ABSTRACT Background: Emergency peripartum hysterectomy is a lifesaving procedure done as a last resort to save a mother’s life. This study analyses the incidence, maternal characteristics, indications and complications following peripartum hysterectomy. Methods: A descriptive and retrospective study of obstetric hysterectomy was done at Medical College and Hospital, Kolkata, India, from March 2016 to October 2021. Case records were analysed to record the incidence, indications, risk factors and complications associated with peripartum hysterectomy during the study period. The study included a total of 129 cases of obstetric hysterectomy, fulfilling the inclusion criteria. The template was generated in an MS excel sheet and analysed on SPSS software. Results: Incidence of peripartum hysterectomy was 0.045%. The most common indication for peripartum hysterectomy was Placenta Percreta with 29 cases (22.5%), followed by 27 cases of Atonic PPH (20.9%). The most common maternal complications were repeated transfusion 47 (36.4%) and shock 43 (33.3%). The most common fetal complications were Perinatal Asphyxia 37 (28.7%), followed by jaundice 12 (9.3%). Conclusions: Emergency peripartum hysterectomy remains a lifesaving procedure. Proper antenatal care, early referral, blood bank facilities and timely decision greatly influences the maternal outcome.

KEYWORDS Peripartum, hysterectomy, placenta previa, uterine rupture
Risk factors for Emergency peripartum hysterectomy include advanced maternal age, multiparity, previous LSCS, placenta previa, operative vaginal delivery and fetal macrosomia. The present study was thus undertaken to study the incidence, indications, risk factors and complications of peripartum hysterectomy over 5 years at Medical College and Hospital, Kolkata.

**Method and materials**

**Type of Study**

Hospital-based descriptive and retrospective study.

**Place of study**

Department of Gynecology & Obstetrics, Medical College & Hospital, Kolkata

**Period of study**

March 2016 to August 2021

**Study population**

Case records were analysed to record the incidence, indications, risk factors and complications associated with peripartum hysterectomy during the study period at the Department of Gynecology & Obstetrics NRS Medical College & Hospital, Fulfilling the inclusion criteria and willingness to participate in the study

**Sample size**

129

**Inclusion criteria**

1. All women aged 18-40 underwent a hysterectomy after 22 weeks of gestational age and within 6 weeks of delivery.

2. Women who underwent hysterectomy following both caesarean section and vaginal delivery

3. Includes women aged 18-40 who delivered outside and were referred to our hospital.

**Exclusion criteria**

1. Patient who had hysterectomy following complications of MVA like perforation of the uterus, uncontrolled haemorrhage.

2. Hysterectomy due to associated complications like pelvic mass or any other gynaecological conditions.

3. Hysterectomy due to uncontrolled bleeding following surgical management of ectopic pregnancy.

**Data collection and interpretation**

Name, age, registration number, address, and other details related to the study were noted. After selecting patients and taking informed consent, the data was collected in a predesigned and pre-tested questionnaire.

**Statistical Analysis**

For statistical analysis, data were entered into a Microsoft excel spreadsheet and then analyzed by SPSS (version 27)
Table 1 Distribution of the participants according to age, parity and gestational age in weeks

| Age (years) | Frequency | Percentage |
|-------------|-----------|------------|
| <20         | 4         | 3.10       |
| 20-25       | 24        | 18.60      |
| 26-30       | 58        | 45.00      |
| 31-35       | 29        | 22.50      |
| ≥ 36        | 14        | 10.90      |
| **Total**   | **129**   | **100.0**  |

| Parity       | Frequency | Percentage |
|--------------|-----------|------------|
| P0+1         | 6         | 4.7        |
| P1+0         | 5         | 3.9        |
| P2+0         | 32        | 24.8       |
| P3+0         | 28        | 21.7       |
| P4+0         | 12        | 9.3        |
| P1+1         | 6         | 4.7        |
| P1+3         | 1         | .8         |
| P2+1         | 17        | 13.2       |
| P2+2         | 5         | 3.9        |
| P3+1         | 8         | 6.2        |
| P4+1         | 5         | 3.9        |
| P4+2         | 3         | 2.3        |
| P5+2         | 1         | .8         |
| **Total**    | **129**   | **100.0**  |

