International Journal of Contemporary Pediatrics
Jain MK et al. Int J Contemp Pediatr. 2018 Nov;5(6):2103-2107
http://www.ijpediatrics.com
pISSN 2349-3283 | eISSN 2349-3291

DOI: http://dx.doi.org/10.18203/2349-3291.ijcp20183841

Original Research Article

Intrapartum oropharyngeal and nasopharyngeal suctioning in neonates born through meconium-stained amniotic fluid: Indian scenario

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Received: 20 August 2018
Accepted: 24 August 2018

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ABSTRACT

Background: Meconium aspiration syndrome (MAS) is a life-threatening respiratory disorder in infants born through meconium-stained amniotic fluid (MSAF). Although anecdotal data concerning the efficacy of intrapartum oropharyngeal and nasopharyngeal suctioning of MSAF are conflicting, the procedure is widely used. We aimed to assess the effectiveness of intrapartum suctioning for the prevention of MAS.
Methods: A prospective quasi randomized control trial, assessor blind, single centre study was done at Department of neonatology, Geetanjali Medical College and Hospital, Udaipur, Rajasthan. Patients were enrolled over a total period of 16 months started from January 2016 to April 2017. 312 patients with MSAF of any consistency, gestational age at least 37 weeks, and cephalic presentation were randomly assigned to suctioning of the oropharynx and nasopharynx (including the hypopharynx) before delivery of the shoulders (n=127), or no suctioning before delivery (n=185). Postnatal delivery-room management followed Neonatal Resuscitation Program guidelines. The primary outcome was incidence of MAS. Clinicians diagnosing the syndrome and designating other study outcomes were masked to group assignment. An informed consent waiver was used.
Results: No significant difference between treatment groups was seen in the incidence of MAS [36 (26.7%) suction versus 36 (19.5%) no suction; p = 0.167], mortality in suction [5 (3.91%) versus no suction 5 (2.74%); p = 0.779], or in the duration of ventilation, oxygen treatment, and hospital care. There was statistically significant difference in need for mechanical ventilation for MAS [13 (10.23%) vs 4 (2.2%); p = 0.005], any respiratory support for MAS 25 (19.7%) suction versus 18 (9.7) p = 0.019).
Conclusions: Routine intrapartum suctioning of infants born through MSAF does not reduce the incidence of MAS. On the contrary, intrapartum suctioning might result in complications like more infant required neonatal resuscitation and respiratory support.

Keywords: Intrapartum, Meconium aspiration syndrome, Meconium-stained amniotic fluid, Nasopharyngeal, Oropharyngeal, Suction

INTRODUCTION

The term meconium is from the Greek word "meconium - arion", meaning opium like. Aristotle gave the substance this appellation as he believed it induced fetal sleep.[1] In most reports the frequency of MSAF has ranged from 5.6% to 24.6% (median 14%).[2] MAS has occurred in 1.7% to 35.8% (median 10.5%) of infants born through MSAF of those infants who developed MAS, 7.3% to 35% (median 17%) had been born though thin-consistency MSAF.[3] Death occurred in 4.9% to 37% (median 12%) of infants with MAS.[4] Passage of

meconium has been often used as a marker of antepartum or intrapartum asphyxia. In the 1970s and 1980s, it was believed "combined approach consists of intrapartum suction before delivery of shoulders, laryngoscopy, and intubation when meconium was visualized at the level of vocal cords" led to virtually nonexistent meconium aspiration syndrome (MAS).[5] Subsequent studies that looked specifically at intrapartum suctioning reported different results shown this combined approach is not that much effective in prevention of MAS even sometimes also harmful.[6,7]

Based on these results and current recommendation by AAP through the neonatal resuscitation programme, the international Liaison committee on resuscitation (ILCOR), and the ACOG, intrapartum management of these pregnancies has radically changed. Intrapartum suction of infants with MSAF is not recommended anymore.[8,9] Despite the evidence and recommendations, some authors still recommend intrapartum suction, if there is MSAF, specially for infants born in communities with limited resources, on the feeling that "the procedure is simple and does not carry significant adverse effects". They follow different strategy according to meconium consistency.[10] Thus, this study was planned to see effect of intrapartum suction of infants with MSAF of all consistency of meconium in developing country.

