

# “Near miss” obstetric morbidity in an inner city hospital in Saudi Arabia

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مراجعة "حافة الخطر" التوليدية في مستشفى عمومي بمدينة داخلية بالمملكة العربية السعودية  
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خلاصة: إن الوصول إلى "حافة الخطر"، مثل استئصال الرحم حول الولادة مثلاً، هو مؤشر أكثر فائدة في تقييم الرعاية التوليدية من معدل وفيات الأمومة في مستشفى حديث بمدينة داخلية. لذلك تمت مراجعة دواعي سائر حالات استئصال الرحم حوالي الولادة التي أجريت على مدى خمسة وثمانين شهراً بمستشفى الملك عبد العزيز في جدة، كما روجعت أنواع العمليات وعوامل الاختطار والمراضة الجراحية لتلك الحالات. فكان معدل استئصال الرحم 1.22 لكل ألف ولادة. وكان النزف الونائي بعد الوضع هو أكثر الأسباب شيوعاً (43.5%)، تلاه تمزق الرحم (30.4%) وانتظام المشيمة (26.1%). ومن بين المجموعة الونائية، كانت خمس مريضات بكربات، وقد أصيبت ثلاث منهن بمقدمة ارتعاج وخيمة. ولوحظ في هذه المجموعة استئصال الولادة على نحو غير عادي. ومن بين مجموعة التمزق الرحمي، كانت مريضتان فقط قد أجرتا العملية القيصرية من قبل. وفي مجموعة المشيمة المتدغمة، كانت لدى ثلاث مريضات مشيمة مزاحة، وكانت لدى مريضتين منهن ندوب عمليات قيصرية سابقة. وتوفيت إحدى الأمهات بسبب انصمام بالسائل السلوي (الأمنيوسي).

**ABSTRACT** A defined "near-miss" end-point, e.g. peripartum hysterectomy, is a more useful measure of obstetric care in a modern inner-city hospital than maternal mortality. Thus, indication(s), type of operation, risk factors and surgical morbidity of all cases of peripartum hysterectomy conducted over a period of 85 months at King Abdul Aziz Hospital, Jeddah were reviewed. The incidence of hysterectomy was 1.22 per 1000 deliveries. Atonic postpartum haemorrhage was the most common reason (43.5%), followed by ruptured uterus (30.4%) and placenta accreta (26.1%). Of the atonic group, five patients were primigravidae, three of whom had severe pre-eclampsia. Abnormally prolonged labour was noted in this group. In the uterine rupture group, only two patients had had previous caesarean sections. In the placenta accreta group, three patients had placenta praevia, two of whom had scars from previous caesarean sections. One maternal death was attributed to amniotic fluid embolism.

## Interventions obstétricales de dernier recours dans un hôpital urbain en Arabie saoudite

**RESUME** Un seuil critique d'intervention défini, par exemple l'hystérectomie pendant le périmpartum, permet une meilleure appréciation des soins obstétricaux que la mortalité maternelle dans un hôpital urbain moderne. Par conséquent, les indications, le type d'intervention, les facteurs de risque et la morbidité chirurgicale ont été examinés pour tous les cas d'hystérectomie pendant le périmpartum qui se sont produits durant une période de 85 mois à l'hôpital Roi Abdel Aziz à Djeddah. L'incidence de l'hystérectomie s'élevait à 1,22 pour 1000 accouchements. L'hémorragie de la délivrance par atonie utérine était la cause la plus courante (43,5%), suivie par la rupture utérine (30,4%) et placenta accreta (26,1%). Dans le groupe avec atonie, cinq patientes étaient primigestes et trois d'entre elles avaient une prééclampsie sévère. Un travail anormalement prolongé a été constaté dans ce groupe. Dans le groupe avec rupture utérine, seules deux patientes avaient déjà accouché par césarienne. Dans le groupe avec placenta accreta, trois patientes avaient un placenta praevia et deux d'entre elles présentaient des cicatrices de césariennes antérieures. Un cas de mortalité maternelle a été attribué à une embolie amniotique.

