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## Peripartum Hysterectomy

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### 1. Introduction

Peripartum or obstetric hysterectomy is the removal of the corpus uteri alone or with the cervix at the time of a cesarean section, or shortly after a vaginal delivery. It is a challenging but life-saving obstetric procedure. The removal of the uterus at cesarean section is referred to as cesarean hysterectomy while the removal after vaginal birth is called postpartum hysterectomy [1]. Peripartum hysterectomy is reserved for situations in which severe obstetric hemorrhage fails to respond to conservative treatment [2,3]. It is therefore unplanned and must be performed expeditiously usually in patients that are generally in less than ideal condition to withstand anesthesia and trauma of surgery. It has been described as one of the riskiest and most dramatic operations in modern obstetrics[2,4,5]. It is therefore associated with significant maternal morbidity and mortality.

### 2. Evolution of peripartum hysterectomy

Cesarean hysterectomy was originally proposed in 1768 by Joseph Cavallini in animal experiments[6].

The first documented hysterectomy on a patient at Caesarean section was performed in United States by Horatio Storer in 1869. Although the uterus was removed successfully, the patient died in 68 hours after surgery[6,7,8]. James Blundell in 1823 based his opinion approving post-cesarean hysterectomy on work done with rabbits.[6]

In 1876, Eduardo Porro of Milan described the first cesarean hysterectomy in which both mother and baby survived. His patient was a primiparous dwarf, Julia Cavallani, who was 25 years of age and was only 144cm in height. In his procedure, the uterus was opened in situ and the child was removed alive. After removal of the placenta, an instrument called a cintrat's constrictor was passed over the neck of the uterus and the wire was sufficiently tightened to control hemorrhage and the uterus was then cut away. The stump was brought out through the abdominal wound which was closed with sutures of silver wire[7].

After Porro's report more cases were reported with various modifications of the Porro's technique. Notable among these modifications were those of Godson in 1884 and Lawson tait in 1890[7,8]

Originally the indications for peripartum hysterectomy included uterine sepsis (amnionitis) after prolonged labour, atonia uteri or uncontrollable hemorrhage from placenta site, cancer of the cervix, extensive atresia of the vagina, preventing discharge of lochia, cases of ruptured uterus where suturing would be unsafe, uterine fibroids and tuberculosis[7].

By the 1950s it was carried out as elective procedure for indications such as sterilization, uterine fibroids and cervical dysplasia. By the 1970s elective cesarean hysterectomy for such procedures fell into disrepute due to the association of the procedure with excessive blood loss and urological injury. Moreover, with the introduction of laparoscopic procedures in sterilization, the indications for peripartum hysterectomy have become almost exclusively emergent occurring complications [7,8].

### 3. Incidence and risk factors

The reported incidence of emergency peripartum hysterectomy varies between 0.2 and 5.4 in 1000 deliveries [5,9]. In general, the average incidence is put at 1 in 1000 deliveries, the higher incidence is being reported from the developing world while developed countries generally report lower rates[5,9]. The high incidence of peripartum hysterectomy in the developing world may be due to her phenomenon of unbooked emergencies and the earlier recourse to hysterectomy due to the lack of adequate cross matched blood and other blood products which limit the time available for examining the effectiveness of other conservative procedures [5,40]. Moreover, certain modern conservative procedures involving interventional radiology are not practicable in most developing world settings due to lack of human and material resources involved[5].

There is significant association between peripartum hysterectomy and previous caesarean section and placenta previa[10,11,12]. The combination of prior caesarean section and placenta previa is said to be an ominous risk factor for the life threatening hemorrhage and peripartum hysterectomy [11,12,25,30]. Owing to the rising caesarean section rate world wide and the concomitant rise in placenta previa and placenta previa accreta, the incidence of emergency peripartum hysterectomy is rising in many countries[5,11,12,25].

Compared to vaginal delivery, emergency peripartum and abdominal delivery are strongly associated [1,19].

The association of peripartum hysterectomy with abdominal delivery may be related to its indications such as placenta previa and previous caesarean sections[1,5,12,13]. It may also be related to the fact that the uterus is readily available for removal in abdominal delivery[19].

