Original Research Article

Clinical study of maternal risk factors and the perinatal outcome in meconium-stained amniotic fluid

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Abstract

Background: Meconium aspiration syndrome is one of the dreadful complications of prolonged labor, fetal hypoxia due to any cause and prematurity. Once the meconium is aspirated by fetus it may cause severe meconium pneumonitis, respiratory distress, acidosis and ultimately respiratory failure. Extensive neonatal care, surfactant therapy and ventilatory management is required for babies developing respiratory distress secondary to meconium aspiration and despite extensive medical care MAS may prove fatal in many cases. **Aim and Objective:** 1 Clinical study of maternal risk factors and the perinatal outcome in meconium stained amniotic fluid.2. To study the mode of delivery in a labour complicated by meconium stained amniotic fluid. **Methods: Study design:** Prospective Study. **Study setting:** Department of Obstetrics and Gynaecology, Dr. D.Y Patil Medical College and Research Institute, Kolhapur **Study duration:** From July 2022 to July 2023. **Study population:** All meconium stained amniotic fluid patients admitted in our institute during study period included in the study. **Sample size:** 100 **Results:** majority of study participants were from 31-35 years age group e.g. 40 followed by 26-30,21-25,18-20 and >35 found 28,19,9 and 4 respectively. Most of the study subjects were Primipara contributing 60 (60%) and 40 (40%) were Multipara. majority of study participants were from > 40 weeks of gestational age contributing 60 (60%) followed by 37-40 weeks 30 (30%) and < 37 weeks 10 (10%) respectively. majority of cases found with moderate thick MSAF 57 (57%) followed by thin MSAF 27 (27%) and thick MSAF found in 21 cases (21%). majority of cases presented with post maturity 60 (60%) followed by PIH 37 (37%), prolonged labour 33 (33%), Anemia 29 (29%),Multiple risk factors 25 (25%),IUGR 17 (17%) and 10 cases found with Oligohydrmnios 10 (10%). majority of cases delivered through LSCS 55 followed by AD 27 and NVD 18. majority of cases with normal birth weight 80 (80%) 20 cases with low birth weight. majority of cases discharged 91 followed by 7 cases DAMA and 2 cases death during treatment. **Conclusion:** Majority of the cases were Primipara**,** Most common maternal risk factor was post maturity, Maximum of cases delivered through LSCS, Perinatal Mortality was 2%.

Keywords: Meconium stained amniotic fluid, Maternal risk factors, Perinatal outcome

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INTRODUCTION

Meconium is the first substance secreted from fetal intestines and consist of intestinal epithelial cells, lanugo, mucus, amniotic fluid, bile and water.[1,2] Its formation begins around 10-12 weeks of gestation and the quantity goes on increasing as the gestational age advances and it is the post-mature baby who is at a greater risk of passage of meconium in utero and its consequences like meconium aspiration syndrome (MAS).[3]

Meconium aspiration syndrome is one of the dreadful complications of prolonged labor, fetal hypoxia due to any cause and prematurity. Once the meconium is aspirated by fetus it may cause severe meconium pneumonitis, respiratory distress, acidosis and ultimately

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respiratory failure.[4] Extensive neonatal care, surfactant therapy and ventilatory management is required for babies developing respiratory distress secondary to meconium aspiration and despite extensive medical care MAS may prove fatal in many cases.[5]

The various hypothesis put forward as the triggering event for in-utero passage of meconium include fetal hypoxia, vagal stimulation causing increased peristalsis and relaxation of anal sphincter and passage of meconium as a consequence of normal gastrointestinal tract maturation as the gestational age advances.[6]

Fetal hypoxia causing increased peristalsis and passage of meconium appears to be plausible as there is increased incidence of passage of meconium in many cases where fetal distress is diagnosed on the basis of fetal bradycardia or abnormal doppler parameters.[7] On the contrary no definite cause is found in many cases where there is meconium staining of amniotic fluid first noted during rupture of membranes.

