Faculty of Medicine
Ain Shams University

ACTIVE MANAGEMENT OF LABOUR

An ESSAY
submitted for partial fulfilment of the
master degree in obstetrics and gynaecology

BY
HESHAM ABD- ALMONEIM HAMZA
M.B.B.CH., Ain Shams University

Under the supervision of

Dr. ALAA EL-DIN EL-ATREBI
Professor of obstetrics and gynecology
Faculty of Medicine
Ain Shams University

Dr. MOHAMED ADEL EL-NAZER
Assistant. Professor of obstetrics and Gynaecology

Faculty of Medicine
Ain Shams University

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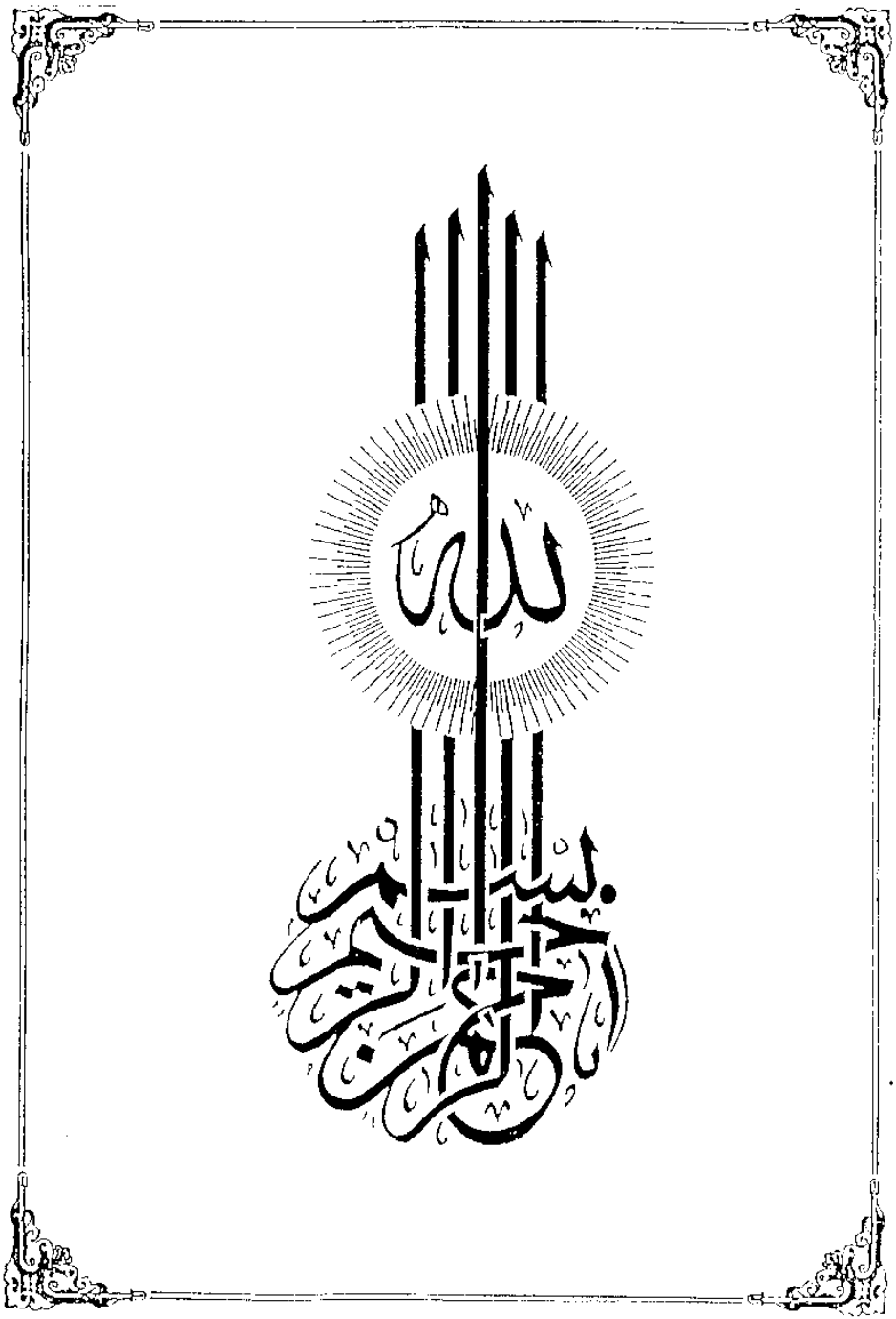
بِسْمِ اللَّهِ الرَحمنِ الرَحِيمِ

وَلَقد خَلَقْنَا الإِنسَانَ مِن سُلالَة من طين (١٢) ثُمَّ جَعَلنَاهُ نُطْفةً في قَرَار مكين (١٣) ثُمَّ خَلَقْنَا النُطْفَةَ عَلَقَةً فَخَلَقْنَا العَلَقَةَ مُضْغَةً فَخَلَقْنَا المُضْغَةَ عظَاماً فَكَسَوْنَا العظَامَ لَحْماً ثُمَّ أَنْشَأْنَاهُ خَلْقاً آخَرَ فَتَبَارَكَ اللَّهُ أَحْسَنُ الخَالِقِينَ (١٤)

صَدَقَ اللَّهُ العَظِيمْ

(الآيات ١٢، ١٣، ١٤ من سورة المؤمنون)



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Contents

Introduction

Active management of labour became a necessary part in the current management of a patient in labour, as it permits early recognition of labour abnormalities, implies a sensible anticipation of the patient's progress in labour, and ensures that every woman has an efficient uterine contractions **(Badraoui et al., 1985).**

In Egypt **Abdullah et al., (1990)** showed that obstructed labour and ruptured uterus comprise one of the major causes of maternal mortality and morbidity.

