Acute Pain
Management

Practical Implementation of the Pancreatic Stone Protein Sepsis Test

An overview of a discussion on sepsis and the Pancreatic Stone Protein (PSP) biomarker by Dr João Pereira, Hospital De Vila Franca De Xira, Portugal and how it can be used for early diagnosis of sepsis and facilitate decision-making regarding the administration of antibiotics. The discussion was chaired by Prof Pedro Póvoa, coordinator of the Intensive Care Unit (ICU) at Hospital de Sao Francisco Xavier, Lisbon, Portugal.

Introduction

Sepsis is a common problem in the intensive care unit (ICU). Sepsis and septic shock remain challenging health problems and are associated with high morbidity and mortality. In addition, sepsis survivors suffer from long-term problems and complications. One of the biggest challenges in sepsis is the early and accurate identification of positive cases. The symptoms of sepsis can be highly variable, making clinical recognition and assessment of the severity of this condition quite difficult. As a result, false negatives frequently occur, increasing the risk of duplicate therapy and overdiagnosis and unnecessary treatment strategies, such as antibiotics. In addition, false negatives increase the risk of death due to delayed therapy of the underlying disease causing or stimulating sepsis.

There is no gold standard to identify a sepsis infection. Most biomarkers in the management of septic patients are not very well-defined, and only a few have been evaluated in large or repeated studies. Therefore, it is not possible to draw any reliable conclusion about which biomarker could be considered the most promising candidate (Pierrakos et al. 2020).

Pancreatic Stone Protein

There is a complex network of biological mediators underlying sepsis. Since the physiologic criteria of sepsis are quite nonspecific, it is challenging to identify patients who might benefit from antibiotic therapies or more novel therapies. Therefore, biomarkers can help improve diagnosis and therapeutic decision-making for high-risk patients (Marshall and Reinhart 2009).

Some of the clinical benefits of using biomarkers include:

- Diagnostic - improves diagnostic accuracy
- Monitoring - measures response to intervention
- Prognostic - identifies subgroups in need of more aggressive interventions
- Surrogate - predicts a clinical outcome

> ❝❝ **PSP is an accurate and promising biomarker for early recognition of nosocomial sepsis** ❞❞

Pancreatic Stone Protein (PSP) is a regenerating protein and lithostathine. It is a lectin-binding protein. In patients with an increase in inflammation and the presence of an infection, the blood levels of PSP tend to increase. For example, in trauma patients, levels of PSP can increase in case of sepsis. Similarly, PSP levels at the onset of ventilator-associated pneumonia (VAP) and in patients with septic shock can predict mortality (Boeck et al. 2011).

Findings from a study comparing sepsis biomarkers PSP, soluble CD25 (sCD25) and heparin-binding protein (HBP) show that PSP and sCD25 perform well as sepsis biomarkers in patients with suspected sepsis at the time of admission to the ICU (Llewelyn et al. 2013). Another review shows that using a cut-off value of 44.18 ng/ml, PSP performs better than CRP or PCT across the considered studies (Prazak et al. 2021).

Pancreatic Stone Protein Sepsis Test

The PSP sepsis test is a point-of-care diagnostic tool that measures the concentration of the pancreatic stone protein biomarker in blood. PSP is an accurate and promising biomarker that could potentially allow early recognition of nosocomial sepsis in adults. When compared to other markers, PSP is less influenced by inflammation. Hence, the robustness of PSP serum levels toward inflammatory insults could potentially be an important criterion for a sepsis biomarker (Klein et al. 2020).

Overdiagnosis of sepsis can result in increased use of resources, delayed therapy of the underlying disease that is simulating sepsis, and unnecessary use of antibiotics, further contributing to increased antimicrobial resistance. It is important to remember that there is insufficient evidence to support the widespread use of antibiotics in hospitalised patients. For example, despite an overall low rate of bacterial co-infections in patients with COVID-19, nearly 70% of patients received antibiotics. Co-infection was reported in only 3.5% of patients and secondary infection in 14.3% of patients with COVID-19. The use of antibiotics in critically ill patients remains high even though in many cases, antibiotics are likely to provide minimal benefit and may also be associated with negative consequences such as adverse events, toxicity and resistance (Langford et al. 2020).

Another meta-analysis highlights that antibiotics may be a major factor negatively affecting patients' immune system during viral infections. To date, there is no effective medical treatment for SARS-CoV-2. There

is evidence to show a relationship between COVID-19 death rates and an average dose of antibiotics reported in some European countries. The World Health Organization (WHO) also says that antibiotics do not work against viruses, only bacteria. SARS-CoV-2 is a virus; hence antibiotics should not be used for prevention or treatment. Therefore, it is important to exercise caution when using antibiotics in patients with COVID-19 (Tyszka et al. 2020).

The PSP test is useful in patients when the underlying condition is unknown so that clinicians can improve the certainty of their diagnosis and subsequent treatment decisions. Findings presented during the session revealed that in patients suspected of sepsis infection, 82% of the PSP values were high (> 250 ng/ml). In nearly 50% of the cases, the values were very high (≥ 600 ng/ml). Therefore, the test identified that these patients needed to be treated immediately.

The PSP test can also help decide whether patients need antibiotic therapy. Patients with small increases in C-reactive protein (CRP), fever, and worsening oxygenation are often started on antibiotics. However, using the PSP test in these patients can help determine whether the PSP biomarker is below the 200 ng/ml cut-off. If this is so, clinicians do not have to prescribe unnecessary antibiotics. Therefore, having biomarker results available at the point-of-care and a

total turnaround time of a few minutes can be extremely beneficial.

Personalised treatment of these patients is essential to improve patient outcomes. Specifically, the use of innovative technology in patients at risk of sepsis, such as the abioSCOPE device, could be beneficial to support patient management.

The PSP test may not be necessary when the diagnosis is already clinically obvious. However, when there is an element of doubt, PSP can prove to be beneficial. The most logical path to determine if a particular patient needs a PSP test is to monitor the patient's condition. If the patient is not improving and if their oxygenation is getting worse, blood pressure is decreasing (but is not low enough to be a shock), white blood cell count is going up (but not enough to signal an infection), a PSP test can help determine the underlying cause. If the PSP test results indicate infection, clinicians can escalate antibiotics while additional tests are conducted.

Conclusion
Overall, the rapid PSP test on the abioSCOPE in-vitro diagnostic device allows clinicians to act quickly and ensure patients with sepsis are identified early, and treatment is initiated as soon as possible. This can facilitate overall management and improve patient outcomes. In addition, early diagnosis of sepsis can be a cost-saving strategy

for hospitals. The smart use of biomarkers can allow the identification of the onset of sepsis, allow clinicians to tailor the use of antibiotics and predict disease severity, and help improve hospital care and patient outcomes. The PSP test has shown promising results in real-life situations, meeting important clinical needs and can help pave the way towards more personalised care. ■

Key Points

- Sepsis is a complex condition. If not recognised and managed early, it can evolve into life-threatening septic shock and multiple organ failure.

- Early recognition of sepsis, immediate initiation of treatment and management, and early antibiotic treatment can prevent organ dysfunction.

- Pancreatic Stone Protein (PSP increases with disease severity and increased inflammation in sepsis.

- PSP has proven to be an essential tool to quickly and accurately diagnose sepsis.

- The abioSCOPE in-vitro diagnostic PSP test enables fast results and allows clinicians to make fast decisions in urgent situations.

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