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Prognostic Value of Laboratory Risk Indicators of Necrotizing Fasciitis Score in Necrotizing Fasciitis

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ABSTRACT

Necrotizing fasciitis is a potentially life-threatening infection of subcutaneous tissues and skin. Laboratory risk indicators of necrotizing fasciitis (LRINEC) score are based on the results of routinely performed laboratory investigations. A prospective study was conducted at tertiary care hospital between December 2018, and September 2020, to find out the correlation of LRINEC score with severity and out come in the cases of necrotizing fasciitis. LIRNEC score was also corelated with serum procalcitonin level at the time of admission. Blood investigations included in LRINEC score [Hemoglobin (g/dL), WBC count (thousand per mm^3), CRP (mg/dL), Serum Creatinine (mg/dL), Blood Glucose (mg/dL) & serum Sodium (mEq/L)] were done at the time of admission. At the same time serum procalcitonin level was also ordered. Detailed history and examination findings were recorded. Aggressive management was started soon after the admission of patient.

Based on the LRINEC score, patients were categorized in three risk categories namely low risk, intermediate risk and high risk. In our study 45% patients were in low risk, 27% in intermediate risk and 28% in high-risk categories. Mean age of presentation was 53.17 years. Most common co-morbidity was diabetes mellitus (36%). Most common site involved was lower limbs (75%). Mortality rate was more than 32% in patients with LRINEC score ≥8. In our study serum procalcitonin levels were proportionate to LRINEC score.

Conclusion: The LRINEC score very well correlates with severity of necrotizing fasciitis and it can be used as a Prognostic indicator.

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INTRODUCTION

Necrotizing fasciitis (*flesh-eating disease*) is rapidly progressive, life threatening, usually polymicrobial infection of the fascia, subcutaneous tissue and skin. Infection spreads rapidly along the fascial planes and if not treated aggressively will lead to widespread skin gangrene and multisystem organ failure.[1–3] Early clinical diagnosis is difficult because local findings of edema, erythema, vesicle, bullae, crepitus and small patches of skin necrosis are also seen in simple cellulitis. Pain disproportionately severe to local clinical findings is important feature which differentiates necrotizing fasciitis from simple cellulitis.[1] Although radiological investigations like plain radiograph, CT scan and magnetic resonance imaging are helpful in diagnosis but may delay the treatment.

Antibiotic therapy along with circulatory support is essential part of primary treatment. But, early debridement of gangrenous patch and laying open

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of affected area is a major determinant of outcome in necrotizing fasciitis. Delay in diagnosis and surgical debridement is main reason of high mortality rates.[4–6] Laboratory risk indicators of necrotizing fasciitis (LRINEC) score is simple and rapid tool to diagnose, and assess the severity of necrotizing fasciitis.[7–10] Present study was done to assess the efficacy of LRINEC score for early diagnosis and grading the severity of necrotizing fasciitis.

MATERIAL AND METHODS

Hundred consecutive patients of necrotizing fasciitis admitted in our hospital were included in this study. Aggressive medical management was started soon after the admission and surgical intervention was done as early as possible. At the time of admission blood samples were collected for complete blood counts, C-reactive protein, serum creatinine, blood glucose, serum electrolytes and serum procalcitonin. Demographic data, clinical history and examination findings were recorded. Meticulous record of investigation reports, treatment given and response to treatment was kept.

Based on their LRINEC score, the patients were categorized into Low risk (LRINEC ≤ 5), Intermediate risk (LRINEC 6 and7), and High Risk (LRINEC ≥ 8) groups. Surgical debridement was done to remove the necrotic tissue. After debridement wounds were irrigated with copious amount of normal saline. Wounds were inspected daily, and further debridement was done if indicated. Raw areas were managed by regular wound dressings, vacuum assisted closure (VAC), secondary suturing, split skin grafting or amputation, depending over the dimensions and condition of wound. Co-morbidities like diabetes mellitus, chronic renal failure, hypertension, etc. were managed with the help of physician. After discharge from hospital, patients were followed regularly.

Table 1: LIRNEC score was calculated.

Parameters	Value	Score
CRP (mg/L)	<150	0
	≥150	4
WBC (thousand per mm^3)	<15	0
	15–25	1
	>25	2
Hemoglobin (g/dL)	>13.5	0
	11–13.5	1
	<11	2
Sodium (mEq/L)	≥135	0
	<135	2
Serum Creatinine (mg/dL)	≤1.6	0
	>1.6	2
Glucose (mg/dL)	≤180	0
	>180	1

OBSERVATIONS

Lower limb was involved in 75% cases (leg in 42%, leg and foot in 27% and thigh in 6%). Other common sites were scrotum with perineum (10%) and arms (7%). Only 22 (22%) patients gave history of trauma

Table 2: Distribution according to gender, age and co-morbidities.

