FIBRIN DEGRADATION PRODUCTS (FDP) AND INHIBITORS IN RETROPLACENTAL BLOOD

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SYNOPSIS

There are many haemostatic changes at delivery but there has been no report on the fibrinolytic activity of blood from the placental bed immediately following delivery. We therefore compared the fibrin degradation products and their inhibitors in retroplacental blood with antecubital blood collected before and immediately after delivery. Though there were no significant differences in plasminogen, a2-antiplasmin, a1-antitrypsin and a2-macroglobulin levels between retroplacental, pre-delivery and post-delivery antecubital blood, there was a statistically significant increase in fibrin degradation products in retroplacental blood when compared with pre-delivery blood. The significance of this finding and its possible immunological relevance is discussed.

INTRODUCTION

The haemostatic mechanism in pregnancy is altered towards an enhanced capacity to form fibrin and a diminished ability to lyse fibrin (1). These changes were thought by Bonnar and coworkers (1) to ensure the integrity of the foetal and maternal circulations during pregnancy. In another study, Bonnar and coworkers (2) demonstrated activation of the clotting mechanism from blood obtained from the uterine vein during placental separation at Caesarean section and they believed it plays an important role in controlling uterine haemorrhage.

This was confirmed by Hahn and Korsan-Bengsten (3) who demonstrated changes in uterine venous blood following placental separation at elective Caesarean section suggesting a general clot promoting tendency with increased local uterine fibrinolytic activity.

However, as there has been no report on the fibrinolytic activity of blood from the placental bed immediately following delivery, we studied blood collected vaginally from the retroplacental bed after delivery of the baby to determine its fibrinolytic status.

CLINICAL SUBJECTS AND METHOD

The subjects were thirteen Chinese women, selected randomly, with uncomplicated singleton pregnancies at term resulting in spontaneous labour and normal vaginal deliveries. Their ages were between 21 and 35 years (mean: 26.7), and their parity were between 0 and 3 (mean: 0.9).

Venous antecubital blood was first collected before delivery when the patient is at 9 cm cervical dilatation. Normal delivery was then awaited. Following the delivery of the infant, the gush of blood (retroplacental blood, RPL) before lengthening of the cord and subsequent delivery of the placenta was collected vaginally. At the same time, venous antecubital blood was collected again.

Disposable plastic syringe with 21G needles were used for drawing blood from the antecubital vein. A clean venepuncture was made each time. RPL and venous blood were collected into plain plastic tubes for inhibitor studies and tubes containing EACA — thrombin for fibrin/fibrinogen degradation products (FDP) and plasminogen assays. Serum was separated after the blood was left to stand at room temperature for about four hours and then spun at 2000g for 15mins. The sera were stored at — 70°C until assayed. Laurell's rocket method (4) was used for measuring alpha1-antitrypsin, alpha2 — macroglobulin and plasminogen. Alpha2 antiplasmin was measured by the method of Aoki et al (5) and FDP by Merskey et al (6).

Statistical analysis is by students' t-test.

RESULTS

Retroplacental blood clotted almost immediately even when collected in citrate anticoagulant. Hence, other parameters of fibrinolysis could not be done. Table 1 shows the results of the FDP, Plasminogen and Inhibitors in RPL blood, pre and post delivery cubital blood of the thirteen Chinese subjects.

When pre-delivery blood was compared with RPL blood a significant increase in FDP was observed ($p < 0.01$) and just significant increase in FDP was seen when compared with post delivery blood ($p = 0.05$). No significant differences in FDP were found between RPL and post-delivery blood.

DISCUSSION

FDP is the result of fibrinolytic activity that has taken place in the vascular system.

In our study, there was no statistically signifcant change in fibrinolytic inhibitors and plasminogen. However, significant increase in FDP ($p < 0.01$) was noted when RPL blood was compared with pre-delivery cubital blood (Table 1). No difference in RPL blood and post delivery blood for FDP was seen. Gilabert and coworkers (7) reported a decrease in FDP in cubital blood during expulsion of the placenta. We found a 2-fold increase ($p = 0.05$) in post delivery blood compared with pre-delivery cubital blood. Elevated FDP was also demonstrated by Bonnar (8) and Kleiner et al (9) in cubital blood.

Hahn (10) demonstrated an elevated FDP in uterine venous blood when compared to cubital blood. This was confirmed indirectly by us, as elevated FDPs in RPL blood. This could only suggest that increase in fibrinolytic activity is apparent in the uterine and retroplacental region during labour and immediate postpartum in the venous circulation. This phenomenon is expected as fibrinolytic activity protects and enhances vascular fluidity during and after placental separation. We have found that Asian Chinese women in late pregnancy have good plasminogen activator activity (11), contrary to the report by Bonnar and coworkers (1). It is possible that fibrinolytic status in Asian women may be different from their Caucasian counterparts.

It has been previously reported by us that there is a significant decrease in s-IgD in B lymphocytes from the retroplacental blood (12). This decrease in s-IgD may be reflection of the increased fibrinolysis going on at delivery. Vitetta and Uhr (13) reported that s-IgD in murine splenocytes is susceptable to cleavage by papain, probably at the hinge region. This proteolytic effect on s-IgD was also shown to be present on human lymphocytes (14). Working with murine lymphocytes, Cambier and co-workers (15) reported that removal of increasing amounts of IgD results in increasing susceptibility of thymus-dependent responsive cells to tolerance induction. This may explain Fuchs and co-workers (16) findings of immunosuppression by mitogenic responses in lymphocytes collected from the uterine bed in early pregnancy. Griffin and Beck (17) reported that there was significantly lower lymphocyte transformation rates at delivery and 2 hours post-partum, as compared to pre-delivery and 24 hours post-partum. Again, this may be explained by increased fibrinolysis at placental separation affecting surface immunoglobulins and their possible function.

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TABLE 1
FDP, PLASMINOGEN AND INHIBITORS IN PRE-CUBITAL BLOOD COMPARED TO POST DELIVERY CUBITAL AND RPL BLOOD

	Pre-delivery	Post-delivery		Retroplacental	
	Mean ± SD	Mean ± SD	p	Mean ± SD	p
FDP ug/ml	11.25 ± 10.0	25.39 ± 27.4	ns	31.25 ± 24.9	0.01
Plasminogen g/l	0.137 ± 0.02	0.139 ± 0.02	ns	0.135 ± 0.02	ns
a2 Antiplasmin mg/dl	4.32 ± 0.88	4.42 ± 0.81	ns	4.38 ± 0.86	ns
a2 Macroglobulin g/l	2.83 ± 0.98	3.01 ± 1.18	ns	2.91 ± 1.08	ns
a1 Antitrypsin g/l	3.64 ± 0.56	3.66 ± 0.54	ns	3.50 ± 0.53	ns

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