Lactate concentration in vaginal fluid as a predictor for spontaneous onset of labour for women with suspected prelabour rupture of the membranes

Thesis

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Introduction

The premature rupture of membrane (PROM) is an event that occurs during pregnancy when the sac which is containing the developing baby (fetus) and the amniotic fluid bursts or develops a hole before the onset of labour ***(Ladfors, 1998)*.**

The amniotic fluid is important for several reasons; it cushions and protects the fetus, allowing the fetus to move freely. The amniotic fluid also allows the umbilical cord to float, preventing it from being compressed and cutting off the fetus supply of oxygen and nutrients. The amniotic membrane contains the amniotic fluid and protects the fetal environment from the outside world. This barrier protects the fetus from organisms (like bacteria, viruses) that could travel up the vagina and potentially cause infection ***(Hannah et al, 2000).***

There are two types of PROM; one occurs at a point in pregnancy between 28-37weeks, this is called preterm PROM. The other type of premature rupture of membranes occurs at 37-40 week of pregnancy before normal labor and delivery should take place, this is called prelabour ROM. PROM occurs in about 10% of all pregnancies. Only about 20% of these cases are preterm PROM. Preterm PROM is responsible for about 34% of all premature births ***(Erikssson et al, 2000).***

The causes of premature rupture of membrane have not been clearly identified, some risk factors include smoking, multiple pregnancies (twins, triplets), and excess amniotic fluid (polyhydramnios) **(*Ladfors et al, 2000).*** In some cases of preterm PROM, it is believed that bacterial infection of the amniotic membrane causes it to weaken and then break. However, most cases of PROM and infection occur in the opposite order, with PROM occurring first followed by an infection ***(Hannah et al, 2000).***

The main symptom of PROM is fluid leaking from the vagina. It may be a sudden, large gush of fluid, or it may be a slow, constant trickle of fluid. The complications that may follow PROM include premature labour and delivery of the fetus, infections of the mother and/or the fetus, and compression of the umbilical cord leading to fetal hypoxia ***(Ladfors, 1998).***

Labour almost always follows PROM, although the delay between PROM and the onset of labour varies. When PROM occurs at term, labour almost always begins within 24 hours. Earlier in pregnancy, labour can be delayed up to a week or more after PROM. The chance of infection increases as the time between PROM and labour increases. While this may cause doctors to encourage labour in the patient who has reached term, the risk of complications in a premature infant may cause doctors to try delaying labour and delivery in the cases of preterm PROM ***(Eriksson et al, 2000).***

Among women with suspected prelabour rupture of membranes (PROM), an important question in clinical practice is whether or not the woman will soon be in spontaneous labour ***(Ladfors, 1998).***

When PROM is diagnosed, the different lactate concentrations in vaginal fluid in women with PROM could describe uterine myometrial activity before the active phase of labour ***(Wiberg-Itzel et al, 2005).***

The lactate concentration found in the vaginal fluid of women with suspected PROM has been thought to arise from lactate released into the amniotic fluid by the fetus mainly through urine and lung excretion ***(Brace, 1997).*** However, recent evidence suggests that some of the lactate may also come from the myometrium, and smooth muscle lining the uterus, ***(Quenby et al, 2004).***

The lactate concentration in amniotic fluid (AF) is reported to be four to six times higher than in fetal and maternal blood ***(Sims et al, 1993).*** Lactate concentrations were previously measured in vaginal fluids in women with suspected PROM and found concentrations between 0.8 and 15.6 mmol/L with the wide range of lactate concentrations measured in vaginal fluids ***(Wiberg-Itzel et al, 2005).***

Aim of work

To assess whether lactate determination in vaginal fluid is associated with, and can predict onset of labour for women with suspected prelabour rupture of the membranes (PROM).

Patients & Methods

Design: Prospective observational study.

Setting: Department of Obstetrics and Gynecology in Ain Shams University, out patient obstetric clinic.

Population:

Reproductive women aged (<20years, 20-35years and>35years), parity (primiparous or multiparous).

Women with suspected PROM after 37 weeks of gestation, who later had spontaneous onset of labour (n=85).

Exclusion criteria:

1- Women with pouring water seen along legs or in pads.

2- Women have uterine contractions or vaginal bleeding.

3- Women with severe preeclampsia or any medical problem who need for urgent management.

4- Women complicated by chorioamnionitis after PROM.

Intervention(s):

All women underwent a speculum examination and a test for determining lactate concentration in vaginal fluid. We used logistic regression to estimate the association between lactate concentration in vaginal fluid and time to onset of labour. We used colorimetric method for measurement of lactate concentration in vaginal fluid.

Main Outcome Measure(s):

Time from examination to onset of labour (cervix $\geq$ 4 cm), Within 24 hours and 48 hours.

Results(s):

Will be recorded & statistically analyzed.

Written consent will be taken from all the patient.

Discussion:

Summary:

Conclusion and Recommendation:

References:

Arabic summary:

References

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Fetal Membranes

The membranous structure that surrounds the developing fetus and forms the amniotic cavity is derived from fetal tissue and is composed of two layers: the amnion (inner layer) and the chorion (outer layer) ***(Seth Guller, PhD 2006).***

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 decidua (i.e. maternal tissue that lines the uterus during pregnancy). ***(Seth Guller, PhD 2006).***

The amnion and chorion are separated by the exocelomic cavity until approximately three months gestation, when they become fused. Intact healthy fetal membranes 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 avascular 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 and Chorion:

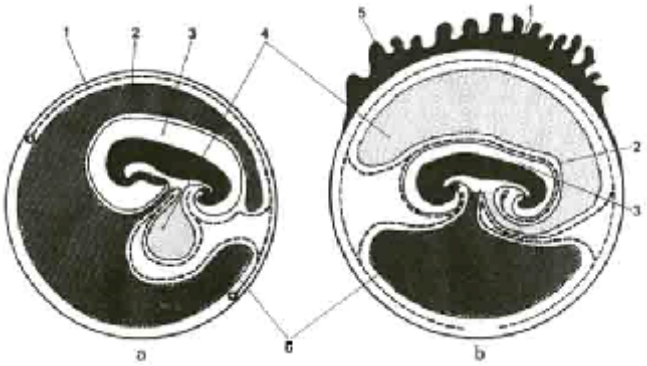

Fig (1): Anatomy of the amnion and chorion.

1: Chorion. 2: Amnion.
3: Mid gut. 4: Allantoises. 5: Placenta.

The amnion:

Inspection of the fetal membranes following delivery reveals that amnion 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.