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Original Research Article

## The changing scenario of pattern of peripartum hysterectomy: prevention and preparedness matters

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### ABSTRACT

**Background:** Peripartum hysterectomy is a life-saving procedure, often associated with significant morbidity. The indication for peripartum hysterectomy has been shifted from PPH and rupture uterus to placental abnormalities and haemorrhage. Reducing the number of caesarean sections is the major step towards minimizing the chance of undergoing peripartum hysterectomy in subsequent pregnancy at the same time the morbidity is more if the peripartum hysterectomy is a on table decision.

**Methods:** This was a descriptive study from a tertiary care centre, South India and all the case records of women who underwent peripartum hysterectomy were reviewed from 2012 to 2017. All the details including demographic details, clinical characteristics, indications and clinical outcome of those women were recorded. The data was analyzed using SPSS version 20.

**Results:** The incidence of peripartum hysterectomy was 0.7/1000 deliveries and it was 0.24% and 0.03% after caesarean section and vaginal deliveries respectively. The placental abnormalities (46.2%) were the commonest cause followed by uterine atony (28.8%) and rupture uterus (21.2%). It was total hysterectomy in all of them except 2 women who underwent subtotal hysterectomy (3.8%) and the commonest visceral injury was bladder (15.4%). The maternal mortality rate was 9.8% and 61.5% (n=32) received massive blood transfusions.

**Conclusions:** Even though a life-saving procedure, the timing and the preoperative hemodynamic status of the women were the major determinants of adverse outcome associated with peripartum hysterectomy. Preoperative planning and risk stratification models are essential to minimize the risk of undergoing hysterectomy and to reduce the morbidity associated with the procedure.

**Keywords:** Peripartum hysterectomy, Placenta praevia, Placenta accreta

### INTRODUCTION

Peripartum hysterectomy (PH), surgical removal of the uterus around the time of delivery either during or in the immediate postpartum period usually within 24 hours, is a life-saving procedure. It is associated with severe maternal morbidity and mortality and considered as a near-miss event in obstetrics. In recent times, there is a shift in the cause for PH from rupture uterus and sepsis to morbidly adherent placenta (MAP).<sup>1-4</sup> Several studies have shown that the risk factors, causes and maternal

outcome of PH differ throughout the world.<sup>1,4,5</sup> It is usually reserved for situations when there is intractable haemorrhage and the outcome depends on factors like transfusion facilities, surgical skill and postoperative care. Most of the times it is unplanned and decided on the table and the decision to perform PH is challenging. There is an increased risk of maternal death, haemorrhage, sepsis, massive transfusion, intraoperative complications and postoperative morbidity and the rate of morbidity is more in developing countries.<sup>2,6,7</sup> The incidence of PH ranging from 0.6 to 2.28 per 1000 births

with the mortality of 0.29-0.94 per 100,000 deliveries. The global rise in caesarean section has increased the risk of undergoing PH due to both rupture uterus and placental abnormalities.<sup>1,8,9</sup> The objective of the study was to estimate the incidence and causes of PH in modern obstetrics from a tertiary center, South India and analyze the outcome of the procedure in terms of maternal morbidity and mortality.

## METHODS

This was a descriptive study of 46 cases of PH performed at JIPMER, a tertiary care center from South India. Medical records of all women who had undergone PH from January 2012 to December 2017 were analyzed retrospectively. Data was collected regarding maternal characteristics like age, parity, past obstetric history, details of current pregnancy and labor, mode of delivery, indications for PH, blood loss, blood transfusion and associated maternal morbidity and mortality. All peripartum hysterectomies were performed by a consultant who is an expert in managing obstetric emergencies and the decision to perform PH was taken by senior consultants. All the quantitative variables were expressed as mean±standard deviation and the qualitative variables were expressed as frequencies and percentages,  $p < 0.05$  considered significant. The data was analysed by using SPSS version 20.

## RESULTS

There were 72,486 deliveries happened during the study period of which 13,047 (17.9%) were caesarean deliveries and 59,439 (82.1%) were vaginal deliveries. A total of 52 peripartum hysterectomies were performed which gives the incidence of 0.7/1000 deliveries. The incidence of peripartum hysterectomies after vaginal and caesarean deliveries were 0.03% (30/100000 deliveries) and 0.24% (240/100000 deliveries) respectively.

