

Evaluation of factors affecting poor neonatal outcomes after category one cesarean section

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Introduction

The World Health Organization (WHO) recommended that the rate of cesarean deliveries should not exceed 10-15%, due to the negative effects of high rate⁽¹⁾.

The widespread introduction of electronic fetal monitoring (EFM) has in part been responsible for increasing cesarean section rates with no change in cerebral palsy rates in term infants ⁽²⁾.

Category one cesarean section is performed when there is an immediate threat to life of mother or fetus. When compared to category two, three and four the associated risk of maternal morbidity and mortality is 15 times higher^(3,4).

The decision to delivery interval (DDI) of 30 minutes has become a surrogate measure of performance, despite evidence suggesting poor correlation with adverse outcome^(5,6).

The aim of our study was to examine the factors associated with adverse outcomes in women undergoing category 1 cesarean sections.

Methodology

This was a retrospective cohort study was performed in large tertiary maternal hospital in Doha, Qatar delivering approximately 18,000 women per annum. All women undergoing a category one cesarean section between January 2020 and August 2020 were included.

The indication for the categorization, maternal characteristics and surgical and perinatal outcomes extracted. The indications for inclusion were: cord prolapse, category 3 CTG, fetal bradycardia, suspected uterine rupture, placental abruption, failed instrumental delivery.

The maternal demographics, organizational characteristics, intrapartum and neonatal outcomes.

The decision to delivery interval is defined as the time from the decision for category one cesarean section to the time the fetus was delivered. This period included preparation time (time from decision to beginning to transfer the patient), transfer time (time to arrival to operating theater), anesthesia time (time from immediate start of anesthesia to skin incision) and delivery time (time from incision to delivery).

The collected data were categorized into two groups, depressed neonate group, (at least one of: Apgar score < 7 at 5 minutes, UA pH < 7.00 or base excess < -12 mmol/L, and the control group, where neonates did not have any abnormal parameters.

Comparison between the two neonatal using IBM SPSS (SPSS Armonk, New York, USA) with statistical significance set at P < 0.05.

Results

577 women were included in the study. Thirty-nine (6.8%) of neonates demonstrated signs of ‘depression’ based on the presence of at least one of the following: Apgar score < 7 at 5 minutes, pH < 7.00 or base excess < -12 mmol/L. The remaining 93.2% (538) of neonates were all delivered in good condition.

The maternal demographics for the two groups are presented in Table 1. There were no significant differences between the 2 groups.

There were significantly more women in the ‘depressed’ group transferring to the operating room directly from the emergency room (30.8% v 10.8%). Fetal heart rate abnormalities were the commonest indications for delivery in both groups (38.4% and 53.7%) (Table 2).

Table 3 outlines the operative factors between the 2 groups, and significantly more women in the ‘depressed’ neonate group had general anesthetics (51.3% v 15.1%), consultant anesthetist in attendance (71.8% v 45.5%) and consultant obstetrician (35.9% v 13.6%) performing the procedure. There was no difference in the anesthesia type conversion rate, number with previous abdominal surgery/ previous cesarean sections between the groups.

The ‘depressed’ condition group neonates were of a lower gestational age (34.1 v 37.5 weeks) compared to the control group and more likely to be treated in the neonatal intensive care unit (NICU), (79.5% v 29.6%) and the mothers in an adult ICU (28.2% v 8%) (Table 4).

The timings from the 2 groups of procedures are outlined in Table 5. The median anesthetic time was quicker (3 minutes v 5 minutes) and the transfer time was significantly slower (10 minutes v 8 minutes) in the ‘depressed’ neonate group. The overall DDI was not different in the 2 groups.

Discussion

To conclude, there was no difference in DDI between depressed neonates and neonates in good condition at delivery, which supports available evidence⁽⁷⁾. Depressed neonates were however more likely to be preterm, transferred from emergency department to theatre, undergo cesarean section under general anesthetic administered by a senior anesthetist and performed by a senior obstetrician.

References

- Monitoring emergency obstetric care: a handbook Geneva: World Health Organization; 2009. http://www.unfpa.org/webdav/site/global/shared/documents/publications/2009/obstetri_c_monitoring.pdf
- Westerhuis ME, van Horen E, Kwee A, van der Tweel I, Visser GH, Moons KG. Inter and intra-observer agreement of intrapartum ST analysis of the fetal electrocardiogram in women monitored by STAN. BJOG. 2009;116(4):545-51
- Lucas DN, Yentis SM, Kinsella SM, et al. Urgency of caesarean section: a new classification. J R Soc Med 2000; 93:346-50
- Clare Newton Dunn, Qianoian Zhang, Josh Tjunrong Sia, Pryseley Nkouibert Assam, Shephali Tagore, Ban Leong Sng. Evaluation of timings and outcomes in category-one caesarean sections: A retrospective cohort study. Indian J Anaesth. 2016 Aug;60(8):546-51. doi: 10.4103/0019-5049.187782
- Schauberger CW, Rooney BL, Beguin EA, Schaper AM, Spindler J. Evaluating the thirty minute interval in emergency cesarean sections. J Am Coll Surg 1994;179:151–5
- Hillemanns P, Strauss A, Hasbargen U, Schulze A, Genzel-Boroviczeny O, Weninger E, et al. Crash emergency cesarean section: decision-to-delivery interval under 30 min and its effect on Apgar and umbilical artery pH. Arch Gynecol Obstet 2005;273:161–5
- Tolcher MC, Johnson RL, El-Nashar SA, West CP. Decision-to-incision time and neonatal outcomes: A systematic review and meta-analysis. Obstet Gynecol 2014;123:536-48

