

PHYSIOLOGICAL BIRTH PREPARATION

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Abstract: Until now, studies of birth physiology among humans were based on interpretations of difficulties. Textbooks have extensively reproduced comparative drawings of maternal pelvis and fetal head to explain the particularities of childbirth in our species. This is why the importance of mechanical factors has been overestimated by theoreticians. Instead of focusing on difficulties, we should first interpret the well-known fact that, occasionally, women who are not special from a morphological perspective can give birth easily and quickly, while others need medical intervention after days of hard labor. This enormous discrepancy is providing reasons to include birth physiology in the framework of brain physiology. This article aims to interpret some of the physiological maternal changes in late pregnancy.

Keywords: pregnancy, birth, human development

It is essential to realize that the part of the brain that has reached an extreme development in our species—the “new brain” or neocortex—does not always play the role of a tool at the service of vital physiological functions. On the contrary, in some particular situations, it can inhibit and weaken such functions. It is as if the tool may become the master. The concept of neocortical inhibition is becoming a key to understanding human nature in general, and some physiological processes—such as the process of parturition—in particular. In a renewed scientific context, a reduction of neocortical control appears as the main factor that makes human birth possible and potentially easy. When this solution found by nature is understood, it is becoming easy, in a first step, to analyze and summarize the basic needs of a laboring woman: She needs to feel protected against all possible neocortical stimulations. The keyword is protection. The main stimulants of neocortical activity are well-known: language, light, and all attention enhancing situations. In a second step, it is becoming possible

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to introduce the concept of physiological birth preparation. On the day when the concept of neocortical inhibition is assimilated and popularized, it will be easy to interpret some of the physiological maternal changes in late pregnancy.

Symptoms and Signs

For a long time, it has been noticed that, at the end of their pregnancies, many women are not as mentally sharp as usual. They mention anecdotes of memory loss, and occasionally poor concentration. Their topics of interest become different. Their needs for socialization may be reduced and reoriented.

This deep-rooted, empirical knowledge is convincingly supported by imaging techniques. As early as 2003, an American study had observed that in late pregnancy, there is a significant reduction of the blood flow in the large arteries going to the brain (Zeeman, Hatab, & Twickler, 2003). Significant decreases occur in both the middle and posterior cerebral arteries between 36 and 38 weeks of gestation. Unfortunately, there is no available data regarding brain blood flow during the very last days of pregnancy. According to a complementary study by the same authors, there is no reduction of the blood flow in the case of preeclampsia (Zeeman, Hatab, & Twickler, 2004). More recently, a Spanish and Dutch team has demonstrated that during pregnancy there are gradual reductions in grey matter volumes (Hoekzema et al., 2017). The observed volume reductions are not distributed randomly across the brain, but are located in areas of the cortex that play a key role in sociability. It is as if the need for privacy is already increasing before the process of parturition starts. There were no changes in the grey matter volumes of the fathers, an evidence for the selectivity of the changes for women undergoing pregnancy. Furthermore, brain changes were similarly affected regardless of means of conception (natural or medically assisted).

The rising rates of melatonin (the “darkness hormone”) might also be presented as a component of this preliminary phase since its release tends to reduce neocortical activity: The synergy between melatonin and GABA (the main inhibitory neurotransmitter) is an established fact (Kivela, 1991; Nakamura et al, 2001; Tamura et al, 2008). We even know about the kind of light that has the most powerful inhibitory effect on melatonin release: It is the blue part of the spectrum (Bagci et al., 2012; Nakamura et al., 2001; Tamura et al., 2008). This kind of knowledge is of paramount importance since modern lifestyle is characterized by the widespread use of a new generation of artificial light (Light Emitting Diodes). This kind of light is rich in the blue spectrum.

We must also keep in mind that the role of melatonin during the birth process is confirmed by its comparatively high concentration in the blood

of babies “born with labor” (Bagci et al., 2012). It is roughly twice the level among babies born by the vaginal route or by caesarean section during labor, compared with babies born by “pre-labor caesarean section.” Let us open a parenthesis to underline the paramount importance of these findings: The protective anti-oxidative properties of melatonin are widely documented.