| Gestational age in weeks | Frequency | Percentage |
|--------------------------|-----------|------------|
| <28                      | 5         | 3.9        |
| 35-37                    | 51        | 39.5       |
| 37-38                    | 33        | 25.6       |
| 38-39                    | 15        | 11.6       |
| 39-40                    | 13        | 10.1       |
| >40                      | 12        | 9.3        |
| **Total**                | **129**   | **100.0**  |
### Table 2 Distribution of participants according to previous obstetrical history

| Previous Obstetrical history | Frequency | Percentage |
|-----------------------------|-----------|------------|
| MTP                         | 1         | 0.78       |
| Incomplete Abortion         | 2         | 1.55       |
| Myomectomy                  | 6         | 4.65       |
| LSCS (Lower segment caesarian section) 1 | 39      | 30.23      |
| LSCS 2                      | 7         | 5.43       |
| LSCS 3                      | 14        | 10.85      |
| LSCS1+DE1                   | 29        | 22.48      |
| VD (Vaginal Delivery)       | 11        | 8.53       |
| VD1+DE (Dilatation and Evacuation) 1 | 1       | 0.78       |
| LSCS1+MTP3                  | 1         | 0.78       |
| LSCS1+VD2                   | 5         | 3.88       |
| LSCS1+DE2                   | 3         | 2.33       |
| LSCS3+DE2                   | 3         | 2.33       |
| LSCS2+VD1+DE1               | 6         | 4.65       |
| Nil                         | 1         | 0.78       |
| Total                       | 129       | 100.0      |

### Table 3 Distribution of participants according to the type of delivery, mode of delivery, previous instrumental delivery and twin delivery

| Type of delivery                        | Frequency | Percentage |
|-----------------------------------------|-----------|------------|
| Spontaneous                             | 86        | 66.7       |
| Obstructed Labour                       | 10        | 7.8        |
| Not in Labour                           | 33        | 25.6       |
| Total                                   | 129       | 100.0      |

| Mode of delivery                        | Frequency | Percentage |
|-----------------------------------------|-----------|------------|
| Emergency LSCS                          | 74        | 57.4       |
| Planned LSCS                            | 23        | 17.8       |
| Vaginal delivery                        | 24        | 18.6       |
| Forceps delivery                        | 8         | 6.2        |
| Total                                   | 129       | 100.0      |

| Previous Instrumental Delivery          | Frequency | Percentage |
|-----------------------------------------|-----------|------------|
| Yes                                     | 5         | 3.9        |
| No                                      | 124       | 96.1       |
| Total                                   | 129       | 100.0      |

| Twin Delivery                           | Frequency | Percentage |
|-----------------------------------------|-----------|------------|
| Yes                                     | 7         | 5.4        |
| No                                      | 122       | 94.6       |
| Total                                   | 129       | 100.0      |
### Table 4 Distribution of participants according to an indication of hysterectomy

| Indication of Hysterectomy                                      | Frequency | Percentage |
|---------------------------------------------------------------|-----------|------------|
| Broad Ligament Hematoma                                       | 5         | 3.9        |
| Atonic PPH (Postpartum haemorrhage)                          | 27        | 20.9       |
| Placenta Increta/Acreta                                       | 29        | 22.5       |
| Placenta Percreta                                             | 9         | 7.0        |
| Uterine rupture                                               | 21        | 16.3       |
| Central Placenta Praevia                                      | 17        | 13.2       |
| Uterine inversion with Atonic PPH                             | 4         | 3.1        |
| Hemoperitoneum after LSCS                                     | 3         | 2.3        |
| Secondary Atonic PPH                                          | 3         | 2.3        |
| DE/Suction Evacuation followed by Uterine Perforation         | 8         | 6.2        |
| Ruptured ectopic with Broad Ligament Hematoma                 | 1         | .8         |
| Broad lig. Hematoma and Broad lig. Fibroid with Atonic PPH    | 2         | 1.6        |
| **Total**                                                     | **129**   | **100.0**  |