	Depressed condition at birth (n=39)	Satisfactory condition at birth (n=538)	Chi-sq/ Mann Whitney U/ unpaired t test (Significance)
Maternal Age			8.0 (p=NS)
<20y	1 (2.6%)	13 (2.4%)	
20-30y	18 (46.2%)	292 (54.3%)	
31-40y	16 (41%)	221 (40.9%)	
>40y	4 (10.3%)	13 (2.4%)	
Median (range) gravidity	2 (1-17)	3 (1-12)	Mann Whitney U 1.93 (p=0.05)
Median (range) parity	1 (0-16)	1 (0-7)	Mann Whitney U 1.98 (p<0.05)
Mean (SD) BMI	30.6 (5.9)	31.4 (5.0)	t statistic=0.79 (p=NS)
Number multiple pregnancies	1 (2.6%)	20 (3.7%)	0.38 (p=0.NS)

Table 1: Patients demographics and general information

	Depressed condition at birth (n=39)	Satisfactory condition at birth (n=538)	Chi-sq/ t test (Significance)
Mean (SD) gestational age	34.1 (4.6)	37.5 (3.2)	t=-6.156 (p<0.0001)
5 minute Apgar <7	28 (71.8%)	0/538	
BE < -12	9/29 (31%)	0/514	* 34 cases missing
Umbilical artery pH <7.00	15/30 (50%)	0/524	* 23 cases missing
ICU admission (mother)	11 (28.2%)	43 (8.0%)	chi-sq 17.5 (p<0.0001)
NICU admission (neonate)	31 (79.5%)	159 (29.6%)	chi-sq 41.1 (p<0.0001)
Mean (range) Estimated blood loss	724.4 (200 - 2500)	540.5 (150-5000)	t=2.81 (p=0.005)

Table 4: Post delivery fetal and maternal information

	Depressed condition at birth (n=39)	Satisfactory condition at birth (n=538)	Mann Whitney U (Significance)
Median (range) Preparation time (min)	8 (1-34)	8.5 (1-36)	0.69 (p=NS)
Median (range) Transfer time (min)	10 (2-21)	8 (0-34)	2.78 (p<0.005)
Median (range) Anesthesia time (min)	3 (1-13)	5 (1-24)	-4.29 (p<0.0001)
Median (range) Delivery time (min)	2 (1-12)	3 (1-29)	-1.02 (p=0.055)
Median (range) decision-to-delivery interval (DDI) (min)	23 (13-61)	26 (1-69)	-1.09 (p=NS)

Table 5: Timing involved the performance of category 1 cesarean sections

	Depressed condition at birth (n=39)	Satisfactory condition at birth (n=538)	Chi-sq/ Mann Whitney U/ unpaired t test (Significance)
Where was decision taken			20.16 (p<0.0001)
Antenatal day unit	0	2 (1%)	
Emergency department	12 (30.8%)	58 (10.8%)	
High dependency unit	1 (0.2%)	1 (2.6%)	
Labor ward	24 (61.5%)	448 (83.3%)	
Antenatal ward	2 (5.1%)	29 (5.4%)	
Indication			13.4 (p=0.06)
APH	13 (33.3%)	86 (16%)	
Fetal bradycardia	7 (17.9%)	80 (14.9%)	
CTG - category 3	8 (20.5%)	209 (38.8%)	
Cord prolapse	3 (7.7%)	22 (4.1%)	
Failed instrumental	0	10 (1.9%)	
Others	4 (10.3)	89 (16.5%)	
Uterine rupture suspected	2 (5.1%)	14 (2.6%)	
Scalp pH <7.2	2 (5.1%)	28 (5.2%)	
Time of day			5.10 (p=NS)
Day time	19 (48.7%)	168 (31.2%)	
Evening	9 (23.1%)	159 (29.6%)	
Night	11 (28.2%)	211 (39.2%)	

Table 2: Pre operative decision information and indications for the category 1 cesarean section

	Depressed condition at birth (n=39)	Satisfactory condition at birth (n=538)	Chi-sq (Significance)
Anesthesia			33.57 (P<0.0001)
Combined CSE	1 (2.6%)	11 (2.0%)	
Epidural	7 (17.9%)	201 (37.4%)	
General	20 (51.3%)	81 (15.1%)	
Spinal	11 (28.2%)	245 (45.5%)	
Anesthesia conversion	2 (5.1%)	15 (2.8%)	0.70 (p=NS)
Anesthetist			10.06 (p=0.002)
Consultant anesthetist	28 (71.8%)	245 (45.5%)	
Specialist anesthetist	11 (28.2%)	283 (54.5%)	
Surgeon			15.96 (p=0.001)
Consultant	14 (35.9%)	73 (13.6%)	
Associate consultant	4 (10.3%)	43 (8.0%)	
Specialist	18 (46.2%)	318 (59.1%)	
Resident	3 (7.7%)	104 (19.3%)	
Previous abdominal surgery	11 (28.2%)	131 (24.3%)	0.29 (p=NS)
Number previous Cesareans			9.22 (p=NS)
0	27 (71.1%)	412 (76.6%)	
1	4 (10.5%)	92 (17.1%)	
2	4 (10.5%)	17 (3.2%)	
3	2 (5.3%)	12 (2.2%)	
4	1 (2.6%)	4 (0.7%)	
6	0	1 (0.2%)	

Table 3: Operative data of category 1 cesarean sections