

Original article:

EPIDEMIOLOGY AND ASSOCIATED RISK FACTORS OF MECONIUM ASPIRATION SYNDROME IN A TERTIARY CARE HOSPITAL, ODISHA

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Abstract:

Introduction-There is high incidence of Meconium Aspiration Syndrome (MAS) in babies who have got thick Meconium Stained Amniotic Fluid (MSAF).

Materials and methods-This was a observational prospective study conducted to evaluate the incidence, prevalence and outcome of babies with meconium stained amniotic fluid.

Results- Among patients of MSAF, maximum were stained with thick meconium stain, most of them had cord staining with meconium. When APGAR score was considered at first one minute, most of them had score less than 3. Most common associated risk factors were maternal anaemia, neonatal birth asphyxia, hyperbilirubinaemia.

Conclusion- MSAF is a very important burden over the treating pediatricians and obstetricians and possesses several complications. . Its incidence and prevalences are known. But, lacks recent overview on this emerging burden. So, this study enumerates different epidemiological parameters of meconium stained amniotic fluid (MASF) newborns as well as the symptomatic meconium aspiration syndrome (MAS)babies.

Keywords-MSAF,MAS

INTRODUCTION-

Meconium Aspiration Syndrome (MAS) is defined as development of respiratory distress in newborns soon after birth, who have got radiological evidence of aspiration pneumonitis along with meconium staining of liquor and staining of nails or staining of umbilical cord or skin. Meconium seems to be toxic to the lungs.MSAF is comparatively more common in primi gravidas when compared to multi gravidas. Postdates, Eclampsia, Intrauterine growth retardation (IUGR), Oligohydramnios, Premature rupture of membrane (PROM) are main associating factors with occurrence of MSAF, infact Regular antenatal check ups do not alter this high rates [1]. India has high rate of claiming more than quarter of neonatal

deaths of the total cases of neonatal mortality in the world (2). One of the main contributors is meconium stained amniotic fluid (MSAF) accounting for approximately 8% - 15% of live birth complications following delivery (3). It has been seen that thick MSAF is mostly associated with maternal age >30, postdated pregnancy (>40weeks), and fetal distress [4] . There is lack of update of incidence and complications associated with MAS. So, this study was undertaken.

MATERIALS AND METHODS-

This is an observational prospective study of two years duration. Incidence, Prevalence and Outcome of Babies presenting with Meconium Stained Amniotic Fluid Presenting in the Department of Pediatrics, M.K.C.G. Medical College, Berhampur

was undertaken in the Department of Paediatrics in collaboration with department of Obstetrics and Gynaecology. A total of 200 cases of meconium stained amniotic fluid infants were studied. The total newborns delivered from October 2009 to November 2011, were divided into two groups, the first group with MSAF and the second group with non-MSAF which represents the control group.

Both the groups were compared with various parameters like clinical history, antenatal, natal and postnatal factors other haematological and radiological parameters were studied and compared. The first group with MSAF is again subdivided in to one with thick meconium (dark green in colour, peasoup in consistency with particulate matter) and other with thin meconium (light yellow or green in colour), both the groups are compared and studied with respect to various parameters like incidence and degree of birth asphyxia, MAS, rate of sepsis and other complications and mortality.

In patients with MSAF, many parameters like progress of labour, consistency and duration of meconium staining and evidence of any fetal bradycardia (<120 beats /min), fetal tachycardia(>160 beats /min) or fetal heart irregularity, method of delivery as spontaneous, induced, instrumental and operative. All babies were attended by one or two trained pediatricians. Then the baby is quickly transferred to the pre-warmed resuscitation table. On receiving the baby, oropharyngeal suction was done using disposable sterile suction catheter No.8 and also drying of the baby is done. If the baby was found to be

depressed, then direct laryngoscopy was done using miller No 0 straight blade for pre-terms and No 1 for terms. The posterior pharynx and glottis area were visualised and if there was presence of meconium in posterior pharynx or glottic area that was suctioned out. If meconium was seen at the level of vocal cords, the baby was intubated with sterile disposable endotracheal tubes (size 2.5 or 3.0) and meconium sucked out, while withdrawing the endotracheal tube through an adapter. This procedure was repeated 2 or 3 times while observing the heart rate till clear aspiration. Positive pressure ventilation using Ambu-bag was not done till meconium had been cleared from trachea in the depressed newborns.

