Effect of Amnioinfusion on Outcome of Neonates Born With Meconium Stained Amniotic Fluid

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Abstracts: Background & Objective: Meconium stained amniotic fluid (MSAF) is associated with significant morbidity and mortality. Amnioinfusion can decrease complications of MSAF. The objective was to study role of Amnioinfusion on outcome of babies born with MSAF. Methods: *Design:* Prospective Interventional Study Setting: Medical college and SSG Hospital, Baroda, Gujarat. *Study Period:* from 1st March 2003 to 31st December 2003 *Inclusion criteria:* evidence of Thick MSAF AND station of the head is zero or above. Patients were grouped randomly in to two groups. In Group A amnioinfusion was performed while in Group B amnioinfusion was not done. Amnioinfusion was done by inserting foley catheter transcervically and infusing normal saline or ringer lactate at the rate of 100ml/min till the coming liquor became clear. Outcome was studied. Results: Out of total 227 babies with thick MSAF amnioinfusion was performed in 52 patients (Group A), rest 175 patients were controls (Group B). Incidence of MAS was significantly lower 7.7% in Group A compared to 25.7% of Group B (P < 0.005). There was significantly lower incidence of birth asphyxia 1.92% in Group A compared to 34.8% in Group B (P value < 0.0001). Incidence of HIE was significantly lower in group A. Incidence of Air leaks and PPHN was similar in both groups. Rate of NICU admission was significantly lower in group A (13.4%) compared to group (51.4%), P value < 0.001. Mortality in Group A was much lower 5.8% compared to 14.85% in Group B (p =0.08). Amnioinfusion did not increase risk of maternal or neonatal sepsis. Conclusion: Amnioinfusion significantly decreases complications of MSAF and improves perinatal survival

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Key words: Amnioinfusion, Meconium stained amniotic fluid

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Introduction: History of meconium stained liquor is a nightmare for both obstetricians and pediatricians as it is associated with significant neonatal morbidity and mortality. Meconium stained amniotic fluid is relatively common problem occurring in 13% (5.6 to 24.6%) of all deliveries.[1] . Acute or chronic hypoxia can result in the passage of meconium in utero. In this setting gasping by the fetus or newly born infant can then cause aspiration of amniotic fluid contaminated by meconium. Aspiration of meconium can obstruct airways, interfere with gas exchange and cause respiratory distress and respiratory failure and other complications like air leaks, persistant pulmonary hypertension of newborn and higher incidence of sepsis. Transcervical amnioinfusion has been proposed as a mean for decreasing the incidence and severity of intrapartum meconium aspiration. The basis of this procedure is dilution of meconium present in the amniotic cavity and cushioning of the umbilical cord to make compression less likely[2,3,4] We carried out randomized study with **objective** to study the effect of Amnioinfusion on outcome of babies born with MSAF.

Material and Methods : It was a Prospective Interventional Study conducted from 1st March 2003 to 31st December 2003. The setting was Neonatal care unit and Obstetrics & Gynecology Department of medical college and SSG Hospital, Baroda, Gujarat. The patients were enrolled after obtaining written informed consent of mother. The clearance of the institutional ethics committee had been obtained. The babies included were babies delivered at SSG Hospital, Baroda with evidence of thick meconium stained liquor and station of the head was zero or above, that is when head had not crossed ischial spine and mother ready to give valid informed consent. Any baby with evidence of major congenital malformation or syndrome was excluded from study. All the maternal and neonatal details were noted. Fetal Heart rate abnormalities were noted by Obstetrician and were defined as per their standard references.

Delivery room management of MSAF: Whenever there was evidence of thick meconium stained liquor, evaluation was done by Obs & Gyn department whether transcervical amnioinfusion was possible or not. Whenever station of the head was zero or above, that is when head has not crossed ischial spine amnioinfusion was possible. In all such patients, selection of cases and controls was done randomly by chit picking method. Patients were divided in two groups, Group A in whom Amnioinfusion was performed and Group B in whom Amnioinfusion was not performed. As a part of policy matter only one out of four units of Obs. And Gyn. Department was performing amnioinfusion. So patients of MSAF coming every forth day had chance to get enrolled in group A.

Transcervical Amnioinfusion[5,6]: 16/18 no. foley catheter was introduced transcervically under all aseptic precautions. Normal saline / ringer lactate kept at room temperature was infused at the rate of 100ml/min till the coming liquor became clear or up to maximum of 1000 ml. of saline was infused. Procedure took up to 10 min. All the details were noted, exact time of detection of meconium, time when amnioinfusion done, interval between amnoinfusion and delivery. Vigorous monitoring of FHR abnormality was done during amnioinfusion, using CTG machine (Cardiotocography).

Protocols regarding suction: We had followed guidelines as per revised NRP 2000,[7] which were accepted universally. As per these guidelines, whenever there is evidence of MSAF suction of mouth and nose was performed at delivery of head with Delee suction catheter. Need for suctioning the trachea for meconium was determined by whether or not the baby was vigorous at birth. When baby was not vigorous as evidenced by depressed respiration Diminished muscle tone Heart rate < 100 bpm, immediate intratracheal suction under direct laryngoscopic guidance was done. Administration of free flow of oxygen was done throughout the suctioning procedure.