METHODS

A prospective quasi randomized control trial, assessor blind, single centre study was done at Department of Neonatology, Geetanjali Medical College and Hospital, Udaipur, Rajasthan. Patients were enrolled over a total period of 16 months started from January 2016 to April 2017. 312 patients with MSAF of any consistency, gestational age at least 37 weeks, and cephalic presentation were randomly assigned to suctioning of the oropharynx and nasopharynx.

Inclusion criteria

- Birth through MSAF of any consistency
- Gestational age of 37 weeks or long and
- Cephalic presentation
- Exclusion criteria
- Major congenital malformations
- Inability to randomize before delivery.

Waiver of consent approved by the institutional review boards on the grounds of the minimal risk assumption. We analyzed data on an intention-to-treat basis. For continuous variables, we used analysis of variance in normal distributions and the Mann-Whitney U test otherwise. Chi squire or Fisher's exact test was used for categorical items. Significance was assumed at the $p<0.05$ level.

RESULTS

This study was carried out over a total period of 16 months started from January 2016 to April 2017. 312 newborns were randomly allocated to receive suction (n = 127) and no suction (n = 185).

Table 1: Maternal demographic data.

Variables		Suction Group		Non-suction Group	P value
Maternal age (mean±SD) years		25.4 (±4.1) yrs		21.4 (±3.4) yrs	0.001*
Antenatal visits (mean±SD)		4.2 (±2.8)		4.7 (±2.8)	0.196
Gravida	Primigravidas	61/127 (48.04%)		95/185 (51.35%)	0.645
	Multigravidas	66/127 (51.35%)		90/185 (48.65%)	
Complications in pregnancy	Yes	56/127 (44.09%)		59/185 (31.89%)	0.038*
	No	71/127 (55.91%)		126/185 (68.11%)	
AFI (USG)	Oligohydramnios (AFI<5)	11 /66 (16.67%)		14/131 (10.68%)	0.355
	Adequate AFI	55 /66 (83.34%)		117/131 (89.31%)	
USG	Not done	61/127 (48.04%)		54 /185 (29.19%)	0.001*
	Done	66 127 (51.96%)		131/185 (70.81%)	
MSAF	Thick MSAF	81 (63.78%)		88 (47.57)	0.007*
	Thin MSAF	46 (36.22%)		97 (52.43%)	
Fetal distress	Yes	55 (43.30)		84 (45.40)	0.802
	No	72 (56.70)		101 (54.60)	
Vaginal delivery		56 (44.09%)		114 (61.62%)	0.003*
Vaccum assisted		1 (0.78%)		0	0.850
Forceps assisted		9 (07.09%)		14 (07.56%)	0.952
LSCS		LSCS emergency	56 (44.09%)	48 (25.94%)	0.001*
		LSCS elective	5 (3.95%)	9 (4.86%)	

In population characteristics (Table 1) there was statistically significant difference among maternal age, complications during the pregnancy, ultrasonography not done during antenatal period in suction and non-suction group. There was statistically insignificant difference among antenatal visits, gravidity and AFI in antenatal USG in suction and non-suction group.

There was statistically significant difference in mode of delivery, both in LSCS and vaginal delivery.

Table 2: New-born demographic data.

Variable		Suction group	Non-suction group	p value
Sex	Male	69 (54.33%)	93 (50.2%)	0.186
	Female	93 (45.67%)	92 (49.7%)	
Gestational age	AGA	96 (75.60%)	124 (67.03%)	0.133
	SGA	31 (24.40%)	61 (32.97%)	
Birth	term	120 (94.49%)	179 (96.76%)	0.486
	post term	7 (5.51%)	6 (3.24%)	
Birth weight	< 2.5 kg	38 (29.92%)	62 (33.51)	0.586
Birth weight (gm) (mean±sd)		2646.2±491.2	2597.2±472.0	0.377
APGAR score at 1 min	< 7	20 (15.7%)	8 (4.3%)	0.001*
	> 7	107 (84.2%)	177 (95.6 %)	
APGAR score at 1 min (mean±sd)		7.8±1.9	7.9±1.4	0.012*
APGAR score at 5 min (mean±sd)		8.7±1.2	8.9±0.8	0.035*
ET suction required		44 (34.6%)	5 (2.7%)	0.000*
PPV required		32 (25.2%)	4 (2.2%)	0.000*