It has also been reported that the multiple pregnancy has a six fold increased risk of emergency peripartum hysterectomy[12,17]. Multiple pregnancies are associated with higher rates of premature labour requiring tocolysis and uterine distension with greater total fetal weight at delivery[12]. All these predispose to uterine atony that can lead to peripartum hysterectomy. The increase in multiple pregnancy rates associated with assisted reproductive technology may provide a further contribution to rising peripartum hysterectomy rates.

Other reported risk factors for peripartum hysterectomy include unbooked status, retained placenta, previous endometrial curettage, abruptio placentae and thrombocytopenia [5,14,15,18].

#### 4. Indications

The most common indication for peripartum hysterectomy is hemorrhage but the underlying causes vary from series to series.

In the developing world, preventable factor such as uterine rupture or uterine atony is the most common indication for peripartum hysterectomy [5,9,13,14,22]. The common causes of uterine rupture in this part of the world include prolonged obstructed labour, rupture of a previous caesarean scar, injudicious use of oxytocics and trauma from instruments or manual removal. If the rupture is extensive and hemorrhage cannot be controlled by uterine repair, then hysterectomy may become necessary [22].

Non-utilization or unavailability of modern potent oxytocic agents may predispose the at risk women to uterine atony and peripartum hysterectomy. There are however cases in which the uterus is not responsive to such uterotonic agents.

Older studies from the developed countries also showed uterine rupture or uterine atony as the most common indication for peripartum hysterectomy. In these countries uterine rupture has been reduced to a rarity by large scale utilization of modern obstetric care while uterine atony has also been reduced by use of potent uterotonic agents [16,23,24,25].

With rising caesarean section rate and marked reduction in the incidence of uterine rupture and atony, recent studies from the developed world have shown that placenta accreta has replaced uterine rupture and atony as the most common indication for emergency peripartum hysterectomy [24,25,26,27,29]. This is due to the rising incidence of placenta previa or accreta associated with the increasing number of women with previous caesarean section [20,21,28,30,31,32,33].

The other indication for peripartum hysterectomy is sepsis. In this era of modern potent antibiotic, sepsis is not a common indication for peripartum hysterectomy. It may however be necessary in cases with extensive uterine sepsis with myometrial abscess formation, in which antibiotic fails to control the infection [12].

If an antenatal diagnosis or strong suspicion of placenta accreta is made, the patient should therefore be counseled about the likelihood of peripartum hysterectomy [28,31]. In addition a senior obstetrician with vast experience in obstetric hysterectomy should be present at surgery.

With the rising caesarean section rate also in the developing countries, placenta accreta is becoming superimposed on the prevalent preventable indication such as uterine rupture and atony [5,14]. Unfortunately placenta accreta is less amenable to conservative management when compared to uterine rupture and atony.

#### 5. Subtotal or total hysterectomy

Peripartum hysterectomy may be either subtotal or total. A subtotal hysterectomy is thought to be technically easier and associated with shorter operating time, less blood loss, less

urological injury and low morbidity [5, 13,22,37]. It is therefore preferred in situations where maternal instability mandates a more expeditious procedure [37]. Moreover in developing countries where homologous blood is often not available, pelvic pathologies are extensive and clinical presentation of patients is worse, subtotal hysterectomy may be preferred[22,40].

Subtotal hysterectomy may be associated with certain post-operative problems from the cervical stump such as cyclical bleeding, vaginal discharge and the need for regular cervical cytology. It may be associated with continued bleeding from the cervical branch of the uterine artery, which supplies the lower segment and the cervix[9,37].

Total hysterectomy is therefore recommended if the patient is in good condition and when there is placenta previa or placenta previa accreta involving the cervix[26,37]. In addition to increased complications associated with total hysterectomy, it is difficult to identify the lower extent of the cervix to enable total hysterectomy in laboring patients whose cervix is fully dilated[31,33,34].

It has therefore been recommended that the decision on the type of hysterectomy should be individualized. With the increasing rate of placenta previa accreta, the need to do total hysterectomy will be on the increase.

## 6. Difficulties associated with peripartum hysterectomy

Peripartum hysterectomy has been described as one of the catastrophes of modern obstetrics [2,4]. The difficulties associated with the procedure are not necessarily the surgical technique but the anatomical and physiological changes associated with late pregnancy and the indications for the surgery as well as the support for such ill patients[12,22].