The mean age of the women was  $28.5 \pm 3.2$  (range: 18-38) years and 13.5% (N=7) were  $>35$  years. The mean parity was  $2.4 \pm 1.8$  (range: 0-5) and 36.5% (N=19) were parity of 3 and above. A total of 12 women (23.1%) were  $>75$ kg and the mean weight of the women was  $62.8 \pm 12.4$  (48-92) kgs (Table 1). Two of them had severe postpartum haemorrhage, one of them had precipitated labor followed by PPH and the other one delivered outside and had severe PPH. There was a patient with failed instrumentation subsequently had rupture uterus. Two of them had uterine surgery in the past in the form of myomectomy and septal resection also had rupture uterus. There was a case of acute fatty liver of pregnancy who underwent caesarean section ended up with PH. There was a case of dengue with severe thrombocytopenia, after vaginal delivery that had postpartum collapse and PPH. This was resistant to medical management and PH was done at the end. Postpartum haemorrhage and rupture uterus were the indications for PH in their first pregnancy.

The mean gestational age was  $36.4 \pm 3.2$  (range 26-41) weeks (Table 1). Of the 2 women (3.8%) were less than 28 weeks, one had rupture uterus following misoprostol use at 28 weeks and the other woman presented with massive hemoperitoneum due to placenta percreta at 26 weeks. Almost half of the women (50%) had a history of prior uterine surgery and 24 women (46.2%) had a caesarean section in the previous pregnancy with the mean of  $1.4 \pm 0.8$  (Table 1).

**Table 1: Maternal characteristics of women underwent peripartum hysterectomy (n=52).**

Variable	Mean±SD	Range
Age (years)	$28.5 \pm 3.2$	18-38
Parity	$2.4 \pm 1.8$	0-5
Maternal weight (kg)	$62.8 \pm 12.4$	48-92
Gestational age (weeks)	$36.4 \pm 3.2$	26-41
Previous obstetric complications	N	%
H/O abortion	4	7.7
H/O ectopic pregnancy	2	3.8
Previous caesarean section	24	46.2
Previous myomectomy	1	1.9
Previous hysteroscopic septal resection	1	1.9
Anemia	30	57.7

The most common indication for peripartum hysterectomy was placental abnormalities, 24 (46.2%) followed by uterine atony (28.8%) and rupture uterus (21.2%). Of the 24 women who had placental abnormalities 4 women (16.7%) had placenta praevia and the rest of them had morbidly adherent placenta (83.3%). The peripartum hysterectomy was on table, decision in 12 (60%) of them who had morbidly adherent placenta and in only 8 of them (40%) the diagnosis was established preoperatively (Table 2).

**Table 2: Indications for peripartum hysterectomy (n=52).**

Indications	N	%
Placental abnormalities	24	46.2
Uterine atony	15	28.8
Rupture uterus	11	21.2
Traumatic PPH (hematoma)	02	03.8

Subtotal hysterectomy was performed in only two women (3.8%) and the rest of them underwent total hysterectomy. Additional surgical procedures like compressive sutures (12 women, 23.1%) and B/L internal iliac artery ligation (16 women, 30.1%) were done before resorting to PH. Uterine packing was done in 14 women (26.9%). Re exploration was needed in four women of which three happened within 4 hours of PH and the other one 12 hours postoperative. While the majority of them required multiple transfusions the mean packed cell, platelet and FFPs were 4, 3 and 6 units respectively.

There were five maternal deaths and three near miss deaths. Since three patients were referred on inotropes and they were in an irreversible state of shock by the time laparotomy was undertaken, early referral and referral with appropriate measures (like an anti shock garment) probably would have changed the outcome. All the women underwent total hysterectomy except two women who were hemodynamically unstable in spite of appropriate measures and underwent subtotal hysterectomy. The common indications were placental abnormalities, rupture uterus and cervical tear/ broad ligament hematoma in the present study was the reason for the high incidence of total hysterectomy.

**Table 3: Outcome of women underwent peripartum hysterectomy (n=52).**

Variable	N/Mean±SD	%/range
Blood loss (ml)	2950±1260	1800-4200
Blood transfused	4.8±2.8	2-24
Hospital stay (days)	14.5±8.4	8-68
Massive PPH	32	61.5
Inotropic support	23	44.2
Bladder injury	08	15.4
Ventilatory support	06	11.5
Maternal death	5	9.6

The frequency and types of complications are given in (Table 4). A total of 32 (61.5%) women had blood loss of >2,500ml with mean estimated blood loss of 2950±1260 (range 1800-4200) ml. Eighteen (34.6%) of them had undergone B/L internal iliac artery ligation and or compressive sutures in addition to hysterectomy. All women received a blood transfusion with an average unit of packed cell transfusion was 4.8 units (range 2-24). Overall, these 52 women received 350 packed cells, 480 FFPs, 180 platelets and 72 cryoprecipitates. Inotropic support was needed in 23 (44.2%) women and 6 (11.5%) of them were on ventilator for >24 hours. The most common visceral injury was bladder injury seen in 8 (15.4%) women. There were 4 laparotomies of which two women had undergone hysterectomy outside for haemorrhage after vaginal delivery and referred in view of persistent hypotension. There was no active bleeding, uterine packing was done in one woman and in another woman internal iliac artery ligation was done. There were 5 maternal deaths (9.6%) of which three of them were referred on inotropes (Table 3). One woman had bleeding placenta percreta with massive hemoperitoneum who presented at 26 weeks and in spite of all the necessary efforts patient could not be revived. The other woman had massive post-partum haemorrhage (PPH) following precipitated delivery who also succumbed to death in spite of best effort. All of them had died within 72 hours except one woman who was discharged in a vegetative state after 68 days of hospital stay and subsequently succumbed at home. The mean duration of hospital stay was 14.5 (range 8-68). It was a near miss death in 6 of them of which three women had intractable PPH following vaginal delivery and one woman had

