Research Paper

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Comparative Study if Coagulation Factors in Pre-Eclampsia and Normal Pregnancy

Medical Science

KEYWORDS : Thrombocytopenia; Severe pre-eclampsia; Activated partial thromboplastin Time

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ABSTRACT

Background : Hematological abnormalities are commonly encountered in pre-eclampsia and poses challenge to life if not diagnosed and managed early. As compared to pre-eclampsia, normal pregnancy does not encounter hematological abnormalities. Monitoring coagulation parameters at times detects unexpected threat which serves as a useful alarm.

Methods : Coagulation indices including platelet count, prothrombin time (PT), activated partial thromboplastin time (aPPT), plasma fibrinogen, and fibrin degradation products (FDP) were measured within 24 hours of admission for fifty women with severe Pre-eclampsia and fifty normal pregnant women for 2 year period from January 2012 to December 2013. The patients with coagulopathies were excluded. The coagulation indices were compared between the two groups.

Results: The mean value of platelet counts were significantly lower while the mean values of aPPT and FDP were higher in the pre-eclampsia patients. The mean values of plasma fibrinogen and PT did not show any statistical difference between these two groups. 47% of the patients with severe pre-eclampsia showed thrombocytopenia, 8 % prolonged PT, 32 % prolonged aPTT, 30 % hypofibrinogenemia,and 30 % elevated FDP. Prolonged aPTT was seen in 6% of patients with platelet counts of more than 150 x 103 / mm3 at the admission time. However, these patients showed evidence of coagulopathies and needed to receive blood or blood products later in their hospitalization duration.

Conclusion: In case an abnormal platelet count or aPTT is detected in a patient with severe pre-eclampsia, a coagulopathic disorder should be clinically suspected.

Introduction :

Hematological abnormalities such as thrombocytopenia and decrease in some plasma clotting factors may develop in pre-eclamptic women[3] The coagulation testing is needed in patients with evidence of Disseminated Intravascular Coagulation and HELLP (hemolysis, elevated liver enzymes and low platelet) syndrome.[1,2]

The initial concept was that only serial measurements of platelet count was adequate for intrapartum screening. Later, combination of platelet count and aPTT, platelet count and liver function tests, platelet count and lactate dehydrogenase, platelet count and antithrombin were suggested for early detection and screening of the patients with pre-eclampsia.[5,6] However, there are still doubts as to the cost-effectiveness of the tests needed to be performed on all patients.

It was shown that abnormal PT, aPTT and fibrinogen levels are found in patients with platelet counts of less than 100,000/ mm^3, so the physician can safely follow only the platelet counts of the patients with severe pre-eclampsia.[4,6,7]On the other hand, another study suggested the evaluation of PT, aPTT and fibrinogen in the patients with severe pre-eclampsia for whom operative delivery or regional anesthesia is planned to prevent bleeding complications.

In this study we aimed to compare the coagulation parameters in the patients with severe pre-eclampsia and normal pregnant women and to determine whether a normal platelet count can assure the physician that no other clinically significant clotting abnormalities are present in the patients with severe pre-eclampsia.

Materials and Methods

This retrospective study was performed for patients referred from Obstetric and Gynecology department and whose coagulation profile was performed at Department of Pathology, P.D.U. Government medical college and hospital , Rajkot in 2 years period (January 2012-December 2013). Total one hundred women in their third trimester of pregnancy were enrolled for the study. Of these fifty patients had pre-eclampsia and fifty had normal pregnancies.

The criteria for pre-eclampsia included sustained blood pressure of at least 160/110 mmHg or higher with persistent proteinuria of 2+ or greater on urine dipstick or elevated creatinine (>1.2mg/dL) Coagulation indices including platelet count, PT, aPTT, total serum fibrinogen level and fibrin degradation products (FDP) were measured . Coagulopathy was diagnosed in a patient if transfusion of any blood products or coagulation factors became necessary due to bleeding or hemolysis in her hospital course. The patients who had any confounding conditions that could have altered the coagulation tests such as placenta previa, sepsis, stillborn were not included in the study.

Thrombocytopenia was defined as platelet count <150,000/ $mm.^3$ PT and aPTT were considered abnormal if they were >15 seconds and >40 seconds, respectively. Fibrinogen was considered low if it was <250 mg/dL and FDP was considered elevated if it was ≥5 µg/mL. The features for HELLP syndrome were: 1) hemolysis defined by abnormal peripheral smear and increased bilirubin >1.2 mg/dL and 2) elevated liver enzymes at a level of twice the upper normal limit for the laboratory as: serum aminotransferase ≥70 U/L 3) low platelets defined as platelet counts <100000/cumm.Statistical analyses were performed by Chi Square,2-tailed t and Fisher's exact test. Statistical significance was considered at $p<0.05$.

