Chapter 1

HOW DOES BIRTH TYPE AFFECT NEWBORN AND CHILD HEALTH?

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INTRODUCTION

Labor is a physiological process in which the fetus and its appendages are expelled from the uterus to the external environment by effacement and dilatation of the cervix as a result of regular and painful uterine contractions (Taşkın, 2014). Childbirth is a turning point with important changes for the whole family as well as for women. Birth is a personal process in which a woman experiences many biological and psychological changes (Bostan ve Kabukçuoğlu, 2022). Although birth is a physiological event, it is not completely risk-free. In this process, deciding on the mode of birth is one of the steps to be taken (Palas Karaca & Genç Koyuncu, 2015). Birth is a special process for each woman and individual factors are taken into account in the choice of birth. This preference should be given individually, respecting the mother's decision. Mothers want to have a say in the mode of delivery and to participate in the decision. At this stage, the duty of midwives and nurses; To ensure the appropriate participation of the pregnant woman in the decision of the mode of delivery (Vatansever & Okumuş, 2013).

The mode of delivery is of great importance as it affects the health of both the mother and the newborn in the short and long term. For this reason, the aim of this review is to evaluate the effects of delivery method on newborn and child health in the short and long term. In this direction, the mode of delivery was considered as vaginal delivery, operative vaginal delivery and cesarean section. Possible effects of delivery method in terms of newborn and child health are given in Table 1.

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VAGINAL DELIVERY

Vaginal delivery is defined as the effacement and dilatation of the cervix and the expulsion of pregnancy products through the vagina due to the onset of uterine contractions. Vaginal birth is known as the most suitable birth method for the mother's nature (Palas Karaca & Genç Koyuncu, 2015). The endorphin hormone secreted during vaginal delivery facilitates the adaptation of the baby to the external environment. In babies born by vaginal delivery, skin-to-skin contact between mother and baby occurs faster and easier. This contact is very important for mother and baby bonding and development. It is known that babies start to suck earlier and their skills such as massaging the breast are better. Babies born by vaginal delivery move from a sterile environment to a non-sterile environment. Taking beneficial bacteria from their mothers while passing through the vaginal canal ensures the regulation of the immune system and contributes to immunity. Babies born this way have a vaginal microbiota with beneficial bacteria. In addition, respiratory problems such as atopic eczema, allergic rhinitis, conjunctivitis and asthma are less common in these babies (Cuppari et al., 2015; Kaya Şenol & Aslan, 2015).

Among the short-term advantages of vaginal delivery for the newborn are increased adaptation to the external environment and natural physiological adaptation to respiratory, hematological and immunological systems. Respiratory distress syndrome, transient tachypnea, and admission to neonatal intensive care are less common in newborns. In studies in the literature, it was found that immune functions and allergic responses were more developed in babies born by vaginal delivery (Gregory et al. 2012; Liu et al., 2015) and mean hematocrit, potassium, calcium, and glucose levels of the postpartum umbilical artery were higher (Majzoobi et al., 2014). Younis et al. revealed in their study that newborns born by vaginal delivery have higher levels of red blood cell, white blood cell, neutrophil and monocyte counts in cord blood than those born by cesarean section (Younis et al., 2017). It is stated that newborns born vaginally have a stronger response to stress and pain than newborns born by elective cesarean section (Schuller et al., 2012).

The long-term advantages of vaginal delivery in terms of child health are that diseases such as atopic eczema, dermatitis syndrome, allergic rhinitis, conjunctivitis and asthma are less common than babies born by cesarean section (Cuppari et al., 2015). However, childbirth is not a completely risk-free event. Neonatal risks of vaginal delivery are related to asphyxia, birth trauma, shoulder

dystocia and its sequelae (long term). Birth trauma includes injury to the brachial plexus, fracture of the diaphragm nerve or clavicle, or humerus (Gregory et al. 2012).

