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A Comparative Study - Amnioinfusion for Reduction of Severity of Meconium Aspiration Syndrome

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Abstract: **The significance of meconium in the amniotic fluid in fetal outcome is uniformly depressing, the thicker the meconium, the poorer is the prognosis for the newborn, Meconium stained amniotic fluid complicates 7 to 22% of live births. This case – control study involved patients admitted to the labour room, with thick meconium in amniotic fluid. 100 patients participated in the study and were randomly assigned into two groups of 50 each, one group received standard obstetric care with amnioinfusion while the other group received standard obstetric care without amnioinfusion. The study period was for two years. The method adopted was one suggested by Wenstrom and Parson consisting of a bolus infusion of average 500ml of pre-warmed normal saline over 20-30 minutes drained by gravity using no: 14 Foley's catheter for infusion. Neonatal parameters were 1 – minute Apgar, 5-minute Apgar, meconium in the oropharynx, and trachea, incidence of meconium aspiration syndrome and admission to neonatal intensive care unit and maternal factors were operative interference for foetal distress and puerperal fever.92% of babies who received amnioinfusion had one minute Apgar of more than 7 compared to only 72% among the controls. This was found to be statistically significant, 5 minute Apgar score between the amnioinfused group and control group was not significant. From our study it is clear that saline amnioinfusion is a simple, safe and relatively inexpensive procedure without much complications which have significant effect in decreasing perinatal mortality and morbidity from Meconium aspiration syndrome.**

Keywords: **Meconium, Amnioinfusion.**

I. INTRODUCTION

Meconium in the amniotic fluid has always been a matter of controversy; obstetrical teaching through this century has included the concept that meconium passage is a potential warning of foetal asphyxia[1]. J.Whitridge Williams[2] observed in 1903 that "a characteristic sign of impending asphyxia is the escape of meconium". He attributed meconium passage to relaxation of sphincter any muscle induced by faulty aeration of the foetal blood".

Meconium stained amniotic fluid complicates 7 to 22% of live births. Meconium aspiration syndrome, a life threatening neonatal respiratory disorder that result from aspiration of meconium into the lungs during intrauterine gasping or at the time of first breath, develops in about 1.8 to 18% of infants delivered from meconium stained amniotic fluid and is associated with increased perinatal mortality and morbidity. Amnioinfusion was first introduced by Gabbe et al[3] in 1976 for variable deceleration in oligohydramnios. Miyazaki and Taylor introduced this technique in premature rupture of membranes[4]. The biggest attraction of amnioinfusion is that it is relatively easy to perform safe inexpensive and can be done without much expertise. Many infusion protocols have been used for amnioinfusion. Most centres use normal saline while many others use lactated Ringers solution plasalyte, isolyte and 0.9 normal saline. It may be used either warmed or at room temperature. The end point of infusion is either administration of a predetermined volume of saline or restoration of normal amniotic fluid volume by ultrasound scan or resolution of foetal heart deceleration. Hence, this study was

undertaken to evaluate the effect of amnioinfusion in reducing the meconium aspiration syndrome and there by on perinatal morbidity and mortality. And the effect of amnioinfusion on operative delivery for foetal distress.

II. MATERIALS AND METHODS

We conducted a randomized case controlled study involving patients admitted to the labour room, Yenepoya medical college hospital, Mangalore with thick meconium stained in amniotic fluid. A total of 100 patients participated in the study and they were randomly assigned into two groups of 50 each, one group received standard obstetric care with amnioinfusion while the other group received standard obstetric care without amnioinfusion. The study period was from November 2006 to October 2008.Both groups were comparable for age and parity.

Inclusion Criteria

Singleton pregnancy, vertex presentation, gestational age more than 37 weeks, estimated baby weight more than 2.5k.g, cervical dilatation less than 5cm, normal foetal heart rate pattern, ruptured membranes either spontaneous or artificial, thick meconium, adequate liquor volume and absence of bleeding per vagina.

Exclusion Criteria

Multiple pregnancy, non-vertex presentation, period of gestation less than 37 weeks, estimated baby weight less than 2.5k.g cervical dilatation more than 5cm, foetal heart rate variation, oligamnios, bleeding per vagina.

