Original Article

Meconium Aspiration Syndrome in Neonates

Meconium Aspiration in Neonates

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ABSTRACT

Objective: To determine the frequency of the factors leading to meconium aspiration syndrome in neonates.
Study Design: Descriptive case series study.
Place and Duration of Study: This study was conducted at the Neonatal Unit of the Department of Pediatric Medicine, Sheikh Zaid Postgraduate Medical Institute Lahore from 02-08-2013 to 2-02-2014
Materials and Methods: A total of 180 patients were selected for this study. After verbal consent for participating in the study mothers were inquired for factors leading to meconium aspiration syndrome like post maturity and cesarean section with detailed history including date of last menstrual period and mode of delivery and filled in predesigned proforma.
Results: There were 101 (56.1%) male and 79 (43.9%) female patients. Neonates delivered with cesarean section were 73 (40.6%), 85 (47.2%) patients had post maturity and 7 (3.9%) patients had IUGR. There were 13 (7.2%) patients had pneumothorax and mortality was recorded in 8 (4.4%) patients.
Conclusion: Cesarean section, post maturity and IUGR are important risk factors, frequently associated with meconium aspiration syndrome.
Key Words: Meconium aspiration syndrome, cesarean section, IUGR, post maturity.

Citation of article: Das C, Sathio SN, Rani S. Meconium Aspiration Syndrome in Neonates. Med Forum 2017;28(3):11-14.

INTRODUCTION

Meconium aspiration syndrome is an important cause of respiratory distress in newborn infants. The pathophysiology of meconium aspiration syndrome is complex and involves airway obstruction, surfactant dysfunction and pulmonary inflammation. Meconium aspiration syndrome can be diagnosed in any infant born with meconium staining of amniotic fluid, develops respiratory distress at or shortly after birth and has positive radiographic findings.[1,2]

The incidence of meconium stained liquor is more in prolonged pregnancies i.e. 19% at 40 weeks of gestational age and 42% at 42 weeks of gestational age and the incidence of passage of meconium during labor also increases with gestational age, its reaches up to 30% at 40 weeks and 50% at 42 weeks.[3]

Several factors are associated with meconium aspiration syndrome like, cesarean section is associated with 41.8%, intrauterine growth restriction (IUGR) in 6% of cases. While complications associated with meconium aspiration syndrome include pneumothorax in 9.6% of cases and mortality occur in 6.6% of cases.

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Received: January 10, 2017; Accepted: February 13, 2017

Term neonates who are admitted with diagnosis of meconium aspiration syndrome continue to represent a high risk population with significant morbidity and often require intensive therapies.[4,5]

The results of this study will bring awareness among mothers and obstetricians regarding factors leading to meconium aspiration syndrome like avoidance of post maturity by induction of labor at term pregnancy between 37 and 42 weeks, avoid unnecessary cesarean section without labor pain or cesarean section on request of mother at term pregnancy and plan for normal vaginal delivery and also IUGR was controlled in form of treating maternal infection and maternal malnutrition. So, the better outcome will be achieved.

MATERIALS AND METHODS

This descriptive case series studywas carried out in Neonatal Unit of the Department of Pediatric Medicine, SheikhZaid Postgraduate Medical Institute Lahore from 02-08-2013 to 2-02-2014.

Sample size of 180 cases is calculated with 95% confidence level, 3.5% margin of error and taking expected percentage of IUGR i.e. (factor leading to meconium aspiration syndrome) i.e. 6% (least among all) in neonates presenting in a tertiary care hospital and collected by non-probability consecutive sampling.

Inclusion criteria:

1. Neonates born after completing 37 weeks or more than 37 weeks of gestation calculated from date of last menstrual period.
2. Neonates referred to Neonatology Unit because of meconium aspiration syndrome.

Exclusion criteria

1. Sick new born with other co morbid conditions like neonatal sepsis
2. Birth asphyxia.

Data collection procedure: Total number of 180 patients admitted in the Neonatal Unit, Department of Pediatrics, SheikhZaid Hospital Lahore, fulfilled the inclusion criteria were included in the study. After taking informed consent of parents, their biodata including name, date of birth, sex, address and date of admission were recorded. There will be no ethical issue regarding privacy and safety of the patients. Information regarding factors leading to meconium aspiration syndrome like post maturity and cesarean section were obtained by history that was by asking date of last menstrual period and mode of delivery. IUGR information was obtained by taking and plotting weight, length and head circumference of neonates on percentile chart. Outcome was determined in terms of development of pneumothorax and mortality in neonates during hospital stay. Pneumothorax was diagnosed with hyper lucent shadow that was more dark shadow with no lung marking on chest x-ray.

Statistical analysis: Data was entered in SPSS version 16 and analyzed. The qualitative variables like gender, factors leading to meconium aspiration syndrome (i.e. post maturity, cesarean section and IUGR) and outcome (pneumothorax and mortality) were presented in the form of frequency and percentages.

