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Alpha-feto protein in obstetrics

Mohamed Mortada Abd Elrahim (M.B.B.Ch) *, Ibrahim Mohamed AbdelRaheim (M.D), Magdy Abdelrahman Mohamed (M.D), Ahmed Hussien Mohamed (M.D).

Department of Sciatica and Obstetrics, Faculty of Medicine, Sohag University

Abstract:

All obstetricians have the primary objective of obtaining an optimum obstetric and perinatal result. Diagnosis of many obstetric complications, such as restriction of intrauterine development, preeclampsia; placental necrosis or early pregnancy abruption may be conducted through several safe tests to minimize maternal and fetal morbidity or mortality. Biochemical markers were used for the earl during the 1980s and 90s. Early detection of fetal genetic disorders was performed using biochemical markers. Soon after the establishment of maternal serum screening tests for early detection of fetal abnormalities, poor pregnancy results started to be reported after unexplained isolated alpha-fetoprotein (AFP) elevation was identified. This correlation was recorded between high AFP and poor obstetric outcomes Recorded over the last 20 years. In this paper, we attempt to investigate recently updated data on the relationship between high levels of maternal serum alpha-fetoprotein (MS-AFP) with various obstetric and fetal outcomes and to assess its significance as effective markers in predicting poor outcomes for pregnancies The aim of the study:

The aim of our study was to detect the significance of AFP in obstetric medicine.

Conclusion: As a result of our research, unexplained AFP rates have been discovered with unfavorable perinatal results. Pregnancies in which AFP rates increasing rapidly were complicated with adverse perinatal outcomes in a more serious manner.

Keywords: Alpha-fetoprotein, Amniotic fluid, Fetus, Maternal, Placenta

Introduction

Alpha-fetoprotein (AFP) is a glycoprotein formed by the fetal secondary yolk sac, liver, and gastroin-testinal tract, which increased steadily in either amniotic or fetal serum up to 13 weeks of gestation and then began to decline rapidly but, at the same time, steadily increased in maternal serum With normal concentration gradient between fetal plasma and maternal serum was 50,000:1; levels usually range from 10 ng/ml to 150 ng/ml. (1) In some circumstances, fetal develop-pment defects such as neural tube and ventral wall defects allowed the AFP to escape into the amniotic fluid, which increased maternal serum levels of AFPs. (2)

Maternal serum AFP screening is generally done at 15-20 weeks and is indicated for fetal liver, testicular, ovarian cancer screening in many cases such as advanced maternal age, past history, or family history of chromo-somal or birth defects. (3) As the upper normal limit, at maternal serum AFP level 2.0 or 2.5, AFP's detection rate (test sensitivity) is at least 90% for anencephaly, and 80% for spina bifida (4).

Function of AFP

AFP's role in adult humans is not yet clear; however, it binds to estradiol hormone in animal studies to prevent its leakage to the fetus through the placenta and in effect prevented the virilization of female fetuses. However, it can not bind to estrogen in human AFP, therefore its role is less clear. (5) Accordingly, AFP may protect the human fetus from the masculinizing effect of maternal estradiol, but its exact role remains to be debated. (6)

Clinical Significance

In the last 20 years, the relationship between unexplained high AFP and poor antenatal outcomes has been established. (7) The measurement of AFP is generally used in two clinical scenarios, Firstly, it is classified as aneuploidy in maternal blood or amniotic fluid as a screening test for certain congenital anomalies. Second, in certain complications related to gestational tumors, the serum AFP level is elevated, and therefore it is a useful biomarker to track certain diseases as intrauterine growth restriction, preeclampsia, placental abruption or necrosis, and irregular placement. What importance is attached to reducing morbidity and mortality rates and improving obstetric results. (8) Originally, these tests were only used to diagnose pregnant women at high risk of congenital neonatal malformations as neural tube defects but were eventually also used to examine other anatomical malformations such as aneuploidy and later complications of the third trimester. (9)

