# LRINEC Score – A Reliable Diagnostic Tool For Early Diagnosis of Necrotizing Fasciitis

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## ABSTRACT

**Objective**

To evaluate the reliability of LRINEC (Laboratory Risk Indicator For Necrotizing Fasciitis) score for clinical diagnosis of necrotizing fasciitis (NF).

**Study design**

Retrospective review of records.

**Place & Duration of study**

Department of General Surgery ward 26, Jinnah Postgraduate Medical Center (JPMC) Karachi, from December 2010 to November 2015.

**Methodology**

The diagnosis of NF was made on the clinical grounds followed by confirmation on surgical intervention by the presence grey necrotic tissues, absence of dermal bleeding and foul smelling dish water color pus. The LRINEC score was applied. Patients were excluded from study if they were of age < 15 or >90 year and patients transferred from other hospitals after the initial treatment.

**Results**

The LRINEC score calculated and all the patients were divided into two groups. One group with LRINEC > 6 included 27 patients while the other group with LRINEC score < 6 included 13 patients. The diagnosis of NF was confirmed on histopathology of tissue sample taken during the first debridement. Histopathology revealed that 23 out of 27 patients with LRINEC >6 and 4 out of 13 patients with LRINEC score <6 had positive histopathology for NF. LRINEC score was found to be 92.15% sensitive (CI; 95%) and 90.70% specific (CI; 95%) with positive and negative predictive value (PPV and NPV) of 95.45% and 85.33% respectively.

**Conclusion**

The diagnostic yield of LRINEC scoring system for necrotizing fasciitis was high. It was easy to apply and cost effective.

**Key words**

Necrotizing fasciitis, LRINEC score, Soft tissue infection.

## INTRODUCTION:

Necrotizing fasciitis is a rare but dreadful surgical emergency, requiring early diagnosis and prompt treatment. This term was first described in 1871 during the American civil war by Joseph Jones. He treated more than 2600 cases.[1] NF primarily involve the fascia and the subcutaneous tissues.[2] Furthermore, the incidence of NF is 0.4 and 0.53 cases per 1,00,000 population.[3,4] NF is associated with high mortality ranging from 6% to 76%.[5-7] The mortality can be reduced by prompt diagnosis and early aggressive management which include debridement and use of antibiotics.

To aid the early diagnosis the laboratory risk indicator for necrotizing fasciitis (LRINEC) scoring

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| Table I: Patients Demographics | | |
|---|---|---|
| **Variables** | **No. of Cases (n)** | **Percentage (%)** |
| **Age (Year)** | | |
| <20 | 1 | 2.5 |
| 21-40 | 6 | 15 |
| 41-60 | 20 | 50 |
| >60 | 13 | 32.5 |
| **Sex** | | |
| Male | 32 | 80 |
| Female | 8 | 20 |
| **Anatomical Site** | | |
| Left leg | 15 | 37.5 |
| Right leg | 9 | 22.5 |
| Left upper limb | 2 | 5 |
| Right upper limb | 2 | 5 |
| Perineum / genitalia | 6 | 15 |
| Abdomen | 4 | 10 |
| Gluteal region | 2 | 5 |
| **Co-Morbid Conditions** | | |
| Diabetes mellitus | 15 | 37.5 |
| Hypertension | 6 | 15 |
| Chronic liver disease | 0 | 0 |
| Obesity | 5 | 12.5 |
| Hypercholesterolemia | 1 | 2.5 |
| Use of Immunosuppression | 1 | 2.5 |

system was developed in 2004 by Wong and his colleagues.[8] A cut off value of LRINEC > 6 considered as a high risk for necrotizing fasciitis. This scoring system also helps in differentiating the life threatening NF from less dangerous soft tissue infection. This could facilitate in early recognition of the condition and initiation of appropriate treatment. This study aimed to evaluate the usefulness of LRINEC scoring in the clinical diagnosis of NF.

