RELATION BETWEEN CERVICAL LENGTH AND DURATION OF SECOND TRIMESTER PREGNANCY TERMINATION

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INTRODUCTION

Abortion-related morbidity and mortality increase significantly as gestation advances. Abortions after 14 weeks of pregnancy constitute 10-15% of all abortions; however, they are responsible for two-thirds of all abortion-related complications and 50% of abortion related deaths ***(Dilek et al., 2011).***

The development of safe and effective abortion techniques for second trimester pregnancy terminations and fetal demise are a major clinical challenge. The main aim of abortion induction is rapid, uneventful, and complete expulsion or delivery of a fetus. Termination of second trimester pregnancies can be achieved by various techniques, including prostaglandin analogues, hydroscopic dilators, and Foley balloon traction. Time period between beginning of induction to abortion or delivery of products of conception can be prolonged in the second trimester of pregnancy due to uterine unresponsiveness and unfavorable cervix. Prolonged administration of various methods and lower response rate to oxytocin infusion results in discomfort and increased anxiety for the woman. Therefore, cervical priming is the major step of second trimester pregnancy termination. The most employed method of termination of pregnancy (TOP) is the application of the prostaglandin analogue misoprostol ***(Ngai et al., 2003).***

Sonographic evaluation of cervix began in 1970s and development of the transvaginal probe a decade later improved its accuracy and diagnostic value. It has proven to be a valuable tool in predicting which pregnancies would respond well to cervical ripening agents ***(Sonek, 1998).***

Medical termination of mid-trimesteric pregnancy (medical induction of abortion) is the ending of pregnancy by a means other than surgery. It is often performed using agents that induce abortion (Prostaglandins, RU486, Methotrexate) ***(CDC, 2004).*** Misoprostol in a dose of 400 mcg vaginally that can be repeated with 4 hours. interval with an initial dose 800 mcg is the recommended dose of misoprostol in induction of abortion in the second trimester ***(Danielsson, 2007).***

Transvaginal ultrasonographic measurement of cervical length has been linked with the risk of preterm delivery ***(Iams et al., 1996 and Sonek et al., 1998).***

Cervical shortening, as seen on sonograms, has been proposed as a representative of the process of cervical effacement ***(Zilianti et al., 1995).***

As a cervical priming agent, misoprostol is cheap, easily stored and can be used readily in several ways, such as sublingual, rectal, vaginal, and oral routes ***(Dilek et al., 2011).***

Bishop score is the traditional method of evaluating cervical status before labor induction. Recently, cervical length measurement by transvaginal ultrasound was evaluated as a new method to assess cervix before labor induction in several trials. However, conflicting results were reported ***(Tanir et al., 2008).***

Transvaginal ultrasound is a non-invasive technique to evaluate the cervix before pregnancy termination ***(Hatfield et al., 2007).***

Theoretically, transvagial ultrasonographic measurements could represent a more accurate assessment of the cervix than the digital examination because the supravaginal portion of the cervix usually comprises about 50% of cervical length, but this is highly variable among individuals. This portion is difficult to assess digitally. In addition effacement is subjective and can vary considerably among examiners. Moreover, effacement is difficult to determine in the closed cervix. In contrast transvaginal ultrasonographic cervical measurement is a good quantitative method ***(Vonda and Denise, 2000).***

AIM OF THE WORK

To evaluate the value of transvaginal measurement of cervical length as a predictor of time of induction of abortion by misoprostol in second trimester termination of pregnancy (TOP).

ANATOMY OF THE CERVIX

Gross Anatomy of The Cervix:

The cervix is divided into two portions the portio-vaginalis, which is the part protruding into the vagina and the portio-supravaginalis, which lies above the vagina and below the corpus. The portion of the cervix exposed to the vagina is the exocervix or portio-vaginalis ***(Howard et al., 2008)***.

The portio-vaginalis is covered by non-keratinizing squamous epithelium, its canal is lined by a columnar mucous secreting epithelium that is thrown into a series of V shaped folds that appear like the leaves of a palm and therefore called plicate palmatae. The endocervical canal is about 2 to 3 cm in length and opens proximally into the endometrial cavity at the internal os ***(Johanthan et al., 2002)***.

The upper border of the cervical canal is marked by the internal os, where the narrow cervical canal widens out into the endometrial cavity. The lower borer of the canal, the external os, contains the transition from squamous epithelium of the portio-vaginalis to the columnar epithelium of the endocervical canal ***(Howard et al., 2008)***.

