

AMNIOINFUSION IN MECONIUM STAINED LIQUOR AND FETAL OUTCOME

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Abstract

Background

The presence of meconium in amniotic fluid of intrapartum patient is of concern to both the obstetricians and neonatologist as it is associated with poor fetal outcome. The passage of meconium can occur before or during labour meconium aspiration syndrome is believed to result from aspiration of meconium during intrauterine gasping or at the first breath. Amnioinfusion done for meconium stained liquor has been found to be useful in reducing the perinatal morbidity and mortality

Material and method

The present study entitled “Amnioinfusion in meconium stained liquor and fetal outcome” was a prospective case control study conducted in the department of obstetrics and gynaecology, Hitech Medical College and hospital, bhubaneswar. The study period extended from December 2019 to December 2022.

A total of 143 patients were included in this study. These patients were divided into two groups:

- a) Study group which consisted of 50 patients and
- b) Control group which included 93 patients

Result

Perinatal mortality and morbidity:

Although there was one still birth and one neonatal deaths in our study but they were not related to the procedure itself (Table 6). Wu et al (1991) found no perinatal deaths in the infused group babies while 2.8% babies died in the noninfused group.

The overall perinatal morbidity was low in our study for infused group patients. In one study by Hofmeyer et al (1998) there was no perinatal deaths neither in study nor in control group in another study conducted by Mohamed et al (1998) there were 4(1.2%) of 324 and 12(3.6%) of 335 perinatal death.

Mode of delivery verses perinatal outcome:

Perinatal mortality does seem to be affected by mode of delivery since the only still birth in the study group and all perinatal deaths in the control group occurred in babies delivered by cae The significance of meconium stained amniotic fluid during labour is a widely debated subject and the management has evolved with time and is still evolving. There has been no agreement on one particular type of management. However at the end of the present study it is opined that amnioinfusion is useful in reducing perinatal morbidity without any maternal risk .

Conclusion

The significance of meconium stained amniotic fluid during labour is a widely debated subject and the management has evolved with time and is still evolving. There has been no agreement on one particular type of management. However at the end of the present study it is opined that amnioinfusion is useful in reducing perinatal morbidity without any maternal risk .

Key word; meconium stained liquor, MAS, oligohydramneous, postdated pregnancy, amnioinfusion.

Introduction

The presence of meconium in the amniotic fluid of intrapartum patients has been considered as a sign of fetal distress and found to be associated with increased perinatal morbidity and mortality Desmond et al (1957). It has been found that early heavy meconium staining of amniotic fluid during labour was associated with more complications to the baby while late passage did not precede neonatal mortality but was associated with increased neonatal morbidity. Early light meconium stained liquor did not significantly effect the neonatal morbidity and mortality Meis et al (1978).

The presence of meconium in amniotic fluid of intrapartum patient is of concern to both the obstetricians and neonatologist as it is associated with poor fetal outcome. The passage of meconium can occur before or during labour meconium aspiration syndrome is believed to result from aspiration of meconium during intrauterine gasping or at the first breath.

Different approaches have been tried to prevent aspiration of meconium into the lungs e.g. clearing fetal airway by suction prior to shoulder delivery Carson et al (1976), endotracheal suction after intubation Ting and Bardy (1975) and suction of airway after delivery of head followed by chest compression during trunk delivery and further suction if meconium is

seen below the vocal cord Goldarch and Shennan (1978). But meconium aspiration syndrome still occur as none of these intervention operate in first stage of labour.

Amnioinfusion done for meconium stained liquor has been found to be useful in reducing the perinatal morbidity and mortality Eriksen et al (1994).

There have been no contemporary trials of operative versus conservative management of suspected fetal distress. In settings without modern obstetric facilities, a policy of operative delivery in the event of meconium-stained liquor or fetal heart rate changes has not been shown to reduce perinatal mortality__ (Hofmeyer & Kulier Cochrane Database Syst Rev. 2000;(2):CD001065).

