

Original Research Article


# A study on validation of modified LRINEC scoring system for the diagnosis of necrotising fasciitis in patients with soft tissue infection

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## Abstract

**Introduction:** Necrotizing fasciitis (NF) is a rare mono-/polymicrobial skin infection that spreads to underlying tissues. NF is quickly progressing and leads to life-threatening situations. Immediate surgical debridement together with I.V. antibiotic administration is required to avoid a fatal outcome. Early diagnosis is often delayed due to underestimation or confusion with cellulitis.

**Aim and objective:** To validate the modified LRINEC scoring system for the diagnosis of necrotizing fasciitis among patients presenting with soft tissue infections.

**Materials and methods:** The data for the study was obtained from patients hospitalized with a provisional diagnosis of necrotizing fasciitis on clinical evaluation and who are admitted at Rajiv Gandhi Govt. General Hospital. Patients presenting with signs and symptoms of Necrotizing Fasciitis admitted from January 2017 to September 2017 at Rajiv Gandhi Govt. General Hospital, were counseled for investigation and treatment of Necrotizing Fasciitis and its complication. 50 patients were treated.

**Results:** About 16% of patients with Modified LRINEC score of  $>8$  had repeated debridements with P-value of test 0.585. About 42% of patients with Modified LRINEC Score of  $>8$  had + Serum CRP values with P-value 0.443. About 10% of patients with Modified LRINEC Score of  $>8$  had Total counts  $>25/mm^3$  and 32% of patients had Total Counts between 15- 25/ $mm^3$  with a P-value of 0.452.

**Conclusion:** Necrotizing Fasciitis is a surgical emergency. Early diagnosis of this life-threatening infection is a crucial prognostic factor for patient survival and relies on the proper interpretation of physical findings. There exists a statistically significant correlation between Modified LRINEC scoring system and prognosis of Necrotizing fasciitis.

### **Key words**

Modified Laboratory Risk Indicators in Necrotising Fasciitis, Necrotising Fasciitis, Systemic Inflammatory Response Syndrome, Peripheral Vascular Disease.

### **Introduction**

Necrotizing fasciitis is a rapidly progressive inflammatory infection of the fascia, with secondary necrosis of the subcutaneous tissues. The speed of spread is directly proportional to the thickness of the subcutaneous layer [1]. Necrotizing fasciitis moves along the fascial plane. The patient becomes extremely toxic and later the skin becomes painful, red and necrotic as it is deprived of its blood supply. The fascial necrosis is usually wider than the skin involvement that is visible clinically [2]. Early recognition and surgical intervention at the earliest is the sole factor in preventing the morbidity and mortality in patients with necrotizing fasciitis [3]. The paucity of specific cutaneous signs to distinguish necrotizing fasciitis from other soft tissue infections such as cellulitis makes the diagnosis extremely difficult. So a scoring system that is easy to follow and cost-effective with high positive and negative predictive value is required [4].

### **Materials and methods**

The data for the study was obtained from patients hospitalized with a provisional diagnosis of necrotizing fasciitis on clinical evaluation and who are admitted at Rajiv Gandhi Govt. General Hospital. Patients presenting with signs and symptoms of Necrotizing Fasciitis admitted from January 2017 to September 2017 at Rajiv Gandhi Govt. General Hospital, were counseled for investigation and treatment of Necrotizing Fasciitis and its complication. 50 patients were treated in the above hospital.

**Exclusion criteria:** Patients below 15 years or above 75 years of age, Patients who had

received antibiotic treatment in the last 48 hours or had received a minimum of three doses of antibiotics prior to presentation, Patients who had undergone surgical debridement for the present episode of STIs, Patients with burns or furuncles with no evidence of cellulitis.

