CASE REPORT

What is the Cause of the Caput Succedaneum and the Region of Periosteal Blood Congestion of the Blood of the Skull?

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ABSTRACT

The mechanism of the appearance of a caput succedaneum and the region of periosteal blood congestion of the skull is considered. It is indicated that to date, the cause of the appearance of caput succedaneum is considered to be the direct pressure of the cervix and uterine walls on the fetal head, which is incorrect. The cause of the caput succedaneum is a violation of the outflow of blood from the presenting part of the head due to the formation of a contact belt between the head and the wall of the birth canal of the mother.

Key words: Caput succedaneum, extracranial birth lesions, head contact belt, region of periosteal blood congestion, venous congestion

INTRODUCTION

A caput succedaneum is an area of edema with small hemorrhages in the tissues of the parieto-occipital region of the head (with head presentation) that occurs during childbirth and disappears within the first 1–3 days after birth. With frontal presentation, edema and hemorrhage occur in the forehead, with facial presentation - in the face, and with pelvic presentation - in the buttocks, scrotum and labia. The «region of periosteal blood congestion» (RPC) arises in the periosteum of the present part of the head and is currently found only when examining the skull of dead children. The location of the RPC corresponds to the location of the caput succedaneum. This allows us to draw a conclusion about the general mechanisms of the pathogenesis of the caput succedaneum and RPC. The aim of the work is to discuss the pathogenesis of a caput succedaneum and RPC.

DISCUSSION

In the course of childbirth with head presentation, the following extracranial birth lesions can occur in the head tissues: (1) Caput succedaneum, (2) region of periosteal blood congestion of the skull (remote procedure call [RPC]), (3) epicranial subaponeurotic hemorrhage, and (4) cephalohematoma. Consider the first two, one could not write about a caput succedaneum if its cause was understandable and universally recognized. Unfortunately, in encyclopedias, Wikipedia, dictionaries, in many sites devoted to birth injury, and in the scientific literature, the cause of a caput succedaneum is the pressure of the head on the cervical region and the pressure of the uterine walls on the head tissue. The caput succedaneum is believed to be "results from pressure on the presenting part of the skull against the dilating cervix,"[1] "compression on the presenting part, exerted by the uterus or cervix,"[2] "is caused by pressure on the head of the fetus,"[3] "severe swelling that involves the scalp of the newborn, and is caused by pressure on the head,"[4] "that results from circulatory stasis caused by compression exerted by the uterus or cervix on the presenting part,"[5] "normally results from pressure placed on the child's scalp during delivery,"[6] and others. In these and similar interpretations of the cause (genesis) of the caput succedaneum, the main thing is not reflected: Caput succedaneum arises not from any

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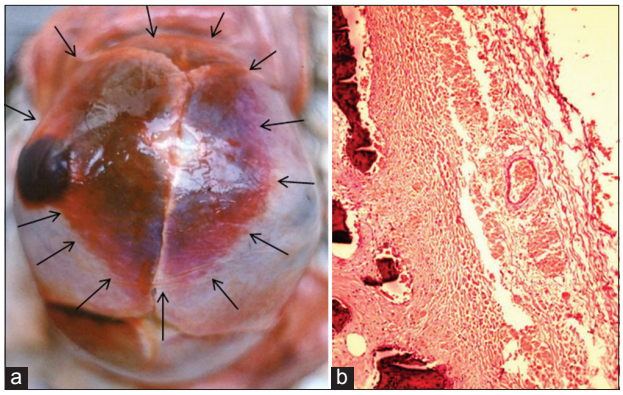

Figure 1: The region of periosteal blood congestion of the skull (RPC). (a) RPC in the skullcap region in neonates (arrows). There is a small cephalhematoma on the periphery of the RPC and an additional fontanel along the sagittal suture. (b) Histological sections of the parietal bone with the periosteum in the RPC. Enlarged plethoric subperiosteal vessels with perivascular hemorrhages. Hematoxylin and eosin ×80

pressure on the fetal head, but from arising venous stasis in the presenting part of the head due to a violation of venous outflow of blood. In the process of childbirth, a "contact belt" is formed between the fetal head and uterine tissues in the birth canal. The pressure on the fetal head during labor can be 120–500 mm Hg.[7,8] The pressure from the side of the uterine wall is maximum in the region of the head contact belt and amounts to 200–300 mm Hg or more.[9]

The head contact waistband is formed at the level of the upper half of the pubic joint and the body of the first sacral vertebra. The contact belt divides amniotic fluid into the front and back. It is at the level of this contact belt that blood vessels, primarily veins, are compressed, and the outflow of venous blood from the tissues of the underlying part into the superficial veins of the head above the contact belt is disrupted. Blood rushes through the diploic veins into the internal venous system of the head. However, due to the insufficiency of this outflow, edema and small perivascular hemorrhages develop in the head tissue below the contact belt.

In the area of the contact belt, the vessels of the periosteum, including the subperiosteal veins, are also compressed. This leads to overflow of blood vessels of the periosteum below the contact belt in the birth canal of the mother, the occurrence of small focal perivascular hemorrhages. In this case, a region of periosteal blood congestion of the periosteum of the skull is formed [Figure 1], which was first identified by me,[10] and which indicates the position of the head in the birth canal. Microscopic examination of SCR in the periosteum determines multiple perivascular hemorrhages [Figure 1b]. When assessing RPC, it can be concluded about the location of the leading point of the head and measure the degree of asynclitism.[11] With RPC, there is no periosteum detachment with the occurrence of subperiosteal hemorrhage. This is a sign of difference between RPC and cephalohematomas [Figure 1a].

CONCLUSION

In the process of childbirth with head presentation, pressure occurs from the side of the walls of the birth canal to the fetal head, which leads to the configuration of the skull, the formation of a contact belt of the head in the birth canal. This leads to a violation of the outflow of blood from the tissues of the presenting part of the head, the formation of a caput succedaneum, and RPC. If the caput succedaneum does not have clear boundaries, it quickly disappears after birth; then the RPC has relatively clear boundaries, it can persist up to 10 or more days after birth. Therefore, RPC can be used for diagnostic purposes in newborns and monitoring the quality of labor management.

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How to cite this article: Vlasyuk V. What is the Cause of the Caput Succedaneum and the Region of Periosteal Blood Congestion of the Blood of the Skull? Clin Res Obstetrics Gynecol 2019;2(2):1-2.