Original Article

Pathology

Significance of Platelet Count and D-Dimers Level in Carcinoma Prostate

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ABSTRACT

Objective: Analysis and recognition of coagulopathies in patients with carcinoma of prostate by carrying out platelet count and D-dimers level.

Study Design: Case-control study.

Place and Duration of Study: This study was conducted at ISRA Hospital, Hyderabad, Liaquat University of Medical & Health Sciences Hospital Hyderabad and NIMRA Jamshoro for a period of six months from from June 2011 to November 2011.

Materials and Methods: Cases were patients with prostatic carcinoma who were diagnosed on biopsy examination. Controls were normal healthy randomly selected age matched adult males from Hyderabad without prostatic carcinoma. A total of one hundred subjects were included in the study.

Results: In Group I (Cases), the mean platelet count was 197.52 x 103 and in Group II (Controls), the mean platelet count was 286.06 x 103. In Group I (Cases), the mean D-dimers level was 0.692 mg/L and in Group II (Controls), the mean D-dimers level was 0.146 mg/L.

Conclusion: Coagulopathies are frequently associated with prostate cancer and should be known to urologists and oncologists because they may compromise short-term prognosis and influence therapeutic strategies. Our results suggest that platelet count and D-dimer levels are altered in patients with prostate cancer.

Key Words: Platelet Count, D-Dimers, Carcinoma Prostate

INTRODUCTION

Tissue factor is released from the host as well as malignant cells. It is considered non-specific for malignant tumors though cancer cells produce increased quantity of tissue factor [(1)]. There is strong association of increased expression of urokinase-type plasminogen activator (uPA) with prostatic carcinoma[(2)]. High levels of plasma urokinase plasminogen activator have been observed in metastatic prostate cancer[(3)]. This increases the risk of primary activation of fibrinolytic system in patients with prostatic carcinoma[(4)]. Coagulation and fibrinolytic abnormalities can be fatal in patients with prostatic carcinoma[(5)]. Coagulation and fibrinolytic abnormalities were investigated in patients with prostatic carcinoma treated with estrogen. A strong association was observed between estrogen therapy and significant decrease in antithrombin III in patients with prostatic cancer[(6)]. The most frequent coagulation abnormality in patients with prostatic cancer is disseminated intravascular coagulation[(7)]. It has been reported that disseminated intravascular coagulation is not usually the first manifestation in patients with carcinoma of prostate[(8)]. Clinical manifestations of coagulation abnormalities vary in patients with malignancies. These range from subtle abnormalities in laboratory parameters to clinically overt disseminated intravascular coagulation and thrombosis[(9)]. 50% of all cancer patients show hemostatic abnormalities while 90% patients with prostatic cancer have these abnormalities[(9)]. Significance of cancer cell associated procoagulant pathway that leads to generation of thrombin and hypercoagulation is reflected in abnormalities in the laboratory parameters[(9)]. Fibrin is present in the tumors and it affects new blood vessels. This shows a close relationship between tumors and the haemostatic system that leads to tumor growth and invasion. Malignant cells themselves can convert fibrinogen to fibrin. In previous studies it was observed that D-dimer is associated with tumor progression. Increased plasma level of D-dimers reflect ongoing fibrinogen metabolism within actively remodeling tumor stroma [(10)]. Anti-thrombin inhibits tumor invasion due to the formation of complexes with proteases including plasma kallikreins and trypsin. As a corollary deficiency of AT can lead to carcinogenesis, tumor growth and progression of prostate cancer[(11)]. Coagulation factors play a key role in haemostasis. Immediately after the damage to the blood vessels simultaneous activation of platelets and coagulation system occurs. Platelets form a primary haemostatic plug to stop oozing of blood from the damaged vessels but this plug is not stable. It needs fibrin for stabilization which is provided by the activated coagulation proteins.

MATERIALS AND METHODS

The study is a case control study, in which cases were patients with prostatic carcinoma who were diagnosed on biopsy examination. Controls were normal healthy randomly selected age matched adult males from Hyderabad without prostatic carcinoma. The patients were taken from ISRA University Hospital, Hyderabad, Liaquat University of Medical & Health Sciences Hospital Hyderabad and NIMRA Jamshoro from June 2011 to November 2011. Study was conducted in the Pathology department, ISRA University Hospital, Hyderabad.

Sampling technique: Cases and controls were selected through non-random sampling.

Inclusion criteria:

- Age more than 60 years.
- Patients having prostatic tumor diagnosed on biopsy.
- No family history of cancer.

Exclusion criteria:

- Patients with liver disease.
- Patients with drug history (heparin, warfarin etc).
- Congenital bleeding and coagulation disorders.

