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Original Research Article

Perinatal Outcome in Meconium Stained Amniotic Fluid: A Case Control Study

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Abstract

Meconium stained amniotic fluid (MSAF) is a a common encounter in pregnancies and is a source of concern among both obstetricians and neonatologists due to its effect on the outcome of the fetus.

Aim: To determine the fetal outcome in the pregnancies which have the presence of meconium stained amniotic fluid.

Methodology: A comparitive study was conducted in the Department of Obstetrics and Gynecology at Dhiraj hospital, pipariya, Waghodia where 160 patients in labour who developed meconium stained amniotic fluid and 190 patients in labour who had a clear amniotic fluid were studied and the outcome of their babies post delivery regarding their birth weight, NICU admissions, and fetal complications was studied.

Results: Out of the total number of patients, 81.25% of the cases and 91.57% of the controls had babies who were asymptomatic at birth. The babies born to the group with meconium stained amniotic fluid had a lower APGAR score at birth as compared to the group with clear amniotic fluid. The incidence of birth asphyxia and NICU admissions was greater among the babies born to the patients with meconium stained amniotic fluid as compared to teh ones born to patients who had clear amniotic fluid.

Conclusion: A postivie relationship between meconium stained amniotic fluid and the development of fetal complications has been established.

Keywords: Meconium, Amniotic Fluid, Fetal Outcome.

Introduction

The presence of meconium in the amniotic fluid is there in 12-16% of pregnancies [1]. It may be a representation of the normal maturation of the fetal gastrointestinal system or it may be an indicator of a fetal distress, indicating an acute or a chronic hypoxia to the fetus [2,3]. It has been linked to a poor fetal outcome which includes a low APGAR score at birth, a higher incidence of chorioamnionitis, an increased rate of NICU

admissions and a greater chance of neonatal death [4]. Because of the presence of meconium in the amniotic fluid, there are increased chances of its aspiration which leads to an injurious effect on the fetal lungs [5].

Before 34 weeks of gestation, the passage of meconium is rare but after 37 weeks of gestation, its incidence increases rapidly with increasing gestational age [6]. Meconium aspiration occurs in 20-30% of the babies who have meconium stained liquor while they are in utero and this means that meconium is present below the level of their vocal cords [7]. Aspiration of meconium by the fetus can occur when the fetus gasps in utero or it can also occur after delivery during the first few breaths of the baby's life [8].

Meconium aspiration syndrome (MAS) is said to occur when there is the presence of respiratory distress in the neonate along with the evidence of aspiration pneumonitis on radiology in patients who have had a meconium stained amniotic fluid [9,10]. There is MAS in 5% of deliveries in which there is a presence of meconium stained amniotic fluid [11] and out of all the infants with MAS, there is the occurrence of death in about 12% of the infants [12].

Meconium stained amniotic fluid (MSAF) can be graded into 3 types.

1. **Grade one meconium stained amniotic fluid:** The fluid is slighly greenish or yellowish in colour. It consists of only a small amount of meconium which gets diluted in a large amount of amniotic fluid.
2. **Grade two meconium stained amniotic fluid:** It is greenish to brownish in colour. There is moderate amount of meconium staining present within a fair amount of amniotic fluid.
3. **Grade three meconium stained liquor:** The amniotic fluid is thick green in colour, having a consistency like that of a "pea soup". Here there is a decrease in the amount of liquor with a massive amount of meconium present within it, making it a thick green colour.

During the recent times, there has been a drastic improvement in the facilities for antepartum and intrapartum care to the patient resulting in a decline in the number of stillbirths. Thus due to this there is an overall improvement in the neonatal outcome. This study was carried out in a center where continuous fetal monitoring facilities are available with a view to compare the fetal outcome in the deliveries which had meconium stained liquor versus the deliveries in which the liquor was clear as well as to evaluate the various maternal factors related to the same.

Materials and Methods

A prospective observational study was carried out in the Department of Obstetrics and Gynecology at Dhiraj Hospital, Pipariya, Waghodia, over a period of 18 months fromt the time period of January 2021 to June 2022.