RESULTS

There were 101 (56.1%) male and 79 (43.9%) female patients (Table 1). The mean weight of the patients was 3.0±0.4 kg. There were 7 (3.9%) patients in the weight range of up to 2.0 kg, 95 (52.8%) patients in the weight range of 2.1-3.0 kg and 78 (43.3%) patients in the weight range of 3.1-4.0 kg.

The mean length of the patients was 49.2±2.3cm. There were 7 (3.9%) patients had length range of 40-45cm, 113 ((62.8%) patients in the length range of 46-50cm and 60 (33.3%) patients in the length range of 51-55cm.The mean head circumference of the patients was 35.0±0.9 cm. There were 132 (73.3%) patients in the head circumference range of 31-35cm and 48 (26.7%) patients in the head circumference range of 36-40cm (Table 2).

In the distribution of patient's mode of delivery by cesarean section, there were 73 (40.6%) patients, who delivered with cesarean section and 107 (59.4%) patients who were not delivered with cesareans section. Post maturity was seen in 85 (47.2%) patients while 95 (52.8%) were normal term babies.IUGR affects 7 (3.9%) patients, and 173 (96.1%) patients had not IUGR. Graph 1 showing all the factors contributing in meconium aspiration.

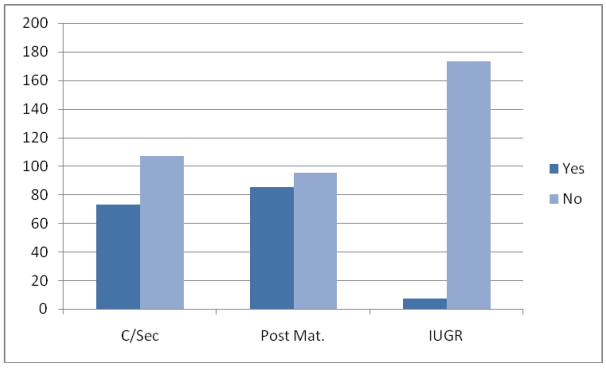
Complications of meconium aspiration like pneumothorax, was present in 13 (7.2%) patients, in 167 (92.8%) patients pneumothorax is not seen. (Table 3)

Table No.1: Distribution of patients by sex (n=180)

Sex	No. of patients	Percentage
Male	101	56.1
Female	79	43.9
Total	180	100.0

Table No.2: Demographics of patients(n=180)

Weight (Kg)	**No. of patients**	**Mean ± SD**
Upto 2.0	7 (3.9%)	3.0±0.4
2.1-3.0	95(52.8%)	
3.1-4.0	78(43.3%)	
Length (cm)		
40-45	7(3.9%)	49.2±2.3
46-50	113(62.8%)	
51-55	60(33.3%)	
Head circumference		
31-35	132 (73.3%)	35.0±0.9
36-40	48(26.7%)	



Graph No.1: Various factor of meconium aspiration

Table No.3: Distribution of patients by pneumothorax (n=180)

Pneumothorax	No. of patients	Percentage
Yes	13	7.2
No	167	92.8
Total	180	100.0

DISCUSSION

Meconium aspiration syndrome is a disease of the term and near-term infant that is associated with considerable respiratory morbidity. It is characterized by early onset of respiratory distress in a new born, with poor lung compliance and hypoxemia clinically and patchy opacification and hyperinflation on radiography.[6,7]

At least one third of infants with MAS require intubation and mechanical ventilation, and newer neonatal therapies, such as high-frequency ventilation (HFV), inhaled nitric oxide (iNO), and surfactant administration are often brought into play.[8-11]

In the past few decades, there is decline in the incidence of MAS in many centers in developed world. The apparent reduction in the risk of MAS has been attributed to better obstetric practices, in particular, avoidance of post maturity and expeditious delivery where fetal distress has been noted.[12,13]

In previous epidemiologic studies, some important risk factors for the development of MAS have been identified, either within the general birth population or among infants born through meconium-stained amniotic fluid (MSAF). The presence of fetal compromise, indicated by abnormalities of fetal heart rate tracings and/or poor Apgar scores, is known to increase the risk of MSAF and of MAS in the meconium-stained infant. Cesarean delivery is also associated with a heightened incidence of MAS. There is an apparent relationship between maternal ethnicity and risk of MSAF and the suggestion in several reports of an increased risk of MAS in black Americans and Africans and Pacific Islanders. .Advanced gestation has also been recognized as a risk factor, both for MSA and for MAS.[14,15]

