

## Maternal mortality and caesarean delivery: A five year review

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### Abstract

**Aim:** To find out maternal mortality related to caesarean delivery

**Methods:** A review of maternal mortality in Government Medical College Hospital Chandigarh, India was conducted for the last five years. [2003 to 2007].

**Results:** Maternal mortality ratio was found to be 496.4 per 100,000 live births and of which 23.59% was causally or incidentally related to caesarean delivery. The caesarean delivery rates for the hospital was 29.08% in 2003 and a rising trend to 36.60% in 2007 was also noted.

**Conclusion:** Caesarean remains a good option when rationally indicated; however the maternal and fetal conditions that indicate the operative delivery may be inherently related to mortality and morbidity.

**Key words:** Maternal mortality, maternal mortality ratio, caesarean delivery

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### Introduction

Maternal death is defined as death of a woman during pregnancy, labour and up to 42 days after birth. Deaths due to obstetrical complication (direct maternal death) or due to previously existing disease which was aggravated by pregnancy (indirect maternal death) are common in developing countries. The maternal mortality ratio (MMR) defined as number of maternal deaths per 100,000 total births is 450 for India compared with 8 for USA. The risk of a woman dying as a result of pregnancy or childbirth is one in 70 for India compared with one in 30,000 in Northern Europe.<sup>1</sup>

The reduction of maternal deaths is a key international development goal. Evidence based health policies and programs aiming to reduce maternal deaths need reliable and valid information. In a WHO analysis of deaths, haemorrhage was the leading cause of maternal death in Africa and Asia; hypertensive disorders represent the highest cause of death in Latin America and Caribbean. HIV/AIDS cause about 6% of deaths in Africa and obstructed labour and anemia each

causing about a tenth of deaths in Asia. Abortion related mortality was highest in Latin America.<sup>2</sup>

The maternal mortality is lowest in countries where analysis of causes of maternal deaths is followed by revised guidelines for the management of specific causes. This is possible where national level policies exist for such reviews and interventions. The regions with high mortality, paradoxically, do not have such integrated reviews and therefore rely on guidelines from these countries.

Maternal deaths in USA have remained constant for several decades. A recent review, however, sought to analyse the causes and especially to what extent is caesarean birth causally as opposed to associatively related to maternal death.<sup>3</sup>

In Australia maternal death is unexpected. The latest published report of maternal mortality in Australia for 2000-2002 shows an increase from 8.4 in 1997-1999 to 11.1 per 100,000 births in 2000-2002. The Australian reporting process does not provide data on the

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relationship of mode of birth and maternal death. In the latest report 70% of the women who gave birth prior to their death [43 of 61] had a caesarean delivery. These were thought to have contributing factors related to caesarean section or anaesthesia, one because of a perforated bowel leading to sepsis, another from uncontrolled haemorrhage from the pelvic wall and the third from sepsis due to an epidural abscess.<sup>4</sup>

A review of maternal deaths occurring at government medical college hospital Chandigarh, India was carried out to see the causes of maternal deaths, the role of cesarean section and whether caesarean delivery was causatively or associatively related to maternal mortality. Such reviews from time to time are vital to enable the analysis of health problems of any area to see any changing trends to study the effect of and to introduce any new corrective measures or policies.

**Methods**

A five year retrospective analysis of maternal deaths occurring in Govt. Medical College Hospital, Chandigarh from January 2003 to December 2007 was carried out. GMCH is a 500 bed referral hospital for surrounding areas from the states of Punjab, Haryana and Himachal Pradesh. Permission to publish the data was taken from the GMCH Hospital Ethics Committee.

**Results**

The maternal deaths, number of deliveries and caesarean deliveries for these years is shown in Table 1. The rise in number of caesarean section rate is noted from 29.08% in 2003 to 36.6% in 2007. Total maternal deaths in proceeding five years were 89. Table 2 shows the aetiological break up of these deaths.

Out of these 89 maternal deaths, 21 (23.59%) were directly or indirectly related to caesarean section. Of these 21 caesarean delivery related deaths, 19 caesareans had been performed at small peripheral hospitals and the patients referred post operatively to GMCH and 2 had been done at GMCH. Of these 21 deaths, 12 were casually related and 9 were

associatively related to caesarean section. The analysis of these 21 caesarean deaths, were as shown in table 3.

**Discussion**

The maternal mortality in the present study broadly confirms to the global scenario with haemorrhage 30.33%, sepsis 23.59% and hypertensive disorders of pregnancy 14.60 forming the majority. However, a further analysis brings to light a disturbing tend of caesarean being directly responsible or a contributing factor to maternal mortality in 23.6% cases.

Caesareans done for foetal indication like breech was found to have increased maternal morbidity and mortality in a study reported from Canada. Liu S et al reported increased postpartum risk of cardiac arrest, infection and of hysterectomy after low risk planned caesareans versus vaginal delivery<sup>5</sup>.

