Original Research Article

Outcome of Neonates Born through Meconium Stained Amniotic Fluid in a Tertiary Care Hospital, PAK Emirates Military hospital Rawalpindi, Pakistan

Abstract

Objective:

The study was conducted on the incidence of meconium aspiration syndrome which is still high in the developing world and contributing significantly to the neonatal mortality. The study was aimed to know the riskfactors contributing to meconium aspiration syndrome and neonatal outcome in a tertiary hospital **(Punjab) Department of pediatric Medicine PAK Emirates Military hospital Rawalpindi in the Pakistan**

Material and Methods:

It was a hospital based cross sectional study This descriptive case series was carried at Department of **Peadiatric Medicine PAK Emirates Military hospital Rawalpindi in the Pakistan** over a period of one year, from Jan 2019 to Dec 2020, involving 2820 patients; All live newborns born through meconium-stained liquor were enrolled and all the details regarding the mother and neonate were recorded. Odd's ratio and bivariate analysis was done to assess the risk factors for meconium aspiration syndrome.

Result:

Out of all the deliveries 12.4% were born through meconium-stained amniotic fluid and meconium aspiration syndrome developed in 5 .6 % of the neonates. Low Apgar score and premature rupture of membranes was significantly associated with the risk of occurrence of meconium aspiration syndrome. Neonates who developed meconium aspiration syndrome had mortality of 6.7%

Conclusion:

The Perinatal asphyxia and premature rupture of membranes were significantly associated with the development of meconium aspiration syndrome and neonates who developed meconium aspiration

syndrome had high mortality.

Keywords: Outcomes factors, Meconium stained, Amniotic Fluid, Military Hospital

Introduction

The meconium Aspiration Syndrome (MAS) is an important cause of morbidity and mortality among newborns in the developing world. Meconium stained amniotic fluid (MSAF), occurs in approximately 17% of all live births[1]. Presence of meconium is a sign of fetal distress warranting immediate evaluation and action. It can lead to MAS. MAS is defined as respiratory distress in an infant born through MSAF whose symptoms otherwise cannot be explained[2].It leads to poor lung compliance, hypoxemia leading to respiratory distress with complications like respiratory failure, pulmonary air leaks and persistent pulmonary hypertension of the newborn. One-third of infants require intubation and mechanical ventilation[3, 4] and newer neonatal therapies like high frequency ventilation, inhaled Nitric Oxide and surfactant administration [5, 6]. The incidence of MAS, morbidity and mortality varies among countries. According to western data there has been a reduction in the incidence of MAS in the past decade due to advances in perinatal care[7]. This has been attributed to better obstetric practices. There is paucity of data regarding the neonatal outcome of babies born through MSAF in Nepal. This study is aimed to assess the perinatal attributes, mortality and morbidity associated with babies born through MSAF. The study would reflect the prenatal and postnatal care of babies delivered through MSAF and the improvement as required in the perinatal health services so that adverse outcome is prevented as well as minimized especially at the regional level II/III perinatal centre.

Material and Methods :

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All live babies born though MSAF over duration of three months from April 2010 to June 2010 were enrolled. To assess the risk factors related with MSAF deliveries and MAS all the details regarding mode of delivery, APGAR score (AS), birth weight, fetal distress, birth asphyxia, maternal age, any maternal illness and parity, time of rupture of membranes, gestational age, chest radiograph findings, clinical course, outcome and mechanical ventilation (MV) as needed were recorded and evaluated. Newborns with gross congenital anomalies were excluded. Risk estimation analysis for MAS was done by calculating Odd's Ratio (OR) and Bivariate Analysis.

