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RESEARCH ARTICLE

USEFULNESS OF PROCALCITONIN AS A BIOMARKER IN BURN PATIENTS PLASTIC SURGERYDEPARTMENT, MOHAMMED VI UNIVERSITYHOSPITAL, MARRAKECH, MOROCCO

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Abstract

Infection is the most common complication and cause of death in patients suffering burnsinjuries.These patients are susceptible to infection and burn wound sepsis secondary to the alterations in their physiology .Procalcitonin is an inflammatory biomarkers , the serum concentration of which increases specifically during bacterial infections. For a burn patient, it's sometimes difficult to differentiate, on the basis of the clinical examination , those who suffer from an acute inflammatory syndrome from those who show the first signs of a severe bacterial infection. However, a correct diagnosis is essential for the prompt initiation of appropriate treatment . Many markers associated with an infectious state have recently been investigated. Among them , serum pro calcitonin has the best sensitivity and specificity for sepsis or other severe bacterial infections. The aim of this work is to evaluate the impact of the implementation of procalcitonin (PCT) on the management of infected patients in the burns resuscitation department of the plastic surgery department at CHU Med VI.Our study is retrospective , observational, and conducted over a period of 6 months, extending from July 1, 2022, to December 31, 2022, for 24burned patients hospitalized in the intensive care unit of the plastic surgery department .The average age of the patients was 38 years; they were predominantly male with a sex ratio of about 1.5 . The average burned skin surface was 27.75% ; 40.3% had a deepening with signsof skin infection; all patients' CRP was high ; 60% had a fever higher than 38.5; 13.3% had a stay in the surgical resuscitation department and were discharged ; a PCT returned positive in 16.6% of patients;the determination was repeated in 4 patients after 24h returned Negatif; 26.6% had a positive bacteriological examination and 40% of patients received antibiotic therapy .PCT maybe used as a useful bio marker for the early diagnosis of burn sepsis in adults, and maybe combined with other diagnostic indexes to further improve the sensitivity and specificity. Thus, even throughout study provides us with the knowledge that the PCT maybe a helpful sepsis biomarker in burned patients, the findings should be viewd with caution.

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Introduction:-

Infection is the most common complication and cause of death in patients suffering burn injuries.

These patients are susceptible to infection and burn wound sepsis secondary to the alterations in their physiology .

One of the factors that contributes to organ failure is sepsis , which is an inflammatory reaction to a serious infection It is early and precise sepsis diagnosis is crucial yet challenging .

However, some sepsis patients also exhibit symptoms associated with SIRS that are caused by non-infectious reasons

Blood microbiological cultures can help with the diagnosis of a persistent bacterial infection, but the results are frequently reported too late and can be either falsely positive or negative

Because of the baseline inflammation in the burned patient, conventional indicators like CRP (C-reactiveprotein) and WBC (white bloodcells) are insufficient to detect sepsis .

In today's clinical practice, procalcitonin (PCT) has developed into a promising new biomarker for early detection of (systemic) bacterial infections. Procalcitonin (PCT), protein that consists of 116 aminoacids, is the peptide precursor of calcitonin, a hormone that is synthesisedby the parafollicular C cells of the thyroid and involved in calcium homeostasis. Procalcitonin arises fromendopeptidase-cleavedpreprocalcitonin.[1]

Methods:-

Our study is retrospective , prospective, observational, and was conducted over a period of 6 months, extending from July 1, 2022, to December 31, 2022. All patients with severe burns over the age of 5 years who are hospitalized for more than 3 days and admitted before 48 hours post-burn were included . for 24 burned patients hospitalized in the USI of the plastic surgery department .

The normal serum value of PCT in a healthy individual without inflammation is less than 0.05 ng/mL.[2] PCT levels associated withlocal infection, possible systemic infection, sepsis, or severe sepsis are: <0.5 ng/mL, 0.5-2 ng/mL, 2-10 ng/mL, and >10 ng/mLrespectively.[3]

Results:-

Data from 24 patients were evaluated . The average age of the patients was 38 years (17-78); they were predominantly male with a sex ratio of about 1.5 (fig1)

The average TBSA was 27.75% [14%, 61%]. fig 2

The most common cause of burn was flam in 62.5% of cases and "scalding" in 37.5% of cases.

