



## OBSERVATIONAL STUDY FOR VALIDATION OF THE LABORATORY RISK INDICATORS FOR NECROTIZING FASCIITIS (LRINEC) SCORE FOR EARLY DIAGNOSIS OF NECROTIZING FASCIITIS.

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### ABSTRACT

**INTRODUCTION:** Necrotizing fasciitis (NF) is a soft tissue infection spreading along fascial planes with or without overlying cellulitis accompanied by severe systemic toxicity. 13 per million of the population is hospitalized worldwide each year for NF, Of these 20-30% die. Mortality rate could reach up to 100% in the absence of proper and timely diagnosis and treatment. It is a surgical emergency which requires immediate wide surgical debridement and patients need to be kept on broad-spectrum antibiotics, otherwise survival is difficult. The most widely adopted score as far as diagnosis is concerned is the laboratory risk indicator for necrotizing fasciitis (LRINEC) developed by Wong and colleagues in 2004. Scores  $\geq 6$  were found to have a 92% positive predictive value and a 96% negative predictive value, It also stratifies patients low ( $\leq 5$ ), intermediate (6-7) and ( $\geq 8$ ) high groups.

**AIM AND OBJECTIVE:** To study validation of the laboratory risk indicator for necrotizing fasciitis (LRINEC) score for early diagnosis of necrotizing fasciitis. To describe the defining characteristics of necrotizing fasciitis (NF), emphasizing early diagnostic indications with the help of the following parameters: C-reactive protein, Total WBC count, Haemoglobin, Serum sodium, Serum creatinine, Blood glucose.

**METHOD:** This was a prospective observational study which include all the patients of necrotizing fasciitis admitted to the surgical wards in Rohilkhand Medical College and Hospital from November 2016 to October 2017.

**RESULT:** A total of 100 patients included in the study were in the age group of 18-70 years and were of both sexes. The mean age of patients was  $43.5 \pm 16.2$  yrs with a maximum number of patients in the 31-40 years (22%) and 51-60 years (23%) age groups. Necrotising fasciitis effected 81% male patients and 19% female patients. Incidence of necrotising fasciitis in patients of Diabetes Mellitus was 18% and in peripheral Vascular Disease 7%. The site of involvement in order of frequency was; Lower limb (51%), Perineal region (25%), Upper limb (13%), and Thigh (8%). Distribution of patients according to LRINEC score was as follows, HIGH risk score  $\geq 8$  was 46%, MODERATE risk score 6-7 was 28%, LOW risk score  $\leq 5$  was 26%. Biopsy confirmation of necrotising fasciitis in patients according to different LRINEC score was as follows, 26% patients belonged to the LOW risk group ( $\leq 5$ ) LRINEC score and out of these 19.23% showed biopsy confirmation of necrotising fasciitis, 28% patients belonged to MODERATE risk group (6-7) LRINEC score out of these 92.85% showed biopsy confirmation of necrotising fasciitis, 46% patients belongs to the HIGH risk group ( $\geq 8$ ) LRINEC score and biopsy confirmation of necrotizing fasciitis was 100%. Mortality of patients (as per LRINEC score) was as follows: In LOW risk and MODERATE risk group all patients survived and their postoperative course was uneventful. 10% patients out of the 46% of patients belonging to the HIGH risk group ( $\geq 8$ ) LRINEC score expired.

**CONCLUSION:** The LRINEC score is an index that is capable of detecting early cases of necrotizing fasciitis and is simple enough for routine use. In patients with multiple comorbidities, the inflammatory response may be blunted and the score should be interpreted with caution. The LRINEC score is also an indicator of the severity of sepsis. Serial LRINEC score monitoring is helpful, and in many cases an increasing score despite broad-spectrum antibiotics is a valuable prognostic indicator.

### KEYWORDS :

#### INTRODUCTION

Necrotizing fasciitis is a soft tissue infection spreading along fascial planes with or without overlying cellulitis. It has also been described as a rapidly progressing necrotizing process accompanied by severe systemic toxicity. The term necrotizing fasciitis can be confusing. It is commonly used as a general term to describe necrotizing soft tissue infection (NSTIs). NSTIs encompass necrotizing forms of cellulitis, fasciitis and myositis depending on the depth of tissues involved. It has been estimated that 13 per million of populations are hospitalized worldwide each year for NF, of them 20-30% die. The mortality rate could reach up to 100% in the absence of the proper and timely diagnosis and treatment. It is a surgical emergency which requires immediate wide surgical debridement and patients need to be kept on broad-spectrum antibiotics, otherwise survival is difficult. As far as diagnosis is concerned the most widely adopted score is the laboratory risk indicator for necrotizing fasciitis (LRINEC) developed by Wong and colleagues in 2004. Scores  $\geq 6$  were found to have a 92% positive predictive value and a 96% negative predictive value, It also stratifies patients into low ( $\leq 5$ ), moderate (6-7) and ( $\geq 8$ ) high scores.