Amnioinfusion is associated with improvements in perinatal outcome, particularly in settings where facilities for perinatal surveillance are limited. The trials reviewed are too small to address the possibility of rare but serious maternal adverse effects of amnioinfusion [Hofmeyer, Cochrane Database Syst Rev. 2000;\(2\):CD000014.](#)

Amnioinfusion may not be without risk. The combined sample size of all previous trials is too small to assess adequately the possibility of rare but serious complications such as umbilical-cord prolapse, amniotic-fluid embolism, and uterine rupture Dragich et al, (1991) and Maher et al, (1994) and Wenstorm et al, (1995).

With this back drop, the present study entitled “Amnioinfusion in meconium stained liquor and fetal outcome.” was designed to find out the incidence of meconium stained amniotic fluid in labour in our tertiary care hospital and whether amnioinfusion has any beneficial effect on over all obstetric out come.

Material and method

The present study entitled “Amnioinfusion in meconium stained liquor and fetal outcome” was a prospective case control study conducted in the department of obstetrics and gynaecology, Hitech Medical College and hospital, bhubaneswar. The study period extended from December 2019 to December 2022.

A total of 143 patients were included in this study. These patients were divided into two groups:

- c) Study group which consisted of 50 patients and
- d) Control group which included 93 patients

All these patients had thick meconium stained liquor and irrespective of whether membrane ruptured spontaneously or artificially or in the hospital or outside were included in the study provided they were in active labour. The patients were considered to be in active labour when the cervical dilatation was

3cm. or more and cervix fully effaced. The patients in the study group were subjected to transcervical amnioinfusion and the control group patients did not receive amnioinfusion. Otherwise, the patients were managed similarly.

SELECTION OF CASES

All the patients selected for the study fulfilled the following inclusion and exclusion criteria.

Inclusion criteria:

- a) Full term pregnancy
- b) Singleton fetus
- c) Cephalic presentation
- d) Cervical dilatation of 3-8 cms.

Exclusion criteria:

- a) Intrauterine death
- b) Major fetal anomalies (if diagnosed antenatally)
- c) Choriomnionitis
- d) Malpresentation
- e) Cardiac disease in the mother
- f) Evidence of fetal distress defined as fetal bradycardia of <100 beats/minute.
- g) Presence of cephalopelvic disproportion

Detailed history was obtained from all patients and a thorough clinical examination was performed. Basic investigations were done in all cases. Ultrasonography was done whenever possible. Cases were assigned to different groups at random and informed consent was obtained in all cases of transcervical amnioinfusion.

Technique of amnioinfusion:

The patients who were decided for transcervical amnioinfusion were made to lie in dorsal position. After doing an abdominal examination to confirm the lie of the fetus and the amount of liquor, auscultation for fetal heart sounds was done. This was followed by a vaginal examination to note the position of the fetal head. Then passing two fingers of the right hand between the cervix and the fetal head, a Nelaton catheter of adequate size was passed towards the occipital side of the head with the left hand for a length of about 20 cms. The catheter was connected to a disposable infusion set which in turn was connected to a ringer lactate bottle. The fluid was initially infused at the rate of 1-1.2 liters/hr. Intermittently the fluid was drained after turning the patients to the left, to the right and to the sitting position so that the infused solution could mix properly with the meconium stained liquor. The colour of the draining fluid was noted. The patients then received ringer solution at the maintenance rate of 5ml/min. until full dilatation of cervix after which the catheter was removed. During this period, fetal heart sound was auscultated at 15 minutes interval. At any time during the procedure, if the patients was decided for caesarean section, the technique was abandoned immediately. All these patients were given inj. Ampicillin 1gm. IV and inj. Metronidazole 500mgm. IV prophylactically. The patients were followed for any morbidity associated with the procedure.

The obstetric outcome including the mode of delivery was compared in both the groups. Apgar scores were used to assess the neonatal status. Other criteria studied were type of resuscitation, nursery admission, use of medications, duration of nursery stay and morbidity if any.

All the cases were recorded as per the case record proforma given below. At the end of the study these data was analysed. Standard error of difference between two proportions was used to statistically analyse the significance between the study and control groups.

