

TO STUDY THE TIME TREND OF NORMALIZATION OF LACTATE THAT FAVORS SURVIVAL IN MAJOR TRAUMA AND SEPSIS.

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Conflict of interest: No conflict of interest.

Abstract:

Background:

A prospective, non-intervention study was undertaken To study the time trend of normalization of lactate that favors survival in major trauma and sepsis in the Department of Surgery, Index Medical College Hospital and Research Centre, Indore, M.P., India for 01 year time duration. A total of 50 patients were included into study.

Result: persistent higher LACTATE levels in non-survivors in major trauma and sepsis after 48 hours. And gradually decrease level in survivor. Thus, rising serum lactate levels suggest early prediction of shock and mortality.(p values less than 0.01)

Above table suggest that rising serum lactate levels predict mortality in trauma and sepsis irrespective of age of patients. Because results are statistically insignificant ($p > 0.01$)

Conclusion: Lactate values probably need to be followed for longer periods in critical patients even when they have tided over the present crisis. The utility of regular lactate analysis in these patients would depend on factors such as availability and cost of test also. There are no existing studies to support the above premise.

Keywords: Normalization, Lactate, Survival, Trauma & Sepsis

Introduction

Lactate is metabolized by the liver (about 60 %), the kidneys (about 30 %), and other organs [1]. The normal blood lactate concentration is around 1 mEq/l. Even minor increases in lactate concentrations to >1.5 mEq/l are associated with higher mortality rates [2]. The exact pathophysiologic mechanisms of hyperlactatemia have been much debated, because the condition does not always simply reflect the development of anaerobic metabolism. In sepsis in particular, metabolic alterations can contribute to elevated blood lactate concentrations, including increased glycolysis, catecholamine-stimulated Na–K pump activity, alterations in pyruvate dehydrogenase activity, and reduced lactate clearance primarily as a result of liver hypoperfusion.

Trauma, an ailment afflicting millions worldwide, more commonly the healthy young, prevails as the predominant topic for contributors to research. The

value for life triumphs over the value for all material resources. Efforts at all levels manifestly endeavor to maintain this stream of life in the individual afflicted with trauma. And as the sequence of events following trauma unfolds at the molecular level, the viel is partly lifted over the drama between existence and nonexistence. The players in the final scene of the drama are possibly the same in the patient who is entangled in the vicious cycle of the syndrome of sepsis. And hence the search for the signal that will reveal the true state of ongoing events in the body continues-to lead to a way that will sustain the stream of life[3].

Material & Method

A prospective, non-intervention study was undertaken after ethical committee approval in the Department of Surgery, Index Medical College Hospital and Research Centre, Indore, M.P., India for 01 year time duration. A total of 50 patients were included into study.

Inclusion and Exclusion Criteria:

➤ The study included the following patients, in the age group of 5-60 yrs in ICU or ward:

- 1). Patients admitted within 12 hrs of trauma including road accidents, burns, rail-road accidents, fall from height and assault etc;
- 2). Patients of suspected or overt sepsis including those criteria for SIRS, septic shock and MODS.

➤ Patients with the following positive history were excluded from the study:

- Co morbidities – Bronchial asthma, DM, IHD, CHF, renal failure, renal transplant, malignancy, chronic pancreatitis.
- History of acute alcohol ingestion, ingestion of poison.
- Chronic medication for diabetes, asthma, tuberculosis, iron supplementation, epilepsy, AIDS.
- Known Inborn Error of Lactate Metabolism.

The patients were admitted and treated as deemed necessary under different surgical units.

Data Collection:

The following data was collected:

- Hospital registration number.
- Date and time of injury/inclusion into study.
- Vitals on admission and at regular intervals, with records of urine output, oxygen saturation, and CVP, as and when available.
- Blood lactate levels at admission, 12hrs, 24hrs, 48hrs.
- Initial work-up: Hb, PCV, T & D, WBC counts, random blood sugar, s. electrolytes: arterial blood gases(as per discretion of treating doctor)
- Documentation of organ dysfunction with s. creatinine, s. bilirubin, platelet count, chest x-ray, arterial blood gases (where available).
- Outcome was recorded as survival or non-survival.
- A record of no. of days of hospital stay was also kept after inclusion into the study.

Treatment was left to the discretion of the attending consultant.

Finally, records were also kept of the types of organ dysfunction and certain intervention including ventilator support, dialysis and surgery.

