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Research Paper

The Morbidities in Term Neonates Delivered by Elective Cesarean Section

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ABSTRACT:

BACKGROUND:

Delivery by elective cesarean section has been risen and was found to be associated with risk of adverse neonatal outcome.

OBJECTIVE:

To assess neonatal morbidities among term neonates delivered by elective cesarean section.

METHODS:

It is a prospective study conducted at neonatal intensive care unit at Al-Yarmuk teaching hospital from the 1st of June 2017 to the 1st of January 2018. Included neonates were: Term, singleton, and product of elective cesarean section. The following variables were studied: maternal age, antenatal steroid, and mode of anesthesia, indication of elective cesarean section, gestational age, neonate gender, Apgar score and birth weight, with neonatal morbidities.

RESULTS:

During the study period, (693) neonates were enrolled. Maternal steroid given to (94.5%). Repeat cesarean section represent (73.2%), and general anesthesia was used in (91.7%). Neonates were subdivided into: early term, and full-late term groups; (55.3%) were male. About a quarter were admitted, mostly with Respiratory distress. The admission associated with gestational age, male gender, and lower birth weight. Only respiratory morbidities and the use of assisted ventilation were significant for early term.

CONCLUSION:

Elective cesarean section is found to be associated with significant neonatal morbidities, especially respiratory ones.

KEYWORDS: Elective Cesarean Section; Neonatal Respiratory Morbidities, Neonatal Intensive

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INTRODUCTION:

Deliveries by caesarean section continue to increase in both developed and developing countries over the last decade because of obstetrical recommendations, maternal request and partly without any obvious or generally accepted medical or obstetric indication have been reported [1,2]; with the resultant significant impact whether on the mother or the baby, including negatively impacting their bonding, early initiation of breastfeeding and furthermore respiratory and other neonatal morbidities [1,3,4].

Traditionally, a delivery date is determined 280 days after the last menstrual period[5]. The Society for Fetal and Maternal Medicine and the ACOG endorse replacing the term "Term" in 2012 with new designation: early term which was previously referred to as late preterm ($37^{0/7}$ wk. of gestation to $38^{6/7}$ wk.), full term ($39^{0/7}$–$40^{6/7}$ wk.), late term ($41^{0/7}$–$41^{6/7}$ wk.) and encourages the use of this new definition[5,6].

Caesarean section can be categorized depending on the urgency of the procedure into: Emergent, Urgent, and Elective; the latter where is no maternal or fetal compromise and delivery is timed to suit the mother and staff[7]. Indications for ECS:

- Past obstetrical history including previous CS or shoulder dystocia.

- Current pregnancy events as monoamniotic twins, placenta praevia, obstructing pelvic mass, active primary herpes.
- Intrapartum events like cephalo-pelvic disproportion [8].

Neonatal morbidities that is observed including: Respiratory morbidities (as transient tachypnea of the newborn, respiratory distress syndrome) are the most frequent cause of admission to NICU in both term and preterm infants, and is one of the most common complications of ECS especially that conducted between 37-38^{+6} weeks of pregnancy that ranges from transient tachypnea of newborn to respiratory failure[9,5]. Other morbidities include hypoglycemia and hypocalcemia[4].

MATERIALS AND METHODS:

It is a prospective study conducted in NICU at Al-Yarmuk Teaching Hospital in Baghdad during the period from the 1st of June 2017 to the 1st of January 2018with a total number of (935) neonate have been delivered by elective CS, of these only (693) neonates were included.

Inclusion criteria were: Term neonate, Singleton pregnancy and ECS.

Exclusion criteria were: Prenatal complication, Neonatal congenital anomalies, maternal medical or obstetrical morbidities and CS after spontaneous rupture of membrane.

The neonate population was subjected to the following: Gestational age at birth and categorized into two groups: early term ($37^{0/7}$ -$38^{6/7}$ wk.) and full-late term neonates ($39^{0/7}$–$41^{6/7}$ wk.), assessed depending on mother's LMP, 1st trimester US and Ballard score. As well as gender, birth weight, Apgar score, NICU admission, its cause, duration and finally the outcome.

Maternal characteristics examined were: age, LMP, comorbidities, delivery details (ECS indication, mode of anesthesia).

