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ORIGINAL ARTICLE

Emergency Peripartum Hysterectomy in a Tertiary Care Hospital in Saudi Arabia

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Abstract

Purpose Post-partum hemorrhage remains an important cause of significant maternal morbidity and mortality throughout the world. The objective of this study was to review the incidence, indications, predisposing factors, and associated complications of emergency peripartum hysterectomy.

Methods This is a retrospective observational study done in a Tertiary Care Center, Riyadh, Saudi Arabia, between 1983 and 2006. Women who underwent emergency peripartum hysterectomy after cesarean delivery or following vaginal birth due to severe post-partum hemorrhage who did not respond to conservative treatment were included in the study. Data were abstracted from chart reviews. Descriptive analysis was carried out to summarize relevant variables. Primary outcomes included indications, risk factors, maternal morbidity, and mortality.

Results There were 66 emergency peripartum hysterectomies among 155,857 deliveries, which yielded an incidence of 0.04 %. Prior cesarean delivery was present in 88 % of the patients; a majority of the patients were grandmultiparous, Para $\geq$ 6 (65 %). The incidence of hysterectomy after cesarean delivery was much higher than after vaginal delivery (0.3 vs. 0.01 %). Common indications included placenta accreta (65 %), uterine atony (27 %), and uterine rupture (8 %). The majority of the study cohort (64 %) had undergone total hysterectomy. Post-operatively, 25 patients (38 %) developed DIC, 32 (48.5 %) had febrile illnesses, and 22 (33 %) experienced injury to the urinary tract. The maternal mortality in this study was 4.5 %.

Conclusions Hysterectomy for the control of obstetric hemorrhage is usually associated with significant mortality and morbidity. Prompt intervention to include peripartum hysterectomy may likely decrease the rate of maternal deaths and significant maternal morbidity.

Keywords Obstetric · Hysterectomy · Emergency · Risk factors · Outcome

Abbreviations

TAH	Total hysterectomy
STH	Subtotal hysterectomy

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BHAL Bilateral hypogastric artery ligation
DIC Disseminated intravascular coagulation
VVF Vesico-vaginal fistula

Introduction

Peripartum hysterectomy is usually carried out as a last resort in uncontrollable life-threatening obstetric hemorrhage. It is an indispensable life-saving procedure in this clinical scenario. Even in modern day obstetric practice, post-partum hemorrhage (PPH) remains an important cause of significant maternal morbidity and mortality throughout the world. According to the most recent report from the U.K. Confidential Enquiry into Maternal and Child Health, the number of maternal deaths due to hemorrhage has increased [1]. Similarly, in Saudi Arabia, between 1989 and 1992, PPH was identified as being the primary cause of maternal deaths [2]. There are at least two major reasons that can account for the continuing high prevalence of this complication. First, high-risk patients with grandmultiparity and a high number of prior cesarean sections are commonly encountered in Saudi Arabia. This population is at risk for uncontrollable PPH related to uterine atony and placenta previa/accreta. Second, there is a general reluctance to undertake fertility control surgical treatments, which may limit family size, because of the social preference for large families. With this background, the objective of this study was to examine the incidence, indications, predisposing factors, associated complications, morbidity, and mortality of emergency peripartum hysterectomies at our tertiary care institution, King Abdulaziz Medical City (KAMC) in Riyadh, Saudi Arabia, over a 24-year period from 1983 to 2006.

Materials and Methods

A retrospective chart review of all patients who underwent emergency peripartum hysterectomy after cesarean delivery or following vaginal delivery due to PPH who did not respond to conservative treatment at KAMC between 1983 and 2006 was carried out. The study was approved by the institutional review board. Hysterectomies performed for an associated gynecological condition were not included in the study. Patients were included in the review after more than 24 weeks of gestation. Data abstracted from chart reviews included detailed demographic data, such as age, parity, gestational age, number of previous cesarean deliveries, the presence of placenta previa/accreta, relevant pathologic variables, and mode of delivery. Information on the primary indication and the type of hysterectomy performed was included also. The fetal outcomes, operative time, estimated blood loss, amount of blood transfusion, need for additional surgery, post-operative complications, duration of hospital stay, and maternal deaths were also recorded. All operations were performed by a consultant and a registrar with help from the gyne-oncologist when required. The strategy for blood and blood product transfusion was mainly decided upon by the anesthetist. In most cases, packed red blood cells were transfused. Febrile illness was defined as two temperature readings $\geq$ 38 °C, at least 6 h apart. Any rise in temperature during the first 24 h was excluded.