Results

Table 1: Lactate Levels

Lactate Levels		Group	N	Mean	SD	p- value
Sepsis	0 hrs	Died	9	38.77	16.54	0.606
		Survived	12	35.44	12.60	
	12 hrs	Died	9	54.68	19.96	<0.01
		Survived	12	27.01	11.48	
	24 hrs	Died	9	51.81	20.20	<0.01
		Survived	12	19.08	5.88	
	48 hrs	Died	9	45.78	15.42	<0.01
		Survived	12	11.80	2.86	
Trauma	0 hrs	Died	5	35.58	22.39	0.143
		Survived	24	26.73	8.93	
	12 hrs	Died	5	50.48	16.59	<0.01
		Survived	24	22.91	11.59	
	24 hrs	Died	5	58.22	14.12	<0.01
		Survived	24	16.05	8.13	
	48 hrs	Died	5	51.36	13.27	<0.01
		Survived	24	12.35	9.11	

Above table 01 suggest that persistent higher LACTATE levels in non-survivors in major trauma and sepsis after 48 hours. And gradually decrease level in survivor. Thus, rising serum lactate levels suggest early prediction of shock and mortality.(p values less than 0.01)

Table 2: Lactate Levels

Lactate Levels	Sepsis		Trauma	
	Died	Survived	Died	Survived
</= 20	1	0	1	6
	100.0%	0.0%	14.3%	85.7%
21-40	3	9	2	16
	25.0%	75.0%	11.1%	88.9%
> 40	5	3	2	2
	62.5%	37.5%	50.0%	50.0%
Total	9	12	5	24
	42.9%	57.1%	17.2%	82.8%
p- value	0.125		0.17	

Above table suggest that rising serum lactate levels predict mortality in trauma and sepsis irrespective of age of patients. Because results are statistically insignificant(p > 0.01)

Discussion

Lactate levels are known to be predictors of survival or mortality in patients of trauma and sepsis. A normalization of serum lactate with aggressive treatment within 24 hours of the insult has been shown by others to have a favorable outcome[4]. Aggressive treatment includes timely resuscitation, antibiotics, surgical management, vasopressor and inotropic drugs, ventilatory support, and dialysis as deemed fit. The aim of all interventions remains patient survival. However, the patient presents with a pre-existing set of variables of morbidity that affect his response to an insult and hence the result of these interventions differs between patients.[5] In a recent publication, Rivers, *et al.*[6] have shown that despite similar hemodynamic variables, serum lactate values can categorize post-surgical patients into survivors and non survivors within 12 hours of ICU admission. They came to the conclusion that lactate, especially when hemodynamic variables were taken into consideration, seemed to have a similar value in identifying survivors as the SAPS and APACHE II scoring systems and offered even better relevant bedside clinical information in terms of patient condition at the moment.[7]

Conclusion

Lactate values probably need to be followed for longer periods in critical patients even when they

have tided over the present crisis. The utility of regular lactate analysis in these patients would depend on factors such as availability and cost of test also. There are no existing studies to support the above premise.

References

1. Levy B. Lactate and shock state: the metabolic view. *Curr Opin Crit Care*. 2006;12:315–21.
2. Singer M, Deutschman CS, Seymour CW, Shankar-Hari M, Annane D, Bauer M, et al. The Third International Consensus Definitions for Sepsis and Septic Shock (Sepsis3) *JAMA*. 2016;315:801–10.
3. Liu V, Morehouse JW, Soule J, et al. Fluid volume, lactate values, and mortality in sepsis patients with intermediate lactate values. *Ann Am Thorac Soc*. 2013;10(5):466–73.
4. Haidl F, Brabrand M, Henriksen DP, et al. Lactate is associated with increased 10-day mortality in acute medical patients. *Eur J Emerg Med*. 2015;22(4):282–4.
5. Duke T. Dysoxia and Lactate. *Arch Dis Child*. 1999;81:343–50.
6. Rivers E, Nguyen B, Havstad S, Ressler J, Muzzin A, Knoblich B, et al. Early goal-directed therapy in the treatment of severe sepsis and septic shock. *N Engl J Med*. 2001;345:1368–77.
7. Vincent JL, Dufaye P, Berré J, Leeman M, Degaute JP, Kahn RJ. Serial lactate determinations during circulatory shock. *Crit Care Med*. 1983;11:449–51