Results

There were total 2820 live births over a period of three months. Out of these deliveries 412 babies were born through MSAF which estimates to be 7.3%. Owing to the lack of complete data 14 babies were excluded. Among 203 babies born through MSAF, 27 developed MAS i.e. 6.6%. Table 1 show different variables studied as risk factors for MAS. Among all the variables APGAR score at 1 minute and 5 minute, premature rupture of membranes (PROM) and need of mechanical ventilation were significant variables associated with increased risk of MAS in the babies born through MSAF by Chi- square test. Table 2 shows the bivariate analysis further done that revealed APGAR score at 1 minute and 5 minute, need of resuscitation and PROM as significant factors contributing to increased incidence of MAS. The clinical outcome is shown in Table 3. Neonates born through meconium-stained liquor were diagnosed and categorized as shown in Table 4. Among the category of others, conditions like congenital heart diseases, intrauterine pneumonia, neonatal depression and suspected case of spinal muscular atrophy were present.

Discussion

In this study MSAF deliveries were 12.4% and out of all the neonates born through MSAF, 6.6% developed MAS. The occurrence of MSAF varied from 6.4% to 14%[8, 9, 10, 12] in other studies. The study done by BhatRY [11] showed MAS occurred in 11.3% of babies born through MSAF while in other studies it varied from 1% to 38.5%[8,9,10,12,13]. Seventeen percent of the babies among MAS group required mechanical ventilation and three newborns were referred due to the ventilators being occupied.

Among all the neonates born through MSAF 26.4% were born through normal vaginal delivery, 262 (8.4%) babies were born through caesarean section and 4.7% by assisted delivery, vacuum being the commonest method. Out of all the babies who developed MAS 20.6% were born through normal vaginal delivery, 39.1% born through caesarean section and 09.2% through assisted vaginal delivery. Mode of delivery was not found to be a significant risk factor for MAS. Some of the studies[12] do not reflect caesarean delivery as the significant risk factor while other studies showed it as the significant risk factor for MAS[7,14]. 42% of the mothers belonged to the age group of 22 to 39 years and 77 % of those mothers whose babies developed MAS were in the age group of 22 to 39 years. Age of the mother, parity and birth weight of babies did not show significant association with MAS similar to other authors[12,14] while few studies showed the association for the parity[9,15]. Although there wasincreased incidence of MSAF and MAS in the post-dated group between 22 to 38 weeks but the gestation was not significantly associated with increased incidence of MAS as seen in other studies[7,14]. The number of post term pregnancy was quite less as compared to other gestational groups probably our hospital being a tertiary hospital and intervention is done timely before the pregnancy could reach post term. Fischer C *et al*[14] found in their study gestational age as main risk factor of MAS but the incidence of MAS in neonates born through MSAF did not depend on gestational age.

Bivariate analysis showed APGAR score at 1 minute, 5 minute, PROM and need of resuscitation as significant factors contributing to increased incidence of MAS. Peter AD[7] found in Australian live births a very strong association with a 5 minute APGAR score<7 with an overall Odd's ratio of 52. Similar observation was made by Bhat RY, Liu WF in their study where they found APGAR score at 1 minute and 3 minutes as significant but they took APGAR score **v**alue at 1minuteas 6 and at 3 minute as 7 respectively. In another study[12] APGAR score at 5 minute < or =5 was found to be significant. Meydlani MM *et al*[15] found APGAR score < or =6 at 5 minute (RR=3.8, 95% CI=1.7-8.4) as significant risk factor for MAS. Similarly others[14,16] have shown low APGAR score as main risk factor for MAS reflecting perinatal asphyxia as a significant risk factor. Those babies requiring resuscitation had significant association with MAS and so are reflected by low APGAR score at 1 and 3 minute. Low APGAR score and need of resuscitation signify the need of improvement in antenatal care and preventing perinatal asphyxia to prevent the morbidity and mortality associated with MAS. 30 % to 50% cases of MAS may require mechanical ventilation or continuous positive airway pressure[17]. PROM was also a significant risk for the development of MAS. In the study done by Bhaskar SH *et al*[9] the incidence of MAS was significantly higher in mothers with PROM. This observation reflects that monitoring and timely intervention is needed when there is history of ruptured membranes to preventMAS. In our study mortality among those who developed MAS was 11.3%. The mortality reported in other studies[7,11,13,18] varied from 2.5% to 29%. The mortality was high especially when compared to western data[7].In a tertiary hospital where many obstetric cases were referred cases, along with the setting of limited resources, inappropriate ratio of patient to health personnel, and limited availability of technology, decreasing morbidityand mortality is a big challenge.