The APGAR score were recorded at 1 minute and 5 minute in all babies. After the initial resuscitation the stomach was aspirated and irrigated with normal saline. All severely asphyxiated, neurologically depressed and symptomatic babies were transferred to the Special New Borne Care Unit (SNCU) with oxygen and supportive care, while all others were observed in the nursery attached to our labour ward. A close monitoring of their respiratory distress using Downey's scoring system was done. All the infants developing respiratory distress were subjected to an initial sepsis screen at the age of 4-6 hours. The criteria laid by Philips et al. for sepsis was taken in to account the abnormal values as suggested by them were, (1) TC <500/cmm (2) Band cell ratio (B/T) >0.2(3) Micro ESR >15 mm fall in 1st hour (4) CRP >0.8 mg/dl. Presence of two or more abnormal laboratory test is considered sepsis.

CRITERIA FOR INCLUSION OF A SYMPTOMATIC MAS CASE IN RANDOMISED TRIAL OF PROPHYLACTIC ANTIBIOTICS

1. All infants with symptomatic MAS and
2. Absence of any of the following exclusion criteria:
 - a) Maternal pyrexia within 2 weeks prior to delivery
 - b) Foul smelling liquor
 - c) Prolonged rupture of membrane (PROM) of more than 12 hours duration
 - d) More than 5 polymorphs /HPF of gastric aspirate
 - e) Sepsis screen right 4 hours of age suggestive of infection

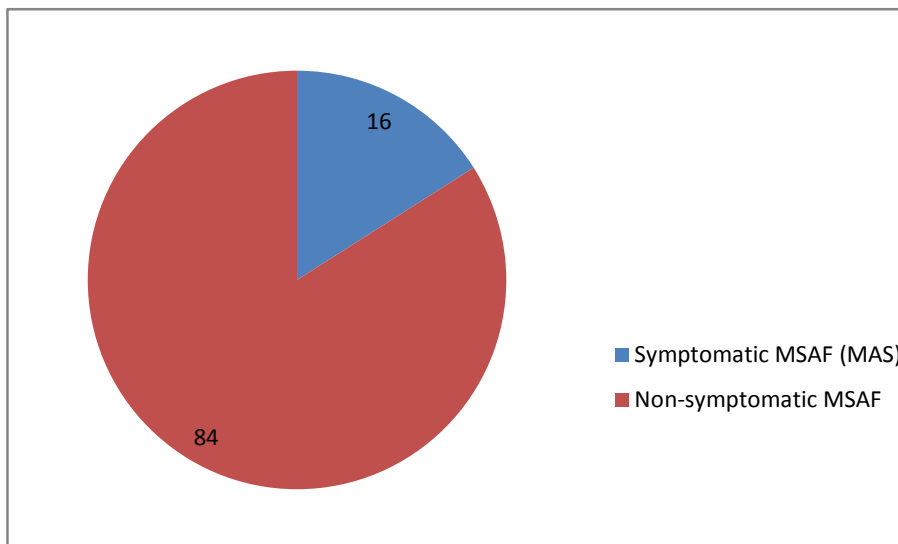
INVESTIGATIONS

All the cases were subjected to following investigations

1. Chest X-ray as early as possible after birth and a subsequent X-ray after 48 hours and 96 hours of age in case infant is still symptomatic at that stage.
2. Sepsis screen (Total leucocyte count, band cells count, micro ESR, blood culture)
3. Polymorphonuclear leucocytes in gastric aspirate in infants born with PROM, are studied using light microscope after leishman staining of the gastric aspirate smear, random blood sugar.
4. Arterial blood gas and acid base parameters in symptomatic MAS

Results:

Fig-1:Incidence(%)of Non-symptomatic MSAF and symptomatic MSAF patients(MAS)



In our study, out of 2231 number of cases, 200 newborns developed MSAF. So, incidence of MSAF came as 8.96%. Among these 200 MSAF patients, 32 newborns developed signs and

symptoms of meconium aspiration syndrome (MAS) and the rest were non-symptomatic. So, among all MSAF patients, incidence of MAS was 16% shown in (Fig-1).