Protocols for postnatal management and monitoring: All babies with MSAF, after initial steps were closely monitored in nursery. Decision of whether baby requires nursery care or not, was taken after initial observation, period extending not more than 2 -4 hours. Monitoring for respiratory distress, HR, RR, chest retractions, cyanosis, CFT / perfusion, BP, SpO_2, air entry and emphysematous chest etc. was done. After initial observation babies who were found to be stable were handed over & roomed in with mother. If respiratory distress was present, was graded by RDS scoring system. Downe's Score / RDS Scoring . Further management, like giving intravenous fluids, delivering oxygen by hood up to 80-90%was done. SpO_2 was monitored and maintained in high 90's. X-ray chest was done in all babies with respiratory distress which was done at 6-8 hrs of life. Vital signs were monitored, BP and perfusion were maintained, volume expanders and vasopressors were used whenever required. Hematocrit and RBS were monitored and maintained, S. Electrolytes, Ca^{+2}, Mg^{+2} were done whenever required and corrected accordingly. ABG was done whenever indicated and assisted ventilation was given whenever required. Anticipation, prevention and treatment of PPHN were done. Post resuscitation management of an asphyxiated newborn was done as per standard NICU protocols. We had used working definitions given by NNPD Network for Meconium Aspiration Syndrome, Respiratory distress, Birth asphyxia.

Immediate outcome was studied with special reference to complications of MSAF like MAS, air leaks, PPHN etc. or any other significant associated morbidity like septicemia, any complication of perinatal asphyxia like, HIE, Acute renal failure, shock etc. All the babies were studied for their immediate outcome till they got discharge / expired.

Result: Our study was a prospective interventional study. Study was conducted during the period of 1st March to 31st December 2003. During this period, there were total **3429** Intramural live births. Our study sample size was 227 they were babies with thick MSAF. Out of these 52 patients were in group A who had undergone the procedure of Amnioinfusion and the remaining 175 were in group B who did not undergo Amnioinfusion.

Both the groups were comparable (Table I) in terms of birth weight, maturity, antenatal care, proportion of SGA and incidence of FHR abnormality except for

Group A which had higher male predominance. Maternal and obstetric factors as well as neonatal morbidities were comparable in both the groups except for septicemia which was higher in group B.

Table 1: Comparison Of Both Groups

Characteristics of Newborn	Group A (52)	Group B (175)
SEX ratio M : F	33 : 19 1.7 : 1	94 : 81 1.2 : 1
Average birth weight	2490.6 gms	2551.6 gm
Average maturity	37.17 wks	37.89 wks
FHR abnormalities	28 (54 %)	103 (58 %)
ANC taken	32/52 i.e. 70%	126/175 i.e. 72%
Proportion of SGA	8/52 i.e. 15%	32/175 i.e. 12.6%
Maternal Morbidity		
Toxaemia /PIH Eclampsia Severe anemia Heart Disease Asthma	10 11 (21.15%) 1 3 (5.7%) 1 (1.9%) 1 (1.9%)	28 32 (18.3%) 4 8 (4.6%) 4 (2.3%) 1 (0.6%)
Obstetric Factors		
FHR abnormalities Prolonged Labour Cephalopelvic Disproportion Cord Accidents Oligohydroamnios Placenta Previa PROM Foul Smelling Liquor Repeated Per vaginal Examination (>3)	28 (54%) 3 (5.76%) 2 (3.8%) 2 (3.8%) 2 (3.8%) 0 2 (3.8%) 1 (1.9%) 25 (48%)	103 (58 %) 10 (5.71%) 4 (2.3%) 7 (4%) 6 (3.4%) 1 (0.6%) 7 (4%) 2 (1.2%) 90 (51%)
Neonatal Morbidities		
Septicemia Pneumonia Meningitis Superficial Infection Hyperbilirubinemia Anemia Hypoglycemia Hypocalcaemia Hypothermia	4 (7.7%) 1 (1.9%) 0 2 (3.8%) 3 (5.76%) 1 (1.9%) 1 (1.9%) 0 0	30 (17.1%) 3 (1.7%) 3 (1.7%) 5 (2.8%) 8 (4.6%) 6 (3.4%) 3 (1.7%) 1 (0.6%) 1 (0.6%)

We compared outcome for both the groups for outcome parameters. Regarding incidence of meconium aspiration syndrome, in Group A 4 out of 52 (7.7 %) and in group B 45 out of 175 (25.7 %) developed MAS (Table II). Difference found was statistically significant. X^2 - 7.69, P = 0.005 (RR 0.3, Cl 0.11-0.8). So Amnioinfusion decreased the chance of developing MAS by 70%.

