

CHAPTER I

LABOR

Definition:

Labor or parturition is the process where by the products of conception (fetus, placenta, membranes) are expelled from the uterus as the result of regular ,progressive, frequent and strong uterine contraction through the birth canal (*Lowder milk & Perry, 2007*).

Physiology of labor:

Progesterone and relaxin may promote the uterus quiescent during pregnancy, weak and irregular contraction occurs through out the last month of pregnancy; eventually a series of regular, rhythmic, and forceful contraction. These may last for several hours, a day or even longer and result in the expulsion of the foetus, placenta, and membrane. Although not all of the factors leading to the initiation of labor are known endocrine, paracrine and mechanical stretching of the uterus all play a role (*Boron & Boul Paep, 2003*).

Theories explain the onset of labor:

Black Burn and Loper (2003) emphasize that the cause of onset of labor may be involves both maternal and fetal factors. Maternal factors such as; progesterone withdrawal, increase oestrogen levels, prostaglandins and oxytocin sensitivity. Fetal factors; such as cortisol level, also are playing a role in the onset of labor.

A) - Maternal factor: That causing onset of labor

Estrongen and Progesterone: It is believed that progesterone causes relaxation of the myometrium. Progesteron plays an imporant role in maintaining the length of gestation, whereas estrongen stimulates myometrial contraction. Estrogen level begins to increase at about 34 to 35 week's gestation, a decrease in uterine responsiveness to progesterone. The changes in these steroid levels are responsible for the increased number of myometrial gap junctions. Gap junctions are protiens that connect cell membranes, facilitating coordinated uterine contractions and myometrial stretching. Estrogen also stimulates the production of prostaglandin in the decidua and fetal membranes, which increases stimulation of smooth muscle contraction of the uterus (*Boron & Boul Paep, 2003; Littleton & Engebretson, 2005*).

Prostaglandins: The uterus as well as the placenta and fetal membranes synthesize and release prostagladins. Prostaglandins from uterine decidual cell, particulary PGFzex and PGE2, act by a paracrine mechanism. Prostagladins have three major effects. First, Prostagladins strongly stimulate the contraction of uterine smooth muscle cells. Second, PGFzex potentiates the contractions induced by oxytocin by promoting formation of gap junctions between uterine smooth muscle cell. Third, prostaglandins also cause softening, dilatation and thinning out (effacement) of the cervix (*Boron & Boul Paep, 2003*).

Oxytocin : it is secreted from the pars nervosa of the pituitary gland. The number of oxytocin receptors in the uterus increases, as a gestation nears term. Estrogen stimulates the synthesis of oxytocin receptors and although maternal serum progesterone levels do not decrease immediately before human parturition. Estrogen levels raise and oxytocin receptor synthesis increase. Oxytocin, which stimulates

powerful uterine contraction, play major role in parturition. Oxytocin is released in response to stretch of the cervix through a neuroendocrine reflex. Maternal oxytocin levels increase through out pregnancy (*Littleton & Engebretson, 2005; Koepfen and Stanton, 20008*).

During second stage of labor, oxytocin release may play a synergistic role in the expulsion of the fetus. During third stage of labor, uterine contractions induced by oxtocin are also important for constricting uterine blood vessels at the site of placenta.

Relaxin: it is the hormone produced by corpus luteum, the placenta, and the decidua. Relaxin may play a role in keeping the uterus in a quiet state during pregnancy. Production and release of relaxin increases during labor (**Boron & Boul Paep, 2003**). It may soften (ripen) the cervix and also loosens ligaments holding the pelvic bones together (*Silver Thorn, 2009*).

B) - Fetal factor: An increase in fetal adrenocorticotropic hormone level at term has an effect on uterine sensitivity to oxytocin and prostaglandins. Thus, stimulating the onset of labor increased cortisol levels and also decrease the production of progesterone by placenta. Cortisol plays a role in initiating parturition remains attractive naturally (*Littleton & Engebretson, 2005*).

Involution of the uterus: it is due primarily to a changing endocrine milieu, almost immediately following delivery of the newborn, marked changes occur in the endocrine status of the mother. The vasculature of the uterus regresses and blood flow to the uterus is significantly curtailed leading to further involution of this organ (**Boron & Boul Paep, 2003**).

Factors affecting the labor process :

Five important factors affect the process of labor (five "Ps") namely; passageway or the birth canal, passenger (the fetus and placenta), power (the uterine contractions), position of mother, psychological response of the mother (*Littleton & Engebretson, 2005*).

Passageway: The passageway consists of both a hard passage (bone pelvis) and a soft passage (maternal soft tissue structures).

Maternal bony pelvis: The pelvis is the bony ring known as the hip girdle, which separates the lower extreme from the trunk. It transmits body weight to the lower extremities. In women, the pelvis also serves as the passage for the fetus to be born.

Pelvic structures: The major pelvic bones include to innominate bones (formed by the fusion of the ilium, ischium, and pubis around the acetabulum), sacrum and coccyx. For obstetric purposes, the pelvis divided into halves, the false pelvis and the true pelvis. An imaginary line called the linea terminalis which extends from the symphysis pubis to the sacrum prominence, separates them (*Orshan, 2008*).