Descriptive analyses were carried out to summarize relevant variables. In addition, the association between categorical variables was examined using the Chi square test or Fisher's exact test, as appropriate. Continuous variables were compared using Student's *t*-test. A *P*-value of <0.05 was considered to be statistically significant. Data management and analyses were carried out using the Statistical Package for Social Sciences (SPSS) software, version 17.

Results

Between 1983 and 2006, there were 155,857 deliveries at KAMC. Sixty-six patients underwent emergency peripartum hysterectomies, yielding an incidence of 0.04 %. Thirteen (0.01 %) patients underwent hysterectomies following vaginal delivery and 53 (0.30 %) patients underwent the procedure following cesarean delivery. The incidence of cesarean hysterectomy was much higher than that of hysterectomy following vaginal delivery. Age distribution among 66 patients who underwent emergency peripartum hysterectomy revealed that 10 (0.01 %) were below the age of 30 years, 42 (0.07 %) were between 31 and 40 years of age, and 14 (0.21 %) were above the age of 40 years. The age-specific risks showed a rising trend in the frequency of hysterectomy with increasing age. The parity-related distribution showed that 23 (0.02 %) patients were between para 1 and 5, and 43 (0.14 %) patients were grandmultiparae ($\geq$para 6). The parity-specific risk of hysterectomy was much higher in grandmultiparity. The age- and parity-specific distributions are shown in Table 1.

The most common indication of emergency peripartum hysterectomy was placenta accreta (65 %) followed by uterine atony (27 %) and uterine rupture (8 %). The analysis of risk factors showed that 53 (80.3 %) patients underwent cesarean delivery at the time of the index pregnancy. Forty-nine of 53 (92.5 %) patients underwent elective cesarean section as majority in this group (84 %) had combination of placenta previa, accreta and prior

Table 1 Hysterectomy: age and parity distribution and the incidence of hysterectomy according to mode of delivery

	Total deliveries $N = 155,857$	Emergency hysterectomies $N = 66$ N (%)
Age		
<20	10,747	0
20–30	81,033	10 (0.012)
31–40	57,341	42 (0.073)
>40	6,736	14 (0.21)
Parity		
0	13,305	0 (0.00)
1–5	111,638	23 (0.021)
≥6	30,914	43 (0.14)
Mode of delivery		
Vaginal	136,389	13 (0.01)
Cesarean	19,468	53 (0.30)

cesarean delivery. Four of 53 (7.5 %) patients underwent emergency cesarean section for failed vaginal birth after cesarean delivery. Fifty-eight (88 %) patients had undergone prior cesarean delivery. Twenty-two (33.3 %) of them had one prior cesarean, 14 (21.2 %) had two prior cesareans, and another 22 (33.3 %) had 3 or more prior cesarean sections. Placenta accreta and previa were present in 43 (65 %) and 41 (62 %) patients, respectively. Forty-three (65 %) of the patients were grandmultiparous (para ≥ 6). Prior curettage was present in 31 (47 %) of the patients (Table 2).

Table 3 illustrates the association of previous cesarean section with placenta accreta and placenta previa. The prevalence of placenta accreta was 46, 86, and 86 % for those with 1, 2, and 3 or more prior cesarean deliveries, respectively, with a *P*-value of 0.001. A similar trend was observed for placenta previa, where it was found that the percentages were 50, 64, and 91 % for 1, 2, and 3 or more prior cesarean deliveries, respectively, with a *P*-value of 0.001. Moreover, additional analysis showed that forty of 43 (93 %) patients with placenta accreta had undergone prior cesarean delivery and placenta previa. Two cases of placenta accreta with no previous uterine surgery were grandmultiparous, and one was associated with placenta previa. The other patient with placenta accreta had undergone a prior cesarean delivery, but did not present placenta previa (data not shown).

Table 4 stratifies the type of hysterectomy according to indications. Forty-two (64 %) of the patients underwent total hysterectomy (TAH) and 24 (36 %) underwent subtotal hysterectomy (STH). Thirty of 43 patients (70 %) with placenta accreta underwent TAH and 13 patients (30 %) underwent STH. Ten of 18 patients (56 %) with uterine atony underwent STH and 8 (44 %) underwent TAH. The majority of patients (80 %) with uterine rupture underwent TAH.

