Clinical Pearl: We Need to Intubate Before the Meconium Stained Baby's First Breath: Times Have Changed!

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It is 1977, and I am a first-year pediatric resident in the delivery room at Evanston Hospital during my first Infant Special Care Rotation (ISCU) rotation. I did a sub-Internship as a senior medical student with the pediatric surgeons at Children's Memorial Hospital and helped to care for a number of surgical neonates in the Neonatal Intensive Care Unit (NICU). As a result, I had the opportunity during this rotation to learn and perform many endotracheal intubations. Now, as a first-year pediatric resident with a definite interest in neonatology and lots of opportunity in the delivery room, I had the chance to perform a lot of intubations in meconium-stained newborn infants. Subsequently, I began to transport infants for Evanston and Children's and moonlight in the NICUs at Evanston and Prentice Women's Hospital over the next four years when we were taught that, first the obstetrician would suction with a DeLee suction catheter or bulb syringe on the perineum; then we would suction the mouth with a DeLee, visualize the cords and intubate the baby's airway. If there was meconium below the vocal cords, we were to continue to reintubate until the airway was clear of meconium. This was especially the case if there was thick meconium seen. Once I completed my 2-year neonatal fellowship in 1982, I worked with a group of dedicated ISCU nurses and my colleague, Dr. Elaine Farrell, and we did a prospective survey of delivery room practice of meconium-stained infants and published the results in Journal of Perinatology in 1988. (1) In that collection of patients from 1984-85, we cared for 464 meconium-stained infants and performed endotracheal intubation in 413 infants (89%). (1) There was evidence of meconium below the vocal cords in 76% of the infants when meconium was present at the level of the vocal cords 126/171 patients. (1) If no meconium was present on the vocal cords, it was present below the vocal cords only 7% of the time in those infants who were also intubated. (1) A total of 14 infants developed evidence of meconium aspiration syndrome (MAS), and of these, 2 developed persistent pulmonary hypertension of the newborn (PPHN). All 14 infants survived. (1) Of the 413 patients who were intubated, 3 developed transient stridor or hoarseness (0.7%). (1)

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Our thought process regarding the management of the airway of the infant with meconium staining of the amniotic fluid (MSAF) was divided into two parts. First, it was important for the obstetrician to suction the infant's airway using a bulb syringe or, at that time, a DeLee suction catheter on the perineum before the first breath. (1,2)

However, a more recent Cochrane review of routine oropharyngeal suctioning vs. no suctioning by Foster and colleagues demonstrated that:

"The currently available evidence does not support or refute the benefits or harms of routine oro/nasopharyngeal suction over no suction. Further high-quality studies are required in preterm infants or term newborn infants with thick meconium amniotic fluid. Studies should investigate long-term effects such as neurodevelopmental outcomes". (3)

Also, the American College of Obstetricians and Gynecologists (ACOG) opinion concluded that:

"Infants with meconium-stained amniotic fluid should no longer routinely receive intrapartum suctioning, whether they are vigorous or not. In addition, meconium-stained amniotic fluid is a condition that requires the notification and availability of an appropriately credentialed team with full resuscitation skills, including endotracheal intubation. Resuscitation should follow the same principles for infants with meconium-stained fluid as for those with clear fluid". (4,5)

"However, the need for ongoing respiratory support after the first postnatal day of life decreased from 36% to 11%, $p < 0.02$. (6) This observation is important as we used to believe that oropharyngeal and endotracheal suctioning to meconium-stained amniotic fluid was essential to prevent and attenuate the development of meconium aspiration syndrome (MAS)."

This history brings us to a new study just published in Hospital Pediatrics by Patrick Myers and Arika Gupta, of the effect of no longer routinely intubating non-vigorous term infants with MSAF (14,322 infants) between 2014 and 2017 (6). Overall, their analysis demonstrated a temporal improvement in one minute Apgar scores and a decreased need for respiratory support after the first day of postnatal life when comparing preintervention (January

1, 2014-January 1, 2016) with post-intervention (January 2016-January 1, 2017). There was also a significant decrease in the number of intubations in the delivery room (6). There was also no change (51% vs. 52%) in the percentage of infants with MSAF with respiratory symptoms and who required respiratory support at admission to the NICU (43% vs. 41%). (6) However, the need for ongoing respiratory support after the first postnatal day of life decreased from 36% to 11%, $p < 0.02$. (6) This observation is important as we used to believe that oropharyngeal and endotracheal suctioning to meconium-stained amniotic fluid was essential to prevent and attenuate the development of meconium aspiration syndrome (MAS). (1,2) A thoughtful editorial by Gupta and Lee suggests a large multicenter randomized controlled trial of the management of non-vigorous infants with MSAF to answer the question about optimal management would be ideal, but really challenging. (7)

One other important point made by Myers and Gupta in their study and discussed by Gupta and Lee is the fact that providers now have fewer opportunities to perform endotracheal intubations on infants with MSAF in the delivery room, which, for all of us who practiced in the 1980s and had many opportunities, found to be challenging at times. (1,6,7) The era of "see one, do one, teach one" has ended, and simulation provides a less stressful opportunity to practice endotracheal intubation on newborn infant high fidelity models with experienced instructors. (6,7) For those of us who practiced in that era, and now have had the opportunity to experience simulation, I found this simulation experience really helpful. One example of the efficacy of simulation in the retention of delivery room skills for pediatric residents is illustrated in the paper by Kamath-Raye and colleagues. (8)

The approach to delivery room management of infants with MSAF continues to evolve with well designed clinical observation studies, including the study by Myers and Gupta. (6) The editorial by Gupta and Lee also provides some other excellent examples for review. (7)

References

1. *Hageman JR, Conley M, Francis K, Stenske J et al. Delivery room management of meconium staining of the amniotic fluid and the development of meconium aspiration syndrome. J Perinatol 1988; 8(2): 127-131.*
2. *Hageman JR. Meconium staining of the amniotic fluid: The need for reassessment of management by obstetricians and pediatricians. Curr Prob Pediatr 1993, November/December.396-401.*
3. *Foster JP, Dawson JA, Davis PG, Dahlen HG. Routine oro/nasopharyngeal suction versus no suction at birth. Cochrane Database of Systematic Reviews 2017, Issue 4. Art. No.: CD010332. DOI: 10.1002/14651858.CD010332.pub2.*
4. *Committee Opinion No.689 Summary: Delivery of a Newborn With Meconium-Stained Amniotic Fluid. Obstet Gynecol. 2017;129(3):593–594. doi:10.1097/AOG.0000000000001946*
5. *https://www.acog.org/Clinical-Guidance-and-Publications/Committee-Opinions/Committee-on-Obstetric-Practice/Delivery-of-a-Newborn-With-Meconium-Stained-Amniotic-Fluid*
6. *Myers P, Gupta AG. Impact of the revised NRP meconium aspiration guidelines on term infant outcomes. Hospital Pediatrics 2020;10 (3): 295-299.*
7. *Gupta A, Lee HC. Revisiting the latest NRP guidelines for meconium: searching for clarity in a murky situation. Hospital Pediatrics 2020; 10 (3): 300-302.*
8. *Kamath-Raye BD, Tabangin ME, Taylor RG, Geis GL. Retention of basic neonatal resuscitation skills and bag-mask ventilation in pediatric residents using just-in-place simulation of varying frequency and intensity: A pilot randomized controlled study. Hospital Pediatrics 2019; 9((): 681-689.*

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