The pelvis is divided into the false pelvis and true pelvis. The false pelvis is the shallow upper section of the pelvis. The true pelvis is the lower curved bony canal, including the inlet, cavity, and outlet, through which the fetus must pass in the birth process. There are four types of female pelvis; gynecoid, android, anthropoid, and platypelloid. These various pelvis types can play a large role in determining the ease of a vaginal delivery. Gynecoid and platypelloid are characterized with wide suprapubic arches, whereas narrow arches android and anthropoid increase the likelihood of forceps and cesarean deliveries (*Littleton & Engebretson, 2005*).

Maternal Soft Parts: For normal labor and birth, the soft tissues of the cervix, vagina, and perineum must stretch to allow passage of the fetus. Progesterone and relaxin increase the elasticity of the muscles and ligaments. Estrogen promotes growth of the vaginal mucosa and underlying tissues and increases cellular glycogen when engagement of fetal head occur (*Orshan, 2008*).

Passenger: The ease with which the passenger goes through the pelvis is determined by many fetal factors: head size, presentation, lie, attitude, and position. There are several aspects are critical to outcome of labor (*Olds, et al., 2004*).

Power: The primary stimulus powering labor is uterine contraction. Contraction can cause complete dilation and effacement of the cervix, during first stage of labor (*Ricci & Kyle, 2008*). The secondary power is the bearing down which involves the contraction of abdominal muscle to increase intra-abdominal pressure which exerted by the woman. Also, secondary power involves the urge to bear down (Ferguson reflex) which occur during second stage (*Rollant, et al., 2001*).

Position: Maternal position in labor can have an effect on both the mother and fetus. During the first stage of labor, it may be psychologically beneficial for the mother not to be confined to lying supine in bed.. If a mother chooses to remain in bed, she should be encouraged to find her most comfortable position. The optimal position for woman, however, may range from sitting in a rocking chair to using a labor ball or being in a semi-reclined position. All positions have advantages and disadvantages. For example, although the squatting position may increase the size of the pelvic outlet, it may be difficult, for woman with an epidural to assume this position. In the absence of a clear

cut "best" position during labor, it is important to consider maternal needs, both physical and psychological, as well as fetal well-being (*Littleton & Engebretson, 2005*).

Psychological response of the mother: Maternal emotional status strongly influences the progression of child birth. The psyche of a frightened and anxious can affect on normal physiology of labor and birth. High levels of catecholamines may interfere with the normal process. Norepinephrine and epinephrine may stimulate both α , β and γ receptors of myometrium and interfere with labor's rhythmic nature, culminating in a pattern of ineffective contraction and, consequently, prolonged child birth. Anxiety also can increase pain perception, leading to an increase need for analgesia (*Orshan, 2008*).

Stages of labor:

The process of labor divided into stages and phases. The first stage begins with the beginning of true labor and ends when the cervix is completely dilated at 10 cm. The second stage begins with complete dilatation and ends with the birth of the infant. The third stage begins with the birth of the infant and ends with the expulsion of the placenta. Some clinicians identify a fourth stage of labor is lasts from 1 to 4 hours after expulsion of the placenta (*Olds, et al., 2004*).

First stage: The first stage of labor begins with beginning of uterine contractions and ends when the cervix has reached full dilation (*Pillitter, 2007*). The first stage is divided into three phases; latent, active and transition phases.

Latent phase: Latent phase the early stage of labor that is characterized by irregular, infrequent, and mild contractions and little or

no dilation of the cervix or descent of the fetus and ends when the cervix is 3 to 4 cm dilated. For the primigravida, the latent phase lasts an average of 9 hours, whereas in the multigravida the latent phase generally lasts an average of 6 hours (*Gyna, et al., 2004; Farlex, 2009*).

Active phase: The active phase of labor begins when the women is 3 to 4 cm dilated and ends when she is 8 cm dilated. During this phase, contractions occur every 2 to 3 minutes and last up to 60 seconds. The intensity of each contraction begins as moderate and continues to increase as the women gets closer to the transition phase. The average length of the active phase in the primigravida is 6 hours and in the multigravida is 4.5 hours. Dilation rate should be at least 1.2 to 1.5cm (*littleton & Engebretson, 2005*).

Transition phase: The last and shortest part of the first phase of labor is the transition which typically is the most intense phase for the laboring women. In transition, cervical dilatation is from 8 to 10 cm and the rate of fetal descent increases. The transition phase should not be longer than 3 hours for nulliparas and 1 hour for multiparas (*Cunningham, et al., 2001*). Contraction occurs every 1.5 to 2 minutes with duration of 60 to 90 seconds. The intensity of the contraction is very strong in the transition phase (*littleton & Engebretson, 2005*).

Second stage: The second stage describes the time from full dilation of the cervix to delivery of the fetus (*Holmes & Baker, 2006*).

Mechanism of second stage is including the following, descent, engagement, flexion, internal rotation, extension, restitution, and delivery of the shoulders (*littleton & Engebretson, 2002*).

Third stage: the third stage of labor is defined as the period of time from the birth of infant until the completed delivery of the placenta (*Olds, et al., 2004*). The stage usually occurs spontaneously within 5 to 30 minutes of the fetus emerging from the birth the canal (*Smith & Brennan, 2004*).

Fourth stage of labor (recovery stage): The fourth stage of labor, is the period from the delivery of the placenta until the uterus remains firm on its own. In this stabilization phase, the uterus makes its initial readjustment to the non pregnant state. The primary goal is to prevent hemorrhage from the uterine atony and the cervical or vaginal lacerations (*Easton, 2000*).