Table 2 Risk factors for hysterectomy ($n = 66$)

Risk factor	Emergency hysterectomies $n = 66$ N (%)
Cesarean section in index pregnancy	53 (80.3)
Prior cesarean delivery	
No CS	8 (12.1)
Prior 1 CS	22 (33.3)
Prior 2 CS	14 (21.2)
Prior ≥ 3 CS	22 (33.3)
Accreta	
Yes	43 (65.2)
No	23 (34.8)
Previa	
Yes	41 (62.1)
No	25 (37.9)
Grand multiparity > 6	
Yes	43 (65)
No	23 (35)
Prior uterine curettage	
Yes	31 (47)
No	35 (53)

CS cesarean section

Bilateral hypogastric artery ligation (BHAL) was performed in 15 (22.7 %) patients. The procedure was performed in nine patients for placenta accreta and in six patients for uterine atony. Ten (15 %) patients underwent uterine artery ligation, six for uterine atony and four for placenta accreta. Seven (10.6 %) patients underwent preoperative internal iliac artery balloon placement. Intervention radiologists positioned the balloons, which were inflated after delivery of the fetus and before hysterectomy, to limit blood loss. All these cases had placenta accreta.

Table 5 presents in detail the clinical parameters related to emergency TAH and STH. Mean estimated blood loss, injuries to the urinary tract, and febrile illness were significantly higher after TAH than STH. Admission to the ICU and the need for re-exploration were higher after TAH, but this trend did not reach statistical significance.

Table 6 illustrates the prevalence of maternal morbidities and mortality. Ten patients (15 %) developed intraperitoneal hemorrhage after hysterectomy and required re-exploration. Two of these patients developed pelvic hematoma after TAH. The evacuation of hematoma and BHAL successfully stopped the bleeding. Six of 13 patients required one or both adnexa to be removed to insure

Table 3 The association between prior cesarean delivery with placenta accreta and previa

	Prior CS				*p* value
	No CS	1 CS	2 CS	≥3 CS	
Accreta					
Yes	2 (25.0 %)	10 (45.5 %)	12 (85.7 %)	19 (86.4 %)	0.001
No	6 (75.0 %)	12 (54.5 %)	2 (14.3 %)	3 (13.6 %)	
Previa					
Yes	1 (12.5 %)	11 (50.0 %)	9 (64.3 %)	20 (90.9 %)	0.001
No	7 (87.5 %)	11 (50.0 %)	5 (36.7 %)	2 (9.1 %)	

CS cesarean section

p-values were calculated by Fisher's exact test

Table 4 Indications and types of hysterectomy

	TAH $N = 42$	STH $n = 24$	*p* value
Hysterectomy indication			
Accreta *N* (%)	30 (71.4)	13 (54.2)	0.13
Atonic uterus *N* (%)	8 (19.0)	10 (41.7)	
Uterine rupture *N* (%)	4 (9.5)	1 (4.2)	

TAH total hysterectomy, *STH* subtotal hysterectomy

p-value was calculated by Fisher's exact test

hemostasis from vascular pedicles at the time of re-exploration. Two patients had active bleeding from the vaginal vault requiring hemostatic sutures to be placed. In this series, 25 (38 %) patients developed disseminated intravascular coagulation (DIC). Coagulopathy was successfully corrected in twenty-three of 25 (92 %) patients with DIC. Two patients with DIC resulted in maternal death along with other factors. Thirty-two (48.5 %) patients had febrile illnesses, twenty-two (33 %) patients had bladder injury, and four (6 %) patients sustained ureteric injury. One of the 22 patients who had bladder injury during hysterectomy developed a vesico-vaginal fistula (VVF) post-operatively. One other patient developed a uretero-vaginal fistula due to an undiagnosed ureteric injury at the time of surgery. One or both adnexa had to be removed in thirteen patients (20 %) because of bleeding. In addition, there were three maternal deaths. One patient was a grandmultipara who had previously undergone cesarean delivery and at the time decided to deliver at home. She was brought to the hospital in a state of shock with a retained placenta. Immediate laparotomy showed uterine rupture secondary to placenta percreta. She had STH, but did not recover from irreversible shock. The second maternal death happened in a woman with history of three prior cesarean deliveries who had undergone elective cesarean section for placenta previa at 38 weeks. Post-operatively, the patient developed intra-peritoneal hemorrhage. She underwent re-laparotomy, STH, and BHAL. This patient expired due to irreversible shock and DIC 15 h after the second laparotomy. The third patient was a grandmultiparous patient who required a ventouse delivery. She developed severe atonic PPH and shock. STH and BHAL were performed, but the patient expired due to severe blood loss, hypotension, and coagulopathy.