In a study comparing vaginal delivery (n=178) and cesarean section (n=178) in Pakistan, it was determined that the rates of neonatal complications were low and there was no difference between the groups in terms of APGAR score, neonatal infection, and cord pH. (Atta et al., 2022). In the study in which patients who had cesarean section (n=60) and vacuum vaginal delivery (n=53) in the second stage of labor were evaluated retrospectively, it was determined that there was no difference between the two groups in terms of admission to the neonatal intensive care unit, Apgar score at 5 minutes <7and fetal blood PH (Yüksel et al., 2020). In a cohort study examining the effect of mode of delivery on neonatal outcomes in Brazil, it was determined that mode of delivery had no effect on neonatal death (within the first 28 days of life), APGAR score, need for mechanical ventilation, transient tachypnea, meconium aspiration syndrome, and hyaline membrane disease (Prado et al., 2018). According to the study in which the results of 6 studies involving 122 women were evaluated in the Cochrane database; when the babies of the mothers in the elective cesarean section group were compared with the babies of the mothers in the elective vaginal delivery group, it was determined that there was no statistically significant difference in terms of respiratory distress syndrome, newborn convulsions and mortality. Again in the same study, no significant difference was found between planned cesarean section and planned vaginal delivery in terms of birth wound, birth asphyxia and Apgar score at 5 minutes <7. It was stated that there was no difference between the groups in terms of initiation of breastfeeding, neonatal seizure, hypoxic ischemic encephalopathy, and respiratory distress syndrome (Alfirevic et al., 2013). According to the results of this study; New studies are needed for a stronger expression of the short and long term advantages of vaginal delivery for the newborn (Gregory et al., 2012).

Table 1. Possible Effects of Delivery Method on Newborn and Child Health

	Vaginal delivery	**Cesarean section**
Possible effects in the short term	Skin-to-skin contact between mother and baby is faster and easier Respiratory problems such as atopic eczema, allergic rhinitis, conjunctivitis and asthma are less (Cuppari et al., 2015; Kaya Şenol & Aslan, 2015) Respiratory distress syndrome, transient tachypnea, less admission to neonatal intensive care Adaptation to the external environment, natural physiological adaptation related to respiratory, hematological and immunological systems (Gregory et al., 2012; Liu et al., 2015) Immune functions and allergic responses are more advanced (Gregory et al., 2012; Liu et al., 2015) Postpartum umbilical artery mean hematocrit, potassium, calcium, glucose levels are higher (Majzoobi et al., 2014) Responses and responses to stress and pain are stronger (Schuller et al., 2012)	Prevention of cord, hand and foot sagging, shoulder fixation, clavicle, long bone fractures and brachial nerve paralysis Reduction in fetal injuries and neonatal neurological damage (Torloni et al., 2011) Less intracranial hemorrhage (Davies & Kadir, 2016) Less neonatal trauma, neonatal infection, hypoxic-ischemic encephalopathy and meconium aspiration (Liu et al., 2015) Fetal depression, short-term pulmonary dysfunction, neonatal respiratory distress syndrome, transient tachypnea, fetal hypoxia, neonatal mortality due to hyaline membrane, delayed neurological adaptation, iatrogenic trauma in the newborn, central nervous system injuries, asphyxia and stillbirth (Gregory et al., 2012; Kıyak Çağlayan et al., 2011; Pei et al., 2014) Newborns are more likely to be admitted to intensive care (Negrini et al., 2021; Offermann et al., 2015)
Possible effects in the long term	Asphyxia, birth trauma, shoulder dystocia and its sequelae (Gregory et al., 2012) Less asthma, allergic rhinitis, atopic eczema dermatitis (Cuppari et al., 2015)	Celiac disease, Type 1 diabetes, (Pei et al., 2014; Cho & Norman, 2013) Obesity (Liu et al., 2015; Pei et al., 2014) Astigmatism (Liu et al., 2017) Learning and behavioral problems (Demirgöz Bal et al., 2013; Neu & Rushing, 2011)

