NEONATAL OUTCOME IN MECONIUM STAINED DELIVERIES — A PROSPECTIVE STUDY

Wg Cdr TS RAGHU RAMAN^{*}, Dr DG JAYAPRAKASH[†]

(Command Hospital Air Force, Bangalore)

ABSTRACT

This prospective study analyzes the neonatal outcome in deliveries complicated by meconium stained amniotic fluid. In a study of 1000 live born deliveries, meconium staining of amniotic fluid was seen in 50 (5%) deliveries. Out of these, 20 newborns (40%) developed classical signs of meconium aspiration syndrome and were managed according to a predetermined protocol. Multiparity, term deliveries, use of sedatives in mother, intrauterine growth retardation and prolonged labour were some of the risk factors for development of meconium aspiration syndrome in newborns. This study highlights the need for review of management protocol in newborns after meconium staining of the amniotic fluid, including the use of prophylactic antibiotics.

MJAFI 1997; 53 : 15-18

KEYWORDS : Amniotic fluid; Delivery; Meconium aspiration; Respiratory distress syndrome.

Introduction

Respiratory distress in a newborn is the most common emergency requiring immediate attention. To a large extent it is preventable. Meconium staining of amniotic fluid (MSAF) resulting in respiratory distress in certain percentage of newborns is a common occurrence in any obstetrical unit. Meconium aspiration syndrome (MAS) accounts for 28 to 40 per cent of neonatal mortality [1]. Understanding of pathogenic mechanisms in MAS has undergone changes over the years. The resultant effect has been on the management strategies adopted in a neonate delivered after MSAF. The main lacuna in the understanding of pathogenic mechanism of passage of meconium during the process of labour has been the nature of the triggering factor. The earlier concept that there is a direct correlation with foetal hypoxia has not been proved. Further, the management of a newborn, born after MSAF labour has also been controversial with many different protocols without proper control studies. This prospective study was aimed at evaluation of neonates delivered after meconium staining of amniotic fluid and the management protocol adopted.

Material and Methods

One thousand consecutive deliveries at Command Hospital Air Force from June 1992 to Jan 1993 were included in the study. Maternal data regarding age, parity, antenatal care and antenatal medical morbidity were recorded. Details of immediate intranatal period were recorded. Following definitions were adopted for the purposes of this study [2] :

- a) Thin meconium - very light green staining of amniotic fluid.
- b) Thick meconium - thick greenish meconium with particulate matter in amniotic fluid.
- c) Meconium aspiration syndrome - development of respiratory distress soon after birth with radiological evidence of aspiration pneumonia (atelectasis or hyperinflation) in the presence of meconium staining of the liquor or staining of nails or umbilical cord or skin.

The management protocol adopted for the study was as follows: On delivery of the head, the oropharynx and nasopharynx, in that order, were suctioned using either a mucus sucker or a mechanical suction device, in all neonates delivered after MSAF. In deliveries complicated by thick

^{*}Reader, Department of Paediatrics, Armed Forces Medical College, Pune; [†]Paediatrician, Jindal Trust Hospital, Bangalore.

meconium, larynx of the neonate was visualized after complete delivery. If meconium was seen in the larynx, tracheal intubation and suctioning was done. Vital parameters were monitored during the procedure. In deliveries complicated by thin meconium staining of amniotic fluid and if the neonate delivered had a good Apgar score, no attempt was made to visualize the larynx. All cases diagnosed as MAS were roomed in the neonatal intensive care unit of the paediatric complex for further observation and management. In the neonatal intensive care unit, such neonates underwent chest radiography, complete blood count, blood culture (in those neonates clinically suspected to have early onset neonatal septicemia) arterial blood gas analysis and ECG. Neonates with MAS were managed with intravenous fluids, oxygen and appropriate mechanical ventilation. No neonate was started on prophylactic antibiotics. On recovery, neonates were discharged and followed for a month in a well-baby clinic.