#### AIM:

To study validation of the laboratory risk indicator for necrotizing

fasciitis (LRINEC) score for early diagnosis of necrotizing fasciitis.

#### OBJECTIVE:

To describe the defining characteristics of necrotizing fasciitis (NF), emphasizing early diagnostic indications with the help of following parameters: C-reactive protein, Total WBC count, Haemoglobin, Serum sodium, Serum creatinine, Blood glucose

#### MATERIAL AND METHODS:

This was a prospective observational study which includes all the patients of necrotizing fasciitis admitted to the surgical wards in Rohilkhand Medical College and hospital from November 2016 to October 2017. A total of 100 patients were studied after due permission from the ethical committee of the college. The patient included in the study were in the age group of 18-70 years and were of both sexes. This score is based on routine laboratory investigations done on admission for evaluation of all severe soft tissue infections: C-reactive protein (CRP), white blood cell count (WBC), Haemoglobin (Hb), Sodium level (Na<sup>+</sup>), Creatinine (Cr), Glucose. These laboratory-based variables form a scoring system, the Laboratory Risk Indicator for Necrotising Fasciitis score (LRINEC), which is able to stratify the likelihood of diagnosis of NF into low, intermediate and high groups. The present study aims to evaluate

the role of LRINEC score as a prognostic tool for early diagnosis in patients with NF.

**OBSERVATION AND RESULT:**

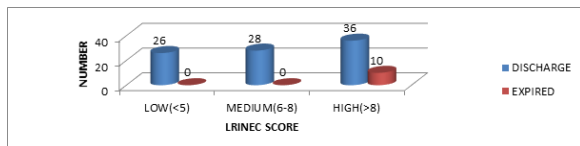
The mean age of patients was 43.5 ± 16.2 yrs with a maximum number of patients in the 31-40 years(22%) and 51-60 years(23%) age group. Necrotising fasciitis effected 81% male patients and 19% female patients. Incidence of necrotising fasciitis in patients of Diabetes Mellitus was 18% and in Peripheral Vascular Disease 7%.The site of involvement in order of frequency was: Lower limb(51%), Perineal region(25%), Upper limb(13%), and Thigh(8%).Distribution of patients according to LRINEC score;HIGH risk score ≥8 was 46%,MODERATE risk score 6-7 was 28%,LOW risk score ≤5 was 26%.



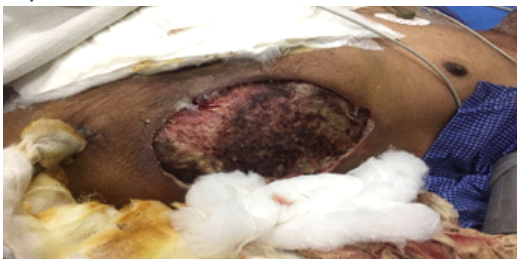
**FIGURE 1: PIE CHART SHOWING DISTRIBUTION OF PATIENTS ACCORDING TO LRINEC SCORE**

Biopsy confirmation of necrotizing fasciitis in patients according to different LRINEC score was as follows 26% patients belonged to the LOW risk (≤5) LRINEC score and out of these 19.23% showed biopsy confirmation of necrotising fasciitis, 28% patients belonged to MODERATE risk group (6-7)LRINEC score and out of these 92.85% showed biopsy confirmation of necrotising fasciitis,46% patients belonged to the HIGH risk group(≥8)LRINEC score and biopsy confirmation of necrotising fasciitis was 100%.

All patients classified (as per LRINEC score), In the LOW risk group and the MODERATE risk group survived and their postoperative course was uneventful.10% patients out of 46% of patients belonging to the HIGH risk group LRINEC score ≥ 8 expired.