Inclusion Criteria:

Pregnant women who had completed 37 weeks of gestation who presented either to the outpatient department of the labour room of Dhiraj Hospital, Pipariya, Waghodia, who had singleton pregnancies with a vertex presentation and who did not have any known fetal congenital malformations.

Exclusion Criteria:

The pregnant patients who had not completed 37 weeks of gestation and who had presentations except for a cephalic presentation and who were already documented for known fetal congenital malformations.

The patients who developed the presence of a Meconium stained amniotic fluid (MSAF) either spontaneously or after an artificial rupture of membranes were taken as cases and the patients who had a clear amniotic fluid were taken as controls.

160 patients had meconium stained liquor and were taken as cases and a comparison was

done between them and 190 patients who were selected randomly who had clear liquor who were taken as controls.

A proforma was designed in which all the information regarding the cases and controls was noted down in a systematic format. The progress of labour of both the cases and the controls was monitored and a partograph was plotted in the active stage of labour. The fetal heart was monitored in a strict mannner by auscultating intermittently. After the presence of meconium was demonstrable after either spontaneous or artificial rupture of membrane, cardiotocography was used for fetal monitoring for 20 minutes. Depending on its readings, it was decided what the mode of delivery would be, after taking into consideration all the obstetrics conditions. If it was decided that a trial of normal vaginal delivery would be continued then a continuous electronic monitoring of the fetus was carried out. If there was any abnormality in the fetal heart in the cardiotocography readings then the patients were taken up for an emergency cesarean section. The outcome of the fetus regarding if the fetus was apparently healthy, its APGAR score at 1 minute and then at 5 minutes, its birth weight, NICU admissions and complications like birth asphyxia, meconium aspiration syndrome and neonatal death was noted.

The statistical analysis of the results was carried out using a Chi-square test.

Results

This study took into consideration 350 pregnant women with 37 completed weeks of gestation. These women had a singleton pregnancy with a vertex presentation. These women were split into two groups. The first group consisted of 160 women who had MSAF who were taken as the cases and the second group consisted of 190 women who had clear liquor and were taken as controls.

Out of 160 women who had developed a meconium stained amniotic fluid (MSAF), 66.57% who were in the age group of 20-30 years. There were approximately half of the cases who presented with a gestational age of more than 40 weeks as compared to the 14.73% of the controls who were a part of the same gestational age. This proved that as the gestational age advances there is an increased chance of having meconium stained amniotic fluid(MSAF).

Table 1: Distribution of cases and controls according to age group

Maternal Age	Cases (%)	Controls (percentage)
<20 years	18 (11.25)	14 (7.36)
20 - 30 years	106 (66.25)	127 (66.84)
>30 years	36 (16.25)	49 (25.79)
Total	160 (100%)	190 (100%)

Out of the total 160 cases consisting of the patients who developed a meconium stained amniotic fluid (MSAF), there were 18 cases (11.25%) who belonged to the age group of less than 20 years, 106 patients (66.25%) who belonged to the age group of 20-30 years, and 36 patients (16.25%) who belonged to the age group of more than 30 years. Among the 190 patients taken as controls which consisted of the patients who had a clear liqour, there were 14 patients (7.36%) who belonged to the age group of less than 20 years, 127 patients (66.84%) who belonged to the age group of 20 to 30 years and 49 patients (25.79%) who belonged to the age group of more than 30 years.

Table 2: Distribution of the cases and controls according to the gestational age.

Gestational Age	Cases (Percentage)	Controls (Percentage)
37-38 weeks	20 (12.5)	26 (13.68)
>38-39 weeks	29 (18.12)	57 (30%)
>39-40 weeks	32 (20)	79 (41.57)
>40-41 weeks	32 (20)	20 (10.52)
>41-42 weeks	43 (26.87)	8 (4.21)
>42 weeks	4 (2.5)	0
Total	160	190

Out of the 160 patients taken as cases which consisted of patients who developed a meconium stained amniotic fluid (MSAF) there were a total of 79 patients (49.37%) who presented at or beyond the gestational age of 40 weeks. Out of the 190 patients taken as controls there were a total of 28 patients (14.73%) who presented at or beyond the age group of 40 weeks. This proves that there are increaesed chances of development of meconium stained amniotic fluid (MSAF) in the patients as the gestational age advances.