Patients selected were all patients admitted to labour room, Clinical details like age, parity, expected date of confinement, obstetric history, complications in present pregnancy like pregnancy induced hypertension, intrauterine growth retardation, oliganmios (clinically or better by ultrasound) were recorded. Clinical examination is done to note the presentation, estimated size of the baby, liquor volume and any foetal heart rate variability. Obstetric examination done to note the presentation, cervical dilatation, membrane status, nature of the liquor (Moderate meconium is greenish or opaque and not watery. Thick meconium has a pea soup quality). Patients fulfilling the inclusion criteria received amnioinfusion while the other group received standard obstetric care without amnioinfusion. All patients has a combined obstetric and paediatric approach consisting of oro and naso pharyngeal suction in the perineum or during caesarean section before the delivery of the baby, splinting the chest of the baby to prevent aspiration and endotracheal intubation and aspiration by the paediatrician after delivery. All deliveries were attended by personals trained in oral, nasopharyngeal and endotracheal suction.

The method adopted in our hospital was one suggested by Wenstrom and parson consisting of a bolus infusion of 500ml-1000ml of pre-warmed normal saline over 20-30 minutes drained by gravity. The procedure is repeated after 6 hours if the patients remained undelivered no.14 Foley's catheter is used for infusion into the uterine cavity.

The following neonatal and maternal parameters were noted and analysed Neonatal parameters were 1 minute Apgar, 5 minute Apgar, meconium in the oropharynx, nasopharynx and trachea, incidence of meconium aspiration syndrome and admission to NICU and maternal factors were operative interference for foetal distress and post-partum fever.

III. RESULTS

Table – 1 Distribution according to 1minute Apgar

Apgar	Cases	%	Control	%
1-5	2	4	10	20
5-7	2	4	4	8
7-10	46	92	36	72

Chi square= 7.219 p=0.027 – significant

Of the 50 patients who received Amnioinfusion, only 2 babies (4%) had an Apgar score between 1-5 compared to 10 (20%) among those do not received amnioinfusion. 2 babies (4%) had an Apgar of 5-7 versus 4(8%) among non-infused. About 46 babies (92%) who received amnioinfusion had one minute Apgar of more than 7 compared to only 36 (72%) among the controls who received standard obstetric care without amnioinfusion and this was found to be statistically significant.

Table – 2 Distribution according to 5minute Apgar

Apgar	Cases		Control	
	No.	%	No.	%
1-5	0	0	2	4
5-7	0	0	3	6
7-10	50	100	45	90

Chi Square = 5.26 P=0.072 – non significant

When effect on 5minute Apgar was analysed it was found that no babies among the amnioinfused group had Apgar below 7. Where as in the control group 2 babies (4%) had Apgar between 1-5, 3 babies (6%) had Apgar between 5-7 and the remaining 45(90%) between 7-10. All babies of mothers who received amnioinfusion had normal Apgar score. The statistical analysis done and P value was found to be not significant.

Table – 3 Distribution According To Presence Of Meconium In The Oropharynx

	Cases		Control	
	No	%	No	%
No meconium	24	48	2	4
Thin meconium	18	36	9	18
Thick Meconium	8	16	39	78

Chi square = 42.1 p<0.001 Very highly significant

To evaluate the effect of emnioinfusion in diluting thick meconium in to thin, absence or presence of meconium in the oropharynx and the presence of meconium whether thick or thin is analysed, 24 (48%) versus 2 (4%) had no meconium in oropharynx.18 babies (36%) of amnioinfused group had thin meconium in the oropharynx compared to 9(18%) of control. 8 babies constituting about 16% among the amnioinfused group had thick meconium versus 39(78%) among non-infused in the oropharynx. This was found to be statistically very high significant.

Table – 4 Distribution according to presence of meconium in the trachea

	Cases		Control	
	No	%	No	%
No meconium	30	60	4	8
Thin meconium	17	34	10	20
Thick meconium	3	06	36	72

Chi square=49.6, p<0.001 very highly significant.

When presence of meconium below the vocal cord is compared, it was found that 30(60%) babies from amnioinfused group had no meconium below the vocal cord compared to 4(8%) among the controls. 17(34%) babies had thin meconium versus 10(20%) among controls. Only 3 babies (6%) among the amnioinfused had thick meconium below the vocal cord compared to 36(72%) among the controls. When statistical significance was analysed and P value was found to be very highly significant.

Table-5 Incidence of meconium aspiration syndrome

	Cases		ntrol	
	No	%	No	%
Mild MAS	5	10	12	24
Moderate MAS	0	0	7	14
Severe MAS	0	0	4	8

Chi square=3.938 , p=.0471-significant.

