Plasma and amniotic fluid concentrations of fibronectin during normal and post term pregnancy

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Summary: Fibronectin is a plasma glycoprotein which is involved in coagulation, platelet function, tissue repair and the vascular endothelial basement membrane. Increase of plasma fibronectin levels in pre-eclamptic patients have been previously reported. There have been no reports however regarding plasma fibronectin levels during post term pregnancy. A significant decrease of maternal plasma concentration of fibronectin was noticed during third trimester, at the time of delivery, and the third post partum day in post term pregnancies as compared to the concentrations found in normal pregnancies.

Key words: Pregnancy; Fibronectin.

INTRODUCTION

Fibronectins are high molecular weight, glycoprotein compounds, which have been classified as α-2-globulins. Fibronectins are present on most cell surfaces, in extracellular fluid, in connective tissue and in the basement membranes of most tissues ([1]). There are at least two classes of fibronectin; plasma and tissue ([2]). Plasma fibronectin appears to function as a nonspecific, opsonizing protein important in the activation of the host immune system, before the synthesis of specific immunoglobulins. Tissue fibronectin on the other hand, is an important factor in the regulation of cell interactions ([3]). Fibronectin is important in tissue remodelling during wound healing and also in binding some bacteria. Seriously ill patients suffering from sepsis, trauma, severe burns and multiple organ failure have depleted plasma fibronectin levels, up to 50% less than the normal levels ([4]). Stubbs *et al.* in 1984, studied plasma fibronectin levels in preeclamptic patients and found them to be higher than in nonpreeclamptic patients. Plasma fibronectin levels in post term pregnancies have not been reported. This study was undertaken to assess plasma fibronectin levels in post term pregnancies.

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MATERIAL AND METHODS

Plasma fibronectin levels were studied in a group of 20 post term pregnancies and a control group of 40 term pregnancies. All patients

were studied prior to delivery, had not been operated upon within the last 5 months and had not received any blood products during the pregnancy. None was known to have any history of coagulation abnormality.

Plasma specimens were obtained in the third trimester, at delivery and 72 hours post partum. Plasma was also obtained from the umbilical cord and the amniotic fluid at delivery. These specimens were frozen at −70 C in plastic tubes pending determination of the plasma and amniotic liquid fibronectin levels. The levels of fibronectin in plasma and amniotic fluid were measured using the simple Radial Immunodiffusion Method. Radial Immunodiffusion kits were obtained from the Binding Site Ltd, University of Birmingham.

Samples and standards of 5μl were applied to the wall of plates, after 100 hours of incubation at room temperature. Results were quantitated by comparison of diameter of the precipitation ring produced by the sample, as compared to the precipitation rings produced by the standards of known concentration.

RESULTS

The plasma fibronectin concentrations in all post term women was below the range established for the normal pregnant women.

The mean (±SD) fibronectin concentration for the control group was 325±18.1 μg/ml and 275±28.2 μg/ml at delivery and cesarean section. In marked contrast the concentrations in the post term group were reduced, with a mean (±SD) of 173.7±35 μg/ml at delivery and 44.8±26 μg/ml at cesarean section, (Tables 1, 2, 3). The amniotic fluid and umbilical cord fibronectin levels in the normal pregnancies were higher than in post term pregnancies but significantly reduced as to maternal plasma concentrations in both groups (Tables 4, 5).

Table 1. – Comparison of fibronectin serum concentrations in normal and post term pregnancies which were completed by normal delivery.

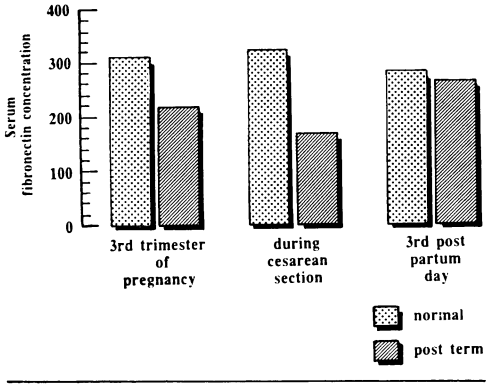


Table 2. – Comparison of fibronectin serum concentrations in normal and post term pregnancies which were completed by cesarean section.