It is possible that different mechanisms may be at play in different patients. Like in post mature babies increased incidence of meconium stained amniotic fluid may represent maturation of gut while in cases with fetal distress, hypoxia causing increased peristalsis and consequently passage of meconium may be the cause.[8]

Irrespective of the cause of passage of meconium in utero it is important to prevent its aspiration as it will invariably cause pneumonitis, emphysema due to ball valve mechanism, acidosis and in severe cases respiratory failure and neonatal death.[9] For this pregnancy with post maturity, fetal compromise or fetal distress should be identified in time.[10] Umbilical artery doppler showing absence or reversal of diastolic flow, decrease or loss of fetal movements, fetal bradycardia and fetal scalp blood pH indicative of acidosis are some of the important features which may suggest fetal hypoxia.

In all such cases appropriate measures must be taken to prevent fetal morbidity and mortality.[11] Meconium stained amniotic fluid may be a normal phenomenon in post-maturity and has little significance unless it is associated with variations in fetal heart rate and other signs of fetal hypoxia. Nonetheless there are always chances that the fetus may make gasping in-utero more hazardous in presence of meconium stained amniotic fluid.[12]

Unless proper resuscitative measures are taken immediately after the delivery aspiration of meconium may take place which is usually followed by major pathological consequences that include airway obstruction, surfactant dysfunction, chemical pneumonitis and pulmonary hypertension. The consequences of pathological processes may cause secondary complications such as persistent pulmonary hypertension in newborn (PPHN), right to left shunts due to pulmonary hypertension, diffuse pneumonitis due to enzymes, bile salts and free fatty acids present in meconium.

Surfactant dysfunction may result in diffuse atelectasis and airway obstruction may result in hyperinflation, pneumothorax and pneumomediastinum.[13] Maternal risk factors associated with meconium stained amniotic fluid and consequently meconium aspiration syndrome include maternal pathologies such as preeclampsia and eclampsia, anemia, oligohydramnios, prolonged labor, maternal infections such as chorioamnionitis, maternal substance abuse such as tobacco or cocaine and placental insufficiency of any cause.[14]

Though meconium aspiration can occur in any gestation complicated or uncomplicated, treating obstetrician must be aware of presence of maternal risk factors so that appropriate preventive and therapeutic measures can be taken in time.[15]

Need for the study: Very few studies conducted in Maharashtra regarding study of abruption placentae at tertiary care center. So I am interested to find out the prevalence of meconium stained, study of maternal risk factors and the perinatal outcome in meconium stained amniotic fluid. To study the various maternal risk factors responsible for meconium stained amniotic fluid. To study the mode of delivery in a labour complicated by meconium stained amniotic fluid.

AIM and OBJECTIVE

1. Clinical study of maternal risk factors and the perinatal outcome in meconium stained amniotic fluid.
2. To study the mode of delivery in a labour complicated by meconium stained amniotic fluid.

METHODOLOGY

Study design: Prospective Study.

Study setting: Department of Obstetrics and Gynaecology, Dr. D.Y Patil Medical College and Research Institute, Kolhapur.

Study duration: From July 2022 to July 2023

Study population: All meconium stained amniotic fluid patients admitted in our institute during study period included in the study.

Sample size: 100

Inclusion criteria:

1. All meconium stained amniotic fluid patients admitted in our institute during study period included in the study.
2. Term labour (>37 completed weeks)
3. Cephalic presentation.
4. Live singleton pregnancy

Exclusion Criteria

1. Antepartum haemorrhage
2. Malpresentations
3. Pregnancy with congenital malformations.
4. Intrauterine death
5. Not willing to participate

Approval for the study:

Written approval from Institutional Ethics committee was obtained beforehand. Written approval of OBGY department was obtained. After obtaining informed verbal consent from all study participants such cases were included in the study.

Sample size: 100

Sampling technique:

Convenient sampling technique used for data collection. All patients admitted in OBGY ward of tertiary care center from July 2022 to July 2023 with meconium stained.

Methods of Data Collection and Questionnaire-

Predesigned and pretested questionnaire was used to record the necessary information. Questionnaires included general information, such as age, sex, Medical history- chief complain, past history, general examination, systemic examination.

