

East African Medical Journal Vol. 88 No 8 August 2011

MATERNAL AND PERINATAL MORBIDITY AND MORTALITY OF CAESAREAN DELIVERY IN THE LATE FIRST STAGE AND SECOND STAGE OF LABOUR

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**MATERNAL AND PERINATAL MORBIDITY AND MORTALITY
OF CAESAREAN DELIVERY IN THE LATE FIRST STAGE
AND SECOND STAGE OF LABOUR**

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ABSTRACT

Objective: To determine whether there is a higher maternal and perinatal morbidity in Caesarean deliveries performed in the late first stage and second stage of labour compared to Caesarean deliveries earlier in the first stage of labour.

Design: A case control retrospective study.

Setting: Tygerberg Academic Hospital, Cape Town (South Africa).

Subject: A cohort of 85 cases and 86 controls was selected from labour ward birth registers and data were collected from patient files. Rates of predefined complications of Caesarean sections and perinatal morbidity were analysed using SPSS version 15 (statistical Package for the Social Science).

Results: There was no difference between cases and controls for the following variables: age, gravidity, parity, past obstetric history, gestational age, HIV status, cardiotocography (CTG) tracing, labour and anaesthesia. Intra-operative complications rates were higher in cases than control though not statistically significant. Maternal high care/ICU admission and neonatal complications rates were significantly higher in cases than controls.

Conclusion: Caesarean deliveries which are performed in the late first stage and second stage of labour are not associated with more maternal intra-operative complications but with significantly higher maternal high care and ICU admissions as well as neonatal complications compared to Caesarean deliveries earlier in the first stage of labour.

INTRODUCTION

Caesarean deliveries with the improved safety of anaesthetic interventions, surgical techniques, advanced technology, knowledge in intensive care medicine, the availability of blood and blood products and the "depaternalisation" of medical care, is becoming more and more popular worldwide, with ranges up to about 40% in some countries (1). South Africa and Tygerberg Hospital (TBH) are not exceptions to the popularisation of Caesarean delivery.

There is ample evidence indicating an association between Caesarean sections with some serious complications for mother and neonates. These complications range from infections to maternal death and neonatal trauma and respiratory difficulties.

Emergency caesarean deliveries (those performed in labour) are at higher risk for complications compared to elective Caesarean sections (performed

prior to labour onset) (2). Caesarean sections performed during labour have been associated with an increased maternal and perinatal morbidity as compared to those performed prior to the onset of labour (2). The more advanced the cervical dilatation (9 to 10cm) the higher the risk of increased maternal and perinatal morbidity (2,3,4). Other factors specific to Caesarean delivery at full cervical dilatation (that is engagement and low station of the foetal head as well as failed trial of instrumental vaginal delivery) have been shown to increase the maternal and perinatal morbidity (2).

Intra-operative and post-operative complications associated with Caesarean deliveries are widely described in the literature (2-4). Maternal complications include: blood transfusion, accidental extension of the uterine incision, hysterectomy, urinary tract injuries, bowel injuries and intensive care unit (ICU) admissions. Some of these complications can be catastrophic in repeat Caesarean delivery.

Common infective complications are wound infections, urinary tract infections and endometritis (2-6). Neonatal complications include: birth trauma, low five minute Apgar score, asphyxia and neonatal sepsis (2,4,6). The prevalence of HIV infection in South Africa is high. There is evidence indicating that maternal Caesarean delivery complications are more common when performed on HIV positive women (7,8). In TBH Caesarean deliveries constitute 26% of all deliveries in contrast to 1.3% assisted vaginal deliveries (data from the 2006 TBH Year Book) (9). There was no study conducted to establish whether there is a higher maternal and perinatal morbidity and mortality of the late first stage and second stage of labour Caesarean deliveries compared to those earlier during first stage of labour. In addition no information was available about complications that occur with a higher frequency when comparing the two groups. Determining and comparing the risks, type and proportions of maternal and perinatal morbidity and mortality of Caesarean deliveries in the earlier first stage and late first stage as well as second stage of labour, could result in changing the management of Caesarean deliveries in Tygerberg Hospital. A new evidence based approach could reduce these risks and reduce the complications and cost related to Caesarean deliveries.

This study aimed at establishing the nature and frequency of complications associated with emergency Caesarean deliveries earlier in labour compared to late in labour using data available in labour ward birth register and patients files.