postpartum collapse following vaginal birth after caesarean section (VBAC) and the other woman presented with bleeding placenta praevia at 34 weeks who had cardiac arrest on table. The three main risk factors identified to be associated with peripartum hysterectomy in the study were multiparity (63.5%), placental abnormalities (46.2%) and h/o prior caesarean section (46.2%).

**Table 4: Comparison of maternal parameters after elective and emergency peripartum hysterectomy in women with adherent placenta.**

Variable	Elective peripartum hysterectomy (N=8)	Emergency peripartum hysterectomy (N=12)	P value
Age	28 (18-34)	27 (18-36)	0.31
Parity	2 (1-4)	2 (1-3)	0.46
Hemoglobin	10.8±1.2	8.2±2.8	0.01
H/O caesarean section	5	10	0.29
USG diagnosis	7	6	0.08
Preoperative MRI	6	2	0.01
Mean blood loss	1862.5±570.6	2513.3±325.7	0.00
Inotropic support	2	8	0.06
Post OP Ventilatory support	2	6	0.26
Bladder injury	1	6	0.08
Wound infection	1	3	0.49
Death	0	1	0.32

The comparison of factors among women who underwent elective vs. emergency PH for placental causes is depicted in (Table 4). The preoperative USG diagnosis was present only in 50% of women who had emergency hysterectomy compared to 87.5% of who underwent elective PH (p=0.08). The mean haemoglobin and mean blood loss were significantly more in the emergency PH group compared to elective PH. The need for inotropic support, visceral injury and postoperative ventilatory support were also more in the emergency PH group although the difference was not significant.

## DISCUSSION

The first successful caesarean hysterectomy was done by Porro of Milan since then it's an important lifesaving procedure in obstetrics. The incidence of PH in the present study was 0.7/1000 deliveries, which are similar to developed countries. This is very different from other

studies of South Asia and Africa, which constitutes a major portion of maternal death.<sup>4,10</sup> Some of the tertiary centers from India have almost similar rates of PH ranges from 0.7-0.8/1000 deliveries. Contemporary evidence has shown that the incidence of PH has changed over the decades, from rupture uterus due to obstructed labor to rupture uterus due to scarred uterus and, atonic postpartum haemorrhage to abnormal placentation. A systematic review on peripartum hysterectomy of Van Den Akker et al had shown the varied incidence of peripartum hysterectomy across worldwide. Overall the incidence was 1/1000 deliveries and it varies from 2.8/1000 deliveries in developing countries to 0.7/1000 deliveries in developed countries.<sup>1</sup> An Indian study by Sharma et al had documented the high rate of 6.9/1000 deliveries from North India over one year period. Referral centre was the sole reason explained in their literature and the placental causes contributed for the majority of peripartum hysterectomies (60%).<sup>3</sup> The incidence of PH was lowest in Ireland (0.32/1000 deliveries) and highest in Pakistan (11%) in a time trend analysis of PH.<sup>4</sup>

The frequency of PH was more common in women of >30 years and multiparous women in the majority of the studies. However, in the present study, 48.1% of women were >30 years and 63.4% of women were multiparous. There were 7 women (13.5%) who had PH in their first pregnancy. Of these 7 women who were primigravidae in the present study, there were two maternal deaths. Even though the risk of undergoing PH is more in multiparous women, nulliparous women should not be taken lightly, thorough history and risk assessment should be done. Moreover, good antenatal care and optimizing the haemoglobin status before delivery play a major role in prevention of PPH. Various studies identified advanced maternal age and increasing parity as independent risk factors for PH. The risk of undergoing PH was 1.4 times more in high parity and 6.6 times more in elder women. The maternal mean age among women who underwent PH was statistically different in two different periods (2009-13 and 2013-18) and it was more in the period II (36.9±4.7 vs. 38.9±5.9 years, p=0.035).<sup>4</sup>