When the incidence of MAS between the two groups were compared, It was found that only 5 babies (10%) of the cases had mild MAS and none of babies had moderate and severe MAS. This is against 12(24%) who had mild MAS, 7(14%) who had moderated MAS and 4 (8%) babies among the non-infused group who had severe MAS. This was found to be statistically significant.

Table – 6 NICU Admission

	Cases		Control	
	No	%	No	%
No admission	48	96	42	84
Admission to NICU	2	4	8	16

Chi square=4, p = 0.007-highly significant.

Only 2(4%) babies among the amnioinfused group got admitted in NICU with MAS and birth asphyxia compared to 8 (16%) among the controls. When analysed by Chi square test, P value was found to be highly significant.

Table – 7 Operative Interference for Fetal Distress

	Cases		Control	
	No	%	No	%
FIND	20	40	16	32
Vacuum	1	2	3	6
LSCS	29	58	31	62

Chi square = 1.35, P = 0.246-non significant

Among amnioinfused group 29 patients (58%) had LSCS for foetal distress whereas 31(62%) among the controls also had LSCS for foetal distress. One patient (2%) among the infused group and 3 pateints (6%) among the controls had vacuum delivery. Rest of the patients among both groups had full normal delivery. When analysed by chi square test, the P value was found to be statistically not significant.

Table – 8 Puerperal Fever

	Cases		Control	
	No	%	No	%
Fever present	4	8	2	4
Fever absent	46	92	48	96

Chi square = 0.012 , p = 0.982-non significant

To analyse whether transcervical amnioinfusion increases the febrile morbidity, the occurrence of puerperal fever were recorded and analysed. Only 4 patients (8%) among the amnioinfused group had puerperal fever compared to 2 patients (4%) among the controls. Chi square test applied and P value was found to be not significant.

IV. DISCUSSION

During hypoxia anaerobic glycolysis occurs and results in the accumulation of lactic acid and pyruvic acid leading to metabolic acidosis, H-icons first stimulate and ten depress the Sino-auricular node leading to tachycardia and bradycardia respectively. It also causes parasympathetic stimulation leading to hyper peristalsis and relaxation of the anal sphincter with passage of meconium. Miller et al[5], 1975, has stated "the presence of meconium in the amniotic fluid without signs of foetal asphyxia is not a sign of foetal distress". The biggest attraction of amnioinfusion is that it is relatively easy to perform safe inexpensive and can be done without much expertise.

In this study, among 50 patients who received amnioinfusion, only 2 babies (4%) had an Apgar score between 1-5 compared to 10 (20%) among those who did not receive amnioinfusion. 2 babies (4%) had an Apgar of 5-7 versus 4(8%) babies among non-infused. About 46 babies (92%) who received amnioinfusion had one minute Apgar of more than 7 compared to only 36(72%) among the controls who received standard obstetric care without amioinfusion. P value was found to be statically significant in this study. This result correlates with study done by Asmitha Muthal Rathore[6] and co-workers in 2002 which showed an improvement in one minute Apgar score with P<0.05. According to their study Mahomed K et al[7] concluded that amnioinfusion significantly reduces the perinatal morbidity and reduces 5' Apgar score below 7. Only 3 babies (6%) among the amnioinfused had thick meconium below the vocal cord compared to 36(72%) among the controls. This correlates with study conducted by Rathor[8] AM and co-workers concluded that amnioinfusion was associated with a significant decrease in the incidence of meconium at the vocal cords (P=0.001) and respiratory distress (p=0.002).

Amnioinfusion serves the following purposes.

1. Dilute thick meconium into thin meconium. Thick meconium is particularly harmful because of its particulate matter which produce chemical pneumonitis.
2. Correct oligohydramnios.
3. Reduce cord compression by its cushioning effect.
4. Overall reduction in meconium passage and intrauterine gasping.

V. CONCLUSION

From the study conducted in our hospital it is clear that saline amnioinfusion is a simple, safe and relatively inexpensive procedure without much complications which have significantly effect in decreasing perinatal mortality and morbidity from meconium aspiration in the amnioinfusion group. The incidence of low one minute Apgar, presence of thick meconium in the oropharynx, trachea, incidence of meconium aspiration syndrome, and admission to NICU all were significantly lower compared to the control group which received the standard obstetric management without amnioinfusion. Present study showed that amnioinfusion does not significantly affected the incidence of operative delivery for foetal distress. From the above study it is found that amnioinfusion does not have significant effect on infectious morbidity as some literature says. The study showed no significant difference in puerperal fever between the study and control group.

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