL yapıldı. PPK nedeni ile postpartum histerektomi insidansı 0.40/1000 doğum, IIAL insidansı ise 0.53/1000 doğum olarak bulundu. IIAL yapılan hastalardan üçünde kanamanın kontrolü için histerektomi yapılması gerektiği ve IIAL'nin histerektomiye önlemede başarısı % 62.5 olarak bulundu. Postpartum histerektomi ve/veya IIAL için endikasyon 12 olguda (% 85) uterin atoni, iki olguda (% 15) ise uterin rüptürü idi. Ortalama kan kaybı 2732.1±1080.5 mL (1200-4500 arasında) bulundu. Uterin atoni nedeni ile histerektomi yapılan bir hasta hipovolemik şok nedeni ile kaybedildi ve maternal mortalite oranı %7' idi.

SONUÇ: Postpartum histerektomi ve/veya IIAL için en sık neden uterin atoni dir. IIAL PPK'nın kontrolünde etkili bir yöntemdir. Bunun başarılı olmadığı durumlarda, acil histerektomi hayat kurtaran bir müdahaledir.

Anahtar Kelimeler: Postpartum kanama, İnternal iliak arter ligasyonu, Peripartum histerektomi, Uterin atoni

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