Criteria for Control Subjects:

- No clinical significant history
- Normal clinical examination
- Normal platelet count and D-dimer levels.

Parameters:

- Platelet count
- D-dimer levels

Sample collection and Preparation: Whole blood (10 ml) samples were collected by venepuncture from all subjects recruited in the study. 3ml was transferred to an EDTA tube for platelet count and 4ml of blood was transferred into the gel tube. Serum was separated by centrifugation at 3000g for 10 min from gel tube and stored at -40°C for analysis of D-dimers**.**

RESULTS

A total of 100 individuals were recruited in the study i.e. 50 patients with carcinoma of prostate and 50 normal controls. Mean ± SD was calculated for platelet count and D-dimers level.

Table No. I. Comparison of Platelet count in Patients and Controls

n= 100 (100%)		
	Group I (Patients) n=50	Group II (Controls) n=50
Mean	197.52	286.06
Std. Deviation	85.10	75.84

Table No. 2: Comparison of D-dimers In Patients and Controls

n= 100 (100%)		
	Group I (Cases) n=50	Group II (Controls) n=50
Mean	0.69	0.14
Std. Deviation	80.07	0.05

Consolidated results of the parameters are shown in table-1.

Table No. 3: Statistical analysis

Parameters	Mean		p value
	Control	Patients	
Platelet Count	286.06 ± 75.84	197.52 ± 85.10	0.001
D dimers	0.14 ± 0.05	0.69 ± 0.07	0.001

DISCUSSION

Early analysis and recognition of coagulation abnormalities in patients with carcinoma of prostate by carrying out platelet count and D-dimer levels should be sorted out to help the patients either in terms of treatment or diagnosis or prevention of fatal complications. Cases were patients with prostatic carcinoma who were diagnosed on biopsy examination. Controls were normal healthy randomly selected age matched adult males from Hyderabad without prostatic carcinoma. A total of 100 individuals were recruited in the study i.e. 50 patients with carcinoma of prostate and 50 normal controls. Mean ± SD was calculated for platelet count and D-dimers level. Mean platelet count in the patients was $197.52x10^3$/ µl as compared to control subjects in whom the mean platelet count was $286.06x10^3$/µl. Among 50 patients 32% of the patients showed thrombocytopenia with a mean platelet count of $80.81x10^3$/ µl. This finding is consistent with the study of Carsten and Duran I and Tannock IF [12,13] in which 10% of the patients with prostatic carcinoma showed thrombocytopenia. In advance prostatic carcinoma, bone metastasis is a frequent complication and may be present at the time of initial clinical diagnosis [14,15]. One of the mechanisms of thrombocytopenia in patients with prostatic cancer is infiltration of the bone marrow with tumor cells. Other likely mechanisms of thrombocytopenia are the consumption of platelets in the thrombosis, DIC, spleenomegaly and damaging effects of malignant cells on platelets [16,17]. Mean D-dimer level was 0.692 mg/L in patients with prostatic carcinoma which was higher than in the control group in which mean D-dimer level was 0.146 mg/L. Out of fifty cases with prostatic carcinoma, 20 (40%) showed elevated D-dimer level. Our results are consistent with the results of Caine et al[18] and Sung et al [11]. Coagulation disorders are frequently associated with prostate cancer and should be known to urologists and oncologists because they may compromise short-term

prognosis and influence therapeutic strategies. Disseminated intravascular coagulation is the most frequently reported disorder but, in spite of its long-time recognition, its treatment remains controversial. Our results suggest that D-dimer levels are altered in patients with prostate cancer. Further study is needed to elucidate the underlying mechanism and clinical significances of such a phenomenon among patients with prostate cancer. Every patient of prostatic carcinoma should be screened for D-dimer levels which is a sensitive coagulation parameter in order to avert adverse malignancy outcome like disseminated intravascular coagulation.

CONCLUSION

Coagulopathies are frequently associated with prostate cancer and should be known to urologists and oncologists because they may compromise short-term prognosis and influence therapeutic strategies. Disseminated intravascular coagulation is the most frequently reported disorder but, in spite of its long-time recognition, its treatment remains controversial.
Our results suggest that platelet count and D-dimer levels are altered in patients with prostate cancer. Further study is needed to elucidate the underlying mechanism and clinical significances of such a phenomenon among patients with prostate cancer.

Recommendations: Every patient of prostatic carcinoma should be screened for platelet count and D-dimer levels which is a sensitive coagulation parameter in order to avert adverse malignancy outcome like disseminated intravascular coagulation.

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