Detailed physical examination including nutritional status, built, the status of the vascular system and neurological system were recorded. Detailed local examination of the involved part was done. On admission, general and medical treatment of necrotizing fasciitis was done and followed by wound debridement as the definitive procedure. The patients were later managed by regular wound dressings, antibiotics, and supportive therapy for maintenance of blood pressure and renal status and in a few cases vacuum-assisted dressings were tried for faster healing. Once the wound was healthy split skin grafting and secondary suturing was done in most cases. Some cases healed by secondary intention. Some cases had to undergo major amputations for control of infection and its spread. Diabetic patients were managed by diabetic treatment like diabetic diet, sugar restriction and anti-diabetic treatment was given with oral hypoglycaemic drugs and insulin. Patients who developed renal complications were managed by salt restrictions, dialysis, and supportive renal treatment. Supportive treatment was given for patients who had bedsores as a complication of NF by regular dressings and water beds. Patients who went into septicemia were managed in intensive care units on ventilators under the guidance of anesthetists and physicians. Post-discharge patients were

followed up to one month regularly on an outpatient basis for dressings, further management of diabetes and hypertension and also to review liver and renal parameters. Major amputation patients were advised rehabilitation and prosthesis were recommended 4 weeks after surgery.

## Results

About 16% of patients with Modified LRINEC score of >8 had repeated debridements with P-value of test 0.585 (**Table – 1**). About 42% of patients with Modified LRINEC Score of >8 had + Serum CRP values with P-value 0.443 (**Table – 2**).

**Table – 1:** M-LRINEC score vs No. of debridements.

M-LRINEC SCORE	No. of debridements		Total
	<3	>3	
<6	8	1	9
6 to 7	7	3	10
>8	23	8	31
	38	12	50

**Table – 2:** M-LRINEC vs serum CRP.

M-LRINEC Score	Serum CRP		Total
	+	-	
<6	5	4	9
6-7	4	6	10
>8	10	21	31
	19	31	50

**Table – 3:** M-LRINEC vs total count.

M-LRINEC SCORE	TC			Total
	<15	15-25	>25	
<6	4	3	2	9
6-7	6	2	2	10
>8	10	16	5	31
	20	21	9	50

**Table – 4:** M-LRINEC score vs hemoglobin.

M-LRINEC SCORE	Hb IN g/dL			Total
	>13.5	11-13.5	<11	
1	4	2	3	9
2	1	6	3	10
3	5	7	19	31
	10	15	25	50

About 10% of patients with Modified LRINEC Score of >8 had Total counts >25/mm<sup>3</sup> and 32% of patients had Total Counts between 15-25/mm<sup>3</sup> with P-value of 0.452 (**Table – 3**).

About 42% of patients with Modified LRINEC Score of >8 had Hemoglobin <11 g/dL with P-value 0.55 (**Table – 4**).

**Table – 5: M-LRINEC vs serum sodium.**

M-LRINEC SCORE	Na		Total
	>135 mEq/dL	<135mEq/dL	
1	8	1	9
2	9	1	10
3	19	12	31
	36	14	50

**Table – 6: M-LRINEC vs serum creatinine.**

M-LRINEC SCORE	Serum creatinine in mg/dL		Total
	<1.4	>1.4	
<6	3	6	9
6-7	4	6	10
<8	8	23	31
	15	35	50

**Table – 7: M-LRINEC vs random blood sugar.**

M-LRINEC score	RBS levels in g/dL		Total
	<180	>180	
<6	3	6	9
6-7	3	7	10
>7	10	21	31
	16	34	50

**Table – 8: M-LRINEC vs serum potassium.**

M-LRINEC score	Serum Potassium IN mEq/dL			Total
	<3.5	3.5-5	>5.1	
<6	0	4	5	9
6-7	2	5	3	10
>8	7	21	3	31
	9	30	11	50

**Table – 9: M-LRINEC vs co-morbidities.**

M-LRINEC score	Co-morbidities					Total
	DM	PVD	SHT	CKD	MAL	
<6	5	1	3	0	0	9
6-7	2	3	3	0	2	10
>8	12	11	3	2	3	31
	19	15	9	2	5	50

About 24% of patients with Modified LRINEC Score of >8 had Increased Serum Sodium levels with P-value 0.098 (**Table – 5**).