Discussion

The prevalence of peripartum hysterectomy varies in different parts of the world depending partly on the acceptability of family planning, healthcare resources, socio-economic status, standard of obstetric care, and local culture.

The overall incidence of peripartum hysterectomy (0.04 %) in our institution was significantly less as

Table 5 Operative management: clinical correlates and complications

Observation	TAH $n = 42$	STH $n = 24$	*p*-value
Operative time (h), mean (sd)	3.6 (1.2)	3.3 (1.5)	0.43
Estimated blood loss (ml), mean (sd)	5,449 (4264)	3,856 (2096)	0.05
Blood transfusion (ml), mean (sd)	2,875 (1786)	2,343 (1778)	0.25
Intra-operative hypotension, *N* (%)	30 (71.4)	16 (66.7)	0.69
Injury to the urinary tract, *N* (%)	20 (9.5)	4 (0)	0.01
Febrile illness, *N* (%)	25 (59.5)	7 (29.2)	0.02
ICU admission, *N* (%)	22 (52.4)	10 (41.7)	0.40
Re-exploration, *N* (%)	9 (21.4)	1 (4.2)	0.08
Mean hospital stay (days), mean (sd)	11.0 (4.3)	10.7 (8.3)	0.89

TAH total hysterectomy, *STH* subtotal hysterectomy

p-values were calculated by Student's *t*-test or the Chi square test

Table 6 Maternal morbidity and mortality ($N = 66$)

Complications	Emergency hysterectomies *N* (%)
Intra-peritoneal bleeding/re-exploration	10 (15.2)
DIC	25 (37.9)
Febrile illness	32 (48.5)
Injury to the bladder	22 (33.3)
Ureteric injury	4 (6.1)
Loss of both adnexa	6 (9.1)
Loss of one adnexa	7 (10.6)
VVF	1 (1.5)
UVF	1 (1.5)
Maternal mortality	3 (4.5)

DIC disseminated intravascular coagulation, *VVF* vesico-vaginal fistula, *UVF* uretero-vaginal fistula

compared to previously reported studies [3–8]. This may be explained by the culture here, which favors continued fertility and resents hysterectomy. There was no difference between the incidence of cesarean hysterectomy (0.3 %) and hysterectomy following vaginal delivery (0.01 %) observed here as compared to other reports [3, 7, 9, 10].

The rate of emergency hysterectomy increased with increasing age and parity, which is consistent with other large studies [5, 8]. The parity-related increase can be explained by its association with placenta previa, number of prior cesarean deliveries, and higher incidence of uterine atony. Based on the cases presented here, we cannot comment on the effect of parity per se as a risk factor for emergency hysterectomy because the majority of grand-multiparous patients (97 %) also had other risk factors such as prior cesarean delivery and placenta previa/accreta. (Confounding variables were not addressed.)

The present study identified placenta accreta as the major reason for hysterectomy, which is consistent with other studies [4–7, 9]. Clark et al. [3] reported uterine atony as the most common indication of peripartum hysterectomy followed by placenta accreta from 1978 to 1982. Korejo et al. [8] and Chestnut et al. [11] reported uterine rupture as the major indication followed by uterine atony and placenta accreta. The increase in peripartum hysterectomy for placenta accreta in our cohort could be explained by the increased number of patients who had undergone prior cesarean deliveries (88 %). The availability of better treatment for uterine atony with a prostaglandin preparation may contribute to the decreased need for hysterectomy due to uterine atony.

The association among previous cesarean section, placenta previa, and placenta accreta is well established. Clark et al. [3] reported that in patients with placenta previa, the risk of having placenta accreta increased from 24 % with one prior cesarean delivery to 67 % with three or more prior cesareans. The report by Silver et al. [12] confirmed this association. Our study showed a similar relationship. The incidence of placenta accreta was 17 % in the presence of placenta previa in women with one prior cesarean delivery. This value increased to 33 % in women with three or more cesarean deliveries. With increasing rates of cesarean section observed worldwide, the incidence of these complications is likely to increase. The use of sonography, color-flow Doppler, and magnetic resonance imaging can help in the early diagnosis of placenta accreta in women with placenta previa who have also undergone a previous cesarean delivery or uterine surgery. This helps the clinician to plan the surgery as well as counsel the patient preoperatively. When performed electively without attempting to remove the placenta, cesarean hysterectomy is associated with reduced maternal morbidity and mortality [13].