### Table 5 Distribution of participants according to type and time of hysterectomy

| Type of Hysterectomy               | Frequency | Percentage |
|------------------------------------|-----------|------------|
| Total                              | 71        | 55.00      |
| Sub Total                          | 58        | 45.00      |
| **Total**                          | **129**   | **100.0**  |

| Time of Hysterectomy               | Frequency | Percentage |
|------------------------------------|-----------|------------|
| Postpartum                         | 44        | 34.1       |
| During LSCS                        | 85        | 65.9       |
| **Total**                          | **129**   | **100.0**  |

### Table 6 Distribution of participants according to Maternal and Perinatal outcome

| Maternal outcome | Frequency | Percentage |
|------------------|-----------|------------|
| Alive            | 117       | 90.7       |
| Near Miss        | 4         | 3.1        |
| Dead             | 8         | 6.2        |
| **Total**        | **129**   | **100.0**  |

| Perinatal outcome | Frequency | Percentage |
|-------------------|-----------|------------|
| Alive             | 93        | 72.1       |
| Fresh Stillborn   | 18        | 14.0       |
| Dead              | 18        | 14.0       |
| **Total**         | **129**   | **100.0**  |
**Table 7** Distribution of participants according to total number of delivery

| Total Number of delivery | Frequency | Percentage |
|--------------------------|-----------|------------|
| LSCS1                    | 8         | 6.2        |
| LSCS2                    | 39        | 30.2       |
| LSCS3                    | 25        | 19.4       |
| LSCS4                    | 4         | 3.1        |
| VD1                      | 10        | 7.8        |
| VD2                      | 13        | 10.1       |
| VD3                      | 7         | 5.4        |
| VD4                      | 3         | 2.3        |
| VD5                      | 2         | 1.6        |
| LSCS1+VD1                | 3         | 2.3        |
| LSCS2+VD1                | 3         | 2.3        |
| LSCS3+VD1                | 5         | 3.9        |
| LSCS1+VD2                | 1         | 0.8        |
| LSCS1+VD3                | 2         | 1.6        |
| LSCS2+VD2                | 3         | 2.3        |
| DE                       | 1         | 0.8        |
| **Total**                | **129**   | **100.0**  |

**Table 8** Distribution of participants according to additional surgery

| Additional Surgery       | Frequency | Percentage |
|--------------------------|-----------|------------|
| Nil                      | 110       | 85.3       |
| Bladder repair           | 10        | 7.8        |
| Bladder and ureter repair| 5         | 3.9        |
| Gut repair with Ileostomy| 4         | 3.1        |
| **Total**                | **129**   | **100.0**  |
Table 9 Distribution of participants according to maternal and fetal complications

| Maternal Complications | Frequency | Percentage |
|------------------------|-----------|------------|
| Repeated transfusion    | 47        | 36.4       |
| Shock                   | 43        | 33.3       |
| Bladder injury          | 3         | 2.3        |
| Shock with Bladder injury | 8      | 6.2        |
| Wound Sepsis            | 7         | 5.4        |
| Paralytic Ileus         | 4         | 3.1        |
| Shock with DIC          | 1         | 0.8        |
| UTI (urinary tract infection) | 3   | 2.3        |
| UTI with Sepsis         | 2         | 1.6        |
| Sepsis with Shock and DIC (Disseminated intravascular coagulation) | 3 | 2.3 |
| Intestinal Injury       | 3         | 2.3        |
| Repeated transfusion, shock, DIC with Bladder and Ureteric Injury | 5 | 3.9 |
| Total                   | 129       | 100.0      |

| Fetal Complications | Frequency | Percentage |
|---------------------|-----------|------------|
| Nil                 | 47        | 36.4       |
| Perinatal Asphyxia  | 37        | 28.7       |
| Jaundice            | 12        | 9.3        |
| Sepsis              | 7         | 5.4        |
| Death               | 26        | 20.2       |
| Total               | 129       | 100.0      |

