



PLATELET COUNT AND SURVIVAL RATE OF BURNS PATIENT- A TERTIARY CARE CENTER STUDY

General Surgery

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ABSTRACT

BACKGROUND: Burn injury affects approximately 1% of population every year. Burn area and patients age have been employed as primary predictors of mortality in burns. Other factors identified are microbiological aspects and duration of stay in hospital. Septicemia is the most important cause of mortality in burns. Burns patient can be saved if septicemia is detected earlier. PLATELET play an important role in immune response. So a fall in platelet count is an indicator of septicemia.

OBJECTIVE: This study was undertaken to compare the survival rate of burns patients according to the platelet count.

MATERIALS AND METHOD: Study area – Medical college Hospital, Thiruvananthapuram during the time period of 1 year (January 2015 – January 2016). Study Subjects – Patients admitted with burns in medical college hospital, Trivandrum. Every patient was subjected to Platelet count evaluation on day 1st, 3rd, 7 th, 14 th, 21 st post burn day. 2 ml of venous blood collected in EDTA bulb. Platelet s counted on Neubauer chamber under microscope.

RESULTS: TOTAL OF 30 burns were studied where 15 of them survived and 15 died. Out of the studied population, 46.7% patients were of age < 35 years., 53.7 % patients were of age > 35 Years. Compared two aspects of platelet count, that is platelet count on day 3 of the patients and fall in platelet count of more than 50 % that of previous value. Of the studied population, 56.7 % patients have platelet count > 1 lakh on day 3, 43.3% have count < 1 lakh. For fall in platelet count, 53.3 % patient's count fall by > 50 % and 46.7% have count < 50 %. those patients with platelet count > 1 lakh 82.4 % survived and with platelet count < 1 lakh 92.3 % died. Patients with pseudomonas infection in the wound, 50 % of them have bad prognosis.

CONCLUSION: When platelet count fall below 1 lakh at day 3, there is 56 times more chance of poor prognosis. When comparing the platelet count of patients on day 1, 3, 7, 14, 21. It shows if patients have more than 50 % of previous value, they are 11 times more prone to have poor prognosis. Survival rate of burns patients can be improved by proper evaluation of platelet count.

KEYWORDS

platelet count, prognosis in burns, percentage fall in platelet count

INTRODUCTION

Burn injury is very common and affects approximately one per cent of the general population every year. The vast majority of burn injuries are minor although painful⁷. 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 injury³. Thus, it seems unlikely that mathematical models based solely on these two, or on any other two indices of burn mortality, can fully describe this complex problem. Recently developed multifactorial models of burn mortality rates omit microbiological aspects of burn wounds from their calculations. In the present study, these and other factors to determine predictors of mortality in burn patient are analyzed. The purpose of this study is to compare initial presentation characteristics, and microbiological and laboratory tests during the course of hospitalization in surviving and non-surviving burn patients. Septicemia is the most important cause of mortality in burns³⁸. Burns patient can be saved if septicemia is detected early which requires very sensitive prognostic indicator... Burns are extremely complex traumatic injuries that can be classified according to burn depth, size and area involved in injury, age and general health status. In treatment planning, it is essential to estimate the extent of burn wound which is expressed by means of percentage of total body surface area (%TBSA)¹⁵. The so-called rule of nines is most commonly applied in adults to estimate the extent of burn wound: the body is divided into areas and each area is attributed a multiple of the number nine¹⁵. The head with the neck and the upper limbs account for 9% each, anterior and posterior trunk 18% each, each lower limb 18% of body surface, the remaining 1% accounts for the genitalia and perineum. Thermal trauma leads to impairment of skin structure and loss of skin functions. Tissue damage is the direct result of heat coagulation of structural proteins.

