

Prognostic Value of Serum Lactate Level in Umbilical Cord in Predicting Complications and Outcome of Meconium Aspiration Syndrome

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Abstract

Background: Meconium drawing is a life-threatening disorder. It is distinguished by significant respiratory difficulties. Lactate is a fast-paced variable, strongly related to difficulties and mortality in nearly every severely sick child. Our aim in this study was to anticipate difficulties with the drawing of meconium by lactate measurement. **Methods:** This is randomised control work, occurring in 40 babies with meconium stained liquor. From February 2020 until November 2020, they were allowed to attend Benha University Hospital. **Results:** The need for resuscitation of babies with meconium contaminated liquor was 60 percent. Administration of surfactants was 16 percent. Stay in the hospital, vary from (4-45) days. Diabetic mother's maternal history was 20% and hypertension maternity was 12%. Infant issues report that 20% air leak syndrome, 16% air leak syndrome, 52% hypoxic ischemic encephalopathy and 64% required for breathing assistance. Air leak syndrome **Conclusion:** Lactate measurement may be utilised to prevent issues such air leak syndrome, ischemic encephalopathy and breathing assistance in babies receiving meconium-treated liquor.

Keywords: Meconium Stained liquor, Outcome, Umbilical cord

1. Introduction

The drawing of meconium breath after delivery with meconium coloured body and liquor with or without air leakage characteristics is known to cause respiratory discomfort. Chest radiographs may reveal extensive, patchy or homogeneous opacity, infiltration and air trapping evidence. [1] Infants who take meconium from the breath more vulnerable to breathing, especially those without perinatal care. [2] Meconium-stained liquor is very troubling from both an obstetrician and a pediatrician's viewpoint, and it is necessary for foetal surveillance to minimise complications and mortality. [3]

When meconium is breathing, three processes impact the lung: airway blockage, inflammation and tensile malfunction. [4]

Lactate is generated with the greatest amount of production seen in muscle in most tissues in the human body. [5] The liver (20–30%), renal cortex (20%), and myocardial are the most significant lactate-consuming tissues (5-15 percent). [6] In different situations the precise pathophysiology of high lactate is complex, patient-specific and disease-specific. In general, higher production, reduced clearance or combination of both may induce lactate rise. [7] Our objective in this study was to anticipate the difficulties of babies who use lactate to extract meconium from the breath.

2. Patients and Methods

It is randomized control work, that's occur on 40 infants who had liquor stained with meconium. They were gave permission to enter Benha University Hospital from February 2020 to January 2021.

2.1. Inclusion criteria

- Infants with liquor stained with meconium.
- Infants equal to or higher than 38 weeks.

2.2. Exclusion criteria

- Preterm or near term infants.
- Other cause of difficult of breathing.

2.3. Methods

A) Examination of infant including

- 1) Determination of sex: (male or female).
- 2) Assessment of vital signs: (body temperature, pulse, respiratory rate, heart rate).
- 3) Anthropometric measurements (body weight, head circumference, body length).
- 4) Skin examination: (pallor, cyanosis, stained).
- 5) Umbilical cord examination.
- 6) Finger nails examination.

B) Investigations including

1. Blood film: Analyzed by sysmex 21-kx cell counter.
2. Kidney function tests: urea and creatinine were done on Bio system A15 chemical auto analyzer by kits supplied by Biosyste (Spain) according to manufacturer instructor.
3. Lactate measurement: The blood was collected from the vein. The normal value of lactate was considered to be 3.0–4.2 mmol/L.
4. Chest radiography.

2.4. Statistics

Descriptive statistics were expressed as range. Distribution of variables was examined using the Kolmogorov–Smirnov test. Quantitative data were analyzed using an independent sample's t test. Qualitative data were analyzed using both the goodness of fit test and test of independence. Pearson regression analysis was used for correlations. Analysis was performed using the SPSS (21).