Table 3: Outcomes

Variables		Suction group	Non-suction group	p value
MAS	yes	34 (26.7%)	36 (19.5%)	0.167
	no	93 (73.2%)	149(80.5%)	
Only O_2 therapy		12 (9.5%)	14 (7.56%)	0.702
Ventilation		13 (10.23%)	4 (2.20%)	0.005*
CPAP		0	0	NA
Respiratory support	Required	25 (19.7%)	18 (9.7%)	0.019*
	Not required	102 (80.3%)	167 (90.3%)	
PPHN		4 (3.14%)	3 (1.62%)	0.613
Pneumothorax		0	0	NA
Pneumonia		0	1 (0.5%)	0.850
Inotropic support required		3 (2.36%)	3 (1.08%)	0.961
Complications		9 (7.9%)	11 (5.9%)	0.881
No complications		117 (92.1%)	171 (92.4%)	0.001*
Duration of hospital stay (days)		4.2 (+3.3)	4.0 (+2.6)	0.745
Death		5 (3.9%)	5 (2.74%)	0.779

In newborn's details, in both group birth weight similar (2646.2 gm in suction group versus 2597.2 gm no suction group p = 0.377), sex distribution were normal (p = 0.186) , gestational age wise distribution i.e. term (120/127 in suction group versus 179/185 in no suction group; p = 0.486), post term (7/127 in suction group vs 6/185 no suction group; p = 0.486), small for gestational age (31/127 in suction group versus 61/185 in non-suction group), appropriate for gestational age same in both group (96/127 in suction group vs 124/185 in non-suction group) {AGA versus SGA, p = 0.133} low birth weight babies distribution similar(38/127 versus 62/127, p = 0.586). But there were statistically significant difference in APGAR score at 1 minute and 5 minute, 20 babies had <7 APGAR score at 1 minute in suction group and 8 babies in non-suction group (p = 0.001), average APGAR score at 1 minute had statistically significant difference in suction and non-suction group (in suction group 7.8±1.9 in non-suction group 7.9±1.4, p = 0.012) score at 5 minute (8.7±1.2 versus 8.9±0.8, p = 0.035). Also, endotracheal suction (in suction group 44/127 versus in non-suction group 5/185, p <0.001) and positive pressure ventilation at the time of birth (32/127 in suction group versus 4/185 in non-suction group p < 0.001) both were significantly high in suction group compared to non-suction group (Table 2). Incidence of MAS was

similar in both groups, in suction group 34 babies developed meconium aspiration syndrome (MAS) out of 127 whereas in non-suction group 36 babies developed MAS (P = 0.167). Intrapartum suctioning made no difference to the occurrence of MAS. Intrapartum suctioning also not made any difference in death or survival (death 5/127 in suction group and 5/185 in non-suction group p = 0.779), duration of hospital stays (4.2±3.3 days in suction group and 4.0±2.6 p=0.745).

No baby developed pneumothorax in both groups, only one baby developed pneumonia that was in non-suction group. In both group occurrence of PPHN similar in both group (4/127 in suction group 3/185 in non-suction group p = 0.613). Babies required inotropic support were similar in both group (3/127 in suction group and 3/185 in non-suction group, p = 0.961). So that complications in both group similar (9/127 in suction group and 11/185 in non-suction group p = 0.881). But there was statistically significant difference in need of respiratory support (25/127 in suction group 18/185 in non-suction group p = 0.019), there were significantly more babies required mechanical ventilation (13/127 in suction group and 4/185 in non-suction group p = 0.005). Though need of only O2 therapy in both group similar (12/127 in suction group 14/185 in non-suction group p = 0.167) Table 3.

DISCUSSION

In our quasi randomized controlled trial assessor blind single centre study, of term-gestation infants born through MSAF, intrapartum suctioning did not decrease the incidence of MAS. Other important outcomes, including mortality, air leaks, length of hospital stay, persistent pulmonary hypertension, were similarly unaffected by this procedure.

In our trial, in suction group significantly more infants required endotracheal suction and positive pressure ventilation at the time of delivery compared to infants in non-suction group. Also, there was statistically significant difference in need of mechanical ventilation, though need of only O_2 therapy in both group similar.