Platelet plays an important role in immune response in burns patients.. Platelets are small fragments of megakaryocytic cytoplasm which plays a fundamental role in haemostasis and also in inflammatory reaction. They release inflammatory mediators, express pro-inflammatory surface molecules, interact with leukocytes thus taking part in the inflammatory response in burns patients⁷. The aim of this

study was platelet count monitoring in burn patients in relation to the severity of burn injury (percentage of total body surface area burned - %TBSA) and disease outcome (survival/death). If TBSA exceeds 30%, the released inflammatory mediators and cytokines migrate to the systemic circulation, inducing systemic inflammatory response to injury. *2 Infections are the leading cause of death in patients who survive the initial period of treatment; they are the consequences of impairments in cellular and humoral immune responses in patients with severe burns²⁷. The total body surface area burned (TBSAB) was calculated from LUND & BOWDER's chart, adding percentages of dermal and subdermal burns. When platelet count of burns patients go below 1 lakh chance of survival in burns patients is less. By comparing platelet count in burns patients after admission and on third day, also taking length of hospital stay, percentage of burn surface area, age and gender as variables we may be able to find out the survival rate of burns patient.

OBJECTIVE

This study was undertaken to compare the survival rate of burns patients according to the platelet count. Burn mortality statistics may be misleading unless they account properly for the many factors that can influence. Such proper investigations and analysis are useful for patients regarding medical and financial decisions.

MATERIALS AND METHOD

It was a prospective study conducted in medical college Trivandrum on admitted patients

VARIABLES STUDIED: Age, Gender, Percentage Of Body Surface Area, Duration Of Hospital Stay, Percentage Of Body Surface Area Involved (Burn Area), Hemoglobin, Serum Albumin, Multi Resistant Bacteria- Culture And Sensitivity, Need For Blood Transfusion.

INCLUSION CRITERIA : patients admitted in burns unit in medical college trivandrum

EXCLUSION CRITERIA –

Patients referred to our hospital from other institutions for additional care and treatment (those that are not admitted immediately after being

Patients with inappropriate blood sampling dynamics are excluded
 Patients readmitted for reconstructive or other care of the same burn are excluded.

Patients who are unwilling to be a part of study.

PROCEDURE -Every patient was subjected to following investigations on 1st, 3rd, 7th, 14th, 21st post burn day.

Platelet-count

By visual method: 2 ml of venous blood collected in EDTA bulb 0.1 ml of blood mixed in 1.9 ml of diluent. Diluent agent used is 10 gm/L ammonium oxalate. Platelets counted on Neubauer chamber under microscope, which appear as small highly refractile particles. Platelets calculated as:

$$\text{Count/L} = \frac{\text{No of cells counted/dilution} \times 10^6}{\text{Volume}}$$

Normal platelet count in adults and children is 1.5 to 4.5 Lakh/c. mm. Other investigations like Hemoglobin level, Pus culture and sensitivity, Serum albumin.

Setting : study conducted on patients in surgical wards (burns unit)
 Sample size : 15 in each group (survivors and non survivors)

Using formula :
 N=

$$(Z1-\alpha/2 + Z1-P)2 (\text{LOG}(P1) + \text{LOG}(P2))^2$$

$$(\text{LOG}(P1) - \text{LOG}(P2))^2 (Z1-P1 - P2)$$

$$Z1-\alpha/2 = 1.96 \quad Z1-P = 0.842$$

P1 and P2 are survival rate. P1 = 33%, P2 = 97%

Power = 5%, significance level = 80%.

SAMPLE SIZE = 30

Data collection : from patients data and lab results available .

Tool : proforma and lab investigations

Statistical analysis : descriptive statistics

KAPLAN – MEIER SURVIVAL CURVE

COX PROPORTIONAL HAZARD MODEL

ANALYSIS AND INTERPRETATION

RESULTS: During the study period extending from January 2013 – January 2014, Studied 30 cases of burns patients .

TABLE 1: Comparing the age distribution of patients

Age in years	Frequency	Percent
<35	14	46.7
>35	16	53.3
Total	30	100.0

TABLE 2 : PERCENTAGE OF BODY SURFACE AREA OF BURNS

Burns	Frequency	Percent
<50%	19	63.3
≥50%	11	36.7
Total	30	100.0

TABLE 3: SHOWING PLATELET COUNT ON ADMISSION AND DAY 3

Platelet count	On admission		At day 3	
	N	%	N	%
≤1 lakh	0	0	13	43.3
>1 lakh	30	100.0	17	56.7
Total	30	100.0	30	100.0

