Services Research

Quality assessment of Premature Rupture of Membranes (PROM) Management in Ain Shams Maternity Hospital

Thesis Submitted for partial fulfillment of Master Degree (Obstetrics & Gynecology)

Processes Outcomes

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دراسة تقييمية علي معالجة الانفجار المبكر للأغشية الجنينية في مستشفي عين شمس للولادة

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List of Abbreviations

AF	Amniotic fluid
AFI	Amniotic fluid index
AFP	Alfa fetoprorein
AFV	Amniotic fluid volume
CRP	C-reactive protein
CS	Ceserian section
CSF	Cerebrospinal fluid
CTG	Cardiotocogram
DAO	Diamine oxidase
EDS	Ehlers donalas syndrome
ESR	Erythrocyte sedmintation rate
FGR	Fetal growth restriction
HCG	Human chorionic gonadotrophine
IGFBPI-1	insulin like growth factor binding protein-1
IgM	Immunoglobin
IL	Interleukin
LOD	Lactate oxidase
MMP	Matrix metalloproteinase
NAD	Nicotinamide adenine dinuclutide
NPV	Negative predictive value
PPROM	Preterm premature rupture of membranes
PPV	Positive predictive value
PROM	Premature rupture of membranes
RDS	Respiratory distress syndrome
TIMP	Tissue inhibitor Matrix metalloproteinase
TNF	Tumor necrosis factor

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Introduction

Premature Rupture of Membranes (PROM) occurs in 10% of all gestations and about 2-4% of preterm pregnancies ***(Modena et al., 2004)***.

Premature rupture of membranes (PROM) is defined as leakage of amniotic fluid beginning at least 1 hour prior to the onset of labor at any gestational age. Preterm premature rupture of membranes is defined as PROM that occurs before 37 weeks gestation ***(Buyukbayrak et al., 2004).***

PROM is an important obstetric problem, it occurs in 10% of all gestation and about 2-4% of preterm pregnancies, which is responsible for 30% of all preterm birth. Management of patients with PROM, regardless the gestational age, remains controversial ***(Modena et al., 2004).***

The interval between PROM and time to onset of labor is referred to as latency period, as this period tends to increase the risk of maternal and fetal infection increses, maternal infection is termed chorioamnionitis which occurs in 3-5% of cases of PROM. While fetal infection occurs in about 5% of all cases of PROM and about 15- 20% in those with chorioamnionitis. Fetal infection may occur as septicemia, pneumonia, urinary

tract infection, local infection such as omphalitis (infection of the umbilical cord) or conjunctivitis ***(Benedetto et al., 2004).***

Other complications that may be associated with PROM include umbilical cord prolapse in about 1.5% of cases of PROM. Placental abruption, caesarean delivery, postpartum hemorrhage and postpartum infection ***(Modena et al., 2004).***

Correct diagnosis of PROM has great importance because failure of diagnosis can lead to unwanted obstetric complications like chorioamnionitis, preterm birth, on the other hand over diagnosis can lead to unnecessary interventions like hospitalization. The approach to the diagnosis of membrane rupture is clinical, with over 90% of cases being confirmed based on the presence of a suspicious history or ultra-sonographic finding followed by documentation of fluid passing from the cervix ***(Hasan and Cevdet, 2007)***.

Traditionally the diagnosis of membranes rupture is clinical in over 90% of cases, being confirmed based on the presence of suspicious history, or ultra-sonographic finding followed by documentation of fluid passing from the cervix ***(Kim et al., 2005).***

These traditional diagnostic methods have some limitation and cannot be applied to all patients with 100% accuracy ***(Buyukbayrak et al., 2004).***

The absence of non invasive gold standard test for diagnosis of membranes rupture leads to search for an alternative biochemical markers which have high amniotic concentration but low vaginal fluid concentration e.g. Prolactin, Alpha fetoprotein, Insulin like growth factor binding protein-1, Fetal fibronectin, Diamine oxidase and B-HCG ***(Esim et al.,2003).***

Aim of the Work

This is a descriptive study to monitor the hospital – Stay period of patients admitted to Ain Shams Maternity Hospital with the diagnosis of PROM as regard methods used for diagnosis, follow up, treatment, complication, patient's records and fetal outcome.

Fetal Membranes

The membranous structure that surrounds the developing fetus and forms the amniotic cavity is derived from the fetal tissue and is composed of two layers: the amnion is a translucent structure adjacent to the amniotic fluid which provide necessary nutrient to the amnion cells. The chorion is the more opaque membrane that is attached to the deciduas ***(Guller, 2006).***

The Amnion:

Embryology of the amnion:

The amnion is derived from the embryonic ectoderm as a single layer over neural ridge of the embryo at the 7^{th} post conception day.