Menstrual history: LMP, EDD, Obstetrics history- marriage duration, parity, Mode of delivery, maternal complications, Type of meconium, No ANC visits, Gestational age at the time of admission, Mode of delivery, Maternal Outcome, Maternal complications, perinatal outcome, perinatal complication.

A detailed history was taken with a special emphasis on associated maternal risk factors like pre-eclampsia, gestational diabetes, history of fever and substance abuse. Ultrasound reports were studied and any abnormality like oligohydramnios or polyhydramnios was noted down. Method of delivery like vaginally, forceps delivery or LSCS was noted. General and systemic examination was done.

Obstetrical examination was done noting the presentation, position, height of fundus, amount of amniotic fluid, fetal heart rate, uterine contraction, pelvic status. When MSAF appeared along with rupture of membrane it was collected and clinically graded thorough and quick vaginal examination was done to assess the state of cervix, station of fetal head, and exclusion of cord prolapse and to note the colour and consistency of AF.

MSAF was collected by introducing Sim's speculum under aseptic precaution and material taken into a clear test tube for clinical gradation according to the colour and consistency.

When AF was thinly stained with greenish yellow in colour, it was graded as thin meconium stained. When AF was dark green or tarry black or muddy in colour and of thick consistency it was considered as thick meconium stained.

Study cases were grouped into thin and thick meconium stained amniotic fluid group on the basis of consistency of meconium. APGAR scores at 1 and 5 minutes, Weight and gender of the newborns was noted. All the babies delivered were kept under observation for 24hours. Babies who were normal and did not develop any complications within 24hours after birth were placed mother-side.

Babies who developed any sign of respiratory distress within 24hours were shifted to NICU. Babies who initially were shifted to mother and developed signs of respiratory distress were also transferred to NICU. Babies were followed-up up to 7 day and their clinical condition was assessed and any abnormalities were recorded. Death and its cause during hospital stay within first week of neonatal life were also recorded

Complete investigation done , Usg, Complete haemogram, Blood electrolyte, Blood biochemistry, Blood culture, Blood gas analysis, Chest X-ray. Proforma of meconium stained notes maintained.

RESULT AND OBSERVATIONS

This prospective study was conducted among 100 cases of meconium stained AF admitted in OBGY department during study period. Majority of cases APGAR score at 1 minute was ≥ 6 found in 60 cases and 40 cases found with <6. APGAR score at 5 minute in 79 cases score was ≥ 6 and 21 cases found with <6. most of the study subjects were Primipara contributing 60 (60%) and 40 (40%) were Multipara.

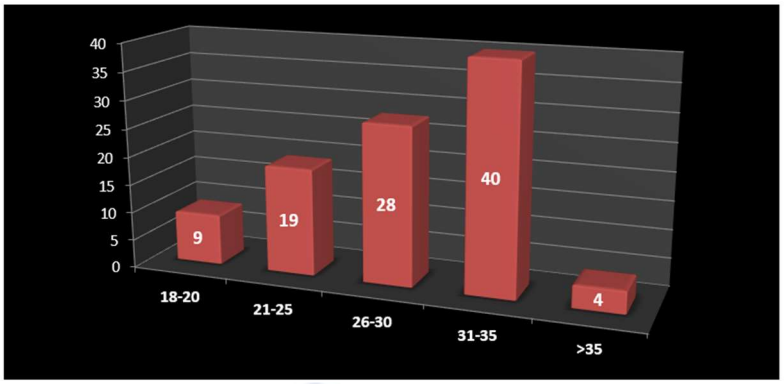

Figure 1: Distribution of study participants as per age (n=100)

Above Figure shows that, majority of study participants were from 31-35 years age group e.g. 40 followed by 26-30,21-25,18-20 and >35 found 28,19,9 and 4 respectively

Table 1: Distribution of study participants as per gestational age (in weeks)

Gestational age (weeks)	Frequency	Percentage
< 37 Weeks	10	10
37-40 Weeks	30	30
>40 Weeks	60	60
Total	100	100

Above table shows that, majority of study participants were from > 40 weeks of gestational age contributing 60 (60%) followed by 37-40 weeks 30 (30%) and < 37 weeks 10 (10%) respectively.

