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PLATELET COUNT: A PROGNOSTIC INDICATOR IN EARLY DETECTION OF POST BURN SEPTICEMIA

Pushpa Ashok Kamble[1], Mayuri Khobragade Kamble[2], Ashok Tarachand Kamble[3], Pratik Abhishek[4]*, Priyansh Pandey[5]

[1]Professor, Department of Anaesthesia, JNMC, Sawangi(Meghe). Wardha.
[2]Associate Professor, Department of Surgery.
[3]Professor, Department of Surgery, JNMC, Sawangi(Meghe). Wardha.
[4,5]Resident, Department of Surgery, JNMC, Sawangi(Meghe). Wardha.

***Corresponding Author: Dr. Pratik Abhishek**
Resident, Department of Surgery, JNMC, Sawangi(Meghe). Wardha.

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ABSTRACT

Introduction: Sepsis remains major cause of death in burn patients. Once patient undergoes septicemia it can lead to SIRS followed by MODS with death as an ultimate effect. Burn patients can only be saved in early phases of septicemia which requires sensitive parameter to detect early septicemia. Platelets play an important role in severe hemostasis disorders and immune response impairments in burn patients. In the present study we have used platelet count as an indicator for detection of early septicemia. **Material and methods:** 66 patients of with 20% to 70% burns were included in a period of 2 years. Platelet count and other investigations were done on 1st, 3rd, 7th, 14th & 21st days. **Results:** Mean platelet count in survivors and non-survivors was 1.95 lac/c.mm - 2.25 lac/c.mm and 1.15 lac/c.mm - 1.98 lac/c. mm respectively. **Discussion and conclusion:** Rebound rise in platelet count on the subsequent post-burn days occurs in survivors while declining trend is maintained till the death of the patients in case of nonsurvivors. Platelet count on any post-burn day is not dependent on the extent of the burn injury but depends on sepsis in burns. The monitoring of the platelet count is of great importance during the resuscitation and care of severely burned patients.

KEY WORDS: platelet, sepsis, septicaemia.

INTRODUCTION

Sepsis remains major cause of death in burn patients. Once patient undergoes septicemia it can lead to SIRS followed by MODS with death as an ultimate effect.

Burn patients can only be saved in early phases of septicemia which requires sensitive parameter to detect early septicemia. Platelets play an important role in severe hemostasis disorders and immune response impairments in burn patients. Platelets are small fragments of megakaryocyte cytoplasm, which play a fundamental role in primary and secondary hemostasis, as crucial reactions of the coagulation cascade occur on their phospholipid surface. Although their primary function is hemostatic regulation, they also act as inflammatory cells. They release inflammatory mediators, express proinflammatory surface molecules, interact with leukocytes and endothelial cells, thus taking part in the induction of acute and chronic immune responses.[1] The majority of burn injuries are minor although painful. In contrast, a small number of individuals receive massive, deep burns that are accompanied by permanent disfigurement or death. Traditionally, burn area and patient's age have been employed as the primary predictors of mortality after thermal injury. Other factors identified during the course of hospitalization also may help to predict accurately those patients who are likely to die.[2]

Long before in 1977, Raymond C. Vilain raised a question: Is the burn center a septic ghetto? This is very true even today, because every new arriving burned patient directly goes to the burn ward where already existing infected patients, contaminated floors, and beds are ready to welcome this burned patient.[3] Sepsis remains the major cause of death in burn patients.

The moment there is invasion of microorganisms into the systemic circulation, the patient develops septicemia. Once the patient develops septicemia, it affects almost all the organ systems of the body, leading to systemic inflammatory response syndrome, followed by multiple organ dysfunction syndrome with death as an ultimate effect. Hence, burn patients can only be saved in early phase of septicemia before the occurrence of irreversible damage to various organs. Declining platelet count

occurs very early in septicemia even before clinical signs and symptoms develop. This requires the presence of sensitive parameters which can detect septicemia in its early phase, so that early detection and institution of treatment can save the life of burn patients. In the present study we have used platelet count as an indicator for detection of early septicemia.

MATERIAL AND METHODS

66 patients of with 20% to 70% burns were included in a period of 2 years. Platelet count and other investigations were done on 1st, 3rd, 7th, 14th & 21st days.