These difficulties are more pronounced in developing countries where patients present very late and the facilities for intensive care are lacking.

Some of these features that pose the difficulties with obstetric hysterectomy include;

- a. Often markedly enlarged and distended uterine and ovarian vessels. There is generally increased blood supply to the pelvic organs in pregnancy.
- b. Pelvic tissues adjacent to the uterus are oedematous and friable.
- c. Trauma of extensive uterine rupture gives rise to gross distortion of the anatomy and oedema of the area surrounding the site of rupture.
- d. Placenta previa percreta may extend into the bladder and other pelvic organs.
- e. Scarring from previous cesarean sections obliterates the utero-vesical space and makes the separation of the bladder from the uterus difficult and injury prone.
- f. The ureters may be sectioned, clamped or stitched because often, heavy bleeding interferes with proper exposure.
- g. Difficulty in identifying the vaginal angles or the cervix to complete a total hysterectomy in laboring patients where the cervix is fully dilated.
- h. The decision to perform hysterectomy is difficult especially in nulliparous women as this brings an abrupt and unwelcome end to their reproductive career. However the delayed decision may cause more blood loss thereby increasing morbidity.

## 7. Complications

An emergency major surgery that is characterized by the above mentioned difficulties will understandably be associated with unavoidable complications.

### 7.1 Intraoperative complications

The most frequent complication of peripartum hysterectomy is excessive blood loss and need for transfusion. Only part of this blood loss is attributable to the procedure itself. The extensive blood loss is related mainly to the primary indications for hysterectomy and delay in deciding to carry out hysterectomy. Oedematous tissue, adhesions from previous surgery and the inherent risk for coagulopathy may contribute to blood loss [12,31,33,35].

Blood transfusion is therefore the most common adjunct therapy and therefore increases the risk of blood transmitted diseases such as Hepatitis B & C and HIV. The average number of units of blood transfused in cases of accreta is 6.6 units with some cases requiring over 20 units of blood [31,38]. At least 8-12 units of blood must be made available in suspected cases of accreta.

The next most frequently reported complication is urological injury which affects the bladder or the ureters.[9,31] The bladder is most frequently injured during the dissection from the lower segment in people with previous caesarean sections. The ureters can be clamped, sutured or stitched where they pass under the uterine vessels at the lateral aspects of the lower segment[31,35] The reported incidence of urological injuries with peripartum, hysterectomy is between 4.6% and 12.5% [5,9].

Less commonly reported complications include bowel injuries, laceration of the large pelvic vessels or infundibulo-pelvic ligaments [35].

### 7.2 Post-operative complications

The post operative morbidity of peripartum hysterectomy is high. The post operative complications include bleeding, wound sepsis/dehiscence, urinary tract infections, ileus, anemia, prolonged duration of hospital stay and/or injury after urinary tract infection. Occasionally pulmonary embolism occurs. Many complications such as bleeding, infections and fistula may require relaparotomy or reoperation for proper management [9,35].

Peripartum hysterectomy is associated with increased mortality. Maternal mortality associated with peripartum hysterectomy is decreasing in the developed world but it is high in the developing countries. Identifiable causes of mortality include persistent hemorrhage, disseminated intravascular coagulopathy renal failure and septicemia [5,9].

## 8. Important surgical techniques

### 8.1 Operative techniques that can reduce blood loss in peripartum hysterectomy

1. These include double clamping or back clamping of the pedicles followed by double ligature using an all encompassing tie followed by a transfixing suture.

2. Internal iliac artery ligation, balloon occlusion of the aorta and internal iliac vessels, intravenous administration of oxytocics and application of tourniquet around the uterine cervix can also reduce blood loss [33,41].
3. Moreover when planning delivery of a patient with predisposing factors for bleeding, a rapid or timely decision will prevent excessive blood loss.
4. When a decision has been made to carry out hysterectomy prior to the uterine incision in cases of placenta previa accreta (especially the percreta variant), the intact placenta should be left in situ following delivery of the fetus through a classical uterine incision.
5. If the cervix and paracolpos are not involved as the source of hemorrhage. Subtotal hysterectomy should be adequate to achieve hemostasis and is safer, faster and easier to perform than total hysterectomy. However if the lower segment and paracolpos are involved in the bleeding such as in cases of placenta previa accreta, total hysterectomy will be necessary to secure hemostasis [9,26].

