The Efficacy and Safety of Rectal Hyoscine Butyl-N-Bromide (HBB) On the Duration of the First Stage of Labor

A Randomized Double-Blind Placebo-Controlled Trial

Thesis

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By

Ayman Amin Wahdan

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Under Supervision of

Prof. Rowaa Abdel-Azeem Moustafa

Professor of Obstetrics and Gynecology

Faculty of Medicine - Ain Shams University

Dr. Hayam Fathy Mohammed

Lecturer of Obstetrics and Gynecology

Ain Shams University

Faculty of Medicine - Ain Shams University

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INTRODUCTION

The active management of labor refers to active control, rather than passive observation, over the course of labor by the obstetric provider. The principle of active management of labor was introduced in Dublin to shorten the length of labor while achieving or maintaining a low rate of caesarean delivery ***(Samuels et al., 2007)***.

There is clearly documented evidence of the success of active management of labor, and it has been shown to reduce the number of caesarean deliveries in institutions employing the protocols ***(Sirohiwal et al., 2005)***. The safety of active management of labor has been demonstrated by several prospective randomized clinical trials involving over 3000 women. The shorter duration of labor from admission to delivery has also been consistently reported in numerous studies of women treated with the active management protocol ***(Sadler et al., 2000).***

Hyoscine (also known as scopolamine) butyl-N-bromide is a quaternary ammonium derivative, which exerts a spasmolytic action on the smooth muscle of the gastrointestinal, biliary, and genitourinary tracts. After intravenous administration, the substance is rapidly distributed ($t_{1/2}$= 29 minutes) into the tissues. Hyoscine-

N-butyl-bromide (HBB) does not pass the blood–brain barrier, and plasma protein binding is low; approximately half the clearance is renal, and the main metabolites found in urine bind have no significant clinical action ***(Drug Information: Buscopan, 2005)***.

HBB has been used to shorten the duration of labor in several hospitals in Jamaica, as it has elsewhere in the world. The mechanism by which it acts in the context of labor has not yet been elucidated, and the evidence for its efficacy was previously largely anecdotal. Major studies have been carried out to evaluate the effect of injectable form of HBB on cervical dilatation but very limited studies are available to gauge the effect of suppository form on cervical dilatation in labor ***(Sirohiwal et al., 2005)***.

AIM OF THE WORK

The aim of the current study is:

1. To assess the efficacy of hyoscine butyl-N-bromide (HBB) rectal suppositories on the duration of the first stage of labor.

2. To assess the safety of rectal administration of HBB in the first stage of labor concerning maternal and neonatal outcome.

Chapter (1)

NORMAL LABOR

Labor refers to the chain of physiologic events that allows a term fetus to undertake its journey from the uterus to the outside world ***(Liao et al., 2005).***

The greatest impediment to understanding normal labor is recognizing its start. The strict definition of labor is uterine contraction that bring about demonstrable effacement and dilatation of the cervix but because this diagnosis is confirmed only retrospectively several methods may be used to define it's start. One of them defines onset as the clock time when painful contraction becomes regular, unfortunately, uterine activity that causes discomfort, but doesn't represent true labor may develop at any time during pregnancy full labor pain often stop spontaneously or it may proceed rapidly into effective uterine contraction ***(Cunningham et al., 2010).***

Parturition can be divided into four uterine phases which correspond to the major physiologically transitions of myometrium and cervix during pregnancy. These phases of parturition include:

1- A prelude to first phase; (2) the preparation for second phase; 3) the process of –third phase; and (4) recovery from – fourth phase. And the phases of

parturition should not be confused with the clinical stages of labor that is the first, second, and third stages, which compromise the third phase of parturition ***(Word et al., 2007).***

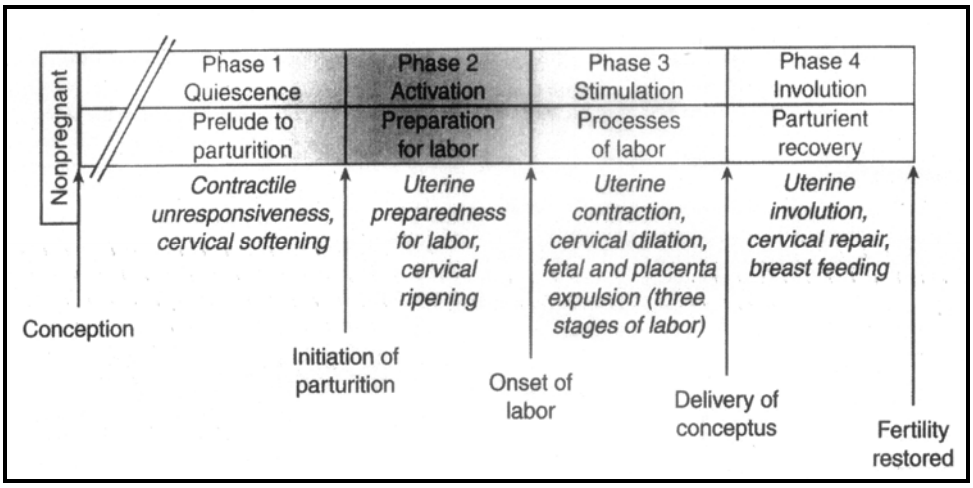

Fig. (1): The phases of parturition

(Quoted from Cunningham et al., 2010)