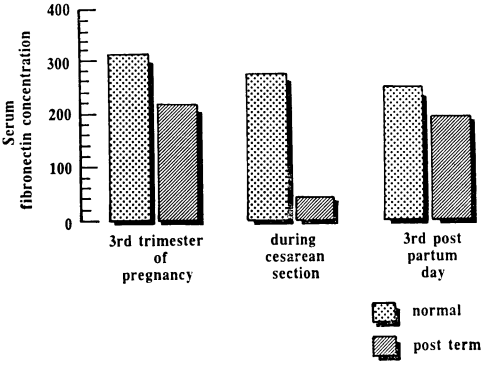


Table 3. – Comparison of fibronectin serum concentrations in normal and post term pregnancies during normal delivery and cesarean section.

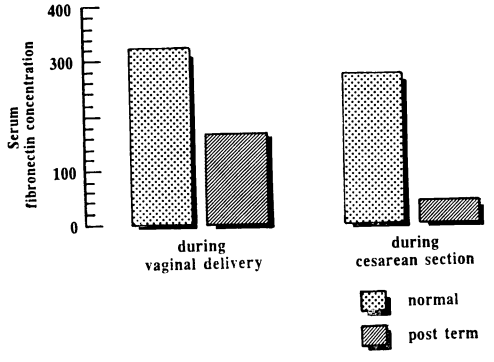


Table 4. – Comparison of fibronectin amniotic fluid concentrations in normal and post term pregnancies during normal delivery and cesarean section.

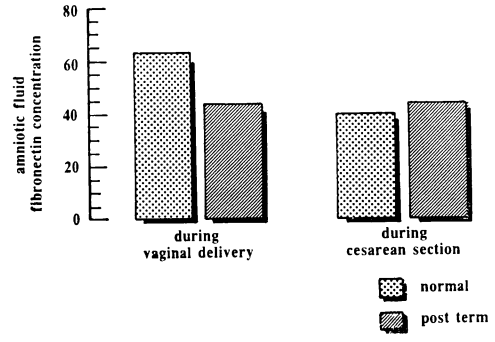
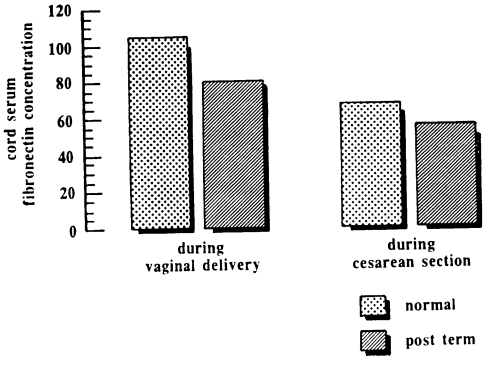


Table 5. – Comparison of fibronectin umbilical cord serum concentrations in normal and post term pregnancies during normal delivery and cesarean section.



DISCUSSION

Plasma fibronectin is a nonspecific, readily available, opsonizing protein involved in initial host defense mechanisms before the synthesis of specific opsonins ([5]).

Moreover, phagocytic activity of leucocytes in vivo is correlated directly with concentration of fibronectin in plasma ([6]). Patients suffering severe traumatic injury, septic shock or hemorrhagic shock maybe experience dramatic reductions in plasma concentrations of fibronectin.

Fibronectin depletion has also been suggested as an important factor in the pathophysiology of septicemia with group B streptococcus in the neonate ([8]).

The Authors observed that the concentrations of fibronectin in plasma of pregnant women increased during the third trimester of pregnancy and were significantly higher during delivery. A decrease in the concentrations was noticed on the third post partum day. An even more significant decrease of maternal plasma concentrations was noticed during cesarean section in normal pregnancies as compared to the concentrations found at the time of normal delivery. Our results agree with those of Bawdon and Davis (1988). This reduction is not as great as has been observed in patients undergoing other types of elective surgery, probably because of the increased fluid volume during pregnancy ([9]). A decrease in the concentrations was also noticed on the third post partum day.

Of the post term pregnancies studied the concentrations of plasma fibronectin were lower than in normal pregnancies during the third trimester, at the time of delivery or cesarean section and on the third post partum day.

The reason for this difference is unclear, damage to the fetal-maternal blood circulation, due to placental aging, is a possible explanation.

The concentrations of fibronectin in umbilical cord plasma and amniotic fluid are significantly less than those observed in maternal plasma at the time of delivery in normal and post term pregnancies. The possibility exists that umbilical cord plasma and amniotic fluid concentrations of fibronectin are representative of reduced opsonization potential and may play a role in the apparent susceptibility to group B Streptococcal septicemia in the neonate ([10]).

These data must be interpreted with caution. The variety of assay methods previously used has made comparisons between various laboratories very difficult. Standardization of fibronectin assay methods as well as the use of longitudinal studies will, hopefully, allow for easier interpretation of future studies of these important compounds.

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