**METHODOLOGY:**
This retrospective study was based upon records of patients managed in the Department of General Surgery ward 26, Jinnah Postgraduate Medical Center Karachi, from December 2010 to November 2015. The diagnosis of NF was made on the clinical grounds. These observations were confirmed at surgical intervention. Presence of gray necrotic tissues, absence of dermal bleeding and foul smelling dish water color pus were considered as

diagnostic features of NF. Culture reports for bacteria isolated were retrieved. Histopathology of the tissue obtained at operation was also reviewed.

The LRINEC score was assessed retrospectively on the collected data to find out its usefulness. Patients with incomplete records and those aged < 15 or > 90 year and transferred form other hospitals after the initial treatment, were excluded. Descriptive statistics were applied. Confidence interval and sensitivity, specificity, positive and negative predictive values were calculated.

**RESULTS:**
A total of 40 patients were included in the study with age ranging between 15-90 year. Most of the patients were between 41 - 60 year of age (n=20 - 50%). NF was more common in males. In this study lower limbs were commonly involved. It was more on left side. The common co-morbid conditions associated

| Table II: Laboratory Parameters | | |
|---|---|---|
| **Variables** | **No. of Cases (n)** | **Percentage (%)** |
| **C-Reactive Protein (mg/l)** | | |
| < 150 | 11 | 27.5 |
| >150 | 29 | 72.5 |
| **Total WBC / mm³** | | |
| <15000 | 16 | 40 |
| 15000 – 25000 | 13 | 32.5 |
| >25000 | 11 | 27.5 |
| **Hemoglobin (gm/dl)** | | |
| >13.5 | 5 | 12.5 |
| 11–13.5 | 16 | 40 |
| <11 | 19 | 47.5 |
| **Sodium (mmol/lit)** | | |
| >135 | 18 | 45 |
| <135 | 22 | 55 |
| **Creatinine (mg/dl)** | | |
| <1.6 | 32 | 80 |
| >1.6 | 8 | 20 |
| **Glucose** | | |
| <180 | 26 | 65 |
| >180 | 14 | 35 |

with NF were diabetes mellitus and hypertension (table I). The analyzed laboratory parameters are given in table II. The most common organism isolated was *Staphylococcus aureus*.

The LRINEC score calculated for all the patients were divided into two groups. One group with LRINEC > 6 included 27 (54%) and the group with LRINEC score < 6 included 13 (26%) patients. The diagnosis of NF was confirmed on the histopathology of tissue sample taken during the first debridement. The histopathology revealed that 23 out of 27 patients with LRINEC > 6 and 4 out of 13 patients with LRINEC score <6 had positive histopathology feature of NF. LRINEC score was found to be 92.15% sensitive (CI - 95%) and 90.70% specific (CI-95%) with positive and negative predictive value (PPV and NPV) of 95.45% and 85.33% respectively.

## DISCUSSION:

The diagnosis of NF is a challenge as its initial symptoms are subtle.[9] NF may present with variety of symptoms like erythema, pain out of proportion on physical examination, blister formation, grayish discoloration of the skin, foul smelling dish water discharge followed by late signs like crepitus and sepsis which may lead to increase in mortality. Wong et al designed LRINEC scoring system on the rationale that NF if diagnosed late and left untreated may lead to SIRS (systemic inflammatory response syndrome) and sepsis. This can be diagnosed with the help of laboratory markers.[8,10]

Our study revealed the high sensitivity and specificity of LRINEC score for the diagnosis of NF. This observation is in line with the results of Wong et al study.[8] Liao et.al and Monohar et al also found similar results.[11,12] In this study most common predisposing factor for NF was diabetes mellitus followed by hypertension which is also reported by Swain et al.[13]

Most common organism identified from the wound culture was *Staphylococcus aureus* followed by *Klebisella* which is also supported by others in literature.[11-15] The major advantage of this scoring system was its application for which routine standard investigations are required. These do not cost much thus making this scoring system applicable in all settings which help in early diagnosis and treatment.

## CONCLUSIONS:

The LRINEC score is a cost effective and useful tool for the diagnosis of NF. It helps in differentiating NF from other less severe soft tissue infections.

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