MATERIALS AND METHODS

A case control study was conducted. Rates of predefined types of complications from Caesarean deliveries (earlier during the first stage and late first stage- second stage of labour) were determined. Data were collected from the birth registers in the labour ward and the files from the medical records at TBH.

The following definitions were used: earlier during the first stage of labour as from onset of labour up to eight centimetres cervical dilatation and late stage first stage and second stage of labour as from nine centimetres cervical dilatation. For the first stage of labour the following data were collected: normal progress, poor progress, fetal condition and for the late first stage-second stage of labour trial of instrumental vaginal delivery.

The maternal outcome criteria were classified as follow:

- Intra-operative complications collected were accidental extension of the uterine incision, blood loss, trauma (bladder, bowels), blood transfusion, duration of operation, consultant called in and

hysterectomy.

- Post-operative complications were wound infection, puerperal sepsis, thrombo-embolic events, haematoma, endometritis, cystitis, acute pyelonephritis, bladder fistula, reoperation, hysterectomy during reoperation, bronchopneumonia, lung atelectasis, length of hospitalisation, high care and ICU admission and death. Perinatal outcomes that were noted included: birth trauma, low Apgar score at five minute (<7), asphyxia, intubation and/or ventilation, sepsis, pneumonia, length of hospitalisation, high care admission for continuous positive airway pressure (CPAP), neonatal ICU admission and death.

Inclusion criteria were: labour, gestational age (36-42 weeks) and birth weight if gestational age unknown (>2000g) and exclusion criteria were: preterm labour (<36 weeks), maternal diseases (insulin dependant diabetes mellitus), eclampsia, AIDS, morbid obesity (BMI>50), foetal anomaly, low birth weight if gestational age unknown (\leq 2000g), prolonged rupture of membranes (>24h), preterm prelabour rupture of membranes, chorio-amnionitis, antepartum haemorrhage and two or more previous Caesarean sections.

Sample size was calculated using an alpha value of 0.05 and a beta value of 0.20 (power 80%) assuming 15% complications in the control group and 35% complications in the study group. Each arm of the study required 80 cases. The two groups (Caesarean deliveries: earlier first stage and late first stage-second stage of labour) were compared in term of the incidence of the complications. Statistical analysis was carried out using SPSS version 15 (statistical Package for the Social Science). The number and percentages of categorical data as well as the mean and standard deviation (SD) of continuous data were calculated. Comparison between mean values of continuous variables was done using the Student's t-test while the Chi-square was used for categorical data. Where an expected cell value was less than ten in a two-by-two table, the Fisher exact test was used. Statistical significance was set at a p-value less than 0.05. Approval was obtained from the ethics committee of Stellenbosch University: (Committee for Human Research) to conduct the study (decision number: N07/04/095).

RESULTS

From the labour ward register 85 study and 86 control cases were collected. These cases were collected over a time span from April 2006 to December 2007. There was no significant difference comparing study and control groups concerning maternal age and previous obstetric history. Regarding the characteristics of the present pregnancy, there was no difference between

the two groups (Table 1). Significantly more control patients received analgesia during labour compared to cases ($p=0.004$).

Intraoperative complications between the groups did not differ significantly (Table 2). Post-operative high care and ICU admission (Table 2) were significantly more ($p=0.03$) in study patients (7) compared to control (1). Post-operative complications did not differ between the two groups but of note was that major complications like thromboembolic events, uterine atony occurred only in the study group (Table 2).

There was no difference in neonatal outcome between the two groups as regarding birth weight,

five minute Apgar scores, gender, intubation and/or ventilation, length of hospitalisation and high care admission (Table 3). However, there were significantly ($p<0.03$) more Apgar score <7 in the study group. There were more neonates with complications in the study (37) compared to the control group (21). The complications were classified as shown (Table 3). The difference was significant more in the study group when any complications were compared to no complications ($p=0.008$). Significantly more asphyxia occurred in the study group ($p=0.04$). The difference was not significant when infectious complications were compared to non-infectious complications ($p=0.46$).