Figure 1 Distribution of participants according to injury during delivery

Table 9 shows the maternal complications; most complications were repeated transfusion 47 (36.4%), followed by shock 43 (33.3%), Shock with Bladder injury 8 (6.2%), Wound Sepsis 7 (5.4%), Repeated transfusion, shock, DIC with Bladder and Ureteric Injury 5 (3.9%), Paralytic Ileus 4 (3.1%), Bladder injury, UTI, Intestinal Injury, Sepsis with Shock and DIC and Intestinal Injury each 3 (2.3%) each. The most common fetal complications were Perinatal Asphyxia 37 (28.7%), followed by jaundice 12 (9.3%), sepsis 7 (5.4%) and death 26 (20.2%).

Discussion

This Hospital based observational prospective study was conducted in the Department of Gynecology & Obstetrics, Medical College & Hospital, Kolkata, from March 2016 to August 2021. A total of 129 cases of obstetric hysterectomy fulfilling the inclusion criteria were included in the study.

The incidence of peripartum hysterectomy in the present study is 0.045% which is comparable to the studies done by Joana Ferreira et al. and Jakobsson M et al. The incidence is low in comparison to other studies, as most of the deliveries were conducted in the hospital following regular antenatal visits. However, a ruptured uterus (70.96%) was the most common indication in our study.

Most ruptured uterus cases were referred from distant peripheral health centres and hospitals. Studies were done in other developing countries also showed ruptured uterus to be the most common indication for peripartum hysterectomy.

The present study shows that the majority, 58 (45%) of the women, were in the age group of 26-30 years, and 29 (22.50%) of the women were in the age group of 31-35 years. 24 (18.60%) of the women were in the group of 20-25 years, 14 (10.90%) in the age group of $\geq 36$, and the remaining 4 (3.10%) were in the age group of <20 years. The mean age is 29.12 years. The findings are similar to the study by Saxena et al. Majority of the women were parity P2+0 32 (24.8%) and P3+0 28 (21.7%). Gestational age of majority of the women were 35-37 weeks (39.5%), followed by 37-38 weeks (25.6%), 38-39 weeks (11.6%), 39-40 weeks (10.1%), >40 weeks (9.3%) and <28 weeks was 3.9%.

In our study, previous obstetrical history of the women. LSCS 1 was seen in 39 (30.23%) women followed by LSCS1+DE1 in 29 (22.48%) women, LSCS 3 in 14 (10.85%) women and vaginal delivery in 11 (8.53%) women. Identifying risk factors and high-risk patients for emergency peripartum hysterectomy is crucial in reducing maternal morbidity and mortality. Risk factors include maternal age >35 years, multiparity, previous caesarean delivery, and repeat caesarean deliveries.
In the present study, 86 (66.7%) of women had spontaneous delivery, followed by 10 (7.8%) and the rest, 33 (25.6%), were not in labour. Emergency LSCS was seen in 74 (57.4%) of women, followed by vaginal delivery in 24 (18.6%), planned LSCS in 23 (17.8%) and Forceps delivery in 8 (6.2%) women. Previous Instrumental Delivery was present in 5 (3.9%) women, and twin delivery was seen in 7 (5.4%) women. This is consistent with recent literature findings, ranging from 18.8 to 60.5%.16,17,18

The present study shows that the most common indication for peripartum hysterectomy is Placenta Percreta, with 29 cases (22.5%). The second most common indication was Atonic PPH (20.9%), followed by Uterine rupture (16.3%), Central Placenta Praevia (13.2%), Placenta Percreta (7%), DE/Suction Evacuation followed by Uterine Perforation (6.2%) and Broad ligament Hematoma (3.9%). The indications for emergency cases are Uterine Hemorrhage, Placental Problems, Uterine rupture, Post-partum atony, etc.19

