Plasma and amniotic fluid concentration of fibronectin during normal and diabetic 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. To ascertain the influence of pregnancy on plasma concentrations of fibronectin, we qualified plasma concentrations of fibronectin in normal pregnant women during the first, second and third trimester; at the time of delivery; and on the third day post partum, using a radial immunodiffusion plate procedure.

The concentrations of fibronectin found in these samples were compared with the concentration of fibronectin in 20 pregnancies complicated by diabetes. Mean plasma concentrations of fibronectin rose significantly through 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.

Of the diabetic group of women studied, higher concentrations of plasma fibronectin were found at the time of cesarean section than at the time of delivery. Maternal plasma concentrations of fibronectin were significantly greater than amniotic fluid and umbilical cord plasma concentrations.

Key words: Diabetic pregnancy fibronectin; Amniotic fluid fibronectin.

INTRODUCTION

Fibronectins are high molecular weight, glycoprotein compounds, which have been classified as a-2-globulins. Fibronectins are present on most cell surfaces, in extracellular fluid, in connective tissue and in the basement membranes of most tissues (6). There are at least two classes of fibronectin; plasma and tissue (10). 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 (4). Fibronectin is important in tissue remodeling 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 (9). Stubbs *et al.* in

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1984, studied plasma fibronectin levels in preeclamptic patients and found them to be higher than in nonpreeclamptic patients. Plasma fibronectin levels in diabetic pregnancies have not been reported.

This study was undertaken to assess plasma fibronectin levels in normal and diabetic pregnancies.

MATERIAL AND METHODS

Plasma fibronectin levels were studied in a group of 20 diabetic patients and a control group of 40 non-diabetic patients. 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 1000 hours of incubation at room temperature. Results were quantitatived by comparison of the 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 diabetic women was below the range established, for the normal pregnant woman (Tables 1, 2).

Plasma fibronectin levels in diabetic women were 55% lower during delivery and only 28% lower at the time of cesarean section than in normal pregnancies (Table 3). The amniotic fluid and umbilical cord fibronectin levels in normal pregnancies were higher in diabetic pregnancies but significantly decreased as to maternal plasma concentrations in both groups Table 4, 5).

DISCUSSION

Plasma fibronectin is a nonspecific, readily available, opsonizing protein involved

Table 1. — *Serum fibronectin concentrations in normal and diabetic pregnancies which were completed by normal delivery.*

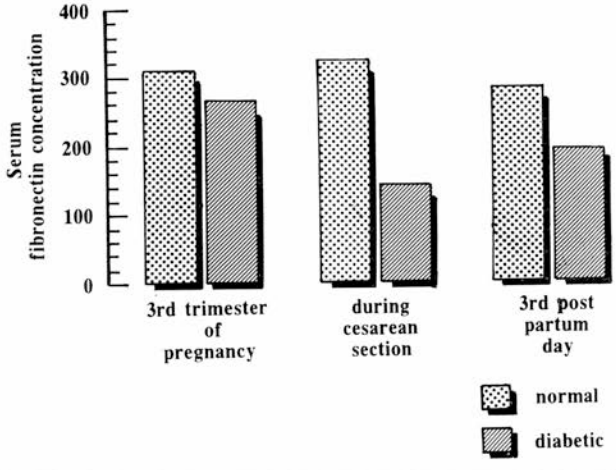
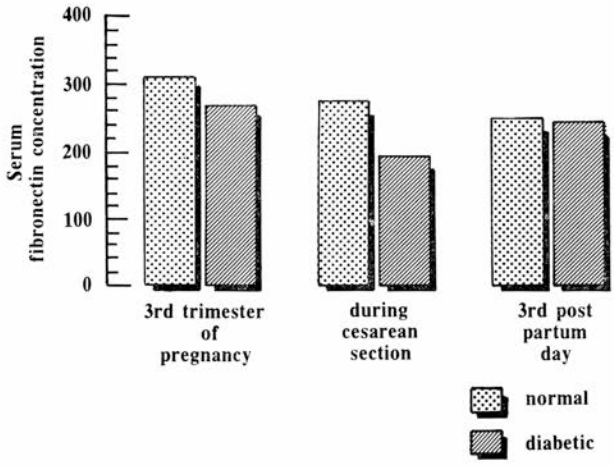


Table 2. — *Serum fibronectin concentrations in normal and diabetic pregnancies which were completed by cesarean section.*



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 ([8]). Patients suffering severe traumatic injury, septic shock or hemorrhagic shock may 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 ([3]).