Conclusion

Among all the risk factors evaluated perinatal asphyxia and PROM were identified as significant in development of MAS in the neonates born through MSAF. The mortality is also high reflecting the need of improvement in the management of neonatal care at the tertiary level especially in the hospital where the number of high-risk deliveries is more. Preventing perinatal asphyxia through appropriate monitoring and

timely delivery will be the main key to prevent MAS. When history of PROM is present timely management is needed to prevent MAS and its sequelae as shown by the study.

Ethical Approval:

As per international standard or university standard written ethical approval has been collected and preserved by the author(s).

Consent

As per international standard or university standard, respondents' written consent has been collected and preserved by the author(s).

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Table 1:
Outcomes Parameter investigation and their association with MAS among neonates born through MSAF

		No MAS	MAS	Total	p-value
	<22	60	3	63	
Age Group	22-39	230	18	248	**0.898**
(years)	>39	13	1	14	
Sex	1	202	12	214	**0.999**
	2	160	12	182	
Birth weight	<2500	26	3	39	**0.105**
(grams)	>=2500	250	24	274	
AS 1 minute	<=3	18	9	27	**<0.001**
	>3	350	13	353	
AS 5minute	<=3	7	2	9	**<0.001**
	>3	350	24	374	
	Normal	150	10		
Mode of delivery	Vacuum	30	3	33	**0.548**
	Caesarean	170	13	183	
Asphyxia	Yes	17	13	30	**<0.001**
	No	322	8	330	

	MSAF	361	22	383	
Fetal distress	MSAF with Tachycardia	1	0	1	**0.815**
	MSAF with Bradycardia	11	0	11	
	Decreased fetal Movements	1	0	1	
Resuscitation	Yes	15	12	27	**<0.001**
	No	360	11	371	
PROM	Yes	9	1	10	**0.005**
	No	320	22	342	
Maternal illness	Yes	56	4	60	**0.113**
	No	340	24	388	
	Primi	224	12	236	**0.225**
Parity	*G2-G4	160	8	168	
	>G4	9	1	0	
Gestational age	>42	39	2	41	
(weeks)	22-40	120	7	127	**0.724**
	40-42	205	12	217	
MV needed	Yes	2	9	11	**<0.001**
Total		4541	315	2820	

The study was conform and clarify that the past decade due to advances in perinatal care[7]. This has been attributed to better obstetric practices. There is paucity of data regarding the neonatal outcome of babies born through MSAF in Nepal. This study is aimed to assess theperinatal attributes, mortality and morbidity associated with babies born through MSAF. The study wouldreflect the prenatal and postnatal care of babies delivered through MSAF and the improvement as required in the perinatal health services so that adverse outcome is prevented as well as minimized especially atthe regional level II/III perinatal center.

Table 2:

Outcomes Risk Factors with increased incidence of MAS by Bivariate analysis

	p-value	OR	95.0% C.I for OR	
			Lower	Upper
AS 1 minute	<0.001	9.29	5.28	**15.22**
AS 5 minute	<0.001	4.42	2.12	**11.48**
Resuscitation	<0.001	13.33	7.40	**25.13**
PROM	**0.010**	**2.28**	**1.44**	**07.30**

Table 3:
Outcome of Neonates born through Meconium Stained Amniotic Fluid

Clinical outcome	No MAS	MAS	Total
Well baby	340	0	**340**
Improved & discharged	25	13	**38**
Expired	2	2	**4**
Referred	4	0	**4**
Total	371	25	396