The present study reports more frequent use of TAH than STH (64 vs. 36 %), which is similar to certain reports [5, 9, 10, 12], whereas others [3, 4, 14, 15] reported equal frequencies of TAH and STH. We performed TAH more frequently (the difference was not statistically significant) than STH due to bleeding from the lower segment, as our major indication of hysterectomy was placenta accreta, a lower-segment disease that is more likely to be cured by TAH. However, we performed STH in 13 (54 %) patients with placenta accreta where bleeding was not much of a problem and TAH in 8 (19 %) patients with atonic uteri. The latter is an upper-segment problem that can be more easily resolved with STH. The type of hysterectomy—whether total or subtotal—is dictated primarily by the condition of the patient. In a desperate situation with excessive bleeding, STH is commonly performed as it is technically easier, requires a shorter operative time, and has less blood loss and fewer post-operative complications. We did not find any significant differences in operative time, blood transfusion, ICU admission, re-exploration, or duration of hospital stay between TAH and STH, as in other reports [6, 14]. The difference in re-exploration rate between TAH and STH did not achieve statistical significance, but the trend for more frequent re-exploration in TAH as compared to STH may likely have been significant had the sample size been large enough. However, urinary tract injuries, amount of blood loss, and febrile illness were significantly higher in the TAH group.

In our study, 15 patients (22.7 %) had BHAL, 80 % of which was performed before hysterectomy in order to preserve the uterus in patients with placenta accreta or atonic uteri. BHAL alone was not effective in conserving the uterus in our cases. However, in 20 % of cases, BHAL was effective in achieving hemostasis when performed immediately after hysterectomy or during the exploration.

A similar finding was reported by another study [16]. In 1985, Clark et al. [17] reported a 42 % success rate with BHAL, although the technique was associated with increased blood loss, operating time, ureteric injury, and cardiac arrest, suggesting that BHAL should be done in hemodynamically stable patients with low parity. In Clark's series, hypogastric artery ligation was used primarily for excessive bleeding associated with uterine atony. Seven (10.6 %) patients with placenta accreta preoperatively underwent internal iliac artery balloon placement by the intervention radiologist and ultimately underwent hysterectomy, which is similar to the results reported by Levine et al. [18]. Kidney et al. [19] reported five successful cases of placenta accreta treated prophylactically with a hypogastric artery balloon, but the study did not involve a comparison group. This technique could be a potential option in attempting uterine conservation [20, 21] with low parity.

In our study, intra-operative hypotension occurred in 70 % of patients, which is more frequent than levels reported by others [9, 11] and could be due to a delay in deciding to perform hysterectomy. Our re-exploration rate of 15 % is higher than that reported by Zelop et al. [5]. Although the development of DIC sometimes stimulates re-operation, coagulation status was within normal limits in these patients. Intra-operative hypotension may have been an important factor in some of the patients who required re-exploration. Collapsed blood vessels might have escaped the surgeon's attention during the primary operation and started bleeding when the patient was normotensive. The rate of urologic injury was higher in this study than in others [4, 5]. Notably, urologic injury would be expected in these cases. The major contributing factors could be due to increased numbers of patients (76 %) who had urologic injury, had previously undergone multiple cesarean sections (>3) and were also associated with placenta accreta (82 %) or percreta (18 %). The increasing rate of sections is becoming a problem throughout the world including our population. Moreover there is no limit in number of sections in a woman as tubal ligation cannot be performed as a sole indication because of religious and social reasons, which is usually not a problem in most parts of the world. Additionally, the hysterectomies were performed as an emergency procedure. Improved preoperative evaluation, if necessary through the use of MRI and the elective arrangement of surgery involving a urologist, could probably reduce the incidence of urologic injury in our cases. We had a significantly higher rate of DIC than others [4, 5, 9], which could be related to our more conservative approach, which in turn increases blood loss and operative time.

In this series, there were 3 (4.5 %) cases of maternal mortality, a figure that is higher than in previous studies [3, 4, 9], but lower than in some other series [8]. Delays in electing hysterectomy and related hypotension and shock may have been the aggravating factors in two of the three maternal deaths. The other maternal death was unrelated to the time factor in decision making.

Hysterectomy for the control of obstetric hemorrhage is a procedure usually associated with significant mortality and morbidity. Although the social background of a preference for large families in the Kingdom of Saudi Arabia is an important factor to consider, prompt intervention to include peripartum hysterectomy may likely decrease some of the maternal deaths and significant maternal morbidity in this population.

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