Table 1. *Continue*		
	Vaginal delivery	**Cesarean section**
Sıimilar in possible effects	APGAR score, neonatal infection, cord Ph (Atta et al., 2022)	
	Neonatal death (within the first 28 days of life), need for mechanical ventilation, transient tachypnea, meconium aspiration syndrome, and hyaline membrane disease (Prado et al., 2018)	
	Respiratory distress syndrome, neonatal convulsion and mortality, birth wound, birth asphyxia and Apgar score at 5 minutes, Breastfeeding initiation, neonatal seizure, hypoxic ischemic encephalopathy, respiratory distress syndrome (Alfirevic et al., 2013)	
	Asthma and allergic disease development (38), necrotizing enterocolitis rates (Son et al., 2016; Kirollos & Abdel-Latif, 2017), celiac disease, pneumonia, bronchopulmonary dysplasia, patent ductus arteriosus, retinopathy of prematurity, pneumonia, early and late onset sepsis (Lionetti et al., 2017; Serçe et al., 2014), neonatal mortality, sepsis, short bowel syndrome, transition time to oral feeding (Kirollos & Abdel-Latif, 2017)	

OPERATIVE VAGINAL DELIVERY (FORCEPS AND VACUUM)

Operative vaginal delivery is the use of tools such as forceps and vacuums to safely perform or accelerate labor in the presence of maternal and fetal indications. Indications for operative vaginal delivery are situations where the mother is exhausted and cannot push effectively, or there is a medical necessity for the mother and baby. Operative vaginal delivery accounts for 2-23% of deliveries. Although operative vaginal deliveries are seen as an advantageous method compared to cesarean section; it has important effects on newborn and child health in the short and long term (ACOG, 2015).

Although operative vaginal delivery provides a reduction in neonatal trauma and morbidity in some cases; may expose the fetus to stress. When the short-term disadvantages of operative vaginal deliveries in terms of newborn health are investigated; **Complications of forceps** include scalp and skin lacerations, external ocular trauma, subgaleal hematoma, intracranial hemorrhage, hyperbilirubinemia, retinal hemorrhage, lipoid necrosis, nerve injuries, tentorium tears, skull fractures, and death. Asphyxia may occur as a result of cord compression between the fetal head and the forceps. Injury to the brachial plexus can result in fracture of the diaphragm nerve or clavicle or humerus (Gregory et al., 2012). **Complications of vacuum are** cephalohematoma, facial nerve palsies, subgaleal hematoma,

retinal hemorrhage, intracranial hemorrhage, hood succedanum and scalp lacerations. Complications related to incorrect application such as not understanding the contraindications of vacuum, applying excessive negative pressure, applying long-term and incorrect traction can also be seen (Sanhal et al., 2011). Intracranial hemorrhages (subdural, subarachnoid, intraventricular, intraparenchymal) and neuromuscular injuries are among **the long-term complications of vacuum in terms of child health** (Durukan & Aksan, 2008). In the retrospective study of Çetin et al. to evaluate the perinatal outcomes of the cases who gave birth with forceps and vacuum application, the complications in the cases in which vacuum was applied were cephal hematoma and intracranial hemorrhage; It is emphasized that the complications in cases where forceps were applied are severe perineal trauma (3rd or 4th degree laceration), fecal incontinence and cephal hematoma in the later period (Çetin et al., 2012).

In a study examining nulliparous birth data from 1995 to 2003 in New York, according to cesarean section; more fractures, facial nerve palsy and brachial nerve palsy in forceps deliveries; lower rates of neurological complications, intraventricular hemorrhage or subdural hemorrhage have been reported (Werner et al, 2011). Compared to cesarean; It is known that vacuum delivery is mostly associated with cephal hematoma, scalp injury, fracture and brachial plexus damage (Walsh et al., 2013).