Therapy for infants with MAS, in particular, those requiring intubation, is evolving rapidly. There is, however, a paucity of longitudinal data examining the proportional uptake of newer therapies in ventilated infants with MAS. Similarly, whereas it is clear that severe MAS is associated with a relatively high risk of pneumothorax and a relatively long duration of respiratory support and oxygen therapy. The mortality rate is lying between 5% and 37%, with the marked disparity in published figures being attributable to the difficulties in identifying the cause of death (respiratory versus non respiratory) and the skewed populations in which the mortality risk is calculated.[6,7]

In this study 40.6% infants were delivered with cesarean section. As compared with the study of Dargaville and Copneli 41.8% infants delivered with cesarean section, which is comparable with our study. While post maturity was found in 47.2% patients which is more or less similar with the study of Adhikari et al post maturity was found in 54% patients.[4,16]

Intrauterine growth restriction (IUGR) which was found in 3.9% patients while the study of Dargaville and Copneli observed intrauterine growth restriction in 6% patients, which is almost comparable with this study.

In this study pneumothorax was found in 7.2% patients. As compared with the study of Dargaville and Copneli pneumothorax was found in 9.6% patients, which is comparable with our study.[4]

Mortality was found in 4.4% patients compared with study by Nangia S (4.6%) neonate not intubated. In another study conducted by Adhikari et almortality was found in 14% patients. Study by NangiaS 10.34% deaths in neonate intubated for meconium aspiration syndrome.[17,18]

CONCLUSION

It is concluded from this study that presence of post maturity, cesarean section and IUGR are important risk factors for meconium aspiration syndrome. The pneumothorax (7.2%) and mortality (4.4%) are outcome variables for meconium aspiration syndrome during hospital stay. The monitoring of labor was the most significant factor in the reduction of meconium aspiration syndrome.

Conflict of Interest: The study has no conflict of interest to declare by any author.

REFERENCES

1. Sylvia C, Alfonso L, David H, Fred M. Meconium inhibits phagocytosis and stimulate respiratory burst in alveolar macrophages. J Pediatr Res 2005; 57:813-8.
2. Yeh TF. Core concepts: Meconium aspiration syndrome: pathogenesis and current management. Neo Reviews 2010;11:503-12.
3. Amjad N, Imran T, Ahmad AN. Fetomaternal outcome of pregnancy between 40 and 42 weeks. J Professional Med 2008;15:317-22.
4. Dargaville PA, Copneli B. The epidemiology of meconium aspiration syndrome. Pediatrics 2006; 117:1712-21.
5. Singh BS, Clark RH, Powers RJ, Spitzer AR. Meconium aspiration syndrome remains a significant problem in the NICU. J Perinatol 2009;29:497-503.
6. Cleary GM, Wiswell TE. Meconium-stained amniotic fluid and the meconium aspiration syndrome: an update. PediatrClin North Am 2008;45:511–29.
7. Wiswell TE, Bent RC. Meconium staining and the meconium aspiration syndrome: unresolved issues. PediatrClin North Am 2003; 40:955–81.
8. Coltart TM, Byrne DL, Bates SA. Meconium aspiration syndrome: a 6-year retrospective study. Br J Obstet Gynaecol 2004; 96:411–14.
9. Wiswell TE, Tuggle JM, Turner BS. Meconium aspiration syndrome: have we made a difference? Pediatrics 2000; 85:715–21.
10. Bhutani VK, Chima R, Sivieri EM. Innovative neonatal ventilation and meconium aspiration syndrome. Indian J Pediatr 2003; 70:421–27.

11. Wiswell TE. Advances in the treatment of the meconium aspiration syndrome. Acta Paediatr 2001;90:28–30.
12. Sriram S, Wall SN, Khoshnood B, Singh JK, Hsieh HL, Lee KS. Racial disparity in meconium-stained amniotic fluid and meconium aspiration syndrome in the United States, 1989–2000. Obstet Gynecol 2003;102:1262–8.
13. Yoder BA, Kirsch EA, Barth WH, Gordon MC. Changing obstetric practices associated with decreasing incidence of meconium aspiration syndrome. Obstet Gynecol 2002;99:731–9.
14. Fugikura T, Klionsky B. The significance of meconium staining. Am J Obstet Gynecol 1975; 121:45-50.
15. Peng TC, Gutcher GR, Van Dorsten JP. A selective aggressive approach to the neonate exposed to meconium-stained amniotic fluid. Am J Obstet Gynecol 2006;175:296–301.
16. Alexander GR, Hulsey TC, Robillard PY, De Caunes F, Papiernik E. Determinants of meconium-stained amniotic fluid in term pregnancies. J Perinatol 2004;14:259–63.
17. Adhikari M, Gouws E, Velaphi SC, Gwamanda P. Meconium aspiration syndrome: importance of the monitoring of labor. J Perinatol 1998;18:55-60.
18. Nangia S, Sunder S, Biswas R, Saili A. Endotracheal suction in term non vigorous meconium stained neonates-A pilot study. Resuscitation 2016;105:79-84.