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Can we Manipulate the Future of the Microbial Flora of the Cesarean Born Infant?

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Editorial

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Abstract

Infants born by CS might have less diversity and heterogeneous microbiome especially during the first weeks of life. Hence, investigators are evaluating whether maternal vaginal microbes applied to the face and mouth of the infant during the first hours of life affects gut microbiome of the infant afterwards.

Keywords: Lactobacillus; Microbiome; Mode of Delivery Caesarean Delivery

Abbreviations: CS: Cesarean Sections

Editorial

Cesarean sections (CS) are among the most common performed surgical procedures worldwide. Delivery by CS has been associated with an increased risk of some adverse health outcomes in children such as asthma and obesity [1]. The effect of mode of delivery on the development of the infant microbiome and microbial equilibrium is one of the factors that affect the development of several adverse pediatric health outcomes later in life.

Mode of delivery along with pre- and perinatal factors such as breast feeding, microbial flora of the mother, bottle feeding and infection play an important role in the formation of the infant's microbiome and contribute to the development of his/her immune status [2]. Moreover, increased risk for atopy related diseases, such as asthma and allergy were associated with the mode of delivery [3].

Infants born by CS might have less diversity and heterogeneous microbiome especially during the first weeks of life. This less heterogeneous microbial flora (microbiome) exists particularly during the first 21 days after delivery. Infants born through CS acquire microbes from the delivery theater which is more or less sterile, and do not resemble the microbes acquired from normal vaginal delivery where the microbes are acquired from the birth canal and vagino-anal area.

Moreover, the immune system (innate and adaptive) of the newborn exists and starts developing directly after birth by the help of the microbial flora acquired during delivery. Low concentration of bacteria is present in the meconium of the vaginally delivered infant. The neonatal stool (meconium) is not fully sterile and actual colonization of the intestinal tract starts during delivery and develops throughout the first and second years of life [4]. Since the infant gut microbial flora diversity in infants born by CS is low; consequently, it has lower Th1 response than those born by normal vaginal delivery [5] (Figure 1).

Figure 1: Inoculum' of Vaginal Bacteria for Cesarean Mode of Delivery.

Thinking of the idea of partial restoration of the microbiota of CS-infants could be done when the vaginal-anal microbial content is introduced to the CS delivered infant directly after birth. The vaginal content is very limited and low in Lactobacillus spp. and does not contain the microbes of the gut of the mother but both can help especially when the mother is on probiotics before delivery.

If the mother is on probiotics during pregnancy and feeds the infant directly by breast milk then this will help formulate the microbial flora of the infant [6].

Collecting birth-canal bacteria and wiping them onto babies after birth could help babies delivered by CS to restore some of the vaginal bacteria which they missed [7]. This is done by using gauze to gather a mother's birth-canal bacteria and apply on the face of babies born by CS thus making the bacterial populations to partially resemble those of vaginally born babies. This intervention is simple but needs to gain medical approval [8].

During labor, the baby is passing the birth canal and in tight contact with the mucosa of the birth canal for a long time so bacteria start to establish in the mouth and gut while growing and colonizing before the baby is delivered. This gauze technique for CS infants would seem to be a simple intervention. Nevertheless, we have to be cautious as with any vaginal delivery to make sure that the mother is HIV-negative, strep-B negative, and has an acid lactobacillus-dominated vagina [8].

Some consider this procedure as a type of fecal transplant, since the gauze applied on the vaginal area will get some of the anal bacteria. Fecal transplant is not a natural exposure. It works under certain circumstances. The inoculation of vaginal content to CS delivered infants is just exposing the baby partially to the natural environment which he/she receives in normal vaginal delivery. Since the first germs to colonize the newborn delivered vaginally come almost exclusively from its mother, the first to reach an infant born by CS come mostly from the environment, particularly bacteria from inaccessible or less-scrubbed areas like lamps and walls, and skin cells from everyone else in the delivery room.

Hence, inoculum of vaginal bacteria could be a solution, but to what extent would the mothers' bacteria restore the composition of bacteria in the CS babies?

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