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Relationship Between Troponin I And Left Ventricular Function In Sepsis Patients In A Tertiary Care Hospital - An Observational Cross Sectional Study.

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ABSTRACT:

Background:-Sepsis is caused by a dysregulated host response to infection. In the setting of sepsis and septic shock, myocardial depression is common despite an apparently normal or increased cardiac output. According to a few studies, troponins also correlate strongly with myocardial dysfunction. Troponin release indicates myocyte damage and loss of cell membrane integrity, and thus gives structural information. Non-invasiveness and instantaneous diagnostic capability are prominent features of echocardiography in critical care. Sepsis and septic shock represent complex situations where early hemodynamic assessment and support are among the keys to therapeutic success.

Methodology:-The present observational cross sectional study is carried out in Department of General Medicine, Agartala Government Medical College (AGMC & GBPH), Agartala, Tripura for a period of two years from December 2020 to December 2022 among patients diagnosed with sepsis in medicine ICU. Troponin-I and echocardiography was performed in all patients diagnosed with sepsis as per SIRS diagnostic criteria in Medical Intensive Care Unit.

Results:-.In our study, 68(77.3%) patients were Troponin I positive. Left ventricular Systolic dysfunction (LVSD) was found in 55(62.5%) patients. Left ventricular diastolic dysfunction (LVDD) was present in 44(50%) patients. Association of LVSD with Troponin I was statistically significant ($p<0.001$**)**. Among 44 LVDD patients 38 patients had Troponin I positivity.

Conclusion:- We found that Left ventricular systolic and diastolic dysfunction (LVSD & LVDD) along with Trop-I positivity are not only very much common but also interlinked in sepsis patients. We conclude that Sepsis Related Myocardial Dysfunction (SRMD) is very much common. Early assessment of SRMD can be done by doing cardiac biomarker (Troponin I) and echocardiography. Troponin I positivity can guide us towards left ventricular dysfunction. This study will further help in future management of cardiac abnormalities in patients of sepsis.

KEY WORDS: LVSD, LVDD, SRMD.

INTRODUCTION

Sepsis is defined as life-threatening organ dysfunction caused by a dysregulated host response to infection. This new definition emphasizes the primacy of the non homeostatic host response to infection, the potential lethality that is considerably in

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excess of a straightforward infection, and the need for urgent recognition. The task force emphasis on life-threatening organ dysfunction is consistent with the view that cellular defects underlying physiological and biochemical abnormalities within specific organ systems.[1].

Today, this heterogeneous syndrome is defined as severe organ dysfunction caused by a dysregulated host response to infection, with renewed emphasis on immune pathophysiology. Despite all efforts of experimental and clinical research during the last three decades, the ability to positively influence course and outcome of the syndrome remains limited.Evidence-based therapy still consists of basic causal and supportive measures, while adjuvant interventions such as blood purification or targeted immunotherapy largely remain without proof of effectiveness so far. [2]

The pathogenesis of the myocardial dysfunction derives from a cascade of events triggered by the initial inciting infection. This cascade results in the production of a variety of endogenous inflammatory cytokines (e.g., TNF-α, IL-1β) and other factors (e.g., lysozyme, platelet activating factor, leukotrienes, prostaglandins), which cause severe cardiovascular derangement including myocardial depression.[3]

According to a few studies, troponins also correlate strongly with myocardial dysfunction. Troponin release indicates myocyte damage and loss of cell membrane integrity, and thus gives structural information.[4] Cardiac troponins are elevated only when there is an insult to cardiac myocyte.[5] Troponin release indicates myocyte damage and loss of cell membrane integrity, and thus gives structural information, whereas BNP reflects wall stress, and thus provides functional information.[6]

Even in patients already monitored invasively, both transthoracic ECHO (TTE) and transesophageal ECHO(TEE) add new relevant information that leads to changes in therapy in more than 50% of cases[7],ECHO seems to be more accurate than the standardized strategy proposed by the Surviving Sepsis Campaign guidelines in the detection of the dominant features of the failing circulation . Indeed, a simplified qualitative approach has demonstrated to be accurate enough[8]

Recent findings Echocardiography can play a key role in the critical septic patient management, by excluding cardiac causes for sepsis, and mostly by guiding hemodynamic management of those patients in whom sepsis reaches such a severity to jeopardize cardiovascular function. In recent years, there have been both increasing evidence of the use of Echocardiography as monitoring tool in the patients with hemodynamic compromise. Also thanks to Echocardiography, the features of the well-known sepsis-related myocardial dysfunction have been better characterized. Furthermore, many of the recent echocardiographic indices of volume responsiveness have been validated in populations of septic shock patients.[9]
This study is designed to assess cardiac manifestations in sepsis patients admitted in medicine ICU of AGMC and GBP hospital.

AIM: To assess the relationship between Troponin I positivity and left ventricular function in patients of sepsis in medicine ICU.