In July 2008, the journal section of American Journal of obstetrics and gynecology discussed a study that focussed on caesarean delivery and its potential impact on the U.S. maternal mortality.<sup>6</sup> In this regard journal club members thought that the exploration of a potential

**Table 2. Causes of maternal deaths**

| Cause of death                           | Break up of 89 [%] |
|--|--------------------|
| Haemorrhage                              | 27 (30.33%)        |
| Hypertensive disorders of pregnancy      | 13 (14.60%)        |
| Sepsis                                   | 21 (23.59%)        |
| Obstructed labour                        | 3 (3.37%)          |
| Anaemia with congestive cardiac failure  | 7 (7.86%)          |
| Anaesthesia related                      | 4 (4.49%)          |
| Jaundice (infective hepatitis)           | 5 (5.61%)          |
| Tuberculosis – meningitis / disseminated | 4 (4.49%)          |
| Pulmonary embolism                       | 2 (2.24%)          |
| Falciparum malaria                       | 1 (1.12%)          |
| Pancreatitis                             | 1 (1.12%)          |
| Carcinoma Cervix                         | 1 (1.12%)          |
| <b>Total</b>                             | <b>89</b>          |

**Table 1. Total deliveries, maternal deaths and cesarean deliveries (C.D)**

| Year         | Maternal deaths | Total deliveries | MMR          | C.D Total (%)        |
|--------------|-----------------|------------------|--------------|----------------------|
| 2003         | 13              | 3428             | 379          | 997 (29.08)          |
| 2004         | 14              | 3544             | 395          | 1099 (31.01)         |
| 2005         | 17              | 3705             | 458          | 1175 (31.71)         |
| 2006         | 20              | 3703             | 540          | 1144 (30.89)         |
| 2007         | 25              | 3549             | 704          | 1299 (36.60)         |
| <b>Total</b> | <b>89</b>       | <b>17929</b>     | <b>496.4</b> | <b>5714 (31.87%)</b> |

**Table 3. Caesarean delivery and maternal deaths**

| Aetiology   | Causally related | Associatively related |
|---|------------------|-----------------------|
| Anaesthesia related   | 5                | 0                     |
| Haemorrhage due to vessel injury in primary caesarean performed for fetal indication like breech & fetal distress | 5                | 0                     |
| Haemorrhage in C.D. done for placenta praevia / accreta L   | 0                | 3                     |
| Induced abortion in previous caesarean with misoprostol   | 0                | 2                     |
| by surgical method  | 0                | 2                     |
| Sepsis after C.D.   | 2                | 0                     |
| C.D. for eclampsia  | 0                | 2                     |
| <b>Total</b>  | <b>12</b>        | <b>9</b>              |

link between caesarean delivery and maternal death was a valid and timely area for Clarke et al to study.<sup>6</sup> Because caesarean delivery is the most frequently performed major abdominal surgery in the USA, any and all related complications can impact the morbidity and mortality rates of the entire obstetric population. This review has only considered maternal mortality in one country in the developed world. The situation is completely different in the developing world. Daily mortality rates from preventable complications of pregnancy and childbirth are 1600 for women and over 10,000 for neonates. Almost all maternal deaths and 90% of neonatal deaths occur in low income countries.<sup>7</sup> To reduce these appalling figures requires more than just good obstetric care; it requires major social changes and, in particular, a commitment to education of both men and women.

Clarke et al studied the causes of maternal mortality and specifically to what extent were such deaths preventable by improved quality of care for individuals, to what extent is caesarean delivery causally as opposed to associatively related to maternal death and might systematic changes in the delivery of obstetric health care reduce maternal death rates? In this study they found 3 maternal deaths due only to primary caesarean delivery – 2 due to haemorrhage from vessels injured during surgery and in 1 case of repeat caesarean delivery, death was due to sepsis secondary to surgical injury to the bowel.<sup>6</sup>

Bates et al found that in Sub Sahara Africa haemorrhage was a major factor in maternal mortality because of lack of adequate blood at the time of need.<sup>8</sup> This factor should be considered as any caesarean delivery can

potentially be associated with unforeseen PPH and this was the reason for high caesarean delivery mortality.

In India this subject is even more relevant because various factors like shortage of medical personnel, inadequate technical facilities in the operation theatre and lack of adequate arrangement for blood make for a very high rate of adverse outcomes.

Anaesthesia related deaths were 5 out of 21 in our study and show substandard care.

Another major cause was rupture uterus due to previous caesarean section in induced abortion at 18 – 19 weeks either with the now freely available misoprostol or dilatation and evacuation done by untrained personnel. Most of these abortions were probably sex determined abortions for female foetus as all these mothers had previous female babies. So female’s foeticide is not only a cause for a skewed sex ratio in India but also an undocumented cause for maternal mortality. In conclusion caesarean remains a good option when rationally indicated.

**Recommendation**

The risks of caesarean need to be quantified for different hospital set ups and the same has to be conveyed to the patient. The risks are actually much higher for small hospitals in developing countries. The trend of increasing rates of caesarean section, also need to be monitored and a registry should be maintained in all hospitals to look into indications of and the caesarean related morbidity and mortality.

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