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## Introduction

In developing countries obstetric haemorrhage is still the primary cause of maternal mortality [1]. In Saudi Arabia, where a maternal mortality rate of around 18 per 100 000 births has been reported, obstetric haemorrhage, including haemorrhage due to abortion and uterine rupture was the leading cause of maternal death [2]. In industrialized countries the situation is different, not only because of a lower maternal mortality rate but also because obstetric haemorrhage is no longer the primary cause [3,4]. However, in a recent study on "near miss" cases, i.e. life-threatening morbidity, postpartum haemorrhage (PPH) was the primary cause for admission to the intensive care unit [5]. It has been suggested that, with the observed decline in maternal mortality, analysis of well defined "near miss" cases may be a more sensitive measure of the standard of obstetric care [5]. In this respect, admission to the intensive care unit may not be an ideal end-point since it is sometimes influenced by factors other than the extent of morbidity — for example differences in policies among different maternity units or sometimes even the availability of beds in an intensive care unit.

This study is a retrospective analysis of cases of peripartum hysterectomy which took place at King Abdul Aziz Hospital and Oncology Centre (Saudi Arabia). The operation is usually performed as a last resort in the course of management of massive obstetric haemorrhage. Hence it is a well defined end-point of "near miss" cases for the most common morbidity in obstetric practice, i.e. haemorrhage. The main objective of the study was to identify the incidence, indications and morbidity associated with peripartum hysterectomy among the studied population.

## Patients and methods

### General

The study was undertaken at King Abdul Aziz Hospital and Oncology Centre (KAH). The hospital was opened in August 1990. The population attending the hospital is mostly of lower socioeconomic class; almost 40% Saudi, the rest being from other Arab countries with a minority from Africa and Asia. The hospital provides antenatal care for high-risk patients who are usually referred from local primary health care centres.

The labour ward registry for the 85-month period since the hospital was opened (from 1 August 1990 until 31 August 1997) was reviewed. The medical records of patients who had had emergency caesarean hysterectomy were identified and manually reviewed for the following data.

- Maternal characteristics: nationality, age, parity, gestational age at presentation and previous history of caesarean section delivery;
- Labour and delivery: onset of labour (whether spontaneous or induced), duration of labour, mode of delivery and the perinatal outcome were recorded;
- Operative data: indications and types of hysterectomy, estimated operative blood loss and transfusion, intra- and postoperative complications and days of postoperative hospital stay.

The operative time, total blood loss and transfusions were calculated from the operative notes, anaesthetic records and fluid charts. Postoperative febrile morbidity was defined as an elevation of temperature  $\geq 38^\circ\text{C}$  on two occasions  $\geq 4$  hours apart, 24 hours after surgery. Hospital stay was calculated from the day of the operation until discharge from the hospital.

The following labour ward protocol for PPH is used at KAH. Upon diagnosis of PPH, uterine massage is applied together with 20–40 units of oxytocin in 500 ml dextrose as intravenous infusion. At the same time the placenta is examined. If uterine atony is still present, 0.4 mg methergin is given intravenously. If bleeding persists, examination under general anaesthesia is performed. In extreme cases exploratory laparotomy is undertaken and the condition is dealt with according to the findings.

Data were analysed and are reported as means  $\pm$  standard deviation and percentages as appropriate. The Student *t*-test was used for comparison between means. A *P*-value of  $< 0.05$  was considered statistically significant.

## Results

### General

During the 85-month study period, 18 842 deliveries took place. In 2457 cases (13%) delivery was undertaken by caesarean section. Emergency peripartum hysterectomies were performed in 23 patients, giving an incidence of 1.22 per 1000 deliveries. No case of elective caesarean hysterectomy was performed during the study period.

Table 1 shows the characteristics of the 23 patients as well as labour, delivery and perinatal mortality data. Only 6 (26.1%) of the patients were booked for antenatal care in our hospital, while 17 (73.9%) were unbooked patients. The majority of the latter group had had no formal antenatal care. Only 7 patients (31.4%) were Saudi nationals, while 16 (69.9%) were non-Saudi.

In all cases, hysterectomy was performed because of severe PPH that failed to respond to conservative medical and surgical measures. In 10 (43.5%) patients uterine atony was the primary cause of PPH,

followed by ruptured uterus in 7 (30.4%), and finally placenta accreta in 6 (26.1%) patients. Patients in the atonic PPH group were significantly lower in gravidity than those in the ruptured uterine or accreta group ( $P < 0.001$  and  $P < 0.03$  respectively). No other significant differences were noted between the three groups (Tables 2–4).