Statistical analysis:

The data analyzed using Statistical Package for Social Sciences (SPSS) version 23. The data presented as mean, standard deviation and ranges. Categorical data presented by frequencies and percentages. Student t-test was used to compare the continuous variables among study groups. Chi square test was used to test qualitative and frequency data and to find any relations between many risk factors and the prevalence of NICU admission. A level of p- value less than 0.05 was considered significant.

RESULTS:

The association between prevalence of NICU admission and general characteristics as shown in table (1, 2) including maternal age, indication of CS and type of anesthesia, neonate gender, GA, weight and apgar score show only significant association between NICU admission with male gender (P=0.001) and with GA that the highest proportion of neonates who admitted to NICU were early term neonates (P=0.01). Also NICU admission was significantly associated with neonates weighing <2.5 kg with (P=0.001), as shown in table (2).

Table 1: Distribution of admitted neonates by certain details.

Variable		No. (n=181)	Percentage (%)
Cause of NICU admission			
Respiratory distress	TTN	115	63.5
	RDS	41	22.7
	Pneumonia	5	2.8
Hypocalcemia		7	3.8
Hypoglycemia		13	7.2
Duration of admission (hours)			
≤ 72		142	78.5
> 72		39	21.5
Management in NICU			
HB O_2		112	61.9
Assisted ventilation		49	27.1
Outcome			
Home(discharged well)		179	98.8
Death		2	1.2

Table 2: Association between NICU and study characteristics.

Variable	NICU Admission		Total (%) n= 693	P- value
	Admitted (%) n= 181	Not admitted (%) n= 512		
Maternal Age group (Years)				
≤ 24	33 (28.7)	82 (71.3)	115 (16.6)	0.832
25-34	101 (26.1)	285 (73.9)	386 (55.7)	
≥ 35	47 (24.4)	145 (75.6)	192 (27.7)	
Gender				
Male	120 (31.3)	263 (68.7)	383 (55.3)	0.001
Female	61 (19.7)	249 (80.3)	310 (44.7)	
Gestational age (Weeks)				
$37 – 38^{+6}$	162 (28.0)	416 (72.0)	578 (83.4)	0.01
$39 – 41^{+6}$	19 (16.5)	96 (83.5)	115 (16.6)	
Weight (Kg)				
< 2.5	20 (44.4)	25 (55.6)	45 (6.5)	0.001
2.5 – 3.5	129 (23.2)	428 (76.8)	557 (80.4)	
> 3.5	32 (35.2)	59 (64.8)	91(13.1)	
Apgar score after one minute				
0-4	6 (28.6)	15 (71.4)	21 (3.0)	0.640
5-7	174 (26.3)	488 (73.7)	662 (95.6)	
8-10	1 (10.0)	9 (90.0)	10 (1.4)	
Apgar score after (5) minute				
0-4	0	0	0	0.125
5-7	28 (33.4)	56 (66.6)	84 (12.1)	
8-10	153 (25.1)	456 (74.9)	609(87.9)	
Elective C/S Indications				
Previous C/S	140 (27.6)	367 (72.4)	507 (73.2)	0.1
Mal presentation	22 (18.3)	98 (81.7)	120 (17.3)	
Maternal request	19 (28.8)	47 (71.2)	66 (9.5)	
Mode of anesthesia				
General	168 (26.4)	467 (73.6)	635 (91.7)	0.466
Spinal	13 (21.9)	45 (78.1)	58 (8.3)	

The association between NICU admission due to respiratory morbidities and maternal dexamethasone administration showed that its administration reduces respiratory morbidities and was statistically significant (p=0.000) as shown in table (3).

Table 3: Association between NICU Admission due to respiratory morbidities only with dexamethasone administration.

Variable	NICU Admission due to respiratory morbidities		Total (%) n= 693	P – value
	Admitted with respiratory morbidity (%) n= 161	Others (%) n= 532		
Dexamethasone injection (within 2 weeks before ECS)				
received	١٣٢ (81.9%)	523 (98.3%)	655 (94.5%)	0.000
Not received	29 (18%)	9 (1.6%)	38 (5.5%)	

The association between GA and morbidities was statistically significant in early term with (P=0.001), but no significant association was found with non-respiratory morbidities. Also GA was significantly associated with the need for assisted ventilation in the management (P=0.017) as shown in table (4).

Table 4: Association between gestational age among neonates admitted to NICU due to respiratory causes and type of management.