### 8.2 Techniques that may reduce urologic complications

Such techniques include:

1. Careful sharp dissection of the bladder in the midline to mobilize the bladder flap in cases of previous cesarean section(s).
2. Placing clamps and sutures against side wall of the uterus and cervix,
3. Perioperative cystoscopy with ureteral stent placement, and checking the integrity of the bladder by filling with methylene blue solution.
4. In addition placing all clamps medial to those used to secure the uterine vessels and adopting the above mentioned measures to reduce bleeding in the operating field will ensure proper exposure and avoid clamping, sectioning or stitching of the ureters [33,35].

### 8.3 Other techniques

Measures that can help in identifying the lower extent of the cervix to enable total hysterectomy at full cervical dilatation include following the lower uterine segment between the thumb and forefinger, incising of the lower uterine segment and using a covering glove to explore the endocervical canal downwards and feel the external os of the cervix [31].

## 9. Alternatives to hysterectomy

The conservative treatment for massive obstetric hemorrhage has the advantage of preserving fertility and menstrual function, and reducing blood loss[36,39]. It is however only possible in the presence of a stable hemodynamic condition and adequate technical support. This treatment modality should be considered whenever feasible in the developing world where there is a strong desire for large family and aversion to hysterectomy [5]. Uterine rupture and atony are however more amenable to conservative treatment than placenta previa accreta. Conservative treatment may however be complicated by sepsis; secondary hemorrhage and treatment failure.

These alternatives to hysterectomy include effective and consistent use of oxytocics, packing of the uterus with gauze after removal of the placenta, uterine and internal arteries

ligation, B-lynch uterine compression suture, balloon tamponade, uterine artery embolization, uterine repair for ruptured uterus, and argon beam coagulation of the placental site [36,39,41,42].

## 10. Practice points

- The combination of prior caesarean section and current placenta previa should alert the obstetrician that emergency peripartum hysterectomy may be needed and as such, adequate preparations should be made.
- A senior obstetrician with experience in peripartum hysterectomy must be present at surgery for suspected placenta accreta.
- If the personnel and material required for the management of diagnosed cases are lacking, referral to centers with such capacity should be made.
- Women undergoing caesarean section should not only be counseled about the short term complications but also the long term complications of placenta previa accreta and peripartum hysterectomy.

## 11. Research points

- There is need for a large multicenter trial comparing the conventional extirpative with conservative management. Although there are several case reports of successful conservative treatment, they cannot be used to evaluate benefits and disadvantages of each therapeutic strategy in a comparative manner.
- Even for the many alternative options to hysterectomy, there is need for randomized controlled trials to guide the choice of options.

## 12. Conclusions

The identification of the risk factors for placenta previa accreta and its antenatal diagnosis may represent a possibility for elective or semi elective peripartum hysterectomy in modern obstetrics.

In view of the rising incidence of placenta previa accreta, all over the world, the need for peripartum hysterectomy may be on the increase and as such residents in Obstetrics must be adequately trained to perform this difficult but life-saving procedure.

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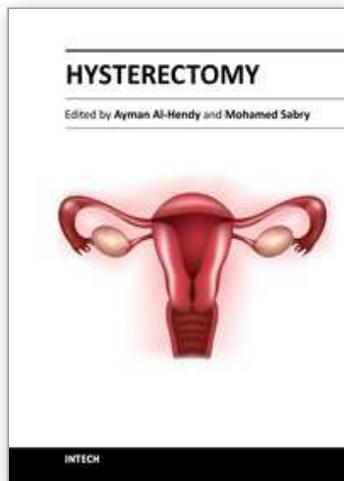
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This book is intended for the general and family practitioners, as well as for gynecologists, specialists in gynecological surgery, general surgeons, urologists and all other surgical specialists that perform procedures in or around the female pelvis, in addition to intensivists and all other specialties and health care professionals who care for women before, during or after hysterectomy. The aim of this book is to review the recent achievements of the research community regarding the field of gynecologic surgery and hysterectomy as well as highlight future directions and where this field is heading. While no single volume can adequately cover the diversity of issues and facets in relation to such a common and important procedure such as hysterectomy, this book will attempt to address the pivotal topics especially in regards to safety, risk management as well as pre- and post-operative care.

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