Total abdominal hysterectomy (TAH) was performed in 13 cases (54.5%) versus subtotal abdominal hysterectomy (SAH) in 10 (45.5%) cases.

### Postpartum haemorrhage due to uterine atony

Table 2 gives details of patients in this group. All patients were delivered by emergency caesarean section except for one who was delivered vaginally.

It is of clinical significance that all patients had an abnormally prolonged labour, mostly in the second stage except for three patients. One patient (case 1) presented with obstructed labour with an already dead fetus; the onset of labour had taken place on board a ship. Another patient presented with a second twin retained for more

Table 1 Patients' characteristics

| Characteristic               | Number          |
|------------------------------|-----------------|
| Age $\pm$ s (years)          | 30.0 $\pm$ 7.4  |
| Gravidity $\pm$ s            | 5.0 $\pm$ 3.3   |
| Birth weight $\pm$ s (g)     | 2932 $\pm$ 1010 |
| Spontaneous vaginal delivery | 5 (21.7%)       |
| Caesarean section            | 18 (78.3%)      |
| Booked                       | 6 (26.1%)       |
| Unbooked                     | 17 (73.9%)      |
| Saudi                        | 7 (30.4%)       |
| Non-Saudi                    | 16 (69.6%)      |

s = standard deviation

Table 2 Obstetric haemorrhage due to uterine atony

| Case number | Age (years) | Gravidity | Antenatal care | Gestational age (weeks) | Delivery mode and indications   | Outcome | Birth weight (g) |
|-------------|-------------|-----------|----------------|-------------------------|---------------------------------|---------|------------------|
| 1           | 40          | 5         | B              | 40                      | CS: prolonged 2nd stage         | SB      | 3900             |
| 2           | 30          | 9         | B              | 38                      | CS: prolonged 2nd stage         | Twin LB | 2700<br>2300     |
| 3           | 20          | 1         | B              | 40                      | CS: retained 2nd twin and PET   | Twin LB | 2400<br>2600     |
| 4           | 23          | 1         | B              | 37                      | CS: PET                         | LB      | 3400             |
| 5           | 24          | 1         | B              | 40                      | CS: prolonged 2nd stage         | LB      | 3200             |
| 6           | 29          | 1         | B              | 43                      | CS: prolonged 2nd stage         | LB      | 3080             |
| 7           | 16          | 1         | B              | 40                      | CS: PET and APH                 | SB      | 1750             |
| 8           | 24          | 2         | B              | 35                      | CS: failure to progress and APH | SB      | 2600             |
| 9           | 30          | 2         | B              | 40                      | CS: fetal distress              | LB      | 3100             |
| 10          | 27          | 2         | B              | 38                      | CS: failure to progress         | LB      | 3300             |
| Mean        | 26.2        | 2.5       |                | 38.8                    |                                 |         | 2820             |
| ± s         | ± 6.9       | ± 2.6     |                | ± 1.8                   |                                 |         | ± 591            |

B (booked patient), CS (caesarean section), PET (pre-eclampsia), APH (antepartum haemorrhage), LB (live birth), SB (stillbirth)

s - standard deviation

than 14 hours. Another patient (case 4) had received three doses of prostaglandin vaginal pessaries (PGE<sub>2</sub>, 3 mg each) over 24 hours.

It is also of note that in this group half of the patients were primigravidae (cases 3 to 7). Three of them (cases 3, 4 and 7) presented with severe pre-eclampsia (PET); in addition one patient (case 7) had abruptio placenta. One patient (case 6) died during hysterectomy with signs of acute amniotic fluid embolism (post-mortem examination had been refused by the family).

In all cases the uteri were sent for histology examination. In three cases (5, 6 and 10) there were signs of acute inflammatory changes, and in two (cases 4 and 9) micro-

scopic features of placenta accreta were seen.

