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Procalcitonin Levels in Septic Patients with Trauma in Road Accidents in Tertiary Care Hospital

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Abstract

Sepsis is a complication of severe infection.

It is characterised by a systemic inflammatory response to severe trauma. It is a potent cause of systemic inflammatory response. It is on a rise due to increasing number of road traffic accidents occurring. Such patients of road traffic accidents require long term hospital care and are at high risk of developing sepsis. Recent data has stated that 18 million of new sepsis cases occur every year worldwide.

The aim of this study is to determine the levels of procalcitonin in trauma patients, with sepsis and evaluate the role of procalcitonin in patients of sepsis. Also, whether it can be used as a diagnostic marker in patients of trauma with sepsis.

Keywords: Septic Patients; Procalcitonin.

Introduction

One of the major causes of trauma is road traffic accidents. Trauma due to road traffic accidents is increasing at an annual rate of 3% [1,2]. But the cases are under evaluated. Very few prospective studies are available in India [3].

Sepsis is a complication of severe infection characterized by a systemic inflammatory response. It can be classified as acute sepsis and chronic form of sepsis [4].

Mortality rates from sepsis range between 25-30% for severe sepsis and 40-70% for septic shock [4,5].

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The clinical presentation of sepsis is highly variable depending on the etiology.

We tried to analyse the prediction of sepsis due to trauma using serum procalcitonin. Specific and rapid markers of bacterial infection have been sort for early diagnosis of sepsis [6]. One such measurement, procalcitonin has recently become of interest as a possible marker of systemic inflammatory response to infection.

Procalcitonin is a 116 amino acid peptide involved as a precursor in calcium haemostasis [7].

This study assessment of procalcitonin levels will give a fair idea about these patients suffering from sepsis. Our aim and objective of the study was to determine the level of procalcitonin in patients of sepsis. A longitudinal study was performed at NKP SIMS Nagpur. Very few studies are done in India so this research can be useful in a larger scale .This research can be of use to patients and also guide the treating doctors

Methodology

Total 50 patients of trauma patients with sepsis in age group ranging from 18 to 60 years irrespective of sex and socio economic status were included in the study. Any patient not willing to cooperate after initially signing the informed consent withdraw from the study. 5 ML of venous blood was collected in plain bottles. Blood samples will be centrifuged at 1500g for 5 minutes and, Procalcitonin levels were measured by kit method. Procalcitonin levels were tested on DAY 1 and DAY 4 if patient developed sepsis.

Ethical requirement

Patients' information sheet was given to each patient

Informed consent was taken

As per requirement case record form was given-requirement of patients were

1. Patient should be aged more than 18 years.
2. Presence of two or more of the following in patients suspected of proven to have infection was taken as diagnosis of sepsis.
   - Temperature more than 100 deg F
   - Heart rate more than 95 beats per minute
   - Respiratory rate more than 20 breaths per minute
   - WBC count more than 12,000 cells per mm (cube)

Sepsis was classified when micro-organisms were recovered from infection site. Patients RTA patient in casualty were admitted in ward, blood sample is centrifuged and processed in vidas. Permission obtained from college ethics committee. We observed the patients clinically. When patients developed 2 or more signs of sepsis, culture and sensitivity from infected site was sent.

Studies show that PCT levels rise within 4 hours after infection and reaches peak within 8 to 24 hours. After infection is controlled it falls back to normal within 24 hours.

Normal PCT levels-up to 0.05 ug/dl and greater than 0.05ug/dl is indicative of sepsis.

Fifty patients were included in this longitudinal study. 17 patients had increase in procalcitonin levels along with sepsis.1 death occurred .rest of the patients had normal levels of procalcitonin.

Statistical Analysis

We used the PEARSON chi-square test or FISHER exact test to compare.

Results

Total number of patients was 50. All the patients had suffered from trauma. Their serum procalcitonin culture and sensitivity and WBC count was done.

Serum procalcitonin (culture and sensitivity)

Serum procalcitonin	Culture/ sensitivity Negative	Culture/ sensitivity Positive	Total
Normal	34	0	34
Row%	100.00%	0.00%	100.00%
Raised	4	9	13
Row%	30.77%	69.23%	100.00%
Total	38	9	47
Col%	100.00%	100.00%	100.00%

Fisher exact test was applied, Chi square- 24.81
p- 0.000005247, Odd's ratio- 10.59

	culture/ sensitivity	culture/ sensitivity	
WBC count			
Normal	29	5	34
Row%	85.29%	14.71%	100.0%
Raised	9	4	13
Row%	69.23%	30.77%	100.00%
Total	38	9	47
Col%	100.00%	100.00%	100.00%

Chi square- 1.5674

p 0.2105930982

Discussion

PCT is composed of 116 amino acids and is physiologically synthesised by thyroid C cells. PCT values are negligible in normal conditions but become detectable at onset of infection. PCT values are closely related to severity and evolution of infection. It is thought to be associated with poor prognosis of patient. PCT has been used to evaluate the evolution of infections and sepsis in patients of trauma due to road traffic accidents. The changes of PCT levels in response to therapeutic treatment have also been reported which suggests the importance of PCT.

Several studies are available which suggest that PCT can be used as a marker of early sepsis and outcome after major trauma. It can also be used as a marker for monitoring response to treatment.

There are several studies that have reported using PCT to guide antibiotic therapy in different settings. Experts have reached a consensus and developed guidelines for the clinical interpretation of elevated PCT and the risk stratification according to different elevated PCT levels in particular the negative predictive value that is PCT less than 0.1 ng/ml.

Sepsis is a life threatening condition that arises when the body's response to infection causes injury to its own tissue and organs.pct is a useful for diagnosis of sepsis due to trauma by road traffic accidents.

In this longitudinal study, out of total 50 patients of trauma due to road traffic accidents 17 patients of sepsis had increase in procalcitonin levels. This result is in concurrence with other studies like Diagnostic and prognostic biomarkers of sepsis in critical care [8].

The correlation of PCT levels was moderately consistent with the severity of trauma that was previously reported by several authors. Current evidence does not support the use of single biomarker in diagnosis of sepsis. Procalcitonin has certain short comings while interpreting results and should be interpreted with caution. In 20 to 30 percent patients of sepsis infection site is never identified. Neither imaging studies nor can blood culture analysis be of help. More over there is a class of patients with unconfirmed infection or who

have Pct and culture negative yet develop organ failure and survival rates as those in whom infection is confirm. Our study of usefulness of Pct in patients of trauma with sepsis is that PCT can be used as a good biomarker.

Conclusion

Study has several important implications for clinicians. Although the present study population is too small to infer the importance of serum PCT in trauma patients, it definitely indicates, that serum PCT, could be involved in the entire course of infections, to facilitate the management of sepsis in critical care. With newest essay method, serum PCT is detected with a high accuracy than other currently available test cannot provide. PCT could guide physicians in developing a clinical strategy and incrementally managing trauma patients with sepsis. Additionally, the daily measurement of PCT aids physicians in guiding antibiotic therapy in trauma patients.

There are some limitations to the present study. First the sample size of the study was relatively small. And consequently the power to demonstrate the interaction among serum PCT and prognosis was limited.

The path physiology of trauma was complex and was influenced by patient specific factors that are age and sex.

The authenticity and soundness of the findings obtained from our study need to be evaluated in future study.

The present study demonstrates serum PCT to be a promising sepsis marker in trauma patients due to road traffic accident. As sample size was small further study is necessary.

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