Table 3: Maternal complications in the cases and the controls

Parameters	Cases (%)	Controls (%)	p value
Anemia	11 (6.87)	7 (3.68)	0.2
Pregnancy Induced Hypertension	26 (16.25)	14 (7.36)	0.014
Prelabour Rupture of Membranes	20 (12.5)	32 (16.84)	0.28
Fetal Bradycardia	30 (18.75)	4 (2.1)	<0.0001
Fetal Tachycardia	8 (5)	6 (3.15)	0.5

Table 3 shows that there was there was the presence of severe anemia in 6.87% of the cases and 3.68% of the controls. Pregnancy induced hypertension was present in 16.25% of the cases and 7.36% of the controls. Prelabour rupture of membranes was seen in 12.5% of the cases and 16.84% of the controls. Fetal Bradycardia was seen in 18.75% of the cases and 2.1% of the controls. Fetal tachycardia was seen in 5% of the cases and 3.15% of the controls. This study showed that the present of pregnancy induced hypertension and fetal bradycardia were significantly higher in the patients who had a meconium stained amniotic fluid as compared to the patients with a clear liquor.

Table 4: Mode of delivery in the cases and the controls

Mode of Delivery	Cases (%)	Controls (%)	p value
Spontaneous Vaginal delivery	65 (40.62)	131 (68.94)	<0.0001
Instrumental Delivery	15 (9.37)	9 (4.73)	0.036
Cesarean section	80 (50)	50 (26.31)	<0.0001
Total	160	190	

Cesarean section as a mode of delivery was common in the patients with MSAF. 50% of the cases had to be taken up for an emergency cesarean section as compared to 26.31% of the controls who were taken for an emergency cesarean section. This is almost double the number and proves to be statistically significant. 9.37% of the cases had to undergo an instrumental delivery as compared to 4.73% of the controls who had an instrumental delivery.

Table 5: Fetal outcome among cases and controls

Parameter	Cases (%)	Controls (%)	p value
Asymptomatic at birth	130 (81.25)	174 (91.57)	<0.0001
Apgar score at 1 minute <7	32 (20)	13 (6.84)	<0.0001
Apgar score at 5 minutes <7	15 (9.37)	11 (5.78)	0.2
Meconium Aspiration Syndrome	6 (3.75)	2 (1.05)	0.25
Birth asphyxia	24 (15)	12 (6.31)	0.002
Neonatal Sepsis	5 (3.125)	5 (2.63)	1
NICU admission	34 (21.25)	15 (7.89)	0.0001
Neonatal death	4 (2.5)	4 (2.1)	1

81.25% of the cases as compared to 91.57% of the controls had babies who were asymptomatic at birth. The Apgar score at 1 minute and at 5 minutes was lower in the patients with MSAF as compared to the patients with clear liquor. 6 babies(3.75%) from the MSAF group and 2 babies (1.05%) developed a Meconium Aspiration Syndrome and 4 babies out of the MSAF group had neonatal deaths although the difference was statistically insignificant as compared to the group with clear liquor. The incidence of birth asphyxia and NICU admissions was greated among the group with MSAF as compared to teh group with clear liquor.

Table 6: Birth weight among the cases and the controls

Birth weight	Cases (%)	Controls (%)
<=2.5 kg	15 (9.37)	21 (11.05)
>2.5 - 3 kg	83 (51.87)	96 (50.52)
> 3 kg	62 (38.75)	73 (38.42)
Total	160	190

The difference among the birth weight among the group with meconium stained amniotic fluid and the group with clear liquor was not statistically significant.