Table 2: Maternal risk factors with meconium stained amniotic fluid (N=100)

Maternal risk factors	Frequency	Percentage
Post maturity	60	60%
Pregnancy induced hypertension	37	37%
Anemia	29	29%
IUGR	17	17%
Oligohydramnios	10	10%
Prolonged labour	33	33%
Multiple risk factor	25	25%

The above table shows majority of cases presented with post maturity 60 (60%) followed by PIH 37 (37%), prolonged labour 33 (33%),Anemia 29 (29%),Multiple risk factors 25 (25%),IUGR 17 (17%) and 10 cases found with Oligohydrmnios 10 (10%).

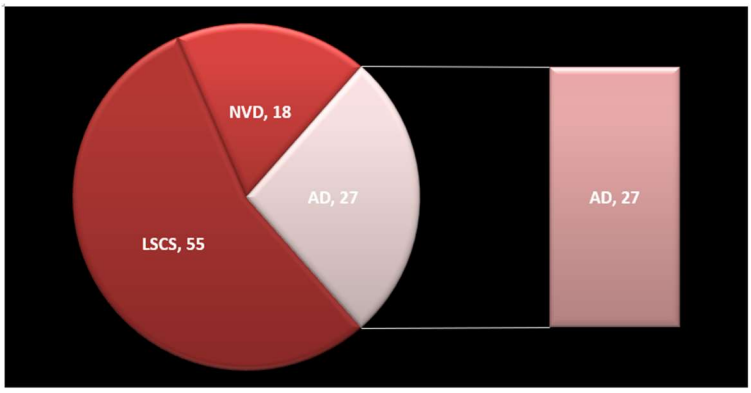

Figure 2: Mode of Delivery

Above figure shows that, majority of cases delivered through LSCS 55 followed by AD 27 and NVD 18

Table 3: Perinatal outcome birth weights in neonates (N=100)

Birth weights in kg	Frequency	Percentage
Low Birth Weight (<2.5)	20	20%
Normal Birth weight (≥2.5-3.9)	80	80%
Total	**100**	**100%**

The above table shows majority of cases with normal birth weight 80 (80%) 20 cases with low birth weight.

Table No.4: Morbidity in neonates born with meconium stained amniotic fluid (N=100)

Morbidity	Frequency	Percentage
Asphyxia	60	60%
Meconium aspiration syndrome	15	15%
Neonatal pneumonia	12	12%
Hypoxic ischemic encephalopathy	8	8%
Persistent pulmonary hypertension	4	4%
Early/ late onset sepsis	10	10%

The majority of cases found Asphyxia 60 followed by meconium aspiration syndrome 15, neonatal pneumonia 12, Early/late onset sepsis 10, Hypoxic ischemic encephalopathy 8 and persistent pulmonary hypertension found in 4 cases.

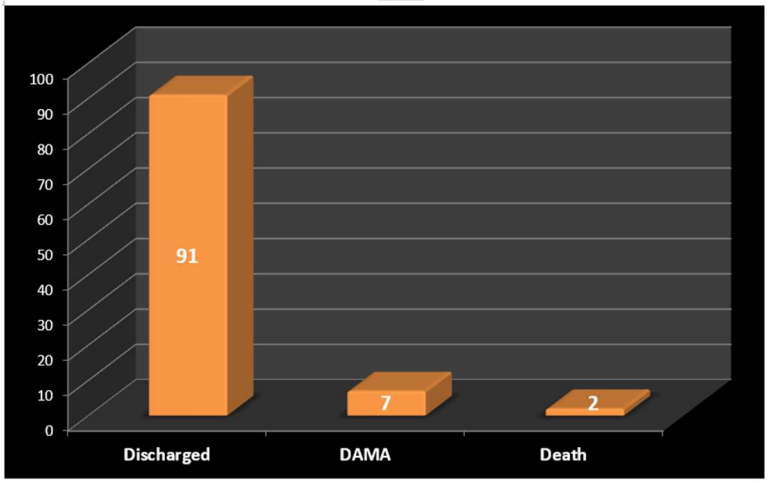

Figure 3: Outcome in neonates born with meconium stained amniotic fluid (N=100)

The above figure shows majority of cases discharged 91 followed by 7 cases DAMA and 2 cases death during treatment.

