Original Article

Perinatal outcome in relation to mode of delivery in Meconium-Stained Neonates

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ABSTRACT

Objective: Meconium-stained amniotic fluid (MSAF) occurs in 7-22% of term pregnancies. It is less common before 38 weeks and more common after 40 weeks of pregnancy and associates with increased perinatal mortality and morbidity. The aim of this study was to determine if the perinatal outcome is affected by mode of delivery in meconium-stained amniotic fluid.

Methodology: Five hundred meconium stained neonates born at Alzahra Hospital were studied from 2008 to 2010. All pregnancies were at 36-42 weeks, single fetus, cephalic presentation and normal fetal heart rate pattern. Umbilical cord arterial blood gasses were analyzed immediately after delivery. Perinatal outcome was compared in normal vaginal delivery (NVD) and cesarean section (CS) groups.

Results: From 500 meconium-stained neonates 73 were born through (NVD) and 427 by CS. Two groups were not significantly different for the maternal age, gestational age and meconium concentration. Although the mean PH was in normal range (PH>7.2) and mean 1st min & 5th min Apgar scores were higher than 8 in two groups, mask ventilation, intubation and suctioning, respiratory distress and admition in NICU were significantly higher in NVD group. Serious complications like MAS and asphyxia were not statistically different between groups.

Conclusions: According to the results of this study it is advisable that cesarean section be limited in MSAF to abnormal fetal heart rate pattern and PH<7.2.

KEY WORDS: Meconium, Perinatal outcome, Delivery.

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INTRODUCTION

Meconium staining of the amniotic fluid (MSAF) has reported less common in preterm labors (5%) but is more common in term (7-22%) and postterm deliveries (23-52%).[1-6] Meconium spillage due to fetal maturity is a normal physiologic event but fetal hypoxia or increased vagal activity from cord compression may be pathologic reasons.[4] According to Parkland hospital, perinatal mortality increases in meconium stained neonates (1.5 vs.0.3 in 1000 live births).[1,2]

Approximately meconium aspiration syndrome (MAS) will be developed in 3 to 4% of meconium-stained infants.Depressed neonates stained with thick meconium are at the highest risk for developing MAS. Meconium aspiration syndrome is associated with persistent pulmonary hypertension, pnumonia, sepsis or respiratory failure which is a major cause of morbidity and mortality in the neonatal population (upto 40%).[6,7]

Oronasopharyngeal suctioning (ONPS) of the infant after delivery of head and before delivery of shoulders is a routine approach to improve

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oxygenation and prevent aspiration. However, there are controversies regarding routine ONPS in the presence of clear amniotic fluid, as it seems to be associated with bradycardia, apnea, and delays in achieving normal oxygen saturations.[3,5]

Meconium aspiration syndrome (MAS) is not prevented by intrapartum ONPS and post-natal endotracheal suctioning of vigorous meconium stained infants. Although MAS is increased in non-vigorous infants born through MSAF, endotracheal suction does not seem to reduce MAS.[5]

The rate of cesarean section (CS) in the presence of stained amniotic fluid is two times the non meconium pregnancies (14% vs. 7%).[8] When facilities like electronic fetal monitoring and fetal scalp blood sampling are not available, it would be difficult to make decision to continue the vaginal delivery or to perform cesarean section. Even though the CS was done, meconium aspiration syndrome might happen and cause significant neonatal mortality and morbidity.[9]

Continuous fetal heart monitoring during labor and assurance of fetal wellbeing by acid-base assessment are important factors in reducing meconium aspiration syndrome.[8] We designed this study to explore if early cesarean section in meconium stained amniotic fluid improves the perinatal outcome.

METHODOLOGY

In a prospective survey 500 meconium stained neonates born at Alzahra Teaching Hospital from 2008 to 2010 were studied. The inclusion criteria were: singleton pregnancy at 36-42 weeks, normal fetal heart rate pattern and cephalic presentation. All meconium stained neonates underwent suctioning of mouth and nose just after the delivery of head. After cutting the umbilical cord, neonate transferred to warmer and in non-vigorous infants, tracheal suctioning was performed by neonatal resident.