Among the long-term disadvantages of operative vaginal delivery in terms of child health are the sequelae and complications that occur mostly due to intracranial hemorrhages and neuromuscular injuries. However, it is stated in the literature that the risk of long-term complications related to operative vaginal delivery is low (Walsh et al., 2013). Operative vaginal delivery can be considered a successful method with rare adverse neonatal outcomes when performed safely and carefully (Yüksel et al, 2020).

In a cohort study by Dahlgren et al. in which they compared nulliparous cesarean section (n=1046) and vaginal delivery (n=38021), it was determined that the **neonatal risk was highest in the operative vaginal delivery and emergency cesarean section groups** (Dahlgren et al., 2009). In a cohort study by Thavarajah et al. in which they examined the relationship between mode of delivery and neonatal outcomes on 39,258 births, compared with vaginal delivery; It is emphasized that **neonatal outcomes** (respiratory distress, seizures, breastfeeding problems, sepsis, neonatal death) **are worse in the emergency and planned cesarean section and operative delivery group (especially emergency cesarean section)** (Thavarajah et al., 2017).

CESAREAN SECTION

Cesarean section is the process of delivering the fetus and its appendages through a surgical incision made on the abdominal and uterine wall starting from the 28th week of pregnancy (Taşkın, 2014). Cesarean section is one of the most frequently performed major surgical procedures in the world and in our country (Çakmak et al., 2014; Dahlke et al., 2013). While cesarean section is a procedure performed to save the life of the expectant mother and the baby; Recently, it has become a procedure frequently preferred by both doctors and pregnant women with the belief that it is safer for the baby and mother (Çakmak et al., 2014; Demirgöz Bal et al., 2013; Dhai et al., 2011).

Although the World Health Organization has predicted the ideal cesarean section rate as 10-15% since 1985; cesarean section rates are increasing rapidly both in the world and in Turkey. The global cesarean rate is 21.1%; the lowest rates are reported in Sub-Saharan Africa, and the highest rates in Latin America and the Caribbean. The top five countries with the highest cesarean rates worldwide are the Dominican Republic (58.1%), Brazil (55.7%), Cyprus (55.3%), Egypt (51.8%) and Turkey (50.8%) has been reported (Betran et al., 2021).

Cesarean section is an advantageous method when vaginal delivery is not possible. It is stated that cord, hand and foot sagging, shoulder fixation, clavicle, long bone fractures and brachial nerve paralysis can be prevented by cesarean section. Thus, it is stated that there is a decrease in fetal injuries and neonatal neurological damage (Torloni et al., 2011). Davies and Kadir showed in their systematic review and meta-analysis study that cesarean section reduces intracranial hemorrhage in newborns with hemophilia compared to vaginal delivery and operative vaginal delivery (Davies & Kadir, 2016). A cohort study from China reported that cesarean section was associated with less neonatal trauma, less neonatal infection, hypoxic-ischemic encephalopathy, and meconium aspiration (Liu et al., 2015). However, cesarean section also has some disadvantages in terms of newborn and child health in the short and long term. **Among the short-term disadvantages in terms of newborn health**; fetal depression due to anesthesia, lung dysfunction, neonatal respiratory distress syndrome, transient tachypnea, fetal hypoxia, neonatal mortality due to hyaline membrane, delayed neurological adaptation, iatrogenic trauma in the newborn, central nervous system injuries. Thoracic air volume in babies born by cesarean section is lower than babies born by vaginal route. In addition, asphyxia and stillbirth can be seen in the short term due to neonatal respiratory diseases. Problems related to digestion, liver function disor-

ders, jaundice, dehydration, infection, nutrition, hypoglycemia, immature brain and regulation of body temperature may occur in newborns in preterm births due to cesarean section (Gregory et al., 2012; Kıyak Çağlayan et al., 2011; Pei et al., 2014). Khafipour and Ghia showed in their study that cesarean section changes the microbiota of the gut and increases the sensitivity of immune cells to inflammation (Khafipour and Ghia, 2013). In a study conducted in New York, when compared to operative vaginal deliveries; It was determined that there were more newborns with a 5th minute APGAR score of <7 in the cesarean section (Werner et al., 2011). Again in the literature, it was determined that the rate of admission to the intensive care unit was higher in newborns in the cesarean section group (Negrini et al., 2021; Offermann et al., 2015).

