IN-LABOUR INTRAUTERINE LIFE

THE PHYSIOLOGICAL REFERENCE

di Michel Odent – **www.wombecology.com**

During labour the fetus must suddenly adapt to dramatic alterations of its environment. It must protect itself, in particular via the release of hormones such as noradrenaline and endorphins. Long before the industrialisation of childbirth, all cultures have disturbed the birth process and therefore the in-labour intrauterine environment, even if only through beliefs and rituals. This is why we must first refer to the physiological perspective. Physiologists look at what is universal and cross-cultural. They offer a sort of reference point. Then the effects of the most common deviations from the physiological reference will be more easily interpreted.

Humans as mammals

All mammals give birth thanks to the sudden release of a flow of hormones. One of these hormones - namely oxytocin - plays a pivotal role. It is necessary to contract the uterus for the birth of the babies and for the delivery of the placentas. It is involved in the induction of maternal love: it is the main component of a real 'cocktail of love hormones' (among the other components of this cocktail are endorphins, prolactin, and vasopressin).

All mammals can also release an emergency hormone – namely adrenaline – whose effect is to stop the release of oxytocin. The emergency hormone adrenaline is released in particular when there is a possible danger.

The fact that adrenaline and oxytocin are antagonistic explains that the basic need of all mammals giving birth is to feel secure. In a wild environment a female cannot give birth as long as there is a possible danger, for example the presence of a predator around. In that case it is an advantage to release adrenaline, which brings more blood to the skeletal muscles and gives more energy to fight or to run away; it is also an advantage to stop releasing oxytocin and to postpone the birth process. There is in fact a great diversity of situations associated with a release of adrenaline. Mammals release adrenaline when they feel observed. It is noticeable that they all rely on a specific strategy not to feel observed when giving birth: privacy is obviously another basic need. The emergency hormone is also involved in thermoregulation. In a cold environment one of the well-known roles of adrenaline is to induce the process of vasoconstriction. This explains that, for the act of bearing

young, mammals must be in a place that is warm enough, according to the adaptability of the species.

Since humans are mammals these physiological considerations suggest that in order to give birth women must feel secure, without feeling observed, in a warm enough place.

The human handicaps

While the physiological perspective can easily identify the basic needs of labouring women, it can also make easily understood the specifically human handicaps in the period surrounding birth. The human handicaps are related to the huge development of that part of the brain called the neocortex. It is thanks to our highly developed neocortex that we can talk, count and be logical and rational. Our neocortex is originally a tool that serves the old brain structures as a means of supporting our survival instinct. The point is that its activity tends to control more primitive brain structures and to inhibit the birth process (and any sort of sexual experience as well).

Nature found a solution to overcome the human handicap in the period surrounding birth. The neocortex is supposed to be at rest so that primitive brain structures can more easily release the necessary hormones. That is why women who give birth tend to cut themselves off from our world, to forget what they read or what they have been taught; they dare to do what civilized women would never dare to do in their daily social life (daring to scream, to swear, to be impolite etc.); they can find themselves in the most unexpected, often primitive quadrupedal posture; I heard women saying afterwards: ‘I was on another planet’. When a labouring woman is ‘on another planet’, this means that the activity of her neocortex is reduced. This reduction of the activity of the neocortex is an essential aspect of birth physiology among humans.

This aspect of human birth physiology implies that one of the basic needs of labouring women is to be protected against any sort of neocortical stimulation. From a practical point of view it is useful to explain what this means and to review the well-known factors that can stimulate the human neocortex.

Language, particularly rational language is one such factor. When we communicate with language we process what we perceive with our neocortex. This implies, for example, that if there is a birth attendant, one of her main qualities is her capacity to keep a low profile and to remain silent, to avoid in particular asking precise questions. Imagine a woman in hard labour, and already "on another planet". She dares to scream out; she dares to do things she would never do otherwise; she has forgotten about what she has been taught or read in books; she has lost her sense of time and then she finds herself in the unexpected position of having to respond to someone who wants to know at what time she had her first contractions! Although it is apparently simple, it will probably take a long time to rediscover that a birth attendant must remain as silent as possible.

Bright light is another factor that stimulates the human neocortex. Electroencephalographers know that the trace exploring brain activity can be influenced by visual stimulation. We usually close the curtains and switch off the lights when we want to reduce the activity of our intellect in order to go to sleep. This implies that, from a physiological perspective, a dim light should in general facilitate the birth process. It will also take a long time to convince many health professionals that this is a serious issue. It is noticeable that as soon as a labouring woman is on 'another planet' she is spontaneously driven towards postures that tend to protect her against all sorts of visual stimulation. For example she may be on all fours, as if praying. Apart from reducing the back pain, this common posture has many positive effects, such as eliminating the main reason for fetal distress (no compression of the big vessels that run along the spine) and facilitating the rotation of the baby's body.

A feeling of being observed can also be presented as another type of neocortical stimulation. The physiological response to the presence of an observer has been scientifically studied. In fact, it is common knowledge that we all feel different when we know we are being observed. In other words, privacy is a factor that facilitates the reduction of neocortical control. It is ironic that all non-human mammals, whose neocortex is not as developed as ours, have a strategy for giving birth in privacy - those who are normally active during night, like rats, tend to give birth during the day, and conversely others like horses who are active during the day tend to give birth at night. Wild goats give birth in the most inaccessible mountain areas. Our close relatives the chimpanzees also move away from the group. The importance of privacy implies, for example, that there is a difference between the attitude of a midwife staying in front of a woman in labour and watching her, and another one just sitting in a corner. It implies also that we should be reluctant to introduce any device that can be perceived as a way to observe, may it be a video camera or an electronic fetal monitor.