### Postpartum haemorrhage due to uterine rupture

Table 3 gives the details of patients in this group. Only two patients (cases 11 and 12) had previous uterine caesarean section scars which complicated the rupture. The first one (case 11) had had three previous caesarean section deliveries. She was admitted in labour and an emergency caesarean section was performed. During operation, the uterus was found to have ruptured. Following delivery of the baby and placenta, the uterus was repaired. After closure of the abdominal wall, the patient passed large blood clots per vagina. An

Table 3 Obstetric haemorrhage due to uterine rupture

| Case number | Age (years) | Gravidity | Antenatal care | Gestational age (weeks) | Delivery mode and indications      | Outcome | Birth weight (g) |
|-------------|-------------|-----------|----------------|-------------------------|------------------------------------|---------|------------------|
| 11          | 35          | 14        | UB             | 40                      | CS: three previous CS              | LB      | 3200             |
| 12          | 32          | 8         | UB             | 33                      | CS: fetal distress and previous CS | LB      | 1970             |
| 13          | 35          | 10        | UB             | 40                      | CS: APH                            | SB      | 5940             |
| 14          | 39          | 5         | UB             | 40                      | CS: ruptured uterus                | SB      | 3400             |
| 15          | 42          | 5         | B              | 40                      | CS: fetal distress                 | LB      | 3400             |
| 16          | 29          | 5         | UB             | 40                      | SVD                                | LB      | 3200             |
| 17          | 34          | 5         | B              | 40                      | SVD                                | LB      | 2380             |
| Mean        | 35.1        | 7.4       |                | 39.0                    |                                    |         | 3348             |
| ± s         | ± 4.3       | ± 3.5     |                | ± 2.5                   |                                    |         | ± 1171           |

*B* (booked patient), *UB* (unbooked patient), *CS* (caesarean section), *APH* (antepartum haemorrhage), *LB* (live birth), *SB* (stillbirth), *SVD* (spontaneous vaginal delivery)  
*s* = standard deviation

emergency laparotomy was performed and TAH with left salpingo-oophorectomy had to be performed. Case 12, had had one previous caesarean section and was admitted in early labour, which was accelerated by amniotomy and oxytocin intravenous infusion.

Two patients (cases 13 and 14) were admitted with antepartum haemorrhage and intrauterine fetal death. They were initially diagnosed and managed as abruptio placentae.

One patient (case 15) was induced because of gestational diabetes mellitus. She received dinoprostone (PGE<sub>2</sub>) vaginal tablets, 3 mg each every 6 hours. However, because of fetal bradycardia, an emergency caesarean section was performed. There was an extensive rupture of the lower uterine segment with intraperitoneal haemorrhage.

Two patients (cases 16 and 17) developed PPH with extensive cervical and lower segment tears following spontaneous

vaginal delivery. In both patients, subsequent uterine histopathology revealed placenta accreta.

### Postpartum haemorrhage due to placenta accreta

Among the six cases of placenta accreta, three were associated with placenta praevia (Table 4). In two of them (cases 19 and 20) the placentas were implanted on top of previous caesarean section scars. In each of the three cases, hysterectomy was performed as a post-caesarean section procedure, i.e. the patient had to be taken back to the theatre for an exploratory laparotomy following completion of the caesarean section operation.

Three patients (cases 21, 22 and 23) came to the emergency room in a state of haemorrhagic shock due to retained placenta and severe PPH. One (case 23) had had a retained placenta for more than 48 hours following spontaneous vaginal delivery at home. In each case complete manual re-

Table 4 Obstetric haemorrhage due to placenta accreta

| Case number | Age (years) | Gravidity | Antenatal care | Gestational age (weeks) | Delivery mode and indications | Outcome | Birth weight (g) |
|-------------|-------------|-----------|----------------|-------------------------|-------------------------------|---------|------------------|
| 18          | 23          | 6         | B              | 28                      | CS: PP                        | LB      | 1100             |
| 19          | 38          | 10        | B              | 32                      | CS: APH                       | LB      | 1490             |
| 20          | 37          | 11        | UB             | 37                      | CS: APH                       | LB      | 4100             |
| 21          | 38          | 6         | UB             | 40                      | SVD                           | -       | -                |
| 22          | 23          | 4         | UB             | 28                      | SVD                           | NND     | -                |
| 23          | 28          | 8         | UB             | 40                      | SVD                           | LB      | -                |
| Mean        | 31.2        | 7.5       |                | 34.2                    |                               |         | 2230             |
| ± s         | ± 6.7       | ± 2.4     |                | ± 5.1                   |                               |         | ± 1331           |

B (booked patient), UB (unbooked patient), CS (caesarean section), PP (placenta praevia), APH (antepartum haemorrhage), SVD (spontaneous vaginal delivery), LB (live birth), NND (neonatal death)  
s = standard deviation

removal of the placenta under general anaesthesia was unsuccessful. In all cases the histopathology revealed placenta accreta.

