

Process of child labour and delivery



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1.Introduction

The ultimate desire of every expectant woman or couple is that pregnancy results in delivery of a healthy infant to a healthy mother. Most times, labour and delivery are uneventful and the family welcomes the newborn with joy. However this process may result in complications that turn the potentially joyous experience into a sour, distasteful nightmare, sometimes climaxing in the worst case scenario – loss of the life of the woman or her child. Thus, for the practicing obstetrician, the importance of mastering the science and art of managing labour and delivery cannot be over-emphasized. Other professionals such as nurses also have important roles to play in the process, and should continually seek knowledge to improve their practice.

1.Definitions

Labour has many definitions by various authors. It can be seen as the onset of painful, palpable uterine contractions after the age of viability, associated with cervical dilatation and effacement with descent of the presenting part, culminating in the expulsion of the products of conception to the outside world per vaginam[C2]. Labour is said to be normal when retrospectively seen to be of spontaneous onset at term, involving a singleton pregnancy with the fetus in vertex presentation, lasting no more than 12 hours, coming to an end with minimal intervention, and devoid of complications to mother and baby. Any deviation from these characteristics makes the labour process abnormal.

Delivery, on the other hand, refers to the mode of expulsion of a viable fetus and placenta to the outside world. Viability here refers to the period above a fixed gestational age or a fetal weight above which independent extrauterine

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existence of a fetus is possible in a given environment. For most parts of West Africa to date, this is taken to be 28 weeks or 1 kg, but is as low as 20 weeks or 500 g in some parts of the world. Delivery may be vaginal (either spontaneous or assisted) or abdominal, as in a caesarean delivery.

1. Initiation of Labour

The main trigger for the onset of labour in humans is still not well understood. However, it is a fact that the uterus remains in a relative state of quiescence throughout pregnancy, with uterine activity increasing with advancing gestational age, and reaching its peak at term. During the period of uterine inactivity, the myometrium remains unresponsive to stretch, while the cervix maintains its anatomical and structural integrity to carry the pregnancy to term³ [C3]. In the last 6 to 8 weeks of pregnancy however, the uterus begins to contract. These contractions are generally painless, brief, and weak, not producing any cervical changes. They are referred to as Braxton Hicks contractions or false labour. The cervix also begins to undergo changes in its connective tissue, which becomes invaded with inflammatory cells and cytokines. Collagen breakdown and rearrangement of collagen fibre bundles occur. There is variation in the amounts of glycosaminoglycans, particularly hyaluronic acid present. This increases the cervix's ability to retain water. Levels of dermatan sulphate also decrease, resulting in decreased crosslinking of collagen fibres. These changes result in increased pliability, thus permitting effacement and dilatation of the cervix as labour ensues. All these events serve as a prelude to labour itself; but they do not explain the change from “pre-labour” to labour proper.

Some of the proposed stimuli for kick-starting the labour process are discussed below.

3. 1 Uterine stretching

As the fetus grows and liquor volume increases, there is a stretching effect on the uterus. Uterine stretching causes the expression of contraction associated proteins (CAPs) which include oxytocin receptors, gap junction proteins, and others. These proteins, together with prostaglandins which are released by the same stimuli, aid in the initiation of the labour process.

3. 2. Prostaglandins

Various factors such as separation or rupture of the membranes, vaginal examination, infection, increase in cytokine levels, and mechanical stretching all contribute to increase production of prostaglandins, which aid cervical ripening and are known to play a role in the initiation of the labour process.

3. 3. Oestrogen & Progesterone

Oestrogen causes increased production of contraction-associated proteins (e.g. oxytocin receptors and actinomyosin) and also stimulates release of oxytocin from the posterior pituitary gland. Other mechanisms include increasing prostaglandin concentrations in the decidua and amnion. All these effects are related to the labour process, and seen to occur towards term. While all this is happening, progesterone secretion falls due to an increase in production of fetal DHEA-S and Cortisol, which reduce progesterone production by inhibiting conversion of pregnenolone to progesterone. This

results in an alteration of the oestrogen-progesterone balance, which then results in prostaglandin synthesis.