Results :

The clinical and paraclinical findings of the patients with severe pre-eclampsia and the control group at the admission time are compared in Table 1. The mean value of platelet counts was lower ($p<0.001$) and the mean values of aPTT ($p<0.005$) an FDP

(p<0.001) were higher in pre-eclamptic patients. However, the mean values of plasma fibrinogen and PT showed no statistical difference between the two groups (p>0.05).

Table 1 : Clinical and paraclinical characteristics.

	Women with Pre-eclampsia	Normal pregnant Women	p-value (by 2-tailed t-test)
Age ((years)	26±5	23±5	
Systolic BP (mmHg)	160 mm of Hg	100 mm of Hg	0.030
Diastolic BP (mmHg)	100 mm of Hg	60 mm of Hg	
Hemoglobin (g/dL)	10.03±2.53	11.18±2.46	<0.001
Platelet´10 3 (/mm3)	153.76±89.69	229.04±59.6	<0.001
Prothrombin time (s)	12.49±4.43	12.50±0.76	0.067
Partial thromboplastin time (s)	36.70±12.35	34.24±2.52	0.005
Plasma fibrinogen (mg/dL)	236.78±66.58	298.08±32.37	0.166
Elevated fibrin degradation products (%)	15. 0	0	<0.001

Simultaneous abnormalities in coagulation tests of patients with severe pre-eclampsia are presented in Table 2.

Table 2: Simultaneous abnormalities of coagulation tests in the patients with pre-eclampsia

Coagulation abnormality	No.	Thrombocytopenia No.(%)	Prolonged PT (%)	Prolonged PTT (%)	Low fibrinogen(%)	Elevated FDP (%)
Thrombocytopenia (<150x10 3 / mm3)	25	-	5(20)	12(48.0)	6(24.0)	15(70.0)
Prolonged PT 15-35s	5	3(60.0)	-	3(60.0)	0	3(60.0)
Prolonged PTT 41-90s	15	12(80.0)	3(20.0)	-	5(33.3)	10(66.6)
Low fibrinogen (<250mg.dL)	14	6(42.8)	0	6(42.8)	-	4(28.5)
Elevated FDP (³5mg/mL)	16	15(93.7)	3(18.7)	10(62.5)	4(25.0)	-

The patients with pre-eclampsia were classified according to their platelet counts (Table 3). There was a significant correlation between thrombocytopenia and prolonged aPTT (p=0.010). There was also a strong correlation between elevated FDP and thrombocytopenia (p<0.001) in patients with pre-eclampsia.

Table 3: Coagulation abnormalities of patients with pre-eclampsia according to their platelet counts

Platelet count	No.	Prolonged PT(%)	Prolonged aPTT (%)	Low fibrinogen(%)	Elevated FDP(%)
³150´10³ / mm³	25	2(8.0)	4(12)	8(32.0)	1(4.0)
100-150´10³ / mm³	13	1(7.5)	6(41.7)	1(16.7)	4(33.3)
£100´10³ / mm³	12	2(17.7)	8(53.8)	5(30.8)	12(84.6)
P value		0.700	0.015	0.700	<0.001

In this study, the comparison of normal pregnant women to the pre-eclampsia patients for mean PT and mean plasma fibrinogen showed no statistically significant difference.

Discussion :

Thrombocytopenia is relatively frequently reported in severe pre-eclampsia with the occurence range of 30-50%.[1,5] The incidence of thrombocytopenia in our study was 50%. This high incidence probably occurred because we included only the cases with severe pre-eclampsia . Platelet count >150,000/mm³ can not assure the physician that no other significant clotting abnormalities are absent. However, the measurement of aPTT seems to be important for early detection of coagulation abnormalities in patients with severe pre-eclampsia who have normal platelet counts. Our results show, if we only considered the platelet counts of less than 100 x 10^3 / mL, we would miss a high percentage of the cases with real coagulation abnormalities.

In this study, there was only one patient with raised FDP and a platelet count of more than 150 x 10^3 /mL who had a simultaneous prolongation of aPTT and who subsequently had DIC . FDP measurement does not seem to be an appropriate screening test since it is expensive and of little help in diagnosis (2%), and same purpose can be achieved by measuring aPTT.

Hence combining platelet count and aPTT are useful to detect an early ongoing coagulopathy in all patients with severe pre-eclampsia who will develop DIC .[8,9]

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