DISCUSSION

This prospective observational study was conducted among 100 cases of meconium stained AF admitted in OBGY department during study period

Distribution of study participants as per age (n=100) in current study majority of study participants were from 31-35 years age group e.g. 40 followed by 26-30,21-25,18-20 and >35 found 28,19,9 and 4 respectively. Similar result found in the study of **Thirukumar M (2020)**[16] He found that the Majority of the study participants represented the 18 to 30 years age group (N=119:79.3%).

Parity (n=100) in present study most of the study subjects were Primipara contributing 60 (60%) and 40 (40%) were Multipara. Similar results were reported by the authors such as **Harikumar *et al.* (2018)**[17] who reported that 69% of the women found to have meconium stained amniotic fluid were primigravida.

Maternal risk factors with meconium stained amniotic fluid. In current study majority of cases presented with post maturity 60 (60%) followed by PIH 37 (37%), prolonged labour 33 (33%), Anemia 29 (29%), Multiple risk factors 25 (25%), IUGR 17 (17%) and 10 cases found with Oligohydrmnios 10 (10%). Similar result observed in the study of **Niranjan KS *et al.* (2019)**[18] Reported that 45 (22.5%) women had no risk factors. Most common single risk factor associated with MSAF was found to be prolonged labour (16.5%) followed by Oligohydramnios (16%) post maturity (12.50%) and PIH (11%).

Mode of delivery. In current study Majority of cases delivered through LSCS 55 followed by AD 27 and NVD 18. Similar result found in the study conducted by **Sheiner E *et al.* (2002)**[19] he reported that the most of cases delivered though LSCS (45%).

Perinatal outcome birth weights in neonates. In current study Majority of cases with normal birth weight 80 (80%) 20 cases with low birth weight. Similar result observed in the study conducted by **Niranjan KS *et al.* (2019)**[18] found that birth weights in the study showed that in case group 158 (79.00%) neonates had normal birth weight while 42 (21.00%) babies were low birth weight. While in control group normal birth weight was seen in 152 (76.00%) neonates and 46 (23.00%) babies were low birth weight. In control group 2 babies were found to have weight more than 4kg (macrosomia) while there were no babies weighing >4kg in the case group. There was no statistical association between MSAF and birth weight.

Morbidity in neonates born with meconium stained amniotic fluid. In current study Majority of cases found Asphyxia 60 followed by meconium aspiration syndrome 15, neonatal pneumonia 12, Early/late onset sepsis 10, Hypoxic ischemic encephalopathy 8 and persistent pulmonary hypertension found in 4 cases. Similar result found in the study by **Niranjan KS *et al.* (2019)**[18] he reported that the Morbidities associated with meconium stained amniotic fluid included birth asphyxia (19.50%) followed by meconium aspiration syndrome (14%), Hypoxic ischemic encephalopathy (12.00%) and sepsis (07.50%). In control group Asphyxia (10%), sepsis (8.50%) and neonatal pneumonia (3.50%) were commonly seen morbidities.

Outcome in neonates born with meconium stained amniotic fluid. In current study majority of cases discharged 91 followed by 7 cases DAMA and 2 cases death during treatment. **Debdas *et al.* [20]** have reported similar perinatal mortality figures (3%) while **Narang *et al.*[21]** have found a slightly higher perinatal mortality in neonates born through meconium stained amniotic fluid (7.7%).

CONCLUSION

Majority of the cases were Primipara**,** Most common maternal risk factor was post maturity, Maximum of cases delivered through LSCS, Perinatal Mortality was 2%.