Some investigators also have reported significant contribution to the amnion originating from trophoblastic cells in addition to the embryonic ectoderm. Regardless of the origin, the amniotic epithelium consists of a single a vascular layer of cuboidal or columnar cells that become more columnar over the placental surface ***(Ronan and Fabiola, 2001).***

The membranous structure that surrounds the developing fetus and from the amniotic cavity is derived from fetal tissue

and is composed of two layers: the amnion (inner layer) and the chorion (outer layer). The amnion is a translucent structure adjacent to the amniotic fluid, which provides necessary nutrients to the amnion cells. The chorion is a more opaque membrane that is attached to the deciduas (i.e., maternal tissue that lines the uterus during pregnancy). The amnion and chorion are separated by the exocelomic cavity until approximately three months gestation, when they become fused. Intact fetal membrance are required for an optimal pregnancy outcome ***(Seth Guller, PhD 2006).***

Fetal membranes, as the name implies, are genetically identical to the fetus. The membranes contain many cell types, but are a vascular and without nerve cells. The cells appear columnar where the membranes are attached to the placenta, but become more flattened or cuboidal adjacent to the decidua ***(Seth Guller, PhD 2006).***

Anatomy of the amnion:

Inspection of the fetal membranes following delivery reveals amnion that is mildly adherent to the fetal side of the chorion. Small amounts of maternal decidual tissue can be observed attached to the outer, maternal side of the chorion.

The amnion is loosely composed of three layers of cells:

- The inner compact layer, which varies greatly in thickness, consists of epithelial cells attached to a basement membrane.
- The mesenchymal cell layer, the thickest of the amnion layers, is comprised of dispersedly distributed fibroblasts.
- The outer intermediate layer, also known as the spongy layer or zona spongiosa, is adjacent to the chorion and can swell to facilitate sliding of the amnion across the chorion. In this way, the intermediate layer provides a cushioning mechanism to reduce stress applied to the fetal membranes ***(Williams's obstetrics 2005).***

The chorion:

Embryology of the chorion:

The chorion is the outer of the two fetal membranes and it is in direct contact with the maternal decidua. It is predominately derived from the trophoblast, which arises as a single layer of cells surrounding the blastocyst ***(Maymon et al., 2000).***

Soon after implantation, the trophoblast proliferates rapidly and invades the surrounding decidua. The trophoblast is made up of an internal layer of cubical cells, the cytotrophoblast or layer of langerhans and an external layer of richly nucleated protoplasm devoid of cells boundaries, the

syncytiotrophoblast. It undergoes rapid proliferation and forms numerous processes (the chorionic villi), which invade and destroy the uterine decidua and at the same time absorb from it nutritive material for the growth of the embryo ***(Germain et al., 1992).***

At 13th post conception day, primary villous stems are formed of a lining of syncytotrophoblast and a core of cytotrophoblast and mesoderm ***(Chard, 2002).***

During 3rd week of embryonic life, the villous stem becomes vascularised and becomes continuous with vessels of the body stalk .The primary villous stem give off syncitial sprout, which acquire a cytotrophoblast and a mesenchymal core to become the primary villous, which constitute a supporting framework ***(Novak et al., 1991).***

During the early second trimester, a second wave of trophoblast invasion takes place from the trophoblast wall ***(Sagol et al., 2001).***

As the pregnancy advances, the villi facing the decidua basalis proliferate and form chorion frondousm, while those facing the uterine cavity degenerate with their contained vessels forming chorion leave ***(Chard, 2002)***.

***Anatomy of the chorion*:**

The chorion is a more opaque membrane that is attached to the decidua (i.e maternal tissue that lines the uterus during pregnancy). It is adjacent to the outer aspect of the amnion and through which major branching umbilical vessels travel on the surface of the placenta ***(Guller, 2006)***.

The chorion leave is generally more nearly translucent than the amnion even though rarely exceeding 1mm in thickness. The chorion leave contains ghost villi and decidua clings to its surface**.**

The chorion leave is composed of four layers:

1. The reticular layer
2. The cellular layer
3. The pseudo-basement membranes
4. The trophoblast ***(Cunningham et al., 2001).***

Physical properties of the fetal membranes:

Chorioamnion, the membranes surrounding the fetus during gestation is a structural soft tissue critical for maintaining a successful pregnancy and delivery. However, the mechanical behavior of this tissue is poorly understood ***(Michelle and Robert, 2005)***.