Stages of labor:

First stage:

The first stage begins with regular uterine contractions and ends with complete cervical dilatation at 10 cm. It is subdivides into an early latent phase and an ensuing active phase; the latent phase begins with mild, irregular uterine contractions that soften and shorten the cervix. The contractions become progressively more rhythmic and stronger. This is followed by the active phase of labor, which usually begins at about 3-4 cm of cervical dilation and is

characterized by rapid cervical dilation and descent of the presenting fetal part. The first stage of labor ends with complete cervical dilation at 10 cm. According to Friedman, the active phase is further divided into an acceleration phase, a phase of maximum slope, and a deceleration phase ***(Freidman & Sachtleben, 1961).*** A characteristic of the average cervical dilatation curve is known as the Friedman labor curve, and a series of definitions of labor protraction and arrest were subsequently established. However, subsequent data of modern obstetric population suggest that the rate of cervical dilatation is slower and the progression of labor may be significantly different from that suggested by the Friedman labor Curve ***(Zhange et al., 2002).***

Second stage:

The second stage begins with complete cervical dilatation and ends with the delivery of the fetus. The American College of Obstetricians and Gynecologists (ACOG) has suggested that a prolonged second stage of labor should be considered when the second stage of labor exceeds 3 hours if regional anesthesia is administered or 2 hours in the absence of regional anesthesia for nulliparas. In multiparous women, such a diagnosis can be made if the second stage of labor

exceeds 2 hours with regional anesthesia or 1 hour without it ***(ACOG, 2003)***.

Examination of prenatal outcomes associates with a prolonged second stage of labor reveals increased risks of operative deliveries and maternal morbidities but no differences in neonatal outcomes**.** Maternal risk factors associated with a prolonged second stage include nulliparity, increasing maternal weight and/or weight gain, use of regional anesthesia, induction of labor, fetal occiput in a posterior or transverse position, and increased birth weight ***(Cheng et al., 2009).***

Third stage:

The third stage of labor is defined by the time period between the delivery of the fetus and the delivery of the placenta and fetal membranes. During this period, uterine contraction decreases basal blood flow, which results in thickening and reduction in the surface area of the myometrium underlying the placenta with subsequent detachment of the placenta. Although delivery of the placenta often requires less than 10 minutes, the duration of the third stage of labor may last as long as 30 minutes ***(Prendiville et al., 2009).*** The third stage of labor is considered prolonged after 30 minutes, and active intervention, such as manual

extraction of the placenta, is commonly considered ***(Norwitz et al., 2003).***

The Puerperium

Immediately and for about an hour or so after delivery, the myometrium remains in a state of rigid and persistent contraction and retraction. This directly compresses large uterine vessels and allows thrombosis of their lumens. For this reason, severe postpartum hemorrhage is prevented ***(Cunningham et al., 2010)***.

Management of labor as regard first stage of labor:

First stage of labor:

Cervical change occurs at a slow, gradual pace during the latent phase of the first stage of labor. Latent phase of labor is complex and not well studied since determination of onset is subjective and may be challenging as women present for assessment at different time duration and cervical dilation during labor. In a cohort of women undergoing induction of labor, the median duration of latent labor was 384min with an interquartile range of 240-604 min ***(Grobman & Simon, 2007).***

Most women experience onset of labor without premature rupture of the membranes (PROM);

however, approximately 8% of term pregnancies is complicated by PROM. Spontaneous onset of labor usually follows PROM such that 50% of women with PROM who were expectantly managed delivered within 5 hours, and 95% gave birth within 28 hours of PROM ***(Hansen et al., 2002)***. Currently, the American College of Obstetricians and Gynecologists (ACOG) recommends that fetal heart rate monitoring should be used to assess fetal status and dating criteria reviewed, and group B streptococcal prophylaxis is given based on prior culture results or risk factors if cultures not available. Additionally, randomized controlled trials to date suggest that for women with PROM at term, labor induction, usually with oxytocin infusion, at time of presentation can reduce the risk of chorioamnionitis ***(ACOG, 2007).***

The rate of cervical dilation should be at least 1 cm/h in a nulliparous woman and 1.2 cm/h in a multiparous woman during the active phase of labor ***(Friedman & Sachtleben, 1961***). However, labor management has changed substantially during the last quarter century. Particularly, obstetric interventions such as induction of labor, augmentation of labor with oxytocin administration, use of regional anesthesia for

pain control, and continuous fetal heart rate monitoring are increasingly common practice in the management of labor in today's obstetric population ***(Martin et al., 2006).*** Vaginal breech and mid- or high-forceps deliveries are now rarely performed ***(Chinnock & Robson 2007).***

On admission to the labor and delivery suite, a woman having normal labor should be encouraged to assume the position that she finds most comfortable; the possibilities including walking, lying supine, sitting, or resting in a left lateral decubitus position. Of note, ambulation during labor did not change the progression of labor ***(Bloom et al., 1998).***

The frequency and strength of uterine contractions and changes in cervix and in the fetus' station and position should be assessed periodically to evaluate the progression of labor. Although progression must be monitored, vaginal examinations should be performed only when necessary to minimize the risk of chorioamnionitis, particularly in women whose amniotic membrane has ruptured. During the first stage of labor, fetal well-being can be assessed by monitoring the fetal heart rate at least every 15