Result

The study entitled, 'Amnioinfusion in meconium stained liquor and fetal outcome' was a prospective observational case control study conducted in the department of O&G, S. C. B. Medical College, Cuttack from December 2009 to December 2011. The results of observation are given below. All these patients had thick meconium stained liquor. The patients in both the study and control groups were evenly matched as far as possible. The patients characteristics were as follows:

Table - 1

Liquor volume as assessed clinically

Amt. of liquor	Study group		Control group	
	number	%	Number	%
Adequate	44	88	77	82.79
Less	6	12	16	17.20
Total	50	100	93	100

Amount of amniotic fluid as assessed clinically after rupture of membranes has been shown in Table –1. In the study group 44(88%) cases had adequate and 6(12%) cases had less than normal and in the control group 77(82.79%) cases had adequate and 16(17.20%) cases less than normal amount of amniotic fluid at the time of admission.

Table - 2

Degree of dilution of meconium in liquor after amnioinfusion

Liquor quality	Study group	
	Number	%
Clear liquor	30	60
Thin meconium stained liquor	12	24
Moderate meconium stained liquor	8	16
Thick meconium stained liquor	-	-
Total	50	100

The above table shows the efficacy of amnioinfusion to dilute the thickness of meconium in the study group. Following amnioinfusion the colour of amniotic fluid changed to clear in 30 (60%) cases, thin meconium stained in 12(24%), moderately stained in 8(16%) cases and there was no case of thickly stained fluid.

Table - 3

Different mode of delivery in various groups

Mode of delivery	Study group		Control group		P. value
	Number	%	number	%	
SVD	19	38	19	20.43	P< 0.05
Instrumental	21	42	30	32.25	P>0.05
LSCS	10	20	44	47.31	P< 0.001
Total	50	100	93	100	

Table-3 shows the different modes of delivery in both groups. In the study group 19(38%) cases had spontaneous vaginal delivery, 21(42%) had vaginal delivery aided by instrumentation and 10(20%) cases had L. S. C. S. whereas 19(20.43%), 30(32.25%) and 44(47.31%) cases had spontaneous vaginal delivery, vaginal delivery with instrumentation and L. S. C. S. respectively in the control group.

Table - 4a

Distribution of Apgar score (at 1 minute)

Apgar score	Study group		Control group		P.value
	Number	%	number	%	
≤ 3	6	12	23	24.7	P< 0.05
4-7	23	46	48	51.61	P>0.05
>7	21	42	22	23.68	P < 0.05

Total	50	%	93	%	
Mean	6.3(±2.131)		5.37(±2.211)		

Table-4a shows the Apgar score of the babies of both groups at 1 minute. The Apgar score was less than/or 3 in 6(12%) babies, 4to7 in 23(46%) and more than 7 in 21(42%) babies born to mothers of the study group and less than/or 3 in 23(24.7%) babies, 4to7 in 48(51.61%) and more than 7 in 22(23.68%) babies born to mothers of the control group. The mean Apgar score for the study and the control group were 6.3 (± 2.131) and (±2.211) respectively.

Table – 4b

Distribution of Apgar score (at 5 minutes)

Apgar score	Study group		Control group		P.Value
	Number	%	Number	%	
≤ 3	2	4	7	7.55	P>0.05
4-7	12	24	38	40.86	P<0.05
>7	36	72	48	51.61	P<0.05
Total	50	100	50	100	
Mean	7.68(±1.974)		7.24(±1.856)		

Table-4b shows the Apgar score of the babies of both groups at 5 minute. The Apgar score was less than/or 3 in 2(4%) babies, 4to7 in 12(24%) and more than 7 in 36(72%) babies born to mothers of the study group and less than/or 3 in 7(7.55%) babies, 4to7 in 38(40.86%) and more than 7 in 48(51.61%) babies born to mothers of the control group. The mean Apgar score for the study and the control group were 7.68 (±1.974) and 7.24(±1.856) respectively.