Table-1: Demographic parameters associated with MSAF and MAS

1	Sex	Sex	Asymptomatic MAS(n=168)	Symptomatic MAS(n=32)	Total
		Male	95(56.54%)	21(65.62%)	116
		Female	73(43.45%)	11(34.37%)	84
2	Locality	Rural	Number	Percentage(%)	
			148	74.00	
		Rural	52	26.00	
3	Gestational age		Number(n=200)	Percentage(%)	
		<37 weeks	14	7%	
		37-41 weeks	176	88%	
		≥42 weeks	10	5%	
4	Birth weight(grams) of meconium stained neonates		Number(n=200)	Percentage(%)	
		<2500	54	27.2%	
		2500 – 2999	96	47.7%	
		3000 – 4000	46	22.7%	
		>4000	04	2.27%	

(Table-1)shows, among the total population of MSAF, the number of males were higher both in symptomatic and asymptomatic newborns. Majority of MSAF patients belonged to rural population. Majority (88%)were in term gestational age group among all MSAF patients.47.7% were having birth weight of 2500-2999gm. Similar

weight range was higher among symptomatic MAS patients with 42.86% number of cases. Incidence of babies with AFD(appropriate for date) was higher(81.8%) among total MSAF patient, the same group was higher among symptomatic MAS patient(78.12%).

Table-2:MAS co-relation with method of delivery and parity

Sl.no			Number of MAS	Percentage of MAS(%)
1	Mode of delivery of meconium stained infants	Spontaneous vaginal delivery	84	42.00%
		Forceps application	27	13.50%
		Caesarean section	89	44.50%
2	Parity of the mothers of symptomatic meconium aspiration neonates	Primigravida	16	50.00%
		1-3 children	12	37.50%
		>3 children	04	12.50%

Among all MSAF babies, majority (44.50%) were delivered by caesarean section. Comparison between the symptomatic meconium aspiration and asymptomatic meconium aspiration stained infants did not show any difference of statistical

significance ($p>0.05$) in the mode of labour onset. In both the groups spontaneous onset of labour was common. 50% of mothers who developed MSAF were of primi gravida.

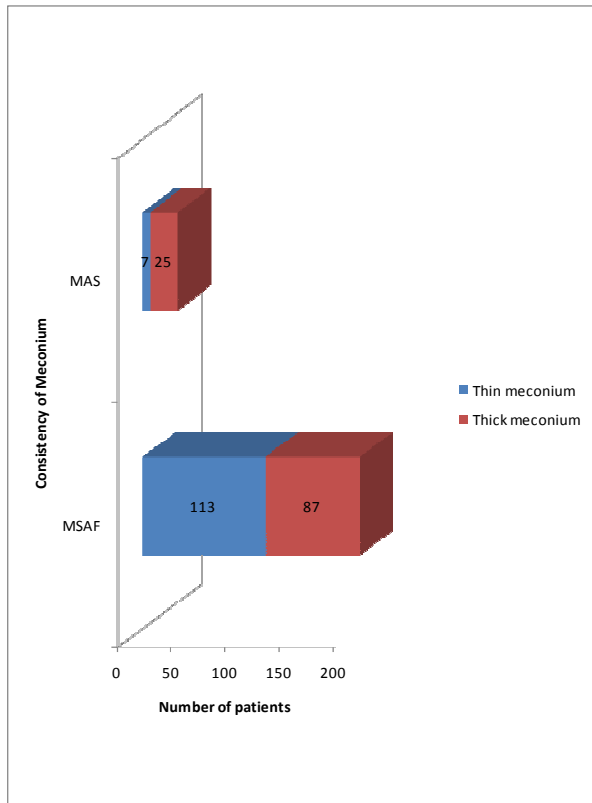
Table-3: Co-ralation of APGAR score with MSAF, MAS and cord staining

Sl.no			Number	Percentage
1	Apgar score & MSAF (n=200)	0-3	24	12
		4-6	29	14.5
		>7	147	73.5
2	Apgar score and MAS (n=32)	0-3	17	53.13
		4-6	09	28.12
		>7	06	18.75
3	Cord staining & development of symptomatic MAS (n=32)[p,0.001]	Present	25	78.57%
		Absent	07	21.43%

(Table-3) denotes that 73.5% of patient of MSAF were having APGAR score of >7 at 1 minute. But when symptomatic patients (MAS) were considered, majority(53.13%) had APGAR score<3 at 1 minute. Amongst MAS patients, 25 out of 32

accounting for (78.57%) symptomatic infants had distinct yellow staining of umbilical cord. In the asymptomatic group only 43.24% infants had meconium staining of the cord. This difference was statistically significant.