The present study shows that broad ligament hematoma occurred in 5% of women, followed by cervical tear in 4% and Ligature on Ureter and Gut injury in 1% of women. In the present study, total hysterectomy was done in 71 (55%). Maximum hysterectomy was done during LSCS (65.9%), followed by postpartum (34.1%). The patient’s condition should influence the final decision to perform a subtotal or total hysterectomy. Hence, while total abdominal hysterectomy is a desirable procedure, subtotal hysterectomy may be a better choice in certain conditions where surgery needs to be completed in a shorter time.20

The present study shows that after peripartum hysterectomy, out of 129 women, 117 (90.7%) were alive, 4 (3.1%) were near miss, and 8 (6.2%) were dead. In perinatal outcome, 93 (72.1%) were alive, 18 (14%) were fresh stillborn, and 18 (14%) were dead. The present study’s maximum delivery was LSCS2 39 (30.2%), followed by LSCS325 (19.4%). Maternal mortality in previous studies has ranged from 1.1% to 16.7%,21,22 This high mortality rate may be related to our hospital’s characteristic as a referral hospital. All the maternal deaths were in unbooked or referred patients who were brought in a hemodynamically unstable condition with varying degrees of shock.

The present study shows that additional surgery was required for bladder repair 10 (7.8%), Bladder and ureter repair 5 (3.9%) and Gut repair with ileostomy 4 (3.1%).

In the present study, maternal complications, most complications were repeated transfusion 47 (36.4%), followed by shock 43 (33.3%), Shock with Bladder injury 8 (6.2%), Wound Sepsis 7 (5.4%), Repeated transfusion, shock, DIC with Bladder and Uteretic Injury 5 (3.9%), Paralytic Ileus 4 (3.1%), Bladder injury, UTI, Intestinal Injury, Sepsis with Shock and DIC and Intestinal Injury each 3 (2.3%) each. The most common fetal complications were Perinatal Asphyxia 37 (28.7%), followed by jaundice 12 (9.3%), sepsis 7 (5.4%) and death 26 (20.2%). During a peripartum hysterectomy, postoperative bleeding,23 Bladder Laceration, Uteral Injury, Fistula, Thromboembolism, and maternal mortality. In other studies, a rupture uterus was the commonest indication, as shown by Sinha et al. (69.9%),24 Mantri et al. (67.28%)25.

**Conclusion and recommendations**

Obstetric hysterectomy is a lifesaving procedure, but the decision should be prompt and treatment by an experienced surgeon. Every obstetrician should be trained to perform this procedure. Despite life-saving measures, there is a significant number of maternal deaths which can be prevented by good maternal care, active management of labour, early recognition of complications, timely referral, and easy availability of transport and blood transfusion facilities. Community education about the advantages of institutional delivery or delivery by trained dais will save many such emergencies. Also, there is a need for more effective implementation of family welfare and reproductive health measures in developing nations to reduce the incidence of life-threatening obstetric haemorrhage and uterine rupture.

**Acknowledgements**

The authors would like to acknowledge the patients who participated in this research study.