Results

In the present study of 100 consecutive live-born deliveries, there were 50 cases of MSAF giving an incidence of 5 per cent. The correlation between maternal factors and MSAF is given in Table 1. Important maternal factors were multiparity, term deliveries, prolonged and assisted deliveries, intrauterine growth retardation and maternal sedation. In 22 cases of MSAF, the meconium was thin and in the remaining 28 it was thick. Meconium aspiration was diagnosed in 20 neonates giving an incidence of 40 per cent. Of these, 17 cases were related to thick meconium staining and 3 cases of MAS due to thin meconium ($p < 0.001$). Table 2 analyzes the immediate postnatal events in 50 cases of MSAF. Findings like presence of meconium in the larynx, trachea and in stomach were related to higher incidence of MAS, despite following the management protocol of tracheal suction at birth. Table 3 includes clinical, radiological and arterial blood gas findings in the 20 neonates with MAS.

Majority of the neonates with MAS (14/20) were managed with oxygen and intravenous fluids. Only 6 neonates were ventilated with continued positive pressure ventilation. One neonate required chest tube drainage for pneumothorax. Complica-

TABLE 1

Maternal factors and meconium staining amniotic fluid (n=50)

Maternal factors	Meconium stained amniotic fluid (%)
Antenatal care	
Booked	48 (96)
Unbooked	2 (4)
Parity	
Primigravida	9 (18)
Multigravida	41 (82)
Gestational age	
37 - 40 weeks	45 (90)
> 40 weeks	5 (10)
High risk pregnancy	
Pregnancy induced hypertension	10 (20)
Sedatives	5 (10)
Intra uterine growth retardation	20 (40)
Labour	
Normal	5 (10)
Prolonged	35 (70)
Assisted delivery	10 (20)

TABLE 2

Immediate post-natal events in meconium stained amniotic fluid (MSAF) deliveries (n=50)

Events	MSAF (%)	MAS (%)
Meconium staining of skin and/or cord	30 (60)	20 (100)
Meconium in the airway	28 (56)	20 (100)
Laryngoscopic finding		
Meconium in larynx	26 (52)	18 (90)
Meconium in trachea	15 (30)	13 (65)
Aspiration from stomach		
Nil	22 (44)	2 (10)
> 5 mL	28 (56)	18 (90)

tions encountered during the study period were hypoxic ischaemic encephalopathy (2 patients), pneumothorax (1 patient) and pneumomediastinum (1 patient). During the follow-up period of 4 weeks, only 1 neonate out of the 20 cases of MAS had persistent respiratory distress without any specific etiology.

Discussion

Meconium, the first gastrointestinal excretion expelled by the neonate was named by Aristotle and is derived from the Greek word *meconion*

TABLE 3
Clinical features of meconium aspiration syndrome (MAS)

Features	MAS (n=20)
Birth asphyxia	
Moderate	6
Severe	4
Respiratory distress	
Tachypnoea only	3
Tachypnoea + retraction	12
Tachypnoea + retraction + cyanosis	5
Radiological	
Coarse irregular opacities	16
Pneumothorax	1
Pneumomediastinum	1
Emphysema	1
Atelectasis	1
Arterial blood gas	
Hypoxemia	15
Hypoxemia + metabolic acidosis	4
Hypoxemia + metabolic & respiratory acidosis	1

meaning 'poppy-juice'. It was believed that this opium-like substance promoted fetal sleep during gestation [1]. According to the classical concept passage of meconium follows stimulation of gut and relaxation of anal sphincter after an episode of fetal asphyxia. The factors that favour passage of meconium suggested are increased maternal age, prolonged gestation, obesity, toxemia and anaemia [2].

The incidence of 5 per cent MSAF in the present study is comparable with that reported by Sunande Gupta et al [3]. Twenty neonates developed MAS, an incidence of 40 per cent. Wiswell and Henley in their study have reported similar incidence. That majority of these cases of MAS were related to thick meconium staining of amniotic fluid, finds reference in the study of Narang et al [4]. The predominant clinical features of respiratory distress, patchy non-homogenous opacities in the lung fields and hypoxemia were classical findings of MAS [5,6].