Abdullah et al., (1985) demonstrated that maternal mortality rate in Egypt is still very high, particularly in Upper Egypt. Community based studies showed a maternal mortality rate of 190 and 300 per 100.000 live births in Lower and Upper Egypt respectively. Ruptured uterus and Caesarean section for obstructed labour account for 26% of maternal deaths in Upper Egypt. It is thus important to have a plan for labour in each individual paturient, in order to point out any deviation from normal and to interfere according to the abnormality present. Active management of labour in this way assure reduction in maternal and fetal morbidity and mortality.

Duignan et al., (1975) defined normal labour as one which started spontaneously, was not stimulated by oxytocic drugs, did not has a lumbar epidural block, did not require an operative delivery, and delivered a baby greater than 2.5Kg in weight. They showed that 29% of primigravidae and 49% of multigravidae were normal by these criteria. The study of **Duignan et al., (1975)** showed that the mean admission

cervical dilatation in primigravidae was 3.7 cm compared with 4.9 cm in multigravidae and the admission head level was lower in primigravidae than multigravidae. The mean duration of the observed first stage was longer in primigravidae and it was 5.6 hours compared with 3.5 hours for multigravidae but only because they were admitted at a lesser dilatation. The important point noted was that the rate of progress for the first stage of spontaneous labour from a given admission cervical dilatation was identical in both groups. Thus we are able to define a normal first stage cervimetric curve of spontaneous labour and use this clinically to aid early recognition of progress of labour.

The Aim of The Work

The aim of the work is to up-date our knowledges in the subject of active management of labour by reviewing the literature in this field, hoping to develop a suitable protocol to be used in our hospitals.

Factors Influencing Labour

Traditionally these factors have been grouped into three main groups by **Studd et al., (1982),** the passages, the passenger and the powers.

Passages :

The size and the shape of the pelvis influences labour considerably. Certain pelvic types such as the android or the anthropoid pelvis favour occipito-posterior position, and the former is of poor obstetric value. The pelvic ligaments are softened and stretched during labour. Cervical dystocia secondary to scarring may obstruct the descent of the fetus, but so - called primary cervical dystocia assumed to be due to congenital anatomical defect in the cervix. In reality this delay in dilatation is due to other factors such as inefficient uterine action, disproportion or malpresentation. The resistance of the maternal soft tissues, particularly in primigravidae may hinder descent of the presenting part and delay spontaneous labour, as may soft tissue obstruction of uterine or ovarian tumours **(Studd et al., 1982).**

Passenger :

Fetal weight, and also the size of head and maturity which both influence the safe degree of head moulding which may occur, influence safe delivery. The flexion of the head determines the diameter of the fetal head presenting to the pelvic brim. The position of the fetal skull similarly influences flexion and the presenting diameter in that an

occipito-posterior position, for example, encourages deflexion and an occipito-frontal diameter **(Studd et al., 1982).**

Powers :

Uterine contractions may be normal or incoordinate these may be depressed by too heavy sedation in labour or prolonged labour and stimulated by oxytocin. Maternal expulsive efforts are important for spontaneous vaginal delivery in the second stage and also adds safety to instrumental delivery **(Studd et al., 1982).**

The most important of these variables is the uterine contractions, as fault which is not frequently present and can be easily and safely corrected **(Studd et al., 1982).**

Physiology of Labour

Onset of labour

A review of the literatures **(Chard, 1973; Liggins et al., 1977 : Thorburn, 1983; and Lofgren et al., 1992)** showed that the factors that lead to the onset of labour are not well defined. However, the understanding of the biomolecular events involved in the initiation of parturition in the human is incomplete; nevertheless, several hypotheses can be formulated to explain the nature of the underlying events that lead to the onset of labour.

Oxytocin theory :

Chard (1973) concluded that the physiologic significance of oxytocin release during labour is poorly defined.

Fuchs et al., (1991) revealed that oxytocin is secreted in discrete pulses of short duration. The frequency of pulses was significantly higher during spontaneous labour than before the onset of labour. They therefore concluded that these finding provide evidence for the participation of oxytocin in the onset and maintenance of spontaneous labour.

Parturition in rats is associated with an abrupt and marked increase in myometrial oxytocin (OT) receptor concentrations. In this study, **Chan and Chen (1992)** investigated the role of myometrial OT receptors in the initiation and the process of parturition. Correlation analyses between OT receptor concentrations

and various parameters associated with gestation and parturition showed that there was a correlation between low OT receptor concentrations and long gestation period, prolonged parturition, and high fetal mortality rate.