It has been reported that **long-term disadvantages of cesarean section in terms of child health** are associated with increased asthma rates, risk of allergic rhinitis, food allergy/sensitivity, atopic eczema dermatitis syndrome, conjunctivitis and atopy (Gregory et al., 2012; Demirgöz Bal et al., 2013). It is also stated to be a risk factor for long-term effects on immune-related conditions such as respiratory morbidity, celiac disease and type 1 diabetes (Cho &, Norman, 2013; Pei et al., 2014). Liu et al. reported in their meta-analysis study that there is a relationship between cesarean section and obesity (Liu et al., 2015). Pei et al. compared to women who gave vaginal birth in their study; In the cesarean section group, the rate of obese infants at age 2 is higher (Pei et al., 2014). In the study of Liu et al. compared to children who gave birth vaginally; It has been determined that the risk of astigmatism is higher in children born by cesarean section (Liu et al., 2017). At school age, attention is drawn to the potential to pose a risk in terms of learning and behavioral problems (Demirgöz Bal et al., 2013; Neu & Rushing, 2011). However, in the literature, different results have been reported in studies evaluating the effect of cesarean section on necrotizing enterocolitis, celiac disease, asthma, allergic disease, atopy, fever and atopic eczema dermatitis syndrome. Aynaci et al. stated in his study that the mode of delivery had no effect on the development of asthma and allergic diseases (Aynacı et al., 2012). In the study conducted by Son et al. it was stated that there was no difference between vaginal delivery and cesarean section in terms of necrotizing enterocolitis rates (Son et al., 2016). Again, some studies in the literature have shown that the mode of delivery is not important in terms of celiac disease, pneumonia and sepsis (Lionetti et al., 2017; Serçe et al., 2014). In the study conducted by Serçe et al. it was stated that no statistically significant relationship was found between the mode of delivery and bronchopulmonary dysplasia, patent ductus arteriosus, retinopathy of pre-

maturity, pneumonia, and early and late-onset sepsis (Serçe et al., 2014). Lionetti et al. showed in their study that the mode of delivery is not important in terms of the rate of celiac disease (Lionetti et al., 2017). Kirollos and Abdel-Latif (2017) showed in their meta-analysis study that 38 studies were examined, that the mode of delivery was not associated with general and neonatal mortality, necrotizing enterocolitis, sepsis, short bowel syndrome, and time to transition to oral feeding (Kirollos & Abdel-Latif, 2017).

Midwives and nurses have great duties in the prenatal, birth and postpartum period. It is necessary to determine the risks that may endanger the birth in the antenatal period and to provide situation-specific solutions. However, despite regular check-ups, some urgent and critical problems may arise at the time of birth. Birth is not a completely risk-free event. In these cases, it may be necessary to resort to operative vaginal delivery and cesarean section. Because it is important for the mother and the baby to get rid of this process in the healthiest way possible. For this, nurses and midwives are in an important position (Erenel & Çiçek, 2018).

CONCLUSIONS

In this review, the effect of the mode of delivery on short and long term newborn and child health has been examined. Although vaginal delivery seems more advantageous in terms of newborn and child health; the presence of interventions during vaginal delivery gains importance. Because any intervention in labor causes the birth to go away from its natural course, even if it is vaginally. Although operative vaginal deliveries and cesarean section are life-saving in any medical indication; it has disadvantages in terms of newborn and child health. For this reason, it is difficult to state the certainty of the short and long-term effects of the mode of delivery in terms of newborn and child health and to talk about their superiority in terms of each other. Birth is a unique process for each woman, and the choice of mode of delivery should be made by respecting the mother's decision and taking into account individual factors. In this process, the decision should be made individually with the cooperation of the physician, nurse or midwife.

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