Decision about the mode of delivery was made based on the routine policy of Alzahra hospital which let vaginal delivery when there is short duration until delivery and the fetal heart rate is normal. Continuous fetal heart rate monitoring was routinely used to detect early signs of fetal hypoxia. Cord blood was taken for blood gasses assessment during twenty seconds after delivery. Fetomaternal outcome was recorded on a questionnaire and data was analyzed by SPSS.15 software.

Table-I: Causes of meconium spillage.

	NVD (%)	*CS (%)*	*P-value*
Post date pregnancy	5 (6.8)	10 (2.3)	0.05
Nuchal cord	4 (5.5)	40 (9.4)	0.19
Oligohydramnious	1 (1.4)	8 (1.9)	0.61
Un known	63 (86.3)	369 (86.4)	0.55

RESULTS

Five hundred meconium stained neonates born through vaginal delivery (73 neonates) or cesarean section (427 neonates) were studied. The mean age of mothers and gestational age between two groups (NVD and CS) were not significantly different (26.51±6.34 vs. 25.63±5.52 p=0.21and 39.47±1.13 vs. 39.44±2.13 p=0.92 respectively).

The frequency of maternal predisposing factors for meconium passage such as preeclampsia, oligohydramnious, placenta previa, placental abruption and premature rupture of membranes were not statistically different between two groups. The causes of meconium spillage were summarized in Table-I. Thick meconium was observed in 57.5% of NVDs and 60.8% of CSs. The difference was not significant (p=0.33). In NVD group 11 neonates (15.5%) and in CS group 18 neonates (4.2%) were admitted in NICU (p=0.001). The mean lengths of stay in NICU was 4.27±3.1 day vs. 4.56±2.38 day through CS (p=0.52).

Need to mask ventilation was in 16.4% of neonates from NVD and 4.2% of CS group (p<0.0005). Intubation and tracheal suctioning was done in 17.8% of NVD group vs. 5.6% of CS group (p=0.001). Mechanical ventilation in neonates of NVD and CS groups were used in 2.7% and 0.5% respectively (p=0.1). Cord blood gasses of neonates were shown in Table-II.

Table-II: ABG of neonates of two groups.

ABG	*NVD*	*CS*	*P-value*
PH (mean ± SD)	7.25±0.09	7.21±0.1	p=0.005
Mild acidosis	14 (19.2%)	131(30.7%)	p=0.01
Severe acidosis	1 (1.4%)	10 (2.3%)	p=o.12
Hco3(meq/l) (mean ± SD)	21.61±2.82	21.79±2.77	p=0.62
Pco2 (mmHg) (mean ± SD)	48.63±11.1	53.81±12.04	p=0.001
BE (meq/l) (mean ± SD)	-5.96±3.28	-6.32±3.08	p<0.36

Normal PH: PH ≥ 7.2 Mild acidosis: 7≤ PH <7.2
Severe acidosis: PH < 7 Normal HCO3: 21< HCO3< 28
Normal PCO2: 27< PCO2< 40 Normal BE: -10< BE < -2

Table-III: Neonatal outcome in meconium stained amniotic fluid.