40.3% had a deepening with signs of skin infection; 26.6% had a positive bacteriological examination ; 60% had a fever higher than 38.5 ,25% had normal temperature and just 5% had temperature under 36.5; 13.3% had a stay in the surgical resuscitation department and were discharged ;none of our the patients had developed sepsis or systemic infection

PCT returned positive in 16.6% of patients; the average of PCT :1.3ng/ml , and Thanks to these PCT results, 40% of patients received antibiotic therapy . a probabilistic antibiotic therapy must be started and then adapted according to the antibiogram data. Fig3

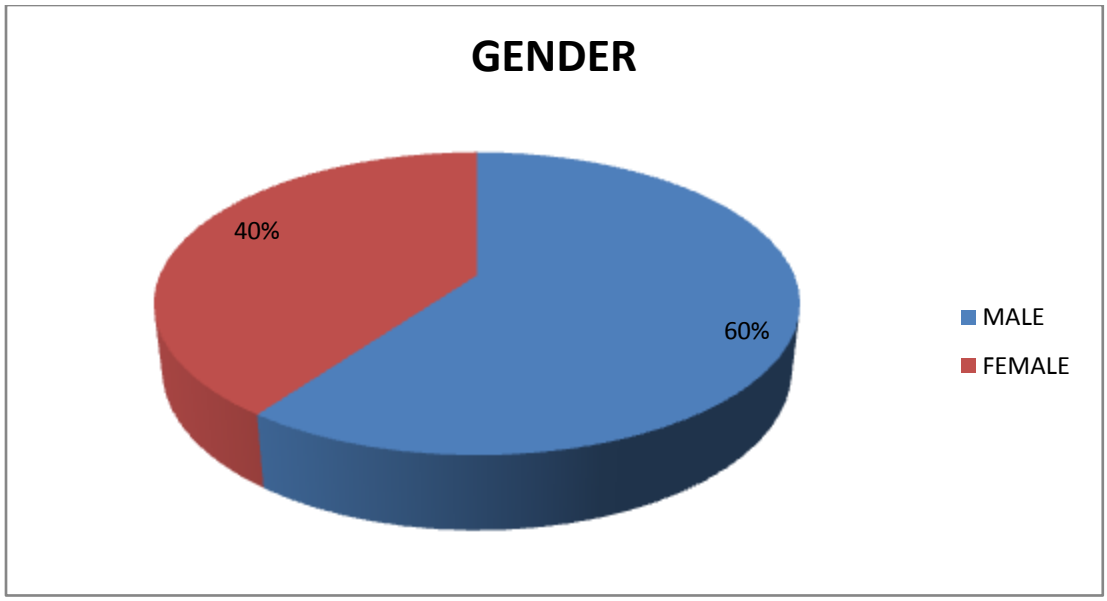

Figure 1:- Gender of the patients.