TABLE 4: SHOWING PERCENTAGE FALL IN PLATELET COUNT

Percentage fall in platelet count	Frequency	Percent
<50%	16	53.3
≥50%	14	46.7
Total	30	100.0

TABLE 6 : SHOWING DURATION OF HOSPITAL STAY

Duration of hospital stay	Frequency	Percent
<7 days	16	53.3
≥7 days	14	46.7
Total	30	100.0

Relation calculated by Pearson chi square test

Variable X² df p OR 95%CI

X²=CHI SQUARE

df= Degree of freedom

P= significance

OR = Odd's Ratio 95%

CI = Confidence Interval

Age v/s prognosis	4.821 ^a	1	.028	5.500	1.145	26.412
Percentage of burns v/s prognosis	17.368 ^a	1	.000			
Platelet count day3 v/s prognosis	16425 ^a	1	.000	56.000	5.127	611.713
Duration of hospital stay v/s prognosis	19.286 ^a	1	.000	91.000	7.349	1126.895
Culture and sensitivity v/v prognosis	2.674 ^a	4	.614			
Percentage fall in platelet count v/s prognosis	8.571 ^a	1	.003	11.000	1.998	60.572

TABLE 12 : PERCENTAGE OF BURNS AND PROGNOSIS

Percentage of Burns	PROGNOSIS				TOTAL	
	death		survived		N	%
	N	%	N	%		
>50	11	100	0	0	11	100
<50	4	21.1	15	78.9	19	100
Total	15	50	15	50	30	100

TABLE 13: PLATELET COUNT OF PATIENTS ON DAY 3

(</> 1 LAKH) AND PROGNOSIS

χ²=16.425 df= 1 P=.000 OR = 56.00 95%= 5.127 – 611.71

PLATELET COUNT ON DAY 3	PROGNOSIS				TOTAL	
	death		survived		N	%
	N	%	N	%		
≤1 lakhs	12	92.3	1	7.7	13	100
>1 lakh	3	17.6	14	82.7	17	100
Total	15	50	15	50	30	100

TABLE 14: RELATIONSHIP BETWEEN COUNT AND PROGNOSIS

Percentage fall platelet count	PROGNOSIS				TOTAL	
	death		survived		N	%
	N	%	N	%		
>50	12	75	4	25	16	100
<50	3	21.4	11	78.6	14	100
Total	15	50	15	50	30	100

TABLE 15 : DURATION OF HOSPITAL STAY AND PROGNOSIS

Duration of hospital stay	PROGNOSIS				TOTAL	
	death		survived		N	%
	N	%	N	%		
<7 days	14	87.5	2	12.5	16	100
≥7 days	1	71.1	13	92.9	14	100
Total	15	50	15	50	30	100

χ²=19.286 df=1 p=0.000 OR=91.000 95%CI=7.349-1126.895

RESULT

The analysis of different variables affecting burns come up with various interpretation. Here we studied the different variables and its impact on the prognosis of burns. Platelet count the factor affecting burns which we are studying have an impact on burns. In our study, 30 burns patients were studied The cut off age for comparing the prognosis was 35 years.

Out of the studied population, 46.7% patients were of age <35 yrs. 53.7% patients were of age > 35 yrs.

Also studied the impact of increasing age on the prognosis of burns As age increases there is bad prognosis of burns.

The graph (Table 11/ Chart 9) showing relation between age and prognosis were analyzed.

The statistics shows:

$$X^2=4.821 \text{ df}=1 \text{ p}=0.028 \text{ OR}=5.50$$

$$95\% \text{ CI}=1.1.4-26.1$$

Which is a significant relation ($p=0.028$) with odd's ratio 5.5.

71.4 % of the survived were < 35yrs. 68.8% patients among the n on survivors are of age > 35yrs. The chart showing the percentage of burn area and prognosis (Table 12/Chart 10), Of the studied people 63.3% patients have burns <50% and 36.7% have burns > 50%. The analysis of it relation to result shows that 100% patients with >50% burns died and 78.9% patients with burns <50% survived.

Platelet count and prognosis (Table 13,14)

We look for platelet count of patients day 1, 3, 7, 14, 21 days.