The peak production of ALLO (allopregnanolone) by the placenta during the days preceding birth might also be considered an important aspect of the preliminary phase. ALLO is a positive modulator of GABA (Children’s National Health System, 2018).

We must add that altered memory and absentmindedness in pregnancy have been the topic of publications in a great diversity of scientific and medical journals. The common point between such studies is a widespread tendency to consider physiological changes during pregnancy only in the framework of preparation for motherhood. As long as there is a lack of interest in birth physiology, it is commonplace to forget that between the time when a woman is pregnant and the phase of mother-infant interaction, there is an acute and critical event, which is giving birth, and that this event needs to be physiologically prepared for.

It is notable that the countless descriptions of what we present as symptoms and signs of this preliminary phase have attracted the attention of a diverse public. Some of them have directly reached health professionals involved in obstetrics (Keenan, Yaldoo, Stress, Fuerst, & Ginsberg, 1998; Sharp, Brindle, Brown, & Turner, 1993), others have reached psychiatrists (Christensen, Leach, & Mackinnon, 2010), others have reached mostly general practitioners (Davies, Lum, Skouteris, Byrne, & Hayden, 2018; de Groot, Vuurman, Hornstra, & Jolles, 2006), or other specialized physiologists (Glynn, 2010; Henry, & Sherwin, 2012; Shetty, & Pathak, 2002). Many have reached psychologists and psychotherapists, and had echoes in the media and the general public.

One can wonder why, in many such studies, it was difficult to confirm facts considered obvious and even established. The main reason is undoubtedly that researchers are not thinking in terms of the preliminary phase of parturition. This is why they are vague about the phases of pregnancy they are exploring. For example, in a huge study published in an authoritative journal of obstetrics, a period as long as the last four months is presented as “late stage of pregnancy” (Keenan et al., 1998). There are reasons to be more curious about the last four weeks and even the last four days! Another reason for discrepancies between the results is that memory has often been the main criterion explored by researchers. The point is that there are many kinds of memory: retrospective, prospective, short-term, long-term, spatial, verbal, visual, emotional, and also priming memory and working memory. When taking into account the point of view of mothers and the results of one particular study, it seems that an altered prospective memory (remembering to perform an act at

the right time) is a frequent aspect of what is commonly called “baby brain” (Rendell, & Henry, 2008).

There are aspects of pre-labor behavior that are not easily measured, and therefore evaluated, through scientific methods. The high incidence of lost objects is still in the framework of empiric knowledge: there are countless anecdotes of women in late pregnancy who lost their keys, their mobile telephone, or their credit card. Some aspects of maternal behavior in the preliminary phase of parturition justify the term “nesting instinct,” since a nest is a protective structure built by certain animals to hold either eggs, or the offspring or, occasionally, the animal itself. The content of a nest is cut off from the rest of the world. In humans, the urge to clean, tidy, and organize the environment has been traditionally interpreted as a sign that labor and delivery are imminent. From an overview of what we learn from tradition, empiric knowledge and scientific knowledge, we can summarize a simple conclusion about the period of transition preceding the process of parturition: It is a phase of human life when down-to-earth preoccupations prevail over all the others.

Practical implications

From a practical perspective, the main question is: “Who must understand that before giving birth women need to live in peace and be protected against unnecessary intellectual stimulations?” The answer is that everybody is concerned, since everybody may have occasionally the opportunity to communicate with pregnant women. In other words, we are studying the evolution of cultural conditioning. However, in the context of the 21st century, we must consider in particular several aspects of a radically renewed social environment, such as small modern family structures, and the medicalization of pregnancies.

The point is to realize the importance of the topic and to phrase urgent questions at a time when this phase of human life is frequently altered, shortened or eliminated, not only through labor induction or pre-labor cesarean section, but also through many aspects of modern lifestyle.

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