Table II

	Group A (52)		Group B (175)	
With Meconium Aspiration Syndrome	4	(7.7 %)	45	(25.7 %)
Without Meconium Aspiration Syndrome	48	(92.3 %)	130	(74.3 %)

Only 1 out of 52 (1.9%) in group A compared to 6 out of 175 (3.4%) in group B developed the complication of pulmonary air-leaks. Regarding PPHN, only 1 out of 52 (1.9%) compared to 4 out of 175 (2.3%) developed complication of PPHN. Incidence of Air-leaks and PPHN were higher in Group B but the difference was not statistically significant. .

We compared the incidence of severe birth asphyxia in either group. Despite the fact that intrapartum risk factors and FHR abnormalities were comparable in either group, babies with SBA were significantly lower in Group A. Only 1 out of 52 (1.92%) of Group A while 61 out of `72 (34.8%) of Group B had severe birth asphyxia. (Table III). This difference was statistically significant. X^2 = 21.9 p <0.0001 (RR 0.05, Cl 0.01-0.37). So amnioinfusion reduced the chance of SBA by 95%. 2 out of 52 (3.8%) in Group A while 24 out of 175 (13.7%) in group B developed HIE. X^2 = 3.84 p value = 0.05, the difference was statistically significant (RR 0.31, Cl 0.08-1.2).

Table III

	Group A (52)	Group B (175)
Sever Birth Asphyxia present	1 (1.92%)	61 (34.8%)
No Sever Birth Asphyxia	51 (98.08%)	114 (65.2%)

Incidence of septicemia in group A was 5.7% (3/52) while it was 17.2% (30/175) in group B. Lower

incidence of septicemia in group A, indicates the procedure at least do not increase the risk of sepsis in new born. Regarding the rate of NICU admission, 7 out of 52 (13.4%) of group A while 90 out of 175 (51.4%) of group B required NICU admission. This difference found was statistically significant. X^2 = 23.53 p <0.001. Mortality in group A was lower and survival was better (Table IV). The difference found is statistically significant. X^2 = 4.58 p = 0.03.

Table IV

	Group A (52)		Group B (175)	
Discharged	48	(92.3 %)	139	(79.4 %)
Expired	3	(5.8 %)	26	(14.9 %)
Left against advise	1	(1.9%)	10	(5.7%)

Average amnioinfusion delivery (AI-D) interval was 41.5 min.

Regarding *mode of delivery*, in group A, 37% (19/52) delivered vaginally, 44% (23/52) by caesarian section and 19% (10/52) were instrumental deliveries, while in group B, 36% (63/175) delivered vaginally, 48.6% (85/175) by caesarian section and 15.4% (27/175) were instrumental deliveries. The difference found in rate of instrumental delivery was statistically not significant.

None of the patient in group A had puerperal sepsis while 1 patient in group -B had. So Amnioinfusion did not increase chances of puerperal sepsis/endometritis.

Discussion: In our study we found that Amnioinfusion reduces the chance of developing MAS. This difference was found to be statistically significant. There are various other studies is which they have found reduction in MAS with amnioinfusion. They are

Lo KW et al. 8	1993
Uhing et al. 9	1993
Erikson et al. 10	1993
Cialone et al. 11	1993
De Meeus et al. 12	1996
Hofmeyr GJ et al. (CRAMP) 4	2000
Peurtas et al. 13	2000
Sahu Latika et al 14	2002
Meta Analysis by Pierce and co worker (of 13 studies) 3	2000
Cochrane Meta analysis (of 12 Studies) 2	2004

No decrease in incidence of MAS with Amnioinfusion was reported by

Spong CY et al. 15 - 1994
Usta et al. 16 - 1995.

In our study there is no statistically significant decrease in LSCS rate. Similar findings were observed by Spong CY et al 15in his study in 1994. Many authors in various studies have reported decrease in rate of LSCS with amnioinfusion.

Lo KW et al.8 -1993
Moodly et al. 17 -1996
Peurtas et al. 13 -2000
Sahu latika et al14 -2002
Rathor Am et al 18 -2002

In our study, amnioinfusion did not decrease the incidence of fetal distress which was also found by Spong CY et al[15] in 1994.

Many authors report that amnioinfusion decrease the fetal distress by relieving cord compression and oligohydroamnios. Studies reporting decrease in fetal distress are De Meeus et al[12], Peurtas et al[13] , Lo KW et al[8], Rathore Am et al[18]. Although the incidence of fetal distress was comparable in either group the difference found in birth asphyxia was statistically significant. So in our study amnioinfusion reduced the chance of baby getting birth asphyxia. Cochrane meta analysis reports a trend towards reduced perinatal mortality. In our study survival was significantly better in amnionfusion group. Incidence of sepsis in Amnioinfusion group was significantly lower compared to non-amnioinfusion group, this may be due to babies in group A had significantly less incidence of MAS, birth asphyxia and HIE, leading to less NICU admission and NICU admission for lesser duration..

Conclusion: Amnioinfusion causes decrease in incidence of meconium aspiration syndrome, birth asphyxia, hypoxic ischemic encephalopathy, rate of

Neonatal ICU admission and improves perinatal survival and does not cause increase in any neonatal or maternal sepsis or morbidity.

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