**Funding**

No funding sources
Conflict of interest
None declared

Ethical approval
The study was approved by the institutional ethics committee

References
1. Cunningham FG, Leveno KJ, Bloom SL, et al. Williams Obstetrics. 24th edn. United States of America: McGraw-Hill Education, 2014:pp 587.
2. Baskett TF, Calder AA, Arulkumaran S. Munro Kerr’s: operative obstetrics. 11th edn. United Kingdom: Elsevier Ltd, 2007:309-10.
3. Rock JA, Jones HW. Te Linde’s: operative gynecology. 10th edn. Philadelphia: Lippincott Williams & Wilkins, 2008:pp 831.
4. Bateman BT, Myhre JM, Callaghan WM, et al. Peripartum hysterectomy in the United States: nationwide 14 year experience. Am J Obstet Gynecol 2012;206(1):63.e1-8.
5. Lovina SM, Machado. Emergency peripartum hysterectomy: incidence, indications, risk factors and outcome. North Am J Med Sci. 2011;3(8):358-61.
6. Carvalho FJ, Cubal A, Torres S, Costa F, Carmo OD. Emergency peripartum hysterectomy: a 10-year review. ISRN Emerg Med. 2012;2012
7. Carvalho JF, Cubal A, Torres S, et al. Emergency peripartum hysterectomy: a 10-year review. ISRN Emergency Medicine Article ID 721918, 2012;2012:7.
8. Jakobsson M, Tapper AM, Colmorn LB, et al. Emergency peripartum hysterectomy: results from the prospective Nordic Obstetric Surveillance study (NOSS). Acta Obstet Gynecol Scand 2015;94(7):745-54.
9. Kiran S, Sinha AR. Emergency obstetric hysterectomy. A 5 years retrospective study at Patna Medical College, Patna, Bihar. IJOPARB 2016;06(4):18-21.
10. Kumari A, Sahay PB. A clinical review of emergency obstetric hysterectomy. J Obstet Gynaecology India 2009;59:427-31.
11. Parveen M, Manjeet K, Gupta AJ. Peripartum hysterectomy: a five year study. Obstet Gynecol India 2008;58(6):504-6.
12. Omo-Olunsi A, Olayinka HT. Emergency peripartum hysterectomy in a developing country. J Obstet Gynaecol Can 2012;34(10):954–60.
13. Nwabodo E, Nnadi D. Emergency obstetric hysterectomy in a tertiary hospital in Sokoto, Nigeria. Ann Med Health Sci Res 2012;2(1):37-40.
14. Saxena SV, Bagga R, Jain V, Gopalan S. Emergency peripartum hysterectomy. Int J Gynaecol Obstet. 2004;85:172-3.
15. Whiteman MK, Kuklina E, Hillis SD, Jamieson DJ, Meikle SF, Posner SF, et al. Incidence and determinants of peripartum hysterectomy. Obstet Gynecol.2006;108(6):1486-92.

16. Jou HJ, Hung HW, Ling PY, Chen SM, WuSC. Peripartum hysterectomy in Taiwan. Int J Gynecol Obstet 2008;101:269-72.
17. Knight M, Kurinczuk JJ, Spark P, Brocklehurst P, for the UKOSS. Cesarean delivery and peripartum hysterectomy. Obstet Gynecol 2008;111:97-105.
18. Rahman J, Al-AliM, Qutub HO, Al-Suleiman SS, Al-Jama FE, Rahman MS. Emergency obstetric hysterectomy in a university hospital: a 25-year review. J Obstet Gynaecol 2008;28:69-72.
19. Peripartum hysterectomy in Taiwan., Int J Gynaecol Obstet, 2008. Jun : 101(3) 269 – 72 doi : 1016/j.iigco.2007.12.004. epub 2008 mar 4.
20. Lovina S.M. Machado. Emergency peripartum hysterec- tomy: Incidence, indications, risk factors and outcome. N Am J Med Sci. 2011 ; 3(8): 358–361.
21. Zeteroglu S, Ustun Y, Engin-Ustun Y, Sahin G and Kamari M. Peripartum hysterectomy in a teaching hospital in the eastern region of turkey. Eur J Obstet Gynecol 2005; 120: 57-62.
22. Flood KM, Said S, Geary M, Robson M, Fitzpatrick C, Malone FD. Changing trends in peripartum hysterectomy over the last 4 decades. Am J Obstet Gynecol 2009; 200:632.
23. American Journal of Obstetrics & Gynaecology march 1993, vol 168(3) 879 -883 doi 10.1016/s0002-9378(12)90838-8
24. Sinha HH, Mishra MG. Hysterecctomy for obstetric emer- gencies. J Obstet Gynecol India 2001;51:111-
25. Mantri L, Maheshwari K, Chandra Kiran. Emergency Hyste-rectomy: A 10 years’ review. J Obstet Gynecol India 1993;43:936-9.