The most frequent indication for PH in the present study was placental abnormalities in 46.2%, followed by uterine atony in 28.8% of cases. These findings are similar to findings from developed countries. The global rise in caesarean section rate has contributed to this changing scenario. However, postpartum haemorrhage is the leading cause of PH in most of the developing countries. The changing trend in the present study is consistent with existing evidence from the literature. Uterine scarring which occurs either due to caesarean section or curettage in previous pregnancy increase the risk of placental abnormalities. Apart from placental abnormalities, the risk of undergoing PH is more in women with previous caesarean section because of rupture uterus. Cromi et al reviewed potential risk factor for PH and he found the risk of undergoing PH after one

caesarean section was 6.72 times (95% CI 2.99-15.09) and the risk increases with the number of caesarean sections. The risk is even higher after myomectomy also (OR 24.5 95% CI 6.7-90.2).<sup>11</sup>

The incidence of PH in the present study among women who delivered vaginally was 30/100,000 deliveries and it was 240/100,000 in caesarean deliveries. The majority of the studies have shown a similar picture across the world. Apart from placental abnormalities, the risk of rupture uterus is also more in women with previous caesarean section. Moreover the readiness of the uterus for hysterectomy in case of PPH is more during caesarean section than a vaginal delivery might also be the reason for the increased incidence of PH in women with caesarean section. Not only previous CS but also caesarean in current pregnancy is a high risk factor for undergoing PH. Uysal et al found the rate of PH was 93.6% after caesarean section compared to 6.4% after vaginal delivery.<sup>7</sup> The odds of undergoing PH was 11.4 times higher during caesarean section.<sup>1</sup>

Many studies from developing countries have shown there is increased rates of subtotal PH (87.7%) than total PH because the most common indication used to be atonic PPH, which requires rapid, simple and safe procedure in the majority of the placental abnormalities, the most common cause in developed countries necessitates total PH as it was in the present study.<sup>3,7</sup>

The maternal morbidity associated with PH is generally high and is mainly due to increased blood loss, bladder injury, ventilatory support, sepsis and increased risk of laparotomy. The maternal mortality of the present study was 9.6%, which is much higher than the reports from developed country (0 to 4.5%). As already discussed three of five maternal deaths had delivered outside and referred in an unstable state. Overall effective blood transfusion facilities, good antenatal care, active management of third stage of labour, appropriate utilization of medical measures and conservative surgeries like uterine packing, tamponade, compressive sutures and devascularisation techniques have minimized the number of PH due to haemorrhage and improved the survival in women with PPH. The most common morbidity was febrile morbidity (19.2%) followed by bladder injury (15.4%) in the present study. The morbidity pattern was similar to other studies in literature.<sup>2,3,6,9-11</sup> The mortality rate due to placental cause was 4.2% (1/24) when compared to post-partum haemorrhage (14.3%, n=4/28). The maternal condition was unstable at the time of peripartum hysterectomy in all these four women and three of them delivered elsewhere and referred late on inotropes.

The morbidity observed in women undergoing PH is not determined due to surgery alone, but to the underlying indications for which it is undertaken, the timing of the decision to proceed for PH and hemodynamic status of the women. The long term morbidity associated with PH

and massive blood loss has not been studied. The risk of febrile morbidity was more in emergency PH (10%) compared to elective PH (0%). However, a detailed analysis of outcome between emergency and elective PH due to all causes could not be done.

Advanced maternal age, parity and previous caesarean section were found to be the important risk factors associated with PH. Even pregnancies following assisted reproductive technologies (ART) were found to be associated with PH (OR 5.9 95% CI 2.2-16.4) and ART pregnancies should be incorporated into risk stratification models for obstetric haemorrhage.<sup>11</sup> Protocol based effective management of high risk pregnancies and risk stratification for PH is essential to minimize the risk of undergoing PH and the morbidity associated with it. Previous uterine surgery being the important cause of placental abnormalities it is prudent to diagnose it in the antenatal period and plan the surgery in advance with adequate precautions. Arranging blood and blood products, multidisciplinary management involving intervention radiologists and anaesthesiologists early would help in minimizing the morbidities associated with PH. Research on innovations and improvements in the conservative surgical approach for managing adherent placenta might help to conserve the uterus in near future.

## CONCLUSION

Placental abnormalities are the most common cause for peripartum hysterectomy in the recent days, which supports the hazard of rising caesarean section. The haemorrhage has become the rare cause of PH even in developing countries; however previous caesarean section and multiparity increase the risk of undergoing peripartum hysterectomy to a greater extent. Effective transfusion facilities are the cornerstone in the management of Obstetric haemorrhage, which will improve the survival and lessen the morbidity. Curtailing the number of primary caesarean section by appropriate auditing and utilization of conservative surgical methods for PPH will minimize the risk of undergoing PH. Establishing the diagnosis in the antenatal period and multidisciplinary protocol based management will reduce the morbidity associated with the procedures as well.

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