GA	Management of respiratory cause		Total (%) n= 161	P- value
	Assisted ventilation (%) n= 49	HBO_2 (%) n= 112		
$37 – 38^{+6}$	49 (32.9)	100 (67.1)	149 (92.5)	0.017
$39 – 41^{+6}$	0 (0)	12 (100.0)	12 (7.5)	

DISCUSSION:

In this study we analyze (693) term neonates who were born by ECS. In our study starting from the analysis of maternal characteristics, showed that the highest proportion of maternal age was in the group 25-34 yrs. (55.7%) that could be attributed to the prevalence of marriage in this age group, thus pregnancy and delivery, without significant association with NICU admission. A similar result was found in Nakimuli et al[10] while Doan et al[11] with slightly higher mean maternal age .

Regarding dexamethasone use, most mothers (94.5%) have been given within two weeks before delivering neonates, and its administration was statistically significant in the reduction of NICU admission due to respiratory morbidities, similar result has been shown by Salem et al[12] thus supporting the dexamethasone role in reducing neonatal respiratory morbidities.

Regarding the indication for ECS, we found that repeat CS was the highest proportion 73.2% and maternal request was next 17.3% without significant association with NICU admission, which was also found Nakimuli et al[10] & Doan et al[11]; but Nakimuli et al showed an association with adverse neonatal outcome.

General anesthesia was used in majority (91.7%), this high result could be attributed to the fact that in our community general anesthesia is still the most preferable mode of anesthesia; even though no significant association found with NICU admission. lower result for general anesthesia use in Nakimuli et al[10], but was associated with adverse neonatal outcome, unlike our study.

Early term neonates represent the highest proportion 83.4% of total ECS. Lower result in Vered et al[13] but still representing the highest proportion being delivered by ECS at early term (56.4%). Even further lower result in Tita et al[14] with (35.8%) neonates were early term. This high result in our study can be attributed to the lack of accurate gestational age assessment whether by LMP or US and variation in sample size with maternal preference in our country for early delivery.

This study showed that 181 (26.1%) neonates were admitted to NICU. Higher result was found by Finn et al[15] and by Nakimuli et al[10], that is explained by the difference in sample size, inclusion & exclusion criteria especially by Nakimuli et al[10].

Of those neonates who were admitted, (89%) had respiratory morbidities. Approximate results were given by Nakimuli et al[10] with 72.8% of admitted neonates to NICU had respiratory morbidity.

Respiratory morbidities in early term group constitute 21.5% while in full, late term group 1.73% from the total ECS. Bizri et al [16], Horiuchi et al [17] also have shown that early term delivery by elective cesarean section associated with high incidence of adverse respiratory outcomes and increasing risk of NICU admission supporting our study results.

In contrast to Doan et al[11] which has shown that respiratory morbidities in early term neonates were only 6% from all those delivered by ECS, while the percentage in full, late term group was 1.6% that approximate our result in the exact age group. This variation mostly can be attributed to sample size variation.

Regarding NICU admission, we found that highest proportion was admitted due to respiratory morbidities and mostly were early term 92%, with a significant association between GA & respiratory morbidities. In Hansen et al[1], similarly and supporting result that higher risk of respiratory morbidities at early term and decrease with advancing GA. Also Finn et al[15] & Hourani et al[3] found a significant association between

GA & neonatal morbidities especially respiratory ones.

In regard to apgar score whether at one or five minutes, no significant association with NICU admission. While in Vidic et al[18] low apgar score at five minutes was significantly associated with respiratory morbidities.

Male to female ratio was 1.23:1, this could be explained by gender preference for male in our country with erroneous conception for better neonatal outcome by CS. The highest rate of NICU admission was seen among male 31.3% which was statistically significant. In Vered et al[13] as well as Doan et al[11] also there was male predominance in CS but with no statistical significance.

In our study 80.4% of included neonates were between (2.5-3.5 kg) and NICU admission was statistically significant with lower birth weight< 2.5kg. Supporting our results, slightly higher results by Nakimuli et al[10] (87.8%) were with weight (2.5kg-3.99 kg) and those with birth weight < 2.5kg found to be associated with risk of neonatal morbidities.

There was no significant association between hypoglycemia and hypocalcemia with gestational age in our study.

A similar result was found by Hourani et al[3] regarding hypoglycemia. While in the study of Tita et al [14], a reduction in the incidence of hypoglycemia with advancing gestational age was found.

CONCLUSION:

Elective cesarean section is associated with significant neonatal respiratory morbidities especially among erly term neonates.

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