Present study has similar findings as compared to other previous studies that assessed efficacy of intrapartum suction in prevention of meconium aspiration syndrome i.e. Falcigia et al, Vain et al.[11-13] In contrast to the present study Carson et al and Wiswell et al studies shown intrapartum suction has role in prevention in meconium aspiration syndrome.[14,15]

Carson et al reported an incidence of MAS of 1.9% among 947 patients with a mortality rate of 28% during a period when only post-delivery intubation and suction was performed compared with an incidence of 0.4% among 273 patients (P = 0.07), and no deaths when intubation and suctioning was combined with intrapartum suctioning.[14] There was a reduction in the number of cases and deaths due to MAS after the introduction of intrapartum suctioning, i.e. comparing the first period and the latter two periods, although this was not statistically significant.

By contrast, nonrandomized clinical trial by Suresh GK et al compared early suctioning (suctioning by the obstetrician before delivery of the thorax) and late suctioning (suctioning by the obstetrician after delivery of the thorax) and showed no difference.[16] The study reported a higher rate of meconium below the cords (53%) among the early suctioning group compared with the late suctioning group, which had a rate of 36% (P <0.001), but there was no difference in the incidence of MAS between the two groups (P >0.05).[16] The reason for the differences in occurrence of meconium below the cords in the second study is unclear.

A study by Yoder BA supported the use of intrapartum suctioning to reduce MAS when it reported on a subset analysis of a randomized controlled clinical trial.[17] The incidence of MAS was 8.5% in infants who did not have intrapartum suction (n = 94) compared with 2.7% in infants who had intrapartum suction (n = 54; P = 0.013).

Actually, this study was done to see effect of endotracheal suctioning in vigours baby for prevention of meconium aspiration syndrome, which was the primary outcome of study, and effect of intrapartum suction in prevention of meconium aspiration syndrome was secondary outcome. Intrapartum suction done in 2000 babies and not done 90 babies only, so there was grossly unequal distribution in both the groups.

Recently, Atlshuler G in a large, multicenter, randomized study, reported that routine intrapartum oropharyngeal and nasopharyngeal suctioning of term infants born through MSAF does not prevent MAS.[18] There were also no differences in subgroups of patients known to be at high risk of developing MAS. The subgroups included those with thick MSAF, abnormal fetal heart rate during labor, and those requiring extensive resuscitation in the delivery room. The study is the only large, randomized, clinical trial that has looked at intrapartum suctioning. This report provides the most conclusive evidence so far showing the failure of intrapartum suctioning to prevent MAS in the presence of MSAF. In this study total no. of patients were 2514, suction done in 1263 infants, not done in 1251 infants. There was no difference in incidence of MAS, in need of mechanical ventilation and mortality.

Current recommendation by AAP through the neonatal resuscitation programme, the international Liaison committee on resuscitation (ILCOR), and the ACOG, intrapartum management of these pregnancies has radically changed. Intrapartum suction of infants with MSAF is not recommended anymore.[19]

Despite the evidence and recommendations, some authors still recommend intrapartum suction, if there is MSAF,

especially for infants born in communities with limited resources, on the feeling that "the procedure is simple and does not carry significant adverse effects". They follow different strategy according to meconium consistency.[19] To base on feelings and assumptions such as a strong assertion that intrapartum suction may be different in low resources population is a rather weak argument; feelings and expert opinion considered level of evidence. Present study is carried out in tertiary care, referral hospital of Mumbai of low resource country, there major proportion of mother from middle and low socioeconomic status.

Suctioning of the hypopharynx is not a risk-free procedure. Potential complication such as the delay in delivery of the infant and the onset of resuscitation efforts, damage to mouth and hyphopharynx, and cardiac arrythemias secondary to vagal stimulation may result from the practices.[19]

In the present study significantly, more infants required post-delivery endotracheal suction and positive pressure ventilation in suction group compare to non-suction group, possible reason behind this is, the ratio of high risk mothers (having antenatal complications) was more in suction group than in non-suction group and as mentioned above suctioning is also associated with delay in delivery and onset of resuscitation efforts of infant.

CONCLUSION

Routine intrapartum suctioning of infants born through MSAF does not reduce the incidence of MAS. On the contrary, intrapartum suctioning might result in complications like more baby required neonatal resuscitation and respiratory support.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

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Cite this article as: Jain MK, Jain A, Sareen D. Intrapartum oropharyngeal and nasopharyngeal suctioning in neonates born through meconium-stained amniotic fluid: Indian scenario. Int J Contemp Pediatr 2018;5:2103-7.