OBJECTIVES OF STUDY:

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• To estimate the positivity of troponin I among sepsis patients of medicine ICU.
• To study the relationship between troponin I and ventricular dysfunction in sepsis in the study population in medicine ICU.

MATERIALS AND METHODS

The present observational cross sectional study is carried out in Department of General Medicine, Agartala Government Medical College(AGMC & GBPH), Agartala, Tripura for a period of two years from December 2020 to December 2022 among patients diagnosed with sepsis in Medicine ICU, at Agartala Government Medical College. Troponin-I was determined in all patients diagnosed with sepsis in Medicine ICU. An echocardiography was also performed for the said patients.

INCLUSION CRITERIA: All patients diagnosed with sepsis admitted in medicine ICU, was included in the study.

EXCLUSION CRITERIA: Patients with Preexisting valvular /structural heart disease, ischemic heart disease, chronic kidney disease, alcoholic liver disease, Pre existing chronic respiratory ailments, Patients in fluid overload states like in pregnancy, severe anaemia, Patients with cerebro-vascular accident were excluded from study .

RESULT:

TABLE-1: TROPONIN I

Troponin I	Number	Percentage
Positive	68	77.3
Negative	20	22.7
Total	88	100.0

In our study,68(77.3%) patients were Troponin I positive and 20(22.7%) patients were Troponin I negative.

TABLE-2 LEFT VENTRICULAR SYSTOLIC FUNCTION

Ejection fraction	Number	Percentage
Normal(≥50)	33	37.5

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Abnormal(<50)	**55**	**62.5**
Total	**88**	**100.0**

In our study, Left ventricular systolic function was normal in 33(37.5%) patients. Whereas Left ventricular Systolic function was abnormal(LVSD) in 55(62.5%) patients.

TABLE-3: LEFT VENTRICULAR DIASTOLIC FUNCTION (based on E/A)

E/A	Number	Percentage
normal (0.8-1.5)	44	50.0
Abnormal (<0.8 or >1.5)	44	50.0
Total	88	100.0

TABLE 4: LEFT VENTRICULAR DIASTOLIC FUNCTION (based on Septal e')

Septal e'(>8cm/sec)	Number	Percentage
Abnormal(<8)	44	50.0
Normal(>8)	44	50.0
Total	88	100.0

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In our study, left ventricular diastolic function was normal in 44(50%) patients, whereas Left ventricular diastolic dysfunction(LVD) was present in 44(50%) patients.

TABLE-5: ASSOCIATION OF TROP I WITH LVSD, LVDD

Parameter	Trop I		Total	P Value
	Positive (n=68)	Negative (n=20		
LVSD EF (%)				
Absent(≥50)	16	17	33	**<0.001**
Present(<50)	52	3	55	
LVDD				
Absent	30	14	44	**0.042**
Present	38	6	44	

In our study, among 55 LVSD patients 52 patients had troponin positivity and in 3 patients Troponin I was negative. Association of LVSD with Troponin I was statistically significant (p<0.001**)**. Among 44 LVDD patients 38 patients had Troponin I positive,6 patients had Troponin I negative. Association of LVDD with Troponin I was statistically significant (p<0.042**).**

DISCUSSION:

Sepsis is a life-threatening condition and a global disease burden. This study is conducted in AGMC & GBP hospital to assess cardiac functions among sepsis patients in Medicine ICU.In our study,68(77.3%) patients were Troponin I positive and 20(22.7%) patients were Troponin I negative Which shows similarity with the study done by P Priyank et al.

Furian T et al in 2011 conducted a study which was concluded as Both LV and RV systolic dysfunctions are prevalent in severe sepsis, being directly associated with markers of endothelial dysfunction. Left ventricular non dilation, RV dysfunction, and diastolic dysfunction seem related to poor prognosis in this scenario.[10]

In our study,Left ventricular systolic function was normal in 33(37.5%) patients .Whereas Left ventricular Systolic dysfunction (LVSD) was found in 55(62.5%) patients. ,Left ventricular diastolic function was normal in 44(50%) patients,where as Left ventricular diastolic dysfunction(LVDD) was present in 44(50%).

In our study, among 55 LVSD patients 52 patients had troponin positivity and in 3 patients Troponin I was negative. Association of LVSD with Troponin I was statistically significant (p<0.001). Among 44 LVDD patients 38 patients had Troponin

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I positive,6 patients had Troponin I negative. Association of LVDD with Troponin I was statistically significant ($p<0.042$).

CONCLUSION:

The early diagnosis of myocardial dysfunction due to sepsis is critical in management of sepsis patients for favourable outcome.We found that Left ventricular systolic and diastolic dysfunction(LVSD & LVDD) are very much common.We conclude that Sepsis Related Myocardial Dysfunction (SRMD) is very much common. Early assessment of SRMD can be done by doing cardiac biomarkers (Troponin I).Positivity of Troponin I can guide us towards left ventricular dysfunction. Early echocardiographic assessment can guide us towards proper management of sepsis patients. This study will help further in future management of cardiac abnormalities in patients of sepsis.

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