3. Results

In this table, according to need of resuscitation, the percentage of yes were 30 (60%) and no were 20 (40%). According to surfactant administration the percentage of yes were 8 (16%) and no were 42 (84%). Table (1)

According to hospital stay between those infants, range between (4-45) days. Table (2)

According to, the percentage of yes for maternal history of diabetes mellitus (DM) was 10 (20%) and no was 40 (80%). According to maternal history of hypertension, yes in 6 (12%) and no in 44 (88%) . Table (3)

According to chest radiography, classic (area of air trapping alternating with areas of atelectasis) in 84%, pnemomediastium 8%, pneumothorax in 8%, white out lung in 14%, multiple focal consolidation of

chemical pneumonitis in 12%, pulmonary interstitial emphysema in 4%. Table (4)

According to cranial ultrasound between those infants, normal in 22 (44%), mild to moderate hypoxia with early hypoxic-ischemic encephalopathy (HIE) in 16 (32%), moderate to severe hypoxia with moderate HIE in 10 (20%). Table (5)

According to echocardiography between infants with liquor stained with meconium, normal in 22 (44%), paten foramen oval (PFO) in 28 (56%), patent ductus arteriosus (PDA) in 8 (16%) interventricular septal hypertrophy (IVSH) in 4 (8%). Table (6)

According to lactate measurement between male and female, there was no statistically significant difference between both, mean (4.527 , 4.40) Table (7)

According to the ROC curve analysis, expect need for respiratory support by measurement of lactate fig. (1).

Table (1) Need for resuscitation and surfactant administration between infants with liquor stained with meconium.

		No.	%
Need for resuscitation	Yes	30	60.0
	No	20	40.0
Surfactant administration	Yes	8	16.0
	No	42	84.0

Table (2) Hospital stay between infants with liquor stained with meconium

	Range	Mean ± SD
Hospital stay (days)	4-45	14.24 ± 11.82

Table (3) Maternal history between infants with liquor stained with meconium.

		No.	%
Maternal history of diabetes mellitus	Yes	10	20.0
	No	40	80.0
Maternal history of hypertension	Yes	6	12.0
	No	44	88.0

Table (4) Chest x ray between infants with liquor stained with meconium.

		No.	%
Chest x ray	Classic	42	84.0
	Pneumothorax	4	8.0
	Pnemomediastium	4	8.0
	Multiple focal consolidation of Chemical pneumonitis	6	12.0
	White out lung	8	16.0
	PIE	2	4.0

Classic: Areas of air trapping alternating with areas of atelectasis

PIE: Pulmonary interstitial emphysema.

Table (5) Cranial ultrasound between infants with liquor stained with meconium.

		No.	%
Cranial ultrasound	Normal	22	44.0
	Mild to moderate hypoxia with early HIE	16	32.0
	Moderate to severe hypoxia with moderate HIE	10	20.0

Hypoxic ischemic encephalopathy (HIE)

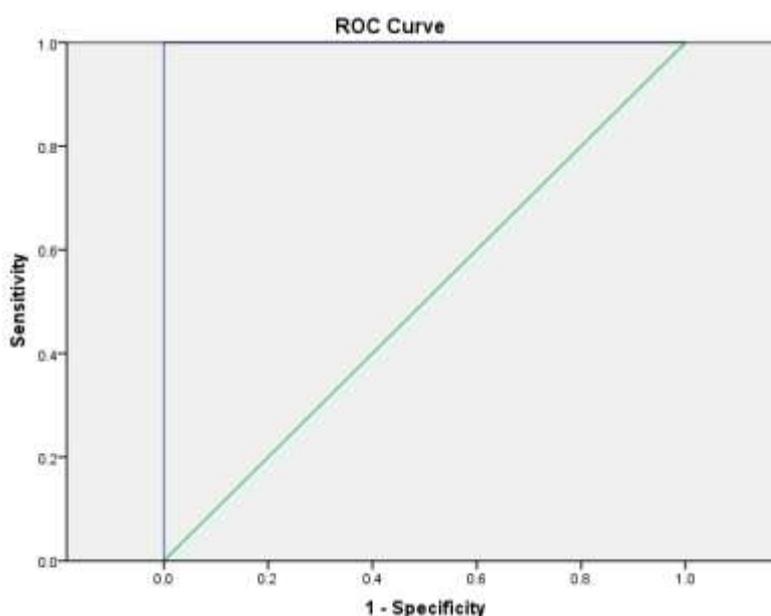
Table (6) Echocardiography between infants with liquor stained with meconium.