Table 1
Characteristics of pregnancy and labour

Designation	Study (n=85)	Control (n=86)
Mean gestational age (weeks)	39.6	39.9
HIV positive	8(9.4%)	10(11.6%)
CD4 count (cells/mm ³)	180-628	182-689
CTG (non reassuring)	25	25
Induction of labour	14	19
Mean labour duration (hour)	16.9	14.1
Analgesia in labour	4	16
Trial of vacuum delivery	4	0

Table 2
Intra-operative and post-operative complications

Complication	Study (%)	Control (%)
Intra-operative		
Accidental extension of uterine incision	9(10.6)	3(3.5)
Bladder injury	1(1.2)	2(2.3)
Bowel injury	0	1(1.2)
Blood Transfusion	10(11.8)	6(6.9)
Cardiac Arrest	1(1.2)	0
Pulmonary oedema	1(1.2)	0
Post-operative		
Wound infection	4(4.7)	5(5.8)
Puerperal sepsis	17(20.0)	9(10.5)
Thromboembolic event	1(1.2)	0
Endometritis	3(3.5)	0
Cystitis	1(1.2)	2(2.3)
Acute pyelonephritis	2(2.4)	0
Hysterectomy	1(1/2)	1(1.2)
Re-operation	3(3.5)	3(3.5)
Readmission	3(3.5)	3(3.5)
PPH (atonic uterus)	1(1.2)	0
Pulmonary emboli	1(1.2)	0
Bronchopneumonia	3(3.5)	3(3.5)

Table 3
Neonatal summary data

	Study (%)	Control (%)	P-value
Apgar score			
Average (SD)	8.9(1.4)	9.3(0.8)	
Median	9	9	
Minimum	2	7	
Maximum	10	10	
Five minute Apgar score <7	5	0	0.03
Statistically not significant			
Complications*			
Birth trauma	8(9.4)	2(2.3)	
Asphyxia	32(37.6)	20(23.3)	
Sepsis	6(7.1)	1(1.2)	0.008
Pneumonia	4(4.7)	1(1.2)	
Statistically significant			
Metabolic acidosis	3(3.5)	0	
Neonatal seizures	1(1.2)	0	

* Any one baby could have had more than one complication

DISCUSSION

The index study found that there were more intra-operative complications when Caesarean deliveries were performed late in the first stage and second stage of labour compared to Caesarean deliveries performed earlier in labour (onset of labour to seven centimetres cervical dilatation) though not statistically significant. The most common intra-operative complications were: accidental extension of the uterine incision (nine in the study, three control group women), blood transfusion (four women in the study and one in the control group). Cardiac arrest and pulmonary aedema occurred in study group only (one each). Hager *et al* reported an intra-operative complication rate of 6.3% when regional anaesthesia and 12.0% when general anaesthesia was used for Caesarean deliveries (3). Allen *et al* reported rates of 6.4% at full cervical dilatation compared to 1.3% at less than full cervical dilatation (2). The spectrum of post-operative complications in the index study is comparable to informations found in the literature but occurred at a higher frequency (Table 2) (2,3).

Significantly more high care admissions occurred when abdominal deliveries were performed late than earlier in labour. This difference could be explained by the fact that almost the majority of severe complications (that is, cardiac arrest, pulmonary edema, pulmonary embolism, thrombo-embolic event, postpartum haemorrhage) occurred only in the study group. Patients having Caesarean sections late in labour as in the study group require vigilance

post-operative care during the first 48 hours following the procedure.

The index study demonstrated, unlike Selo-Ojeme *et al* and Alexander *et al* studies but in agreement with the findings of Cebekulu and Buchmann that neonates seem to be at higher risk for increased morbidity when Caesarean deliveries were performed late in labour (Table 2) (6,11,12). The rate of birth trauma, asphyxia, sepsis, pneumonia, metabolic acidosis and neonatal seizures were higher. This high rate of neonatal complication was reflected by the fact that four neonates in the study group required intubation and/or ventilation compared to the control group. Asphyxia was by far the most common neonatal complication. The difference in neonatal complications between the two groups was significant ($p=0.008$). There were five neonates with the five minute Apgar score of less than seven and all of them were in the study group which was a significant finding ($p<0.03$). Neonatologists must take note of these findings and consider a policy of sending more experienced doctors to receive babies in theatres when caesarean sections are done late in the first stage and second stage of labour.

The study was hampered by the shortcomings of case control studies. Many files had incomplete information, operative notes were not done thoroughly and there may have been missing information.

Recommendations: Cesarean sections performed late in labour were not associated with more maternal

complications (intra-operative and post-operative) but showed significantly more neonatal complications especially birth asphyxia.

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