1. *Fetal contribution*

The fetal hypothalamo-pituitary-adrenal axis is activated as term approaches, and this results in increased synthesis of Corticotrophin Releasing Hormone (CRH), Adrenocorticotropin Hormone (ACTH) and Cortisol production. The release of Cortisol triggers increased production of oestrogen and also stimulates phospholipase A2 enzyme which mobilizes arachidonic acid from the glycerophospholipids of the fetal membranes. Arachidonic acid then goes through the cyclo-oxygenase enzyme pathway, leading to production of prostaglandins which then results to initiation of labour.

1. Stages of labour

Labour is classified into three stages:

F irst stage spans from the onset of uterine contractions to attainment of full cervical dilatation.

S econd stage begins from full cervical dilatation to delivery of the baby while the *third stage* is the period from delivery of the baby to delivery of the placenta and membranes.

The first stage is subdivided into two phases – a passive phase, which extends from the onset of labour pains to a cervical dilatation of 4cm, and an active phase, extending from 4cm dilatation to full cervical dilatation. The passive phase is characterised by relatively slow cervical dilatation with no predictable rate, and may vary from hours to days. The active phase,

however, is characterised by a rapid and relatively constant rate of cervical dilatation at a minimum of 1cm per hour. This expected line of cervical dilation when plotted on the cervicograph is referred to as the “ Alert line”. This will be discussed more under monitoring of labour using the partogram [C4].

The second stage, which represents the final descent of the fetus through the birth canal, is divided into two phases:

1. Pelvic or Passive phase is the period between full cervical dilatation to the time when the parturient starts feeling the urge to bear down. In this phase the presenting part is yet to reach the pelvic floor.
2. Perineal or Active phase is the period characterized by intense urge to bear down and the parturient usually experiences involuntary urge to “ push” the presenting part to the outside world par vaginam.

The duration of the second stage of labour varies between multiparas and nulliparas, and also depends on whether or not regional anaesthesia is used during labour. The Consortium on Safe labour established the 95th percentile for second stage length in nulliparas to be 2. 8 hours (168 min) in the absence of regional anaesthesia and 3. 6 hours (216 min) with regional anaesthesia. In multiparas, the values were 1 hour without regional anaesthesia and 2 hours with regional anaesthesia.

The third stage of labour extends from delivery of the fetus to delivery of the placenta, and usually lasts no longer than 30 minutes. Here, placental separation occurs in part due to the rapid reduction in uterine volume following delivery of the fetus, leading to shearing off of the placenta from its

attachment to the uterine wall. The uterus usually remains contracted, shutting off the blood vessels that supplied the placenta during the pregnancy and preventing excessive haemorrhage. Failure of the uterus to contract or failure of the placenta to separate from its attachment may result in the third stage problems of postpartum haemorrhage or retained placenta[C5]respectively.

1. Monitoring of labour using the partograph

The partograph is a pictorial record of the process of labour, and of fetal and maternal condition during labour. It is a tool designed to help prevent prolonged labour and promptly identify any abnormalities of the labour process that require intervention or referral.[C6]

The partograph was initially designed by R. H. Philpott in 1972, but was later modified and simplified by the World Health Organization. It is easy to use, decreases the incidence of prolonged labour, prevents unnecessary interventions, facilitates early referral, and decreases the maternal and perinatal morbidity and mortality due to obstructed labour.

It has 3 major components: the fetal record, the cervicogram, and the maternal record. Other components besides these three include the identification section which carries information such as name, age, parity, hospital number, date, time of admission, time of rupture of membranes, past obstetric history, past medical history, and examination notes.