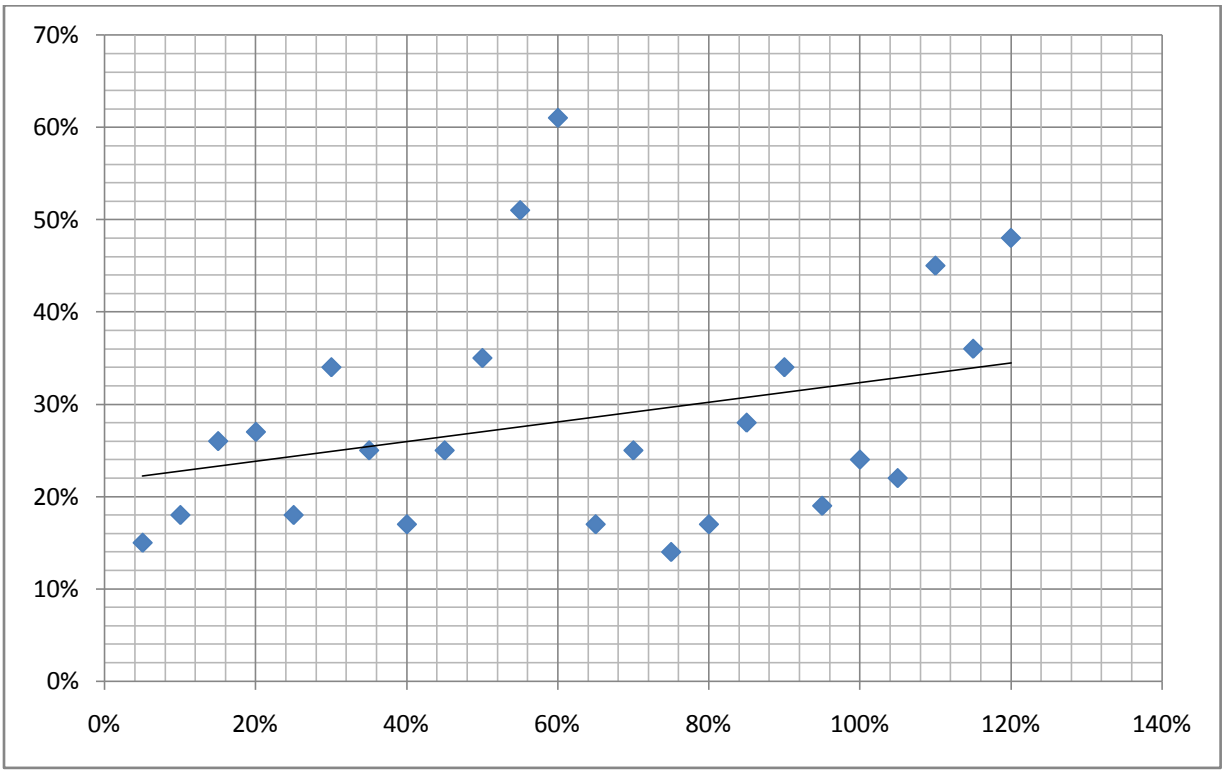

Figure 2:- The average TBSA %.

Tableau I:- Example of burned patient had deepening of the lesions + signs of infection.

		
At admission	After 5 days	After 15 days
27 yearsold Mechanism: scalding TBSA: 25%	Depening of lesion Inflammatory halo Positive general signs Necrotic staining	Improvement of lesions and general signs after administration of antibiotics

Discussion:-

Results demonstrate that serum PCT maybe used as a useful bio marker for the early diagnosis of burn sepsis in adults, and maybe combined with other diagnostic indexes to further improve the sensitivity and specificity. Thus, even though our study provides us with the knowledge that the PCT maybe a helpful sepsis biomarker in burned patients, the findings should be viewed with caution.[4]

Serial procalcitonin tests and procalcitonin kinetics may help with the early detection of sepsis, the reduction of unnecessary antibiotic administration, and the selective pressure on multi resistant organisms .

In our study C-reactive protein was poorly specific it was hight for all patients the same case for Andrew ti al [4]Procalcitonin was moderately sensitive (73%) and specific (75%) for sepsis in patients with burns . C-reactive protein was highly sensitive (86%) but poorly specific (54%)

To reducebias, additional multi-center, larger-scale prospective studies using standard laboratory procedures and threshold values should be conducted. Moreover, more PCT investigations are Sepsis in pediatric populations must bediagnosed.metanalyse[5]

In the study of wineberg :In the initial phase following a burn, an increase in PCT was a meaningful indicator for bacterial infection (P = 0.03), but not beyond day eight . PCT did not connect with other biomarkers, although it did withC-reactive protein as a diagnostic for sepsis (P 0.001). Every study day up to their deaths , the mean PCT in the patients who passed away was noticeably higher than it was in the patients who survived (P 0.02, continuously). Patients who were taking inotropes and those who did not leave the intensive care unit by day 14 both hadsignificantly higher PCT levels (P = 0.0001).[6]

While PCT levels during the infection phase can be utilized as an early warning indicator for severe systemic infection, serum PCT levels during the shock phase are a possible indicator for determining the severity of burns. A bad prognosis is more likely when PCT levels are high during the shock and infection periods, necessitating focused therapy [7]

Beside for xu[3].Approximately half of the patients (50.93%) exhibited elevated serum PCT concentrations during the early phase, and elevated PCT levels may not becaused by infections. Early-phase PCT level was an independent risk factor for sepsis occurrence in extensive-burn patients within 60 days of injury. It might be a potential burn severity indicator during the early phase of burn injury .

Procalcitonin (PCT) offers better specificity than C-reactive protein (CRP) .However, their cost limited their use and routine application,[8]in our study we did have a difficult because of the cost of PCT, « procalcitonin no available in the hospital laboratory »

Conclusion:-

PCT maybe used as a useful bio marker for the early diagnosis of burn sepsis in adults, and maybe combined with other diagnostic indexes to further improve the sensitivity and specificity. Thus, even though our study provides us with the knowledge that the PCT maybe a helpful sepsis bio marker in burned patients, the findings should be viewed with caution.

Conflict of intereststatement

All authors declare thatthey do not have any conflict of interest in this publication.

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