In fact any situation likely to trigger a release of adrenaline can also be looked at in the framework of factors that tend to stimulate the neocortex. When there is a possible danger, it is vital to remain alert and attentive. Another way to conclude that to feel secure is a basic need.

The mechanical difficulties of the birth of Homo Sapiens are also related to brain development. At term, the smaller diameter of the baby's head (which is not exactly a sphere) is roughly the same as the larger diameter of the mother's pelvis (which is not exactly a cone). The evolutionary process adopted a combination of solutions in order to reach the limits of what is possible.

The first solution was to make pregnancy as short as possible, so that, in a sense, the human baby is born prematurely. Furthermore we have realized recently that the pregnant mother can, to a certain extent, adapt the size of the fetus to her own size by

modulating the blood flow and the availability of nutrients to the fetus. That is why small surrogate mothers carrying donor embryos from much larger genetic parents give birth to smaller babies than might have been anticipated.

From a mechanical point of view, the baby's head must be as flexed as possible, so that the smaller diameter is presenting itself before spiralling down to get out of the maternal pelvis. The birth of humans is a complex asymmetrical phenomenon, the maternal pelvis being widest transversally at the entrance and widest longitudinally at the exit. A process of 'moulding' can slightly reshape the baby's skull if necessary.

Our close relatives

When mentioning the mechanical particularities of human birth, one cannot help referring to and comparing ourselves with our close relatives the chimpanzees. The head of a baby chimpanzee at term occupies a significantly smaller space in the maternal pelvis, and the vulva of the mother is perfectly centered, so that the descent of the baby's head is as symmetrical and as direct as possible. It seems that since we separated from the other chimpanzees, and all along the evolution of the hominid species, there has been a conflict between moving upright on two feet and, at the same time, a tendency towards a larger and larger brain. The brain of the modern Homo is four times bigger than the brain of our famous ancestor Lucy. There is a conflict in our species because the pelvis adapted to the upright posture must be narrow to allow the legs to be close together under the spine, which facilitates transfer of forces from legs to spine when running. An upright posture is the prerequisite for brain development. We can carry heavy weights on our head when we are upright. Mammals walking on all fours cannot do the same. That is apparently why the process of evolution found other solutions than an enlarged female pelvis in order to make the birth of the 'big-brained ape' possible: the faster our ancestors could run, the more likely they were to survive.

Why humans are special

Physiologists constantly refer to what they learn from non-human mammals. This leads to keep in mind the main differences between human beings and other species. One of the main differences is that the effects of a disturbed birth process on maternal behaviour are much more evident at an individual level among non-human mammals.

Countless animal experiments have confirmed that maternal behaviour can be dramatically disturbed by general anaesthesia. Almost a century ago, in South Africa, Eugene Marais was making experiments to confirm his intuition as a poet that a connection exists between the pain of birth and maternal love.(1) He studied a group of sixty Kaffir Bucks, knowing that there had not been a single instance of a buck mother in the herd rejecting her young in the previous fifteen years. He proceeded to

give the birthing females a few puffs of chloroform and ether, and noticed that the mothers refused to accept their newborn lambs afterwards. Maternal behaviour is also highly disturbed by regional anaesthesia. In the 1980s, Krehbiel and Poindron studied the effects of epidural anaesthesia among ewes giving birth.(2) The results of this study are easily summarized: when ewes give birth with an epidural anaesthesia, they don't take care of their lamb.

Today caesareans are common in veterinary medicine, particularly among dogs. This is possible as long as human beings compensate for a frequently inadequate maternal behaviour, assist the process of nursing and provide, if necessary, commercial canine milk replacers. The effects of a caesarean on the maternal behaviour of primates are well documented, because several species of monkeys are used as laboratory animals. This is the case of the 'crab-eating macaques' and the rhesus monkeys.(3) In these species the mothers do not take care of their baby after a caesarean; laboratory personnel must spread vaginal secretions on the baby's body in order to try to induce the mother's interest for her newborn.

We don't need to multiply the examples of animal experiments and observations by veterinarians and primate-using scientists to convince anyone that a caesarean – or just the anaesthesia that is necessary for the operation – can dramatically alter the maternal behaviour of mammals in general.
In this regard humans are special. Millions of women all over the world have taken care of their baby after a caesarean birth or simply an epidural birth or a 'twilight sleep birth'.

We know why the behaviour of humans is more complex and more difficult to interpret than the behaviour of other mammals, including primates.(4) Human beings have developed sophisticated ways to communicate. They speak. They create cultures. Their behaviour is less directly influenced by their hormonal balance and more directly by the cultural milieu. When a woman knows that she is expecting a baby, she can anticipate displaying some maternal behaviour. This does not mean that we cannot learn from non-human mammals. The spectacular and immediate behavioural responses of animals indicate the questions we should raise about ourselves.

Where human beings are concerned, the questions must include terms such as "civilisation" or "culture". For example, if other mammals do not take care of their babies after a caesarean, we must first wonder: 'What is the future of a civilisation born by caesarean?'

References:

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2 – Krehbiel D, Poindron P. Peridural anaesthesia disturbs maternal behaviour in primiparous and multiparous parturient ewes. Physiology and behavior 1987; 40: 463-72.
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