Table- 4c

Distribution of Apgar score (at 10 minute)

Apgar score	Study group		Control group		P.value
	Number	%	Number	%	
≤ 3	1	2	3	3.2	P>0.05
4-7	8	16	14	15.03	P>0.05
>7	41	82	76	81.72	
Total	50	100	93	100	
Mean	8.24 (±1.572)		7.98 (±1.574)		

Table-4c shows the Apgar score of the babies of both groups at 10 minute. The Apgar score was less than/or 3 in 1(2%) babies, 4to7 in 8(16%) and more than 7 in 41(82%) babies born to mothers of the study group and less than/or 3 in 3(3.2%) babies, 4to7 in 14(15.03%) and more than 7 in 76(81.72%) babies born to mothers of the control group. The mean Apgar score for the study and the control group were 8.24 (±1.572) and 7.98 (±1.574) respectively.

Table - 5

Incidence of presence of meconium in the oropharynx and below

Presence of meconium	Study group		Control group		p.value
	Number	%	Number	%	
Meconium at or below vocal cords	10	20	33	35.48	P < 0.05
Meconium staining of body	3	06	12	12.90	P>0.05

Total	13	26	45	48.38	
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Table-5 shows the percentage of patients with presence of meconium at or below the vocal cords and evidence of meconium staining of body in both the groups. Meconium at or below the vocal cords was found in 10(20%) and 33(35.48%) cases in study and control groups respectively. Whereas meconium staining of the body was seen in 3(6%) and 12(12.9%) cases in the study and control groups.

Table - 6
Perinatal morbidity

Parameters	Study group		Control group		P.value
	Number	%	number	%	
Septicemia	3	06	7	07.5	NS
Pneumonia	1	02	4	04.3	NS
Meconium aspiration syndrome	-	-	3	03.2	NS
Hypoxic ischemic encephalopathy	4	08	16	17.2	NS
Overall morbidity	8	16	30	32.25	P<0.05

Observations tabled above shows that perinatal morbidity in study group were 8(16%) which included septicemia in 3(6%), pneumonia in 1(2%) and HIE in 4(8%) neonates. Similarly in the control group the overall morbidity was 30(32.25%) which included in septicemia in 7(7.5%), pneumonia in 4(4.3%), MAS in (3.2%) and HIE in 16(17.2%) newborns.

Table - 7

Mode of delivery and perinatal outcome

Mode of delivery	Study Group		Control group	
	Intranatal Death	Neonatal deaths	Intranatal death	Neonatal death
Vaginal delivery*	0	1	0	0
Caesarean	1	0	0	4

*: Includes spontaneous and instrumental delivery.

There was only one intranatal death in the study group which occurred in a baby delivered by caesarean section but there was one neonatal death in vaginal delivery. In the control group there was no intra-natal death associated with any mode of delivery but 4 neonatal deaths were there following caesarean delivery.

Discussion

Dilution effect on liquor after amnioinfusion

In our study, this technique of amnioinfusion was found useful significantly improving the quality of colour of liquor i.e. the liquor which initially at the outset was thickly meconium stained had completely become clear in most of the cases (60%) and in the remaining cases the colour had considerably improved. In none of the cases the amniotic fluid remained thickly meconium stained (Table 2). It proves that amnioinfusion definitely helps in washing out meconium from amniotic cavity Wenstron and Parsons (1989) .

Mode of delivery

It was observed in our study that 38% of patients in the study group delivered spontaneously whereas only 20% did so in the control group (Table 3). This difference was found to be statistically significant(P-value <0.05). There was no significant difference between both the groups as far as instrumental delivery was concerned (P-value >0.05). The rates of instrumental delivery were higher in both the groups and this was probably because of the anxiety of the attending obstetrician in cutting short the second stage for reasons like fetal

distress, failure of powers etc. the rates of LSCS were remarkably high in the control group and this was found to be statistically significant(P-value <0.001).

Wenstrom and Parsons (1989), had observed that patients receiving amnioinfusion has significantly lower incidence of operative delivery (including instrumental delivery). The rates of instrumental delivery in our study were higher in both the groups and there was no significant difference observed between the study and the control groups. Strong et al (1990), had also observed in their study of amnioinfusion done for oligohydramnios that this technique reduces the incidence of operative delivery for fetal distress significantly.

From our observations on LSCS we conclude that the need for LSCS is minimized with amnioinfusion. Similar observations were made by different authors in their studies as quoted below.

The following table shows the caesarean section rates in different studies.