NVD (%)	*CS (%)*	*P-value*	
Gestational age (w)	39.47±1.13	39.44±2.13	0.92
Birth weight (g)	3102.6±524.82	3251.08±468.06	0.01
Neonatal BMI	12.43±1.62	13.30±1.59	<0.0005
Head circumference (cm)	34.90±1.30	35.06±1.42	0.38
AGA	71 (97.3)	416 (97.04)	0.66
SGA	2 (2.7)	9 (2.16)	
LGA	0 (0)	2 (0.5)	
Mean admition period in NICU (d)	4.27±3.1	4.56±2.38	0.52
Number of neonates admitted in NICU	11 (15.5)	18 (4.2)	0.001
Positive pressure ventilation (Ambobag)	12 (16.4)	18 (4.2)	<0.0005
Intubation & Suctioning	13 (17.8)	24 (5.6)	0.001
Chest compression	1 (1.4)	1 (0.2)	0.27
Mechanical ventilation	2 (2.7)	2 (0.5)	0.1
Mean 1st min Apgar score	8.05±1.98	8.43±1.23	0.125
Apgar score 1st min <7	9 (12.9)	32(7.5)	0.1
Mean 5th min Apgar score	9.32±1.05	9.84±0.49	0.009
Apgar score 5th min<7	4 (5.6)	3 (0.7)	0.009
Respiratory distress	7 (9.6)	12 (2.8)	0.012
Convulation	0 (0)	1 (0.2)	0.85
Cyanosis	0 (0)	1 (0.2)	0.85
Low Apgar (<4)	4 (5.6)	3 (0.7)	0.009
Icterus	1 (1.4)	3 (0.7)	0.46
Hypotonicity	1 (1.4)	1 (0.2)	0.27
Mild asphyxia	3 (4.1)	6 (1.4)	0.13
Moderate asphyxia	1 (1.4)	4 (0.9)	0.65
Severe asphyxia	1 (1.4)	0 (0)	0.14
MAS	1 (1.4)	3 (0.7)	0.46
TTN	1 (1.4)	3 (0.7)	0.46

BMI: Body mass index MAS: Meconium aspiration syndrome TTN: Transient tachypnea of neonates
AGA: Appropriate for gestational age LGA: Large for gestational age SGA: Small for gestational age

The mean first minute Apgar score was 8.05±1.98 in NVD group vs. 8.43±1.23 in CS group (p=0.125) whereas the mean5th min Apgar score was significantly lower in NVD group (9.32±1.05 vs. 9.84±0.49 p=0.009).

From the main causes of admition in NICU, only neonatal respiratory distress was significant between two groups (p=0.012). Asphyxia, MAS and TTN were observed in 6.9%, 1.4% and 1.4% of neonates born through NVD respectively vs. in 2.3%, 0.7% and 0.7% in CS group respectively which differences were not significant between groups. Logistic regression showed that there is relation between acidosis and Apgar score less than 7 (p=0.004) but acidosis is not related to thick meconium (p=0.43) and respiratory distress (p=0.61).

DISCUSSION

In current study 500 meconium stained neonates with normal fetal heart rate pattern were investigated. Despite normal fetal heart rate pattern in all cases, 8.2% and 1.4% had first and fifth minute Apgar score less than 7 respectively. 29% mild acidosis, 2.2% severe acidosis, 3.8% respiratory distress, 1.8% mild asphyxia and 0.8% moderate asphyxia. Low Apgar score, need to ventilation, intubation and tracheal suctioning, and respiratory distress were observed significantly higher in meconium-stained neonates born vaginally.

Becker (2007) in a study on 1123 meconium-stained neonates found low 5th minute Apgar score in 0.9%, mild acidosis in 14.8% and severe acidosis in 0.2% (p=0.32). The mean PH in NVD group was 7.24 vs. 7.28 in CS group.[10] Although some studies have indicated that there was correlation between chronic neonatal asphyxia and meconium spillage, Simsek and collegues' study (2008) revealed no correlation.[2,11-13] We could not find relation between acidosis and meconium concentration.

Although 1st min Apgar score and PH were not statistically different between NVD and CS groups in our study, the increased rate of low 5th min Apgar score, need to mask ventilation, intubation and tracheal suction and respiratory distress in NVD group was probably due to more interventions by neonatal and obstetric residents. There are controversies about intrapartum suctioning and endotracheal suctioning for meconium stained neonates but the SOGC no longer recommend routine intrapartum suctioning of the oropharynx and nasopharynx of neonates delivered following labours complicated by meconium.[1-7,14]

In spite of increased rate of low Apgar score and respiratory distress and need to resuscitation in vaginally delivered neonates, the results of present study shows that the mode of delivery does not have effect on serious complications like MAS and asphyxia and performing cesarean section for meconium-staind amniotic fluid with normal fetal heart rate pattern does not improve perinatal outcome.

CONCLUSION

Considering the mode of delivery has no effect on perinatal outcome in the presence of normal fetal heart rate pattern, it is recommended that cesarean section be performed in the face of abnormal FHR pattern and confirmed fetal acidosis by fetal scalp PH.

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