With improved understanding of basic pathogenic mechanisms in MAS, management of neonates born after MSAF has also undergone changes. The pioneering animal studies of Gooding et al suggested that, *in utero*, nasopharyngeal meconium was not aspirated into the trachea until

the onset of postpartum breathing [7]. This resulted in the intrapartum strategy aimed at removing meconium prior to the onset of respiration. The effectiveness of this combined obstetric and paediatric strategy has been demonstrated by Carson et al [8]. In the present study the strategy was modified to avoid tracheal suction in neonates born after thin MSAF, as recommended by the committee on neonatal ventilation/meconium/chest compression of the American Heart Association [9].

One interesting observation in the present study was that despite adequate tracheal suction in neonates born after thick MSAF the majority went on to develop MAS. Hence the question arises whether the events precipitating MAS are perinatal or antenatal. Accordingly, the new postulation is that meconium staining is not an independent marker of fetal distress. Neonatal outcome has been found to be better related to fetal heart rate pattern rather than presence or absence of meconium [10]. Keeping this hypothesis in view and the utility of the management protocol current being followed, there is a need to reevaluate the strategies in the management of neonates born after MSAF. Firstly, there is need for intensive monitoring during the intrapartum period in all high risk pregnancies with potential danger of meconium passage. Secondly, early intervention and delivery of all such identified fetuses will further reduce the incidence of MAS. Some initial work has been done on the beneficial effect of prophylactic intrapartum amino infusion in the management of MAS [11]. This strategy requires more trials before it is accepted as a modality of treatment.

The second interesting aspect of this study is the avoidance of prophylactic antibiotics in MAS. Two recent studies have highlighted this [12,13]. There were no patients with neonatal septicemia in the present study.

REFERENCES

1. Holtzman BR, Banzhaf WC, Silver RK, Hageman RJ. Perinatal management of meconium stained amniotic fluid. *Clin Perinatol* 1989; 16: 825-38.
2. Narang A. Definition of major illnesses as applicable at different levels of the health care delivery system. In: Singh M, Paul VK, Bhakoo ON, editors. *Neonatal nomenclature and Data collection*. Delhi: Vani Press, 1989; 27-35.

3. Sunande G, Shivpuri VM, Pushpa G. Meconium aspiration syndrome. *J Indian Med Assoc* 1984; 82: 47-50.
4. Narang A, Nair PMC, Bhakoo ON, Vashist VL. Management of meconium stained amniotic fluid : A team approach. *Ind Pediatr* 1993; 30: 9-13.
5. Wiswell TE, Henley MA. Management of meconium stained neonate. *J Pediatr* 1990; 117: 341-2.
6. The fetus and the neonatal infant. In: Nelson WE, Vaughan VC, editors. *Textbook of Pediatrics*. 14th ed. Philadelphia: WB Saunders, 1992; 421-524.
7. Gooding CA, Gregory GA, et al. An experimental model for the study of meconium aspiration of new born. *Radiology* 1971; 100: 137-40.
8. Carson BS, Losey RW, Boves Jr WA, et al. Combined obstetric and pediatric approach to prevent MAS. *Am J Obstet Gynecol* 1976; 126: 712-4.
9. Wiswell TE. Meconium and tracheal aspiration. *Pediatrics* 1992; 90: 475-6.
10. Bochner CJ, Medcaris AL, Ross MJ, et al. The role of antepartum testing in the management of post-term pregnancies with heavy meconium in early labor. *Obstet Gynecol* 1987; 69: 903-7.
11. Sacovsky Y, Amon E, Bader Me, Petric RH. Prophylactic amino infusion during labor complicated by meconium : a preliminary report. *Am J Obstet Gynecol* 1989; 161: 613-7.
12. Wiswell TE, Henley MA. Infratracheal suctioning, systemic infection and the meconium aspiration syndrome. *Pediatrics* 1992; 89: 2063-4.
13. Krishnan L, Nasruddin, Prabhakar P, Bhaskaranand N. Routine cover for newborns intubated for aspiration of meconium: is it necessary? *Ind Pediatr* 1995; 32: 529-31.