	Characteristics	Frequency
Gender		
• Male	67 (67%)	
• Female	33 (33%)	
Age	<15 years	2 (2%)
	16–30 years	8 (8%)
	30–40 years	12 (12%)
	41–50 years	23 (23%)
	51–60 years	30 (30%)
	61–70 years	13 (13%)
	>70 years	12 (12%)
Co-morbidities	Diabetes mellitus	36 (36%)
	Chronic Renal failure	18 (18%)
	Hypertension	13 (13%)
	Obesity	9 (9%)
	Intravenous drug abuse	3 (3%)
	HIV	2 (2%)
	Pulmonary tuberculosis	1 (1%)
	Malnutrition	1 (1%)

Table 3: Distribution of gender and age groups in low, Intermediate and high-risk cases.

	Low Risk	Intermediate Risk	High Risk	Total
Gender				
• Male	26	19	22	67
• *Female*	19	8	6	33
Age				
<15-years	2	0	0	2
16–30 years	5	2	1	8
30–40 years	4	5	3	12
41–50 years	12	7	4	23
51–60 years	15	5	10	30
61–70 years	4	2	7	13
>70-years	3	6	3	12

preceding the necrotizing fasciitis. Patients in each category were appropriately managed, and their outcomes are discussed below.

Table 4: Number of Debridement done.

Number of debridement	Low Risk	Intermediate Risk	High Risk
1	38	9	5
2	7	13	4
3	0	5	11
4	0	0	7
5	0	0	1
Total	45	27	28
Mean ± SD	1.155 ± 0.37	1.85 ± 0.7	2.82 ± 1.124
Average number of debridement required were1.81 ± 1.01			

Table 5: Details of Hospital stays.

Category	Mean Hospital stay in days (Mean ± SD)
Low Risk	3.47 ± 1.85
Intermediate Risk	7.61 ± 1.641
High Risk	11.00 ± 3.712
Hospital stay (in days) in our study group was 6.69 ± 4.027.	

Table 6: Mortality data.

Risk Category	Number of patients	Mortalities	Mortality Rate
Low Risk	45	0	0%
Intermediate Risk	27	0	0%
High Risk	28	9	32.14%
Total	100	9	9.00%

Table 7: Amputation in each category patients.

Category wise distribution	Number of patients	Amputation	Percent (%)
Low	45	0	0
Intermediate	27	2	7.41
High	28	4	14.29
Total	100	6	6.00

Table 8: Mean Serum Procalcitonin in each category.

Category	Mean Serum Procalcitonin level in ng/mL (Mean ± SD)
Low Risk	0.98 ± 0.27
Intermediate Risk	2.05 ± 0.508
High Risk	3.28 ± 0.667

DISCUSSION

Necrotizing fasciitis is progressive soft tissue infection with a wide spectrum of clinical course. The systemic inflammatory response syndrome in the setting of sepsis causes change in the biochemical parameters. In our study, 67 patients were male and 33 were female. This very well correlates with other studies.[11–13] Mean age of presentation in our study group was 53.17 years.[14]

Thirty six percent patients in our study group were diabetics. Diabetes mellitusis reported as most common co-morbidity in necrotizing fasciitisin many studies.[12,15,16]

Like other studies, we found that lower limb (70%) is most common site for necrotizing fasciitis followed by scrotum, perineal area (10%) and upper limb (8%).[16,17]

Only 22% of our patients had exposure to some kind of injury and 78% patients had spontaneous origin.

We took number of debridement required as an indicator of progression of necrosis. Number of debridement required very well correlated with LIRNEC score. Number of debridement in lowrisk group, intermediate group and high-risk group were 1.15 ± 0.37, 1.85 ± 0.7 & 2.82 ± 1.124, respectively.

Average duration of hospital in our study is 6.69 ± 4.027 days. Like other studies there is significant variation in three risk groups.[15] Mean hospital stays in low-risk group, intermediate risk group and high-risk group is 3.47 ± 1.85, 7.61 ± 1.641 and 11.00 ± 3.712 days, respectively. Akin to other publications, mortalities in our study were limited to high risk group[16]. There was no mortality in low risk and intermediate risk groups, but 9 (32.14%) patients died in high-risk group. Serum Procalcitonin was ordered in all of our patients. Procalcitonin levels well correlates with LIRNEC score. In our study observed Procalcitonin levels in low-risk group, intermediate risk group and high-risk group are (Mean ± SD in ng/mL) 0.98 ± 0.27, 2.05 ± 0.508 and 3.28 ± 0.667, respectively.

CONCLUSION

LIRINEC score is based on routine laboratory investigations. We find it to be simple and reliable for grading the severity of necrotizing fasciitis. LIRNEC score very well correlates with progressive tissue necrosis, hospital stay and mortality. Serum levels of procalcitonin increases with increase of LIRNEC score.

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