For estimation of platelet count, 2 ml of venous blood was collected in EDTA bulb (as anticoagulant) and gently mixed without delay. To this 0.1 ml of blood in 1.9 ml of diluent (1 in 20 dilution) was added. The diluent agent used was 10 g/l ammonium oxalate. The Neubauer counting chamber was filled with suspension and placed in moist petri dish and left for 20 minutes to settle the platelets. Platelets appeared under ordinary illumination as small (but not minute) highly refractile particles under the microscope. The number of platelets in one or more area of 1 mm^2 was calculated as follows: Platelet count /lt = (Numbers of cells counted x dilution x 10^6) / Volume counted Appropiate antibiotic was given according to culture and sensitivity. All patients were divided into two groups: (A) survivors and (B) nonsurvivors.

RESULTS

Total patients 66
Survivor group 37 (56.06%)
Non survivor group 29 (43.93%)

	Survivors	Non Survivors
Mean platelet	1.95 lac/c.mm - 2.25 lac/c.mm	1.15 lac/c.mm - 1.98 lac/c. mm
Mean TLC	9610/c.mm - 11230/c.mm	11600/c.mm - 12700/c.mm
Mean Neutrophil	80% - 82%	82% - 85%
Mean Serum	1.12mg% - 1.18mg%	1.41mg% - 1.44mg%
Low Platelet	5(13.55%)	18(62%)

DISCUSSION

In this study, it is found that predominant victims of burn injury are in the age group of 21–30 years. Social customs and problems like dowry might be the main factors in the young female population.

Survivors in the present study show decrease in platelet count in the initial post-burn days followed by rise in platelet count to the normal level on subsequent post-burn days. This finding coincides with similar observation in the studies by other authors.[1, 4, 5, 8, 10] Of 32 burn patients, 14 survived having rebound increase in platelet count.[8] Of 30 patients in survivors, platelet count on the 7th post-burn day decreased below the normal level. Seventh day onward, it started increasing and reached up to 5.5 lakh/mm^3 on the 15th post-burn day.[4] Thus, the rising trend in platelet count in survivors after initial fall coincides with this study. In this study, every burn patient was followed up for 21 days (if no death occurs) and behavior of platelet count was studied. In nonsurvivors, declining trend in platelet count was observed with development and progression of septicemia. Thus, this declining platelet count can be correlated with bad prognosis of patients. Similar findings were observed by other authors[1–3, 5, 7, 8, 10–12] They were observed for progressive decrease in platelet count on subsequent post-burn days in nonsurvivors. They correlated this observation with bad prognosis of the patient. Septic burn patients with acute renal failure presented with severe proteinuria that correlated to outcome, glomerular (creatinine/urea clearance) and tubular (fractional excretion of sodium and potassium) functional impairment, and systemic inflammation (white blood cell and platelet counts). Proteinuria is a negative prognostic factor and an index of renal involvement in the systemic inflammatory reaction.[13]

Significant difference in platelet count was revealed on the 4th and 7th days during monitoring in burn patient groups according to the severity of injury. A significant decrease in platelet count was observed in group B (moderate/severe burns) on day 4 as compared to day 1; platelet count was below the reference range. A significant increase in platelet count was observed on day 7 compared to day 4 in both groups according to severity of burn injury. A rising trend in platelet count further continued on day 14 compared to day 7, but with no significant difference between groups.[1]

CONCLUSION

Thus, in conclusion, rebound rise in platelet count on the subsequent post-burn days occurs in survivors while declining trend is maintained till the death of the patients in case of nonsurvivors.

Platelet count on any post-burn day is not dependent on the extent of the burn injury but depends on sepsis in burns. The monitoring of the platelet count is of great importance during the resuscitation and care of severely burned patients. Whenever the platelet count begins to decline, all measures to support the general condition of the burned patient should be initiated, including the administration of intravenous fluids and antibiotics, optimal care of the burn wound, debridement or escharectomy and blood transfusion, so serial platelet count in post-burn period can be used as a prognostic indicator in burn patients.

This study concludes that serial decline in platelet count can be used as an indicator or index to judge the septicaemia. If septicaemia is predicted, it prompts early institution of vigorous treatment to combat septicaemia. Patients who were on the verge of death were saved with early vigorous treatment. This proves that prediction of

early septicaemia with platelet count helped the patients with good recovery.

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