Alpha-fetoprotein in different obstetric outcomes

1. Down syndrome

Though Down syndrome screening represents a significant advance in prenatal care, their detection rates have been poor. Down syndrome screening was introduced primarily as an adjunct to alpha-fetoprotein (AFP) neural tube defect screening during the second trimester. (10) In Nicolaides et al. research, in 65 cases of Down syndrome, the AFP median level in maternal serum was 0.78 and based on this, they indicated that the inclusion of AFP in the standard screening protocol performed during the first trimester could minimize the false positive rate from 10 percent to 15 percent depending on the cutoff used. (11)

2. Neural tube defect (NTD)

The amniotic liquid AFP levels were elevated significantly during pregnancy in the whole of the anencephaly and most cases of spina bifida before 30 weeks of gestation. AFP spills from the fetal bloodstream into the amniotic liquid at the point where the baby NTD is exposed by the skin. (12)

3. Placenta previa

An interruption in the maternal-fetal interface has been guessed to cause AFP to leak into the maternal circulation. It makes elevated rates of AFP a proxy marker for premature implantation and placental dysfunction, which for some adverse obstetric outcomes are the fundamental pathological structures. (13, 14)

In addition, an expanded danger for strange placental adherence (e.g. placenta accrete / increta / percreta) has also been shown in women with elevated maternal serum AFP levels, especially in the presence of a preplacenta. (15, 16)

4. Placenta accrete

In setting a non-anomalous fetus, it was proposed that the placenta accrete spectrum (PAS) associates an increased level of AFP. (17) Zelop et al. found that, despite the fact that AFP was increased in approximately 45 percent of PAS cases, the negative controls did not raise rates indicating a

high negative predictive value for this study. (18)

5. Ectopic pregnancy

AFP accumulation in the vaginal blood due to the unrestricted leakage of AFP from the fetal circulation that used to rule out ectopic pregnancy in pregnant cases with unknown locations of pregnancy during workup. For live ectopic pregnancy the serum level of AFP was also higher. That verified the fetus being the primary source of maternal AFP. (19) However, elevated maternal AFP levels in ectopic pregnancy were observed in only one case report. (20)

6. Placental abruption

The mechanism responsible for elevated maternal serum AFP was breaching the fetal-maternal-placental barrier as placental vascular damage from early subclinical abruption or fetal-placental ischemia. (21) Nonetheless, this relationship between elevated maternal serum level of AFP and placental abruption remains inconclusive as no correlation recorded from one published study.

7. Placental necrosis

Placental necrosis secondary to placenta and uterus separation associated with placental barrier distribution prevents leakage of AFP into maternal circulation which increased the amount of AFP transmitted from the fetus to the mother. (22)

Until now, no research has accentuated its relation to the degree of placental damage (such as hematoma necrosis). Cali et al. is the first study of placental necrosis on a rare case of extreme AFP levels. (23)

8. Preterm birth (PTB)

The possible explanation behind the association between elevated AFP values and PTB risk could be placental perfusion impaired, ischemia causing placental damage and resulting in increased serum AFP resulting in premature delivery. (24) Past research detailed that the risk of PTB was increased by maternal AFP over 2 MoM. (25) Terms of Reference (25) Though investigation showed that PTB risk did not increase as a result of rising concentration of AFP. (26)

9. Preeclampsia

The elevated AFP was associated with the presence of maternal uterine vascular disease that interfered with placental blood supply resulting in placental ischemia, necrosis and chronic villous injury, resulting in increased AFP leakage into maternal circulation. (21) In females developed preeclampsia, Kang found no significant increase in maternal serum levels of AFP (27)

10. Respiratory prenatal disorder

The amniotic liquids and cord blood of the newborns had pulmonary dysplasia showed elevated inflammatory markers and proinflammatory mediators such as chemokines, adhesion molecules, AFP, cytokines and proteases and signifycantly decrease of the anti-inflammatory cytokines. Mizejewski found that, during the 2nd trimester, the maternal blood level of MSAFP was significantly elevated in pulmonary dysplasia affected newborns. (21)

Conclusion :

As a result of our research, unexplained AFP rates have been discovered with unfavorable perinatal results. Pregnancies in which AFP rates increasing rapidly were complicated with adverse perinatal outcomes in a more serious manner.

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