About 46% of patients with Modified LRINEC Score of >8 had Serum Creatinine levels >1.4 mg/dL with P-value 0.676 (**Table – 6**).

About 42% of patients with Modified LRINEC Score of >8 had RBS values >180 mgs/dL with P-value 0.987 (**Table – 7**).

About 14% of patients with Modified LRINEC Score of >8 had Serum Potassium >5.1 mEq/dL and 6% of patients with Modified LRINEC Score

>8 had Serum Potassium <3.5 mEq/dL with P-value 0.043 (**Table – 8**). About 24% of patients with Modified LRINEC Score of >8 had diabetes mellitus with P-value 0.320 (**Table – 9**).

About 22% of patients with Modified LRINEC Score of >8 had Hospital stay >10 days with P-value 0.091 (**Table – 10**). About 32% of patients with Modified LRINEC Score of >8 underwent Amputations with P-value 0.283 (**Table – 11**).

**Table – 10:** M-LRINEC vs hospital stay.

M-LRINEC score	Hospital stay		Total
	<10 days	>10 days	
<6	9	0	9
6-7	8	2	10
>8	20	11	31
	37	13	50

**Table – 11:** M-LRINEC vs amputations.

M-LRINEC score	Amputation		Total
	+	-	
<6	7	2	9
6-7	6	4	10
>8	15	16	31
	28	22	50

## Discussion

Necrotizing fasciitis was first described as a rapidly spreading gangrene of the subcutaneous tissue caused by beta-hemolytic streptococci group A. This disease was later considered as a clinical entity rather than a specific bacterial infection [5]. Many virulent organisms can cause necrotizing fasciitis. Necrotizing fasciitis is a surgical emergency. Early recognition and prompt aggressive surgical debridement of all necrotic tissue are critical for survival [6]. Early diagnosis of the presence of a necrotizing soft tissue infection is critical if optimal outcomes are to be achieved. Distinguishing an NSTI that necessitates surgical debridement from non-necrotizing cellulitis that responds solely to antibiotic therapy however can be difficult [7]. Unfortunately, any delay in diagnosis is potentially catastrophic, because the concomitant delay in appropriate surgical therapy has been shown to increase mortality [8]. We have diagnosed necrotizing fasciitis whenever there is necrosis of subcutaneous tissues extending through the fascial planes [9]. The paucity of cutaneous findings early in the course of disease

makes it difficult to diagnose the condition early [10]. Often the disease is masqueraded as cellulitis or abscesses. In these patients, the diagnosis has been made when the infection progressed despite treatment with broad-spectrum intravenous antibiotics [11]. It has been shown by numerous studies in the past that early recognition and surgical intervention at the earliest is the sole factor in preventing the morbidity and mortality in patients with necrotizing fasciitis [12]. The paucity of specific cutaneous signs to distinguish necrotizing fasciitis from other soft tissue infections such as cellulitis makes the diagnosis extremely difficult. So a scoring system that is easy to follow and cost-effective with high positive and negative predictive value is required [13]. One such scoring system is the LRINEC scoring system devised by Sarani B, et al. in 2005 which claims to have a positive predictive value of 92.0% and a negative predictive value of 96.0%. Hence we would like to modify and validate this scoring system in our patients and if found to have similar comparable predictive values, it would prove to be a boon to developing countries like

India where the mortality of the disease reported ranges from 7 to 76% and also where there is also constraint for resources [14, 15].

## Conclusion

Necrotizing Fasciitis is a surgical emergency. Early diagnosis of this life-threatening infection is a crucial prognostic factor for patient survival and relies on the proper interpretation of physical findings. There exists a statistically significant correlation between Modified LRINEC scoring system and prognosis of Necrotizing fasciitis

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