Progesterone theory :

For many years, theories have been proposed that involve progesterone withdrawal as an important endocrine event in the initation of the human labour. This theory evolved initially form observations made years ago on pregnant rabbits. In rabbits, withdrawal of progesterone was followed by evacuation of the contents of the pregnant uterus and administration of progesterone will inhibit uterine evacuation long beyond the normal time for delivery. From the results of most studies on women however, considerable evidence has been provided that progesterone levels, at least in maternal blood, do not decrease before labour commences **(Pritchard and MacDonald, 1985).**

Progesterone is known to prevent labour at term in domestic animals. Progesterone, and also its metabolites, relax pregnant rat myometrium in vitro. The serum concentration of some metabolites is high during pregnancy, but decreases significantly prior to parturition and some metabolites have anaesthetic properties in human beings **(Lofgren et al., 1992).**

Estrogens :

In a study by **Biswas et al., (1991)** to assess the role of catechol estrogens in the initiation of labour, they compared the levels in amniotic fluid during the second and the third trimesters and from women undergoing caesarean section at term not in labour and those with spontaneous labour at term. Catechol estrogen concentrations in amniotic fluid increased significantly with the progress of pregnancy. Further, concentrations were significantly higher in spontaneous labour at term compared with those obtained during caesarean section at term not in labour, so they suggest that catechol estrogens, through their stimulation on prostaglandin synthesis, participate in the initiation of labour.

Organ communication system hypothesis

Role of the fetus :

Indeed, the bovine fetus, the ovine fetus, and the human fetus each appear to participate in the timely onset of labour **(Thorburn, 1983).**

In the classical experiments in animal species such as the sheep, the fetus plays a fundamental and direct role in the physiological onset of labour **(Liggins et al., 1977).** In this species an intact fetal pituitary - adrenal axis essential for parturition. The onset of spontaneous labour is preceded by an increase in cortisol production by the fetal adrenal. This results in a rise in the fetal cortisol levels which is followed by a fall in maternal progesterone and an increase in maternal estrogen

concentrations. This change in the ratio of estrogens to progesterone is believed to stimulate the release of prostaglandins. from placental and other intrauterine tissues. Prostaglandins in turn, seem to stimulate uterine contractility and lead to the onset of labour. These hormonal events activate certain enzymes in the sheep placenta which enhance the conversion of progesterone into estrogens. However, this sequences of endocrine events is not detectable in human pregnancy.

MacDonald and Nathanielsz (1991) found that a structure in the fetal brain, the fetal hypothalamic paraventricular nucleus, is necessary for onset of parturition to occur in sheep. The same observation was demonstrated by **Cluckman et al., (1991)** and they added that the adrenal glands of the fetuses with prolonged gestation, due to lesions including the paraventricular nuclei bilaterally, were normal in weight and light microscopic appearance.

At term the secretion of oxytocin and vasopressin into the fetal circulation has been well documented. Both these peptides are found in higher cocentrations in umbilical arterial blood than in umbilical venous blood which confirms their fetal origin. The concentration of oxytocin and vasopressin in cord arterial blood increases with the progress of labour but whether this is part of a general fetal response to labour or is causally related to the onset of labour, is unknown. The role of fetal oxytocin is unclear. Oxytocin levels in the fetal circulation are higher than in maternal circulation and the levels in cord blood are higher after labour of spontaneous onset than after induced labour or at elective Caesarean section. A recent theory suggests that at the time of the onset of labour fetal oxytocin excreted into amniotic fluid in fetal urine could reach the decidua and stimulate prostaglandin production. The

increased prostaglandin production by decidual tissue would in turn stimulate myometrial contractility and establish the onset of labour **(Fuchs et al., 1982).** However, this hypothesis has not been supported in humans. In vivo and the in vitro data on the influence of oxytocin on prostaglandin production by human decidua at term are contradictory, **(Seller and Lopez, 1985).**

Role of the placenta :

The human placenta is relatively rich in glucocorticoid receptors from very early in gestation and their concentration increases moderately towards term. **(Lopez et al., 1982).** The role, if any, of these receptors in relation to the onset of parturition is presently unknown. The production of progesterone by human placenta remains stable throughout the last 2-3 weeks of gestation and there is no conclusive evidence that progesterone levels fall before the onset of labour in either fetal or maternal circulation.

The decidua and fetal membranes :

It is now well established that amnion, chorion and decidua can convert arachidonic acid to a variety of prostanoids, the most important of which in terms of parturition, have traditionally been prostaglandinE_2 (PGE_2) and prostaglandin$F_{2\alpha}$ ($PGF_{2\alpha}$).

Only free arachidonic acid from its esterified form in tissue phosopholipids has been considered the regulatory step in the biosynthesis of prostaglandins. This appears to be of great significance, as prostaglandins, are not stored in cells but are released immediately after their synthesis and are rapidly metabolized. The release of arachidonic