Discussion

The passage of meconium before the birth of the baby is common and it occurs in abour 20% of the pregnancies at full term. This means that in one in four or five prengnacies, there is a passage of meconium in utero before birth. It increases the NICU admissions which makes it an important cause of a poor outcome of the fetus.

In this study it was found that the incidenc of MSAF was greater within the age group of 20-30 years. A similar results was found in the study done by Sandu SS *et al* [13] In this study it was found that the incidence of MSAF is found to increase with the increase in teh gestational age. In this study, 50% of the patients taken as cases had a gestational age of 40 weeks. A majority of the cases were unbooked which meant that these patients only came to the hospital after having completed 10 months or beyond or when they felt that it was absolutely necessary to deliver. These patients mostly had previousl successful home deliveries and they were mostly postdated. In a study conducted by NAveen S *et al*., it was found that postdated pregnancy was an important risk factors for the developement of Meconium Stained amniotic fluid (MSAF) [14] There is an association of MSAF with PIH. PIH leads to the development of uteroplacental insufficiency which futher leads to fetal hypoxia, fetal distress and hence the passage of meconium in utero by the fetus. In this study it was found that 16.25% of the cases

had Pregnancy induced hypertension. Similar results were obtained from a study conducted by Bhide *et al*., (8-f) and Hosna Ara Katun *et al*., [15] in which 13% of the cases had an association with PIH.

In out study the incidence of cesarean section as a mode of delivery in the group of patients who had meconium stained liquor was almost double as compared the group of patients who had clear liquor. This was similar to the results obtained from the study conducted by Saunders *et al*., [16]. The higher rate of a cesarean sections may be because of a lack of proper facilities for fetal monitoring like fetal electonic monitoring and tracing the fetal scalp pH and its monitoring. This shows that there is an association of meconium stained amniotic fluid and abnormalities in the fetal heart pattern which brings the mode of delivery to a cesarean section.

Contrasting to this finding, Wong SF [17] in thier study noted that in the study group which had meconium stained liquor, 13.2% of the patients underwent an emergency cesarean section as compared to 8.8% of the patients in the group with a clear liquor. In their study, the rates of cesarean section in meconium stained amniotic fluid were lower which could be attributed to the presence of fetal scalp pH monitoring at their center. A cesarean rate of 49.1% in meconium stained liquor was reported by Naveen S *et al*., [14] in their study.

There is a direct correlation of the consistency of meconium with the outcome of the fetus. At the onset of labour if there is a presence of thick meconium the perinatal mortality is increaesed by five to seven times [18]. In the fetuses who pass thin meconium, it is mostly due to their physiological maturation and it is more likely that they are healthy at birth [19]. In this study however consistency of meconium was not used to divide the cases.

In this study, 81.25% of the infants were asymptomatic when they were born. 29.37% of the cases had a low apgar score and 3.75% of the babies had meconium aspiration syndrome. In a study conducted by Patel *et al*., [20] it was reported that 19% of the babies born to mothers with MSAF had a poor apgar score. In their study the incidence of NICU admissions among the cases with MSAF was 21.21% and meconium aspiration syndrome was diagnosed in 12.8% of the babies born to mothers with MSAF [20]. In our study, neonatal deaths occured in 4 babies out of the group with MSAF.

Conclusion

Meconium stained amniotic fluid is troublesome both from the obstetrician as well as the pediatrician's point of veiw as it leads to an increase in the rate of cesarean section, leads to birth asphyxia, the meconium can be aspirated by the fetus leading to Meconium aspiration syndrome and it causes an increase in the rate of NICU admissions. All of these were observed in this current study. This shows that the presence of Meconium in the amniotic fluid needs a meticulous monitoring of the fetus in a view to bring about a decrease in the perinatal morbidity and mortality.

Ethical clearance was given by the ethical committee at Dhiraj General Hospital, SBKS MI & RC.