**FIGURE 2: SHOWING MORTALITY OF PATIENTS (AS PER LRINEC SCORE).**



**PICTURE 1: SHOWING NECROTIZING FASCIITIS OF CHEST AND ABDOMINAL WALL**



**PICTURE 2: SHOWING NECROTIZING FASCIITIS OF LOWER LIMB**

**DISCUSSION**

Kao LS et al. found that there was no age or gender predilection, but higher rates of NSTIs were seen in obese, diabetic, and immunocompromised patients, as well as alcoholics and patients with peripheral vascular disease .In our study also the Incidence of necrotising fasciitis in patients of Diabetes Mellitus was 18% and Peripheral Vascular Disease was 7%.<sup>4</sup>

Williams N et al. reported that Necrotizing fasciitis resulted from a polymicrobial, synergistic infection, most commonly a streptococcal species in combination with staphylococcal, Escherichia coli, Pseudomonas, Proteus. In our study also the most common organisms isolated are Escherichia Coli, Klebsiella Oxytoca , Klebsiella Pneumoniae , Staphylococcus Aureus ,and group A streptococcal infections.<sup>5</sup>

Anaya et al.<sup>6</sup> have demonstrated that infection of the lower extremities is the most common site of NF followed by the abdomen and the perineum. In our study also the most common site of infection was the Lower limb(51%), followed by Perineal region(25%), Upper limb(13%) and Thighs(8%).

Edlich RF et al.<sup>7</sup> found that patients suffering from necrotizing fasciitis were affected by polymicrobial infections. Young MH et al. found that there was microbial invasion of local blood vessels, which together with toxins cause severe sepsis, multisystem organ failure and death. Necrotizing fasciitis is a surgical emergency which requires immediate wide surgical debridement and the patients need to be kept on empiric broad-spectrum antibiotics awaiting culture and sensitivity. All tissue that appears pale, ischemic, and necrotic or does not bleed appropriately needs to be removed. Early diagnosis, aggressive serial debridement, broad spectrum antibiotics and multidisciplinary critical care approach are vital to attain favorable outcomes in NF patients as was done in our study.

Chin-Ho-Wong et al.<sup>8</sup> in his study stated that the LRINEC score is capable of detecting early cases of necrotizing fasciitis among patients with severe soft tissue infections. A LRINEC scores more than 6 should raise the suspicion of necrotizing fasciitis, and a score of more than 8 is strongly predictive of the disease. We calculated the LRINEC score for all patients and the cut-off level was a score 6. The present study showed that out of 100 patients 54 patients (54% of NF) had a LRINEC score of more than 6. On the basis of the present study, it can be said that LRINEC score is a very important early diagnostic tool.

Goh et al. Concluded that the median mortality ratio was 21.5%. However, its range in the literature is extensive, varying from 8.7% to 76%.<sup>9</sup> In our study In LOW risk and MODERATE risk group all patients survived and the postoperative course was uneventfull while In 46% of patients and those belonging to The HIGH risk group(≥ 8)LRINEC, 10% patients expired.

**CONCLUSION**

The LRINEC score is an index that is capable of detecting early cases of necrotizing fasciitis and is simple enough for routine use. It is based on routine laboratory investigations done on admission for evaluation of all severe soft tissue infections viz C-reactive protein, Total WBC count, Haemoglobin, Serum sodium, Serum creatinine, Blood glucose. These investigations are cheap and readily available.

It can stratify patients into high, moderate, and low risk categories for serious soft tissue infections warranting admission, intravenous antibiotics, and immediate further evaluation.To achieve early diagnosis, operative debridement, and ultimately better survival in necrotizing fasciitis, patients in the moderate and especially the high risk categories should be evaluated urgently to exclude necrotizing fasciitis.

The LRINEC score is also an indicator of the severity of sepsis. Serial LRINEC score monitoring is helpful, and in many cases an increasing score despite broad-spectrum antibiotics is a valuable prognostic indicator.

However in patients with multiple comorbidities, the inflammatory response may be blunted and the score should be interpreted with caution. MRI scan, frozen section biopsy, or the finger test are some diagnostic tests that should be considered in equivocal cases of soft tissue infections.

#### REFERENCES

1. Ahrenholz DH. Necrotizing soft-tissue infections. *Surg Clin North Am.* 1988;68:199–214.
2. Janevscus RV, Hann S, Butt MD. Necrotizing fasciitis. *Surg Gynecol Obstet.* 1982;154:97–102.
3. Misiakos EP, Bagias G, Patapis P, Machairas A, et al. Current concepts in the management of necrotizing fasciitis. *Front Surg.* 2014;1:36.
4. Kao LS, Lew DF, Arab SN, et al. Local variations in the epidemiology, microbiology, and outcome of necrotizing soft-tissue infections: a multicenter study. *Am J Surg.* 2011;202(2):139–145.
5. Williