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To study the correlation between the level of lactate with outcome i.e. survival or non-survival

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Abstract

Background: A prospective, non-intervention study was undertaken after ethical committee approval in the Department of Surgery, Index Medical College Hospital & Research Centre, Indore for 01 year time duration from June 2017 to May 2018. A total of 50 patients were included into study.

Result: The temperature is not strongly related to mortality in trauma and sepsis patient. Because of p value is more than 0.01 so statistically not significantly related.

Above table suggest that out of 21 patients of sepsis 12(57.1%) survived and 9(42.9%) non-survived and out of 29 patients of major trauma 24(82.8%) survived and 5(17.2%) non-survived. Thus, p-value <0.01 statistically significant result.

Conclusion: An analysis of observation revealed higher mean lactate levels in non-survivors as compared to survivors. Also mean value of serial lactate levels in non-survivors did not attain normal levels, while that of survivors reached normal levels by 24 hrs in trauma patients and 48 hrs in sepsis patients.

Keywords: Lactate, survival & non-survival, & lactate

Introduction

The arrival of a patient of trauma sets a whole team of doctors and nurses into a flurry of well directed activity. The patient gains a new individuality as a body system under intensive and invasive monitoring. As machines beep and oxygen flows, an unhindered inflow of medicines finds its way through many hands into the body system All efforts are aimed at attainment of normalization of all parameters of vital function ^[1].

A whole cascade of events, now not unknown to science, had in fact already been initiated in this body system at the moment of traumatic impact. This cascade of reaction, termed Systemic Inflammatory Response Syndrome, is also ongoing in a patient of Sepsis. And while such a chain of reaction does not always lead to death, all efforts are directed to prevent deterioration. The continuum of clinical and pathophysiological events triggered in the body by trauma and infection are manifested as shock. If undeterred, this extends to the ominous Multi Organ Dysfunction Syndrome (MODS), which may range from mild organ dysfunction to frank failure ^[2].

The use of therapeutic hypothermia (TH) has been demonstrated to be a promising treatment for post-reperfusion pathophysiology, and improves both survival and neurological outcomes after CA.8 Nevertheless, neurological prognostication and mortality prediction in this patient population remains a major challenge. Early and effective serum lactate clearance or lower serum lactate measurements have been shown to be associated with decreased mortality in patients with a diverse set of critical illnesses, including sepsis and severe trauma. Several preliminary studies have investigated the prognostic value of serial lactate measurement and lactate clearance in post-CA patient cohorts. Recently, Cocchi *et al.* found an association between a combination of serum lactate levels and vasopressor requirement and mortality after out-of-hospital CA ^[3].

Material and Method

A prospective, non-intervention study was undertaken after ethical committee approval in the Department of Surgery, Index Medical College Hospital & Research Centre, Indore for 01 year time duration from June 2017 to May 2018. A total of 50 patients were included into study.

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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: Major Trauma and Sepsis

Outcome	N	%
Died	14	28.0%
Survived	36	72.0%
Total	50	100.0%

Above table suggest out of 50 patients of major trauma and sepsis there is 14(28%) non-survived and 36(72%) survived.

Table 2: Etiology of Survived & Non-Survived

Etiology	Outcome		Total
	Died	Survived	
Sepsis	9	12	21
	42.9%	57.1%	100.0%
Trauma	5	24	29
	17.2%	82.8%	100.0%
Total	14	36	50
	28.0%	72.0%	100.0%

p- value <0.01

Above table suggest that out of 21 patients of sepsis 12(57.1%)

survived and 9(42.9%) non-survived and out of 29 patients of major trauma 24(82.8%) survived and 5(17.2%) non-survived. Thus, p-value <0.01 statistically significant result.

Table 3: Temperature

Temperature	Group	N	Mean	SD	p- value	
Sepsis	0 hrs	Died	9	109.56	16.24	0.706
		Survived	12	106.67	17.75	
	12 hrs	Died	9	110.22	17.85	0.265
		Survived	12	102.00	14.97	
	24 hrs	Died	9	114.44	15.65	0.147
		Survived	12	104.50	14.35	
48 hrs	Died	9	113.78	17.85	0.055	
	Survived	12	100.17	12.75		
Trauma	0 hrs	Died	5	98.50	23.17	0.617
		Survived	24	103.00	15.38	
	12 hrs	Died	5	104.00	26.00	0.869
		Survived	24	102.67	13.93	
	24 hrs	Died	5	106.80	22.16	0.468
		Survived	24	101.17	14.10	
	48 hrs	Died	5	104.80	20.62	0.406
		Survived	24	98.58	13.77	

Table suggests that temperature is not strongly related to mortality in trauma and sepsis patient. Because of p value is more than 0.01 so statistically not significantly related.

Discussion

A relationship between increased blood lactate levels and the presence of tissue hypoxia was suggested as early as 1927 in patient with overt circulatory failure. Many clinical and experimental studies demonstrated that lactate values in blood start to rise when tissue hypoxia is present. As vital parameters are maintained over a wide ‘normal’ range, this hypoxia may be clinically missed [4]. In a recent publication, it is shown that despite similar hemodynamic variable, serum lactate value can categorize post- surgical patient into survivors and non survivors within 12 hrs of ICU admission. The role of traditional end point of resuscitation and arrived at the conclusion that using these end points may leave a substantial number of patient, upto 50 to 85% in some series, in ‘compensated’ shock, which if allowed to persist would lead to death of the patient [5]. They supported the use of lactate, base deficit and gastric intra mucosal pH as the appropriate end points of resuscitation of trauma patient and suggested attainment of a goal of correction of one or all three of these markers of tissue perfusion within 24 hr of injury for effective resuscitation. As measurement of lactate may not be available at every centre it was postulated that in a normal acid base environment, lactate would correlate with the anion gap or base excess. However, the postulate was refuted by the work of Abramson D *et al.* [6] who demonstrated that no correlation between the three actually existed and that lactate had to be actually measured [7].

Conclusion

An analysis of observation revealed higher mean lactate levels in non-survivors as compared to survivors. Also mean value of serial lactate levels in non-survivors did not attain normal levels, while that of survivors reached normal levels by 24 hrs in trauma patients and 48 hrs in sepsis patients.

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