References

1. Maymon E, Chaim W, Furman B, Ghezzi F, Shoham Vardi I, Mazor M. Meconium stained amniotic fluid in very low risk pregnancies at term gestation. Eur J Obstet Gynecol Reprod Biol. 1998;80:169–73.
2. Shaikh EM, Mehmood S, Shaikh MJ. Neonatal outcome in meconium stained amniotic fluid- One year experience. J Pak Med Assoc. 2010;60(9):711–14.
3. Fleischer A, Anyaegbunam A, Guidetti D, Randolph G, Merkatz IR. A persistent clinical problem: profile of the term infant with significant respiratory complications. Obstet Gynecol. 1992;79:185–90.
4. Ahanya SN, Lakshmanan J, Morgan BL, Ross MG. Meconium passage in utero: mechanisms, consequences, and

management. Obstet Gynecol Surv. 2005; 60: 45-56.
5. Patil KP, Swamy MK, Samatha K. A one year cross sectional study of management practices of meconium stained amniotic fluid and perinatal outcome. Obstet Gynecol India. 2006; 56: 128- 30.
6. Steer PJ, Eigbe F, Lissauer TJ, Beard RW. Interrelationships among abnormal cardiotocograms in labor, meconium staining of the amniotic fluid, arterial cord blood pH and Apgar scores. Obstet Gynecol. 1989; 74: 715- 21.
7. Wiswell TE, Bent RC. Meconium staining and the meconium aspiration syndrome. Unresolved issues. Pediatr Clin North Am. 1993; 40: 955-81.
8. Kligner MC, Kruse J. Meconium aspiration syndrome: Pathophysiology and prevention. J Am Board Fam Pract. 1999; 12: 450-66.
9. Lee J, Romero R, Lee KA, Kim EN, Korzeniewski SJ, Chaemsaithong P, et al. Meconium aspiration syndrome: a role for fetal systemic inflammation. American journal of obstetrics and gynecology. 2016;214(3):366.
10. Klingner MC, Kruse J. Meconium aspiration syndrome: pathophysiology and prevention. The Journal of the American Board of Family Practice. 1999;12(6):450–66.
11. Sippola T, Aho H, Peuravuori H, Lukkarinen H, Gunn J, Kääpä P. Pancreatic Phospholipase A 2 Contributes to Lung Injury in Experimental Meconium Aspiration. Pediatric research. 2006; 59(5):641.
12. Davis P, Shekerdemian L. Meconium aspiration syndrome and extracorporeal membrane oxygenation. Archives of Disease in Childhood-Fetal and Neonatal Edition. 2001;84(1):F1–F3.
13. Sandhu SK, Singh J, et al. Critical evaluation of meconium staining of amniotic fluid and foetal outcome. J Obstet Gynaecol India. 1993;43:528–53.
14. Naveen S, Kumar SV, Ritu S, Kushia P. Predictors of meconium stained amniotic fl uid: a possible strategy to reduce neonatal morbidity and mortality. J Obstet Gynecol India. 2006;56:514–7.
15. Khatun M, Arzu J, Haque E, Kamal MAL, Mamun M, Khan M, et al. Fetal outcome in Deliveries with Meconium Stained Liquor. Bangladesh J Child Health. 2009;33:41–5.
16. Saunders K. Should we worry about meconium? A controlled study of neonatal outcome. Trop Doct. 2002;32(1):7–10.
17. Wong SF, Chow KM, Ho LC. The relative risk of fetal distress in pregnancy associated with meconium-stained liquor at different gestation. Journal of Obstetrics and Gynecol. 2002;22(6):594–99.
18. Rossi EM, Philipson EH, William TG, Kalhan SC. Meconium aspiration syndrome: intrapartum and neonatal attributes. Am J Obstet Gynecol. 1989;161:1106–10.
19. Wiswell TE, Bent RC. Meconium staining and the meconium aspiration syndrome. Unresolved issues. Pediatr Clin North Am. 1993;40:955–81.
20. Patil KP, Swamy MK, Samatha K. A one year cross sectional study of management practices of meconium stained amniotic fluid and perinatal outcome. Obstet Gynecol India. 2006;56:128–30.