		No.	%
Echocardiography	Normal	22	44.0
	PFO	28	56.0
	PDA	8	16.0
	TR	4	8.0
	RVD	12	24.0
	IVSH	4	8.0

Patent Foramen Oval (PFO), Patent Ductus Arteriosus (PDA), Tricuspid Regurgitation (TR), Right ventricle dilatation (RVD), Interventricular septal hypertrophy (IVSH)

Table (7) Comparison between male and female according to lactate measurement.

		Male	Female	t.test	P. value
lactate measurement (mmol/L)	Mean \pm SD	4.527 \pm 1.96	4.40 \pm 1.60	.238	0.813

**Fig. (1)** ROC curve to expect need for respiratory support by measurement of lactate.

4. Discussion

We have dealt with 40 children who draw meconium. The proportion of Yes for the need for a revival was 60% and No 40%.

We agree with Joshi et al., [8] they have shown the necessity to resuscitate children with alcohol stained with meconium up to 53 percent.

We disagree with Dhannaram et al., [9] since only 10.2 percent of babies with liquor stained with meconium required to recover.

Our study has shown that children with liquor stained with meconium who required surfactant treatment were 16% and 84% not.

In line with the findings of El shahed et al. [10], they identified a growing demand for the administration of surfactants in children. This occurs because of surfactant therapy which increases respiratory function and index of oxygenation 6 hours after treatment and reduces the breath of meconium.

In Subirà et al. [11], however, no difference has been shown between surfactant washing in babies with

meconium breath and restrictions on air leaks or respiratory support time.

In our study, maternal hypertension was developed by 12%, according to the maternal risk factor in the development of meconium intake.

We agree with Vain and Batton [12] that different foetal stress factors, such as maternal hypertension, stimulate the passage of meconium in part from foetal maturation.

We disagree with Rovas et al., [13] examined the risk variables that produce meconium attraction; they showed that the development of meconium attraction was not related to the development of maternal hypertension.

In our study, it was established according to maternal DM (20 percent).

In conjunction with Mohammed et al [14].s study, the maternal DM was a significant risk factor for liquor stained with meconium

However, Aviram et al. [15] did not detect a significant relationship between maternal DM and stained meconium fluid.

According to the chest radiograph, 84% of our work showed air tapping regions alternating with atelectasis.

We agree with Vain & Batton [12] when the typical chest X-ray was developed in newborns with the breath of meconium, the lung was over-expanded with widely distributed, coarse and patchy infiltrates.

In our study, 12% of babies suffered from chemical pneumonitis in their chest X-rays.

We disagree with Shaikh et al., [16] when 23.6 percent of patients were found to have pneumonitis.

In this study, 20% of babies were exposed to all air leaks. Pneumothorax, pneumomediastina and interstitial pulmonary emphysema were determined to be 8%, 8% and 4%.

We agree with Narang et al. [17] that the air leak was found in 15.4 percent of cases.

We disagree with Dargaville & Copnel, [18] since they found that the total risk of air leak was 9.6%.

Raghu Raman & Jay Prakash, [19] found that pneumothorax in just 2% of patients, and pneumothorax in only 2% of cases.

In this study, we found that, after cranial ultrasonography, 52% of patients had hypoxia ischemic encephalopathy (HIE), 32% had mild to moderate HIE, and 20% had moderate to severe HIE.

We agree with Allanson et al. [20] that 69.7 percent of patients exhibited various degrees of HIE.

We disagree with Raghu Raman & Jay Prakash, [19], who found that only 4% of patients had HIE.

20 percent of children with DRM had patent ovals foramen and 16 percent had patent arteriosus ductus.

The Nakwan & Chitrapatima [20] researchers found patent foramen ovale at 16% and patent ductus arteriosus at 3%.

In this study, there was no difference in the measurement of lactate between men and women; (4.527, 4.40).

We agree with Zhang & Ji, [21] they have shown that there are no variations between genders in rest or peak blood lactate levels and lactate removal rates.

According to ROC, rising lactate may be expected to lead to issues like HIE, air leaks and requirement for respiratory assistance in babies with alcohol with meconium stained.

As in the study of yang et al. [22] they analyse serum enzymes in anticipation of the severity of meconium in babies, serum lactate may be a suitable examination of issues such as a need for respiratory assistance in infants with meconium intake.

5. Conclusion

Measurement of lactate may predict issues in babies with meconium-treated alcohol such hypoxic ischemic encephalopathy, air leak, lung white and respiratory supports.

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