Table 4:
outcomes Diagnosis of Neonates born through Meconium Stained Amniotic Fluid

Outcome	Frequency	Percent
MAS	10	**1.50**
Perinatal Asphyxia	7	**1.20**
Perinatal Asphyxia with MAS	17	**2.02**
MAS with Sepsis	1	**0.12**
Septicemia	1	**0.12**
Born through MSAF without any complications	356	**45.1**
Others	07	**1.38**
Total	**399**	**100**

References

1. Walsh MC, Fanaroff JM. Meconium stained fluid: approach to the mother and the baby. *Clin Perinatol* 2007;34(4):653-55.
2. Fanaroff AA. Meconium aspiration syndrome: historical aspects. *J Perinatol* 2008;28:S3-S7.
3. Coltart TM, Byrne DL, Bates SA. Meconium Aspiration Syndrome: a 6-year retrospective study.*Br J Obstet Gynaecol* 1989;96:411-14.

4. Wiswell TE, Tuggle JM, Turner BS. Meconium aspiration syndrome: have we made a difference?*Pediatrics* 1990;85:715-21.

5. Bhutani VK, Chima R, Sivieri EM. Innovative neonatal ventilation and meconium aspiration syndrome. *Indian J Pediatr* 2003;70:421-27.

6. Wiswell TE. Advances in the treatment of the meconium aspiration syndrome. *Acta Paediatr* 2001;90:S28-30.argaville PA, Copnell Beverley. The Epidemiology of Meconium Aspiration Syndrome: Incidence, Risk Factors, Therapies and Outcome. *Pediatrics* 2006;117:1712-721.

8. .Liu WF, Harrington T. Delivery room risk factors formeconium aspiration syndrome. *Am J Perinatol* 2002;19(7):367-78.

9. Bhaskar SH, Karthikeyan G, Bhat BV, Bhatia BD. Antenatal Risk Factors and Neonatal Outcome in Meconium Aspiration Syndrome: *Indian J Maternal Child Health* 1997;8(1):9-12.

10. Hernandez C, Little BB, Dax JS, Gilstrap LC, Rosenfield CR. Prediction of theseverity of meconium aspiration syndrome*. Am J Obstet Gynecol* 1993;169:61- 70.

11 Bhat RY, Rao A. Meconium-stained amniotic fluid and meconium aspiration syndrome: a prospectivestudy. *Ann Trop Paediatr* 2008;28(3):199-203.

12 Khazardoost S, Hantoushzadeh S, Khooshideh M, Borna S. Risk Factors for meconium aspiration in meconium stained amniotic fluid. *J Obstet Gynaecol* 2007;27(6):577-79.

13 Malik AS, Hillman D. Meconium aspiration syndrome and neonatal outcome in a developing country. *Ann Trop Paediatr* 1994;14(1):47-51.

14 Fischer C, Rybakowski C, Ferdynus C, Sagot P, Gouyyon JB. A Population- Based Study of Meconium Aspiration Syndrome in Neonates born between 37 and 43 weeks of Gestation. *Int JPediatr* 2012; 2012: 321-545.

15 Meydlani MM, Dilbaz b, Calistan E, Dilbaz S, Haberal A. Risk factors for meconium aspiration syndrome in infants born through thick meconium. *Int J Gynaecol Obstet* 2001;72:9-15.

16 Bhutani VK. Developing a systems approach to prevent meconium aspiration syndrome: lessons learned from multinational studies. *J Perinatol* 2008;28:S30-S35.

17 Goldsmith JP. Continous positive airway pressure and conventional mechanical ventilation in the treatment of meconium aspiration syndrome. *J Perinatol* 2008;28:S49-55.

18 Velaphi S, Van Kwawegen A. Meconium aspiration syndrome requiring assisted ventilation: perspective in a setting with limited resources. *J Perinatol* 2008;28:S36-42.