Authors	Amnioinfusion group	Control group	p.value
Sadovsky et al (1989)	26 (n=19)	33 (n=21)	NS
Macri et al (1991)	2.35 (n=85)	20 (n=85)	P< 0.05
Lo & Rogers (1993)	5 (n=60)	17.3 (n=52)	P<0.05
Present study (2011)	20 (n=50)	47 (n=93)	P<0.001

However Sadovsky et al (1989) did not find this technique to reduce the rate of caesarean section. The total number of cases in their study was small and probably this was the reason why they did not find this difference.

Apgar score:

Observation of our study showed that at 1 minute, the babies with apgar score of more than 7 were significantly more in the study group as compared to the control group(P-value < 0.05). Less number of babies in the study group had apgar score of less than 3 as compared to the control group and this difference was also found to be significant(P-value <0.05). At 5 minutes also there were significantly more babies in the study group who had apgar scores of more than 7(P-value < 0.05). There was no significant difference in the apgar scores at 10 minutes between both the groups (P-value > 0.05) (Table 4a,b&c). From this, we may conclude that amnioinfusion helps in improving the apgar scores of the babies.

Wenstrom and Parsons (1989) had also observed that patients receiving amnioinfusion had significantly fewer low I minute apgar scores as compared to controls.

Resuscitation technique:

Presence of meconium in oropharynx and meconium staining of body:

All babies whose body was stained with meconium had vocal cord staining also (Table 5). In our observational study it is seen that meconium at or below the vocal cords was found to be

significantly low in the study group as compared to the control ($p < 0.05$). From this we conclude that the passage of meconium at or below the vocal cord is minimized with amnioinfusion. The evidence of meconium staining of body was not found to be statistically significant (P value > 0.05) and it appears that amnioinfusion does not influence the staining of the body of the fetus with meconium. This may be because the deposition of pigments of meconium over the fetal skin requires a considerable period of time before delivery where as the entry of meconium into the respiratory passage may acutely occur during labour Walker (1954). The table below shows the results of different studies on presence of meconium below vocal cords and effect of amnioinfusion on it.

Authors	Amnioinfusion group (%)	Control group (%)	p.value
Wenstorm and Parsons (1989)	5.5	36.3	$P < 0.01$
Sadovsky et al (1989)	0	29	$P < 0.05$
Macri et al (1991)	4.7	38.8	$P < 0.05$
Whing et al (1993)	18.2	29.1	$P < 0.01$
Present study (2011)	20	35.48	$P < 0.05$

Indication for nursery admission:

Babies had one or more than one indication for nursery admission.

- a) SBA was defined as apgar score of < 3 at 1 minute and
- b) MBA defined as apgar score of 4-7 at 1 minute
- c) MAS babies were diagnosed to have MAS if any two of the following criteria were present.
 - a. Respiratory distress
 - b. Presence of meconium at or below vocal cord and
 - c. Chest x-ray evidence meconium aspiration

Duration of nursery stay :

Perinatal mortality and morbidity:

Although there was one still birth and one neonatal deaths in our study but they were not related to the procedure itself (Table 6). Wu et al (1991) found no perinatal deaths in the infused group babies while 2.8% babies died in the noninfused group.

The overall perinatal morbidity was low in our study for infused group patients. In one study by Hofmeyer et al (1998) there was no perinatal deaths neither in study nor in control group in another study conducted by Mohamed et al (1998) there were 4(1.2%) of 324 and 12(3.6%) of 335 perinatal death.

Mode of delivery verses perinatal outcome:

Perinatal mortality does seem to be affected by mode of delivery since the only still birth in the study group and all perinatal deaths in the control group occurred in babies delivered by caesarean section (Table 7). This is in agreement with the findings of Sasikala et al (1995).

Procedure related maternal complications:

No complication was noted in mothers receiving amnioinfusion in our study. Wenstrom and Parsons (1989), Macri et al (1991) and Whing et al (1993) also found the procedure to be safe and simple and inexpensive.

Conclusion

The significance of meconium stained amniotic fluid during labour is a widely debated subject and the management has evolved with time and is still evolving. There has been no agreement on one particular type of management. However at the end of the present study it is opined that amnioinfusion is useful in reducing perinatal morbidity without any maternal risk.

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