Compared two aspects of platelet count, that is platelet count at day 3 of the patients and fall in platelet count to more than 50% that of previous value.

Of the studied population, 56.7% patients have platelet count >1 lakh on day 3, 43.3% have count < 1 lakh on day 3.

For fall in platelet count, 53.3% patient's platelet count fall by >50% and 46.7% have < 50% fall.

For platelet count > 1 lakh on day 3, 82.4% survived.

For those with platelet count < 1 lakh, 92.3% died

$$\chi^2=16.425 \text{ df}=1 \text{ P}=0.000 \text{ OR}=56.0095\% = 5.127 - 611.71$$

The relation with prognosis is significant with odd's ratio of 56.

If count fall by more than 50%, 75% of patients are non survivors. If its below 50%, 78.6% of them survived.

$$\chi^2=8.571 \text{ df}=1 \text{ p}=0.003 \text{ OR}=11.00095\% \text{ CI}=1.998-60.572$$

The relation is significant with odd's ratio 11. The chart showing the percentage of burn area and prognosis (Table 12/Chart 10), Of the studied people 63.3% patients have burns <50% and 36.7% have burns > 50%.

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The relation is significant with odd's ratio 11.

Klebsiella-16.7%

MRSA-3.3%

The impact of culture and sensitivity in prognosis of burns patients remains controversial in my study, Here patients with pseudomonas infection in the wound, 50% patients have bad prognosis. Those patient s with sterile culture 43% are non survivors

DISCUSSION:

This study aims to study the importance of platelet count and its monitoring on the prediction of prognosis in burns. Along with that other prognostic factors of burns like age, percentage of burns, culture and sensitivity, duration of hospital stay are also analyzed.

On analysis, most of the variables studied have a definite prognostic value in burns patients.

we analyzed two aspects of platelet count, count on day 3 and percentage fall in platelet count.

When the platelet count drop to less than 1lakh, nearly 93% of those patients died. Its impact on prognosis of burns patients is so high that there is 56 times more chance of poor prognosis.

Another aspect is percentage fall in platelet count.

When there is a fall of more than 50%, the prognosis is bad. Those patients with > 50% fall, 75% of those expired. There is significant prognostic value that there is 11 times more chance of poor prognosis. The cause of fall in platelet count is commonly septicemia. Control of septicemia by proper usage of antibiotics and frequent platelet count monitoring is important in burns management. In previous studies - Jefferson Lessa Soares et al Predictive factors of mortality in burns

42.9% non survivors have platelet count < 1,00,000.

98% survivors have count > 1,00,000

In our study 92.3% non survivors with platelet count < 1,00,000.

82.4% survivors have count > 1,00,000.

Age of the patient and its implication as a prognostic predictor studied. As age advances, the prognosis is poor. It is observed that if the age is more than 35, there is 5 times more chance for poor survival. One of the most important prognostic factor observed in our study is duration of hospital stay. Patient who managed to survive for 7 days or more in the hospital has very high probability of good prognosis. Around 93 % of our patients who were in patient for longer duration survived. Percentage of body surface area involved also have great impact on prognosis. In our study 100% mortality for those having burned area more than 50%

CONCLUSION

Platelet count is the important prognostic factor in burns. Monitoring of platelet count of burns patients helps in planning the treatment protocol for the patient. It helps in early identification of sepsis. We can start proper Antibiotic coverage and other supportive measures. Survival rate of burns patients can be increased by proper evaluation of platelet count. In a developing country like ours where burns is a major social and economic burden in our society, this investigations like platelet count monitoring, which is cheap and affordable has its own importance. Age and duration of hospital stay is two other important factors affecting prognosis of burns. We can improve the hospital duration of patients by adequate use of our resources. With this above mentioned methods we can make burns management fruitful and not a burden. Patients whose count fall below 1 lakh on day 3 has 56 times more chance of bad prognosis. If platelet count of a patient falls by > 50 % there is 11 times more chance of poor prognosis. If hemoglobin count is less than 10 there is 3.5 times more chance of poor prognosis. If patient survived for more than 7 days there is 91 times more chance of good prognosis

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