Before childbirth, the external cervical os is small, regular and oval opening. After childbirth, the orifice is converted into a transverse slit that is divided such that there

are the so-called anterior and posterior lips of cervix. It torn deeply during delivery, it might heal in such a manner that is appears to be irregular, nodular or stellate. These changes are sufficiently characteristic to permit an examiner to ascertain with some certainty whether a given women has borne children by vaginal delivery ***(Cunningham et al., 2005)***.

Anteriorly, the upper boundary of the cervix is the internal os, which corresponds to the level at which the peritoneum is reflected upon the bladder. The supra-vaginal segment is covered by peritoneum on its posterior surface. This segment is attached to the cardinal ligaments anteriorly, and it is separated from the overlying bladder by loose connective tissue. The other segment is the lower vaginal portion of the cervix, also called the portio-vaginalis ***(Cunningham et al., 2005)***.

The normal human cervix in the nullipara is about 2.0cm to 2.5cm in its anteroposterior diameter and 2.5cm to 3.0cm in its lateral diameter. This difference is due to the shape of the cervical canal, which is straight in the sagital plane and spindle shaped in the frontal plane. The wall of the cervix is about 1.0cm thick throughout its length ***(Danforth, 1983)***.

The substance of the cervical wall is made up of dense fibrous connective tissue with only a small (about 10%) amount of smooth muscle. What smooth muscle that lies on the periphery of the cervix, connecting the myomotrium with the

muscle of the vaginal wall. This smooth muscle is circularly arranged around the fibrous cervix and is the tissue into which the cardinal and uterosacral ligaments and pubocervical fascia insert ***(Howard et al., 2008)***.

Cervical Ligaments:

The cervix is held in its position by its ligaments namely:

1. The Pubocervical Ligaments:

Extends to the posterior surface of the pubic bone surrounding the urethra to the front of the supravaginal cervix ***(Danforth, 1983)***.

2. The Mackenrodt ligament:

The cardinal ligament or the transverse cardinal ligament: At the lateral margin of each broad ligament, the peritoneum is reflected on to the side of the pelvis. The thick base of the broad ligament is continuous with the connective tissue of the pelvic floor. The densest portion is usually referred to as the cardinal ligament also called the transverse cardinal ligament or the Mackenrodt ligament and is composed of connective tissue that medially is united firmly to the supravaginal portion of the cervix ***(Cuningham et al., 2005)***.

3. The Uterosacral Ligaments:

Each uterosacral ligament extends from an attachment posterolaterally to the supravaginal portion of the cervix to encircle the rectum and inserts into the fascia late over the sacrum. ***Umek et al. (2004)*** used MRI to describe anatomical variations of these ligaments. The ligaments are composed of connective tissue and some smooth muscle and are covered by peritoneum. They form the lateral boundaries of pouch of Douglas ***(Umek et al., 2004 and Cunningham et al., 2005)***.

These cervical ligaments stabilize the cervix in approximately the centre of the pelvis in non-pregnant women, while during pregnancy, they are the "guy ropes" the uterus pulls upon to expel the baby in the second stage of the labor ***(Danforth, 1983)***.

Cervical Physiology:

[1] The Cervical Canal:

In the non-pregnant uterus, the endocervical canal has a fusiform shape, a length of about 30 mm and an average diameter of approximately 5 mm. The cervical canal is lined with columnar epithelium except for its most distal lower part, including the ectocervix and the external os, where squamous epithelium predominates.

Non-ciliated secretary cells in and beneath the columnar epithelium produce an abundant sticky liquid, the cervical mucus. The mucus production varies from a high of 600mg/day during midcycle to a low of about 50mg/day during other times of the cycle. The columnar epithelium also contains kinociliated cells, i.e., cells with cilia that are capable of motion. The kinocilia of these cells appear to beat rhythmically towards the external os. These ciliated cells are involved in some sort of mucociliary clearance of micromolecules produced by the secretory cells. The kinociliated cells direct the flow of mucus towards the vagina. Since the strongest flow occurs in the periphery of the canal close to the epithelium, it has been suggested that this arrangement, according to physical fluid theories, encourages rapid movement of the spermatozoa swimming in the centre of the canal and delays defective sperm in the periphery. It has been suggested that prostaglandins may influence both kinociliary activity and mucus production but this hypothesis remains unproven ***(Hafez, 1982)***.

Great interest has been directed towards determining the composition of the cervical mucus, and several investigations have elicited the biophysical and biochemical properties of this unique liquid. The viscosity of cervical mucus undergoes cyclical changes, being minimal at time of ovulation and thereby facilitating sperm penetration. The stickiness of the mucus, also referred to as tack, is most pronounced during pregnancy ***(Carlstedt et al., 1983)***.