5. 1. Fetal Record: This consists of two components – the fetal heart rate (FHR) and the colour of the liquor. The FHR is recorded every 15 minutes on the partogram, while the colour of the liquor is recorded at every vaginal

examination, usually every 4 hours. The FHR is plotted using dots on the graph, which has the FHR on the y-axis and time on the x-axis. These dots may be connected with a line to give a picture of the FHR variation. The normal fetal heart rate is between 120 and 160 beats per minute for a term fetus. Single readings outside the normal range may be innocuous, but a persistently low or high FHR for longer than 10 minutes may be an indicator of fetal distress.[C7] It should be noted that fetal heart rate could dip during the height of a uterine contraction with immediate recovery to baseline at the end of the contraction phase. This is a normal physiologic response of the fetus to reduce utero-placental blood flow during uterine contraction and usually no specific intervention is required. Additionally, those monitoring fetal heart conditions during labour should also be aware of the relative physiologic fetal bradycardia that occurs due to fetal head compression in the second stage of labour.

5. 2. The Cervicogram:

The cervicogram gives an instant picture of the progress in labour in terms of cervical dilation over time. The cervicogram has two diagonal lines running upwards from left to right and parallel to each other. The first is the alert line, which proceeds from the cervical dilatation at admission into active phase labour at 1cm per hour to full cervical dilatation. This line depicts the expected path of labour progress in the active phase, and deviations from this path particularly to the right could give early warning of abnormal labour requiring specific actions. The second line, called the “ Action line”, is a line drawn 4cm to the right of the alert line and parallel to it. It should be noted that in monitoring labour, the action line should not be crossed without a

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specific intervention or action taken to address the potential problem causing the sub-optimal progress.

Another indicator of progress of labour is descent, which is also plotted on the same graph using an ' o '. Descent is defined as the number of fifths of the fetal head palpable per abdomen. These recordings are done at every vaginal examination, usually 4 hourly.

5. 3. Maternal Record: This carries the maternal vital signs of pulse, blood pressure and temperature. It also has a section for urine parameters - urine volume and the presence of protein or acetone using dipsticks.

Drugs and infusions given to the parturient are also recorded in a special section of the partograph.

Infusions of oxytocin are also recorded, stating the concentration used and the rate of infusion. It is important to note that the decision whether or not to use oxytocin infusion should only be taken by a physician.

1.Complications of labour

These can be classified based on the stage of labour in question

6. 1. First stageComplications: in the latent phase, problems could include maternal anxiety, fetal malpresentation and malposition, prolonged latent phase, fetal distress, cord prolapse, prolonged rupture of membranes, hypertensive disorders of pregnancy, failed induction of labour, and others. In the active phase, uterine hypocontractility, obstructed labour, haemorrhage, cord prolapse, meconium staining of the liquor,

cardiotocographic abnormalities, fetal distress, fetal demise, cervical dystocia, cephalopelvic disproportion, maternal dehydration and ketosis.

6. 2. Second Stage Complications: Here, there may be maternal exhaustion, delayed second stage, fetal distress, cord prolapse, fetopelvic disproportion, shoulder dystocia, problems with breech delivery such as entrapment of the aftercoming head, and malposition.

6. 3. Third Stage Complications: The commonest third stage complication is Postpartum haemorrhage and retained placenta. These complications are best prevented through the active management of the third stage of labour [C8]. This entails administration of an oxytocic within the first minute of delivery of the baby, early cord clamping, delivery of the placenta by controlled cord traction and uterine massage. To further prevent the phenomenon of post partum haemorrhage following delivery, a 'fourth stage' labour has been advocated. This is the first 4-6 hours following delivery of the placenta when maternal vital signs as well as monitoring for uterine tone is done to prevent or to diagnose and treat promptly any unexpected event of haemorrhage after child birth.

7. Conclusion

Labour and delivery are the climax of pregnancy, and the precise mechanism for the initiation of labour is still not well understood in humans. However multiple theories exist on the events that kick-start the process. There are three stages of labour which have unique problems that can be identified early with a partograph. The knowledge of labour and delivery and their management is ever important for all professionals involved in this process.

Successful management of labour and delivery gives life and joy, while mismanagement or delayed diagnosis and intervention can result in preventable morbidity and mortality to the mother her baby or both!

Further Reading

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