The authors observed that the concen-

Table 3. — *Serum fibronectin concentrations in normal and diabetic pregnancies during vaginal delivery and cesarean section.*

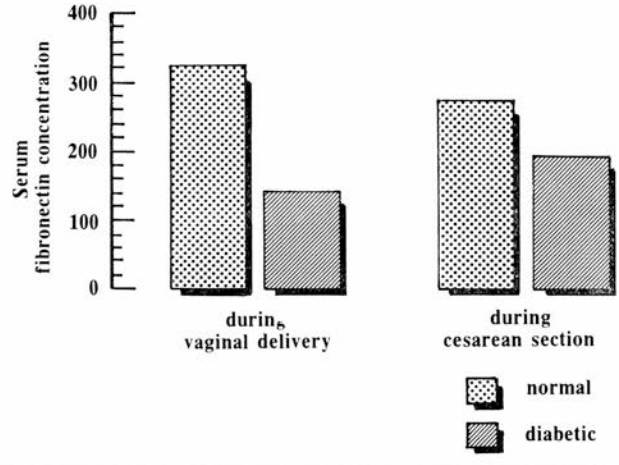
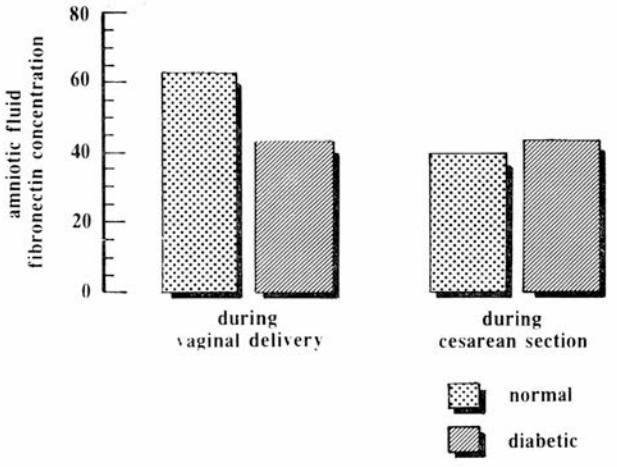
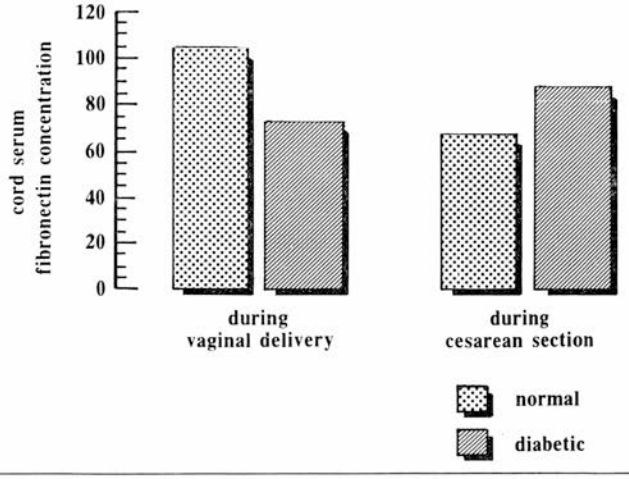


Table 4. — *Amniotic fluid fibronectin concentrations in normal and diabetic pregnancies during normal delivery and cesarean section.*



trations of fibronectin in plasma of pregnant women are 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 decrease is not as great as has been observed in patients undergoing

Table 5. — *Comparison of fibronectin umbilical cord serum concentrations in normal and diabetic pregnancies during normal delivery and cesarean section.*



other types of elective surgery, probably because of the increased fluid volume during pregnancy ([1]). A decrease in the concentrations was also noticed on the third post partum day.

Of the diabetic group of women studied, a higher concentration of plasma fibronectin was found at the time of cesarean section than at the time of delivery, but the concentrations of plasma fibronectin, were lower than in normal pregnancies during the third trimester at the time of delivery and on the third postpartum day. The reason for this difference is unclear. A possible explanation is the damage due to the vascular endothelium in diabetic women. The mechanisms for the regulation of plasma fibronectin levels are not yet well known ([1]).

The concentrations of fibronectin at the time of delivery in umbilical cord plasma and amniotic fluid were less than those observed in maternal plasma in both normal and diabetic 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 ([2]).

This 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 hopefully will allow for easier interpretation of future studies of these important compounds.

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