BIBLIOGRAPHY

1. Holtzman BR, Banzhaf WC, Silver RK, Hageman RJ. Perinatal management of meconium stained amniotic fluid. Clin Perinatol. 1989;16:825-38.
2. Lopez-Rodriguez E, Echaide M, Cruz A, Taeusch HW, Perez-Gil J. Meconium impairs pulmonary surfactant by a combined action of cholesterol and bile acids. Biophys J. 2011;100(3):646-55.
3. Wiedemann JR, Saugstad AM, Barnes-Powell L, Duran K. Meconium aspiration syndrome. Neonatal Netw. 2008;27(2):81-7.
4. Singh SN, Srivastava R, Singh A, Tahazzul M, Kumar M, Kanta C, Chandra S. Respiratory distress including meconium aspiration syndrome in vigorous neonates born through meconium stained amniotic fluid: incidence, onset, severity and predictors at birth. Indian J Pediatr. 2013;80(7):538-43.
5. Davis RO, Philips JB, Harris BA, Wilson ER, Huddleston JF. Fatalmeconium aspiration syndrome occurring despite airway management considered appropriate. Am J Obstet Gynecol. 1985;151(6):731- 6.
6. Galal M, Symonds I, Murray H, Petraglia F, Smith R. Postterm pregnancy. Facts, Views and Vision ObGyn. 2012;4(3):175.
7. Gudmundsson S, Dubiel M. Doppler velocimetry in the evaluation of fetal hypoxia. J Perinat Med. 2001;29(5):399-407.
8. Anderson GG. Post-maturity: a review. Obstet Gynecol Surv. 1972;27(2):65-73.
9. Lin HC, Su BH, Lin TW, Peng CT, Tsai CH. Risk factors of mortality in meconium aspiration syndrome: review of 314 cases. Acta paediatrica Taiwanica Taiwan er ke yi xue hui za zhi. 2004;45(1):30-4.
10. Whitfield JM, Charsha DS, Chiruvolu A. Prevention of meconium aspiration syndrome: an update and the Baylor experience. Proceedings (Baylor University Medical Center). 2009;22(2):128-31.

11. Mundhra R, Agarwal M. Fetal Outcome in Meconium Stained deliveries. J Clin Diagn Res. 2013;7(12):2874-6.
12. Ahanya SN, Lakshmanan J, Morgan BL, Ross MG. Meconium passage in utero: mechanisms, consequences, and management. Obstet Gynecol Surv. 2005;60(1):45-56.
13. Kopincova J, Calkovska A. Meconium-induced inflammation and surfactant inactivation: specifics of molecular mechanisms. Pediatr Res. 2016;79(4):514- 21.
14. Usta IM, Mercer BM, Sibai BM. Risk factors for meconium aspiration syndrome. Obstet Gynecol. 1995;86(2):230-4.
15. Liu WF, Harrington T. Delivery room risk factors for meconium aspiration syndrome. Am J Perinatol. 2002;19(7):367-78.
16. Addisu D, Asres A, Gedefaw G, Asmer S. Prevalence of meconium stained amniotic fluid and its associated factors among women who gave birth at term in Felege Hiwot comprehensive specialized referral hospital, North West Ethiopia: a facility based cross-sectional study. BMC Pregnancy Childbirth. 2018 Oct 30;18(1):429. doi: 10.1186/s12884-018-2056-y.
17. Harikumar S. Study on meconium stained fluid-perinatal outcome. Int J Reprod Contracept Obstet Gynecol. 2018;7:587-95.
18. Niranjan KS, Lucksom PG. A study of maternal risk factors and the perinatal outcome in meconium stained amniotic fluid in central referral hospital. Int J Reprod Contracept Obstet Gynecol 2019;8:4146-54.
19. Mohan M, Deepak AV. Maternal risk factors and perinatal outcome in meconium stained amniotic fluid: a cross sectional study. Int J Reprod Contracept Obstet Gynecol 2018;7:4103-8.
20. Debdas AK, Kaur T. Meconium stained liquor: reappraisal. J Obstet Gynaecol India. 1981;31:924-9.
21. Narang A, Nair PMC, Bhakoo ON, Vashisht K. Management of meconium stained amniotic fluid: a team approach. Indian Pediatr. 1993;30:9.

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