Fig-2: correlation of consistency of meconium with MSAF and MAS



(Fig-2) denotes that out of total 200 patients of meconium stained amniotic fluid, only 87 were thick meconium stained accounting for 43.75% whereas 113 of them were thin meconium stained accounted for 56.25%. Out of 113 thin meconium stained 07 developed symptomatic meconium aspiration accounted for (6.19%) and out of 87 thick meconium stained 25 developed symptomatic, meconium aspiration syndrome accounted for (28.73%). The frequency of occurrence of meconium aspiration syndrome was higher with thick meconium as compared to thin meconium.

DISCUSSION-

Our study shows 8.9% of the deliveries were associated with meconium staining of amniotic fluid. This is comparable to the incidence of 8.5% as shown by another study [5]. Fig-1 shows from the study that 16% of the meconium stained infants

developed significant aspiration leading to respiratory morbidity similar report from Gregory et al reported a 20% incidence of symptomatic meconium aspiration[5]. This low incidence of symptomatic meconium aspiration syndrome in the present study is due to the effective neonatal resuscitation, more particularly the selective intubation done for respiratory depressed infants during delivery.

Table-1 shows that 65.62% males were more predisposed to the development of symptomatic meconium aspiration unlike study done by Espinheira MC et al [6] where more females were symptomatic for MAS. In this study, 74% of MSAF infants belong to rural area. The probable explanation for this is due to lack of health care facility in rural areas. When gestational age is considered, maximum(88%) were in term gestational age(37-41 weeks). The reason may be

meconium is rarely found in the amniotic fluid prior to 34 weeks gestation, meconium aspiration primarily affects infants born at term and postterm[7]. Out of 200 meconium stained infants 96 (47.7%) infants weighed more than 2500grams at birth over half of them being more than 3000 grams. Almost similar results seen in symptomatic MAS patients(n=32). Out of 200 neonates with meconium stained amniotic fluid maximum [164 (81.8%)] neonates were appropriate for date (AFD), 18 (9.09%) small for date(SFD) and 18 (9.09%) large for date(LFD). The difference between distribution of meconium stained infants and normal infants was found to be statistically significant [p<0.01]. Similar results seen with symptomatic MAS patients with maximum of them were having AFD (78.12%).

Table-2 depicts that out of all meconium stained babies, maximum (44.5%) were delivered by emergency caesarean section. Similar results were seen Peter A [8] where 42% and study by Naveen S. et al found 49.1% of MSAF patient were delivered by emergency caesarean section[9]. While another study by Wong SF et al found that 13.2% of MSAF had undergone caesarean sections as compared to 8.8% cases who had undergone them in clear amniotic fluid. Such lower rates of caesarean section could be due to incorporation of scalp pH sampling in their study, unlike ours [9]. When parity is concerned, half of the mothers(50%) who delivered MAS babies were having primi gravida unlike study by V.Gupta[10] who found that there is no association between MSAF and parity.

Fig-2 depicts that frequency of occurrence meconium aspiration was higher with thick meconium as compared with thin meconium. Similar results were also shown by other studies and thick meconium is usually regarded as a

common finding in severe meconium aspiration syndrome[11]

Table-3 depicts the co-relation of 1minute APGAR score with MSAF and MAS. At 1 minute, APGAR score was >7 in most (73.5%) of meconium stained patients, while APGAR score was low [0-3] in (53.13%) of symptomatic MAS group of patients at 1 minute. Low Apgar score has been universally associated with MAS [11, 12]. There was a significantly higher incidence of cord staining with meconium in the symptomatic MAS ones with (78.57%) of patients with significance of [p<0.001]. Similar results by Bhat RY et al however found thick meconium as the only significant factor contributing to MAS. [13].

Table-4 depicts that when maternal risk factor are considered, anaemia is associated in 80% of MSAF patients. Another study found no significant association with anaemia [9]. When fetal risk factors are considered, birth asphyxia, neonatal seizure, hyperbilirubinemia are commonly associated with MAS. When neonatal risk factors are considered, birth asphyxia hypoxic ischemic encephalopathy are commonly associated with MSAF, similar Association with was also seen in another study [6].

CONCLUSION-

Meconium stained amniotic fluid (MSAF) is a crucial burden for both obstetricians and paediatricians. It increases the rate of caesarean sections, causes birth asphyxia of newly borne babies, most importantly it may progress into Meconium Aspiration Syndrome (MAS) and increases intensive care unit admissions of newborns, which were clearly seen in our present study. So, Presence of MSAF requires efficient intensive foetal monitoring, so that there may be decrease in the perinatal morbidity and mortality.

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