### Complications and surgical morbidity

One patient (case 6) died. The cause of death was attributed to amniotic fluid embolism. Disseminated intravascular coagulation developed during operation in one patient (case 19), while five patients (cases 7, 8, 14, 17 and 22) presented with established features of disseminated intravascular coagulation. Table 5 compares surgical morbidity in patients who had total (13, 54.5%) and subtotal hysterectomy (10, 45.5%). The mean blood loss was significantly more in the total compared with the subtotal hysterectomy group ( $P < 0.04$ ). Unilateral oophorectomy was performed in five patients during the course of total hysterectomy and in one patient during subtotal hysterectomy. The rates of occurrence of other surgical morbidity were not statistically different between the two groups.

Table 5 Morbidity of total versus subtotal hysterectomy

| Variable                 | Total hysterectomy | Subtotal hysterectomy |
|--------------------------|--------------------|-----------------------|
| Operative time (mins)    | 153 ± 64.6         | 164 ± 57              |
| Blood loss (mL)*         | 4376 ± 1939.5      | 3200 ± 1288           |
| Blood transfused (units) | 6.4 ± 3.8          | 5.1 ± 1.9             |
| Days in hospital         | 10.6 ± 5.7         | 10.3 ± 3.9            |

\*Statistically significant  
Values given are mean ± standard deviation.

Relatively minor postoperative complications including fever (27.3%), urinary tract infection (18.2%) and wound infection (18.2%) were observed. Major postoperative complications included brachial vein thrombophlebitis (case 21), chest infection, left pleural effusion and pneumothorax (case 3), pulmonary embolism

(case 17) and acute renal failure (case 15). Seven patients had to be admitted to the intensive care unit for variable periods of time.

## Discussion

The incidence of peripartum hysterectomy in the present study is slightly higher than those reported in similar reviews [6,7]. However, comparison of absolute figures between different centres has very limited significance. Ideally when calculating the incidence of peripartum hysterectomy, the denominator should be all cases that had PPH during the study period. However, an accurate estimate of the rate of PPH is very difficult to obtain, especially in a retrospective analysis.

In our study, the commonest indication for hysterectomy was atonic PPH (45.5%), whereas in similar studies from industrialized countries placenta accreta has been identified as the primary indication for peripartum hysterectomy, followed by atony then uterine rupture [7,8]. This has been largely attributed to the use of newly developed pharmacological agents in the management of atonic uteri, such as dinoprost ( $\text{PGF}_{2\alpha}$ ) [9]. The observed increase in cases of placenta accreta was due to a rise in the incidence of prior caesarean section deliveries [7,8].

The results of our study highlight several important observations. First, in a number of cases potentially avoidable factors can be identified. Probably the most obvious one is lack of antenatal care. In a city like Jeddah, the absence of antenatal care cannot be attributed to a shortage of medical facilities. It is more likely due to ignorance or illiteracy among women of a lower socioeconomic class, who are often most vulnerable to obstetric complications. This

emphasizes the need for more education of women in the value of antenatal care as well as the need to make access to medical service easier for all patients. This is particularly important in this part of the world with a multinational population that usually has a high prevalence of obstetric risk factors.

Second, more attention needs to be given to "predictors" of massive PPH. In a previous large case-control study of about 10 000 women who had PPH, pre-eclampsia, twins and abnormalities of labour, such as augmentation, prolonged second stage and nulliparity, were all identified as important independent risk factors for uterine atony [8]. In our study, almost all the patients in the atonic PPH group had one or more of those risk factors.

