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EDITORIAL

Neonatologists and non-vigorous newborns with meconium-stained amniotic fluid (MSAF) in the delivery room: time for hands off?

Comment on: Kumar A, Kumar P, Basu S. "Endotracheal Suctioning for Prevention of Meconium Aspiration Syndrome: A Randomized Controlled Trial." *European Journal of Pediatrics* 2019

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Abbreviation

DR	Delivery room
DRR	Delivery room resuscitation
GA	Gestational age
ETS	Endotracheal suctioning
MAS	Meconium aspiration syndrome
MSAF	Meconium-stained amniotic fluid
NICU	Neonatal intensive care unit
NPR	Neonatal resuscitation program
RCT	Randomized controlled trial

Fetal hypoxia causes intestinal peristalsis, relaxation of anal sphincter with release of meconium in the amniotic fluid, fetal gasping, and potential meconium aspiration in utero. Meconium can also be aspirated during the first breaths at birth. Meconium induces alveolar direct damage and injuries both the lung parenchyma and the endothelial cells by an inflammatory response. Between 3 and 12% of infants born with meconium-stained amniotic fluid (MSAF) develops meconium aspiration syndrome (MAS) [8], characterized by typical X-ray findings, respiratory distress, and frequently worsened by pulmonary hypertension [6]. Since MAS is burdened by a relevant neonatal morbidity and mortality [7], a skilled resuscitation team has to be present at the birth. The ILCOR 2015 recommendations [5], in the case of non-vigorous newborns with MSAF reached this consensus: "We suggest that routine tracheal intubation for suctioning of meconium in non-vigorous infants should not be considered as a standard of care but may be considered a reasonable alternative to no tracheal intubation if a meconium plug is suspected." This sentence invited to further research with well-powered RCTs on this approach to try to provide a definitive answer. Anyway, large RCTs in the delivery room are difficult to organize and are frequently burned by the deferred consent that is unusual in many countries. After all, there is not an increase of MAS after these guidelines; however, admission in the NICU of meconium-stained non-vigorous newborns in mechanical ventilation, oxygen, and surfactant therapy for respiratory distress seems to be increased [1]. On the other hand, since the severity of MAS mostly depends from the severity of acidosis due to prenatal hypoxia and from the degree of meconium aspiration already occurred in utero, post-natal tracheal suction seems not to affect the outcome [2]. The real amount of meconium aspirated from the trachea in non-vigorous neonates at birth is very difficult to define. For the neonatologist, is it really time for hands off?

In 2016, Nangia et al. [3] enrolled non-vigorous-term neonates born through MSAF in a pilot RCT, to be managed "with" ($n = 88$) or "without" ($n = 87$) endotracheal suction in course of neonatal resuscitation according to the NPR recommendations. The primary outcome was occurrence of MAS and/or death. No differences were found between the two groups, not only for the primary outcome but also for duration of respiratory distress, need for any respiratory support, and length of hospitalization. They concluded "in non-vigorous neonates born at term through MASF, endotracheal suction does not appear to alter the incidence of MAS and/or death." The authors stressed the need for a multi-center trial to address whether the current practices and guidelines can be justified but neither recent RCT nor systematic review of trials analyzing tracheal intubation at birth for prevention of morbidity/mortality among non-vigorous neonates born with MSAF have been published.

In 2017, a Cochrane review protocol has been published [4]. This review will include RCTs and cluster RCTs comparing tracheal suction with no tracheal suction at birth in non-vigorous neonates born through MASF. The review will include

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trials enrolling neonates born at term or late preterm. This review will measure the following: incidence of MAS, neonatal mortality, need of respiratory support, air leaks, hospitalization length, and incidence of neurodevelopmental delay.

In this issue of EJP, Kumar et al. report the results of an open-label RCT, in which randomized 132 non-vigorous neonates (> 34 weeks' GA) born with MSAF to receive routine endotracheal suctioning (ETS) ($n = 66$) or no ETS ($n = 66$) during delivery room resuscitation (DRR); the primary outcome was the incidence of MAS. The two groups did not differ with regard to DRR, need for respiratory support, and development of severe complications. No difference in the incidence of MAS, in the length of stay in hospital, and in mortality was observed. These findings suggest that routine ETS in the DR at birth is not useful in preventing MAS in non-vigorous neonates (both term and late preterm) born through MSAF. The results of the study of Kumar are object of interest for the Cochrane review protocol mentioned before. The study confirms that MAS is related above all to the in utero occurrence of meconium aspiration in the distal airways and also suggests that post-natal tracheal aspiration is ineffective in clearing meconium from the trachea and does not affect outcome. The study was performed in a single center and thus not generalizable, and we need further larger, multicenter RCTs to define standard of care of infants born though MSAF. In the meantime, without additional risks for patients, neonatologists may consider to keep their hands off the neonate.

Authors' Contributions The author wrote the paper entirely by himself.

Compliance with ethical statements

Conflict of interest The author declares that he has no conflict of interest.

Ethical approval This article does not contain any studies with human participants or animals performed by any of the authors.

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