Among the atonic PPH group, prolonged second stage of labour was the most commonly observed abnormality. It is possible that prolonged labour predisposes to a low grade of subclinical endometritis, which may adversely affect the efficiency of contraction/retraction of already exhausted uterine muscle fibres. In the present study, the histopathological examination of the uteri of almost 30% of the patients in the atonic PPH group showed features of heavy inflammatory infiltration.

It is of note that the patients who developed uterine atony were significantly lower in gravidity compared with those in the other two groups. This finding highlights the vulnerable state of primigravidae as a risk group for atonic PPH. Other studies have found no association between grand multiparity and increased risk of haemorrhage due to atony [11-13]. However, grandmultiparity, particularly high parity which is rarely encountered in industrialized societies, is still an important risk factor for non-atonic PPH. This was pointed out by Al-Mashari et al. in a study on maternal mortality in Saudi Arabia in which advanced maternal age,

high parity and increasing fetal size were important risk factors for uterine rupture and maternal mortality [2].

In our study, uterine rupture was the second most common reason for peripartum hysterectomy. In only two patients was there was a history of previous caesarean section. This is in contrast to most studies reported from industrialized countries where previous caesarean section is usually the main feature associated with uterine rupture [14-16].

Rupture of the uterus is potentially predictable and hence a preventable complication. A large fetus, abnormal fetal lie and previous scarred uterus are all risk factors for uterine rupture, all of which can be identified antenatally. However, in the present study only two patients, of those who had uterine rupture, had been booked for antenatal care.

Two patients among the uterine rupture group were admitted as cases of abruptio placenta. Subsequently, uterine rupture was discovered when it was decided to proceed with caesarean section delivery. These two cases emphasize the difficulty in making a differential diagnosis between abruptio placenta and uterine rupture. Reaching the right diagnosis requires a high index of suspicion.

The potential risks associated with induction and/or augmentation of labour in multiparous patients, particularly women of high parity, should not be underestimated [17]. In such patients, the use of oxytocics is associated with increased incidence of hypertonic uterine contractions, fetal distress and uterine rupture. Similarly, prostaglandin might have a cumulative effect. One patient (case 15) in our study, who had gestational diabetes, had received 10 doses of prostaglandin vaginal pessary over 3 days.

The dangerous combination of placenta praevia and accreta has been identified by several authors [18-20]. In a recent study in Saudi Arabia, the risk of placenta praevia was shown to increase five-fold in patients who had had previous caesarean section compared with those with a non-scarred uterus [21]. It was also noted as a particularly dangerous combination in the last Saudi confidential maternal mortality report [2]. Hence, it has been suggested that patients with previous caesarean section in whom the placenta is implanted over the uterine scar should be counselled for hysterectomy [22]. In the present study, three cases of the placenta accreta group had had previous caesarean section. In each of the three cases, conservation of the uterus failed.

If hysterectomy is to be performed, the preferable procedure is total abdominal hysterectomy. However several studies, as well as our study, do not show statistically significant differences between subtotal and total abdominal hysterectomy regarding operative time, need for transfusion, number of intraoperative and postoperative complications and maternal mortality [7,23]. Thus at the time of the emergency, a balance should be made between what is desirable and what is feasibly safe. Sometimes, defining the anatomical limits of the vaginal vault may not be easy, particularly after prolonged, obstructed labour and in the presence of oedema and bleeding. Striving for total abdominal hysterectomy in such cases can compromise the patient's chance for safety and runs the risk of bladder or ureteric injury [23].

There is no doubt that in our study hysterectomy was a life-saving procedure. Whether or not more uteri would have been saved if other pharmacological agents and techniques, such as uterine packing, arterial embolization, uterine devascularization or



internal artery ligation, were included in the protocol for management of PPH is a matter for speculation. However, there is no doubt that proper management of obstetric haemorrhage is difficult. It requires multiple resources, a team approach and the presence of a well rehearsed management protocol for dealing with obstetric haemorrhage.

Finally, there was only one case of maternal mortality among 23 "near miss" cases resulting from massive obstetric

haemorrhage. Thus, depending on the maternal mortality rate alone in reviewing and evaluating our obstetrics practice would not properly reflect potentially avoidable problems and future needs, e.g. the importance of antenatal care. This fact emphasizes the value of using a well defined end-point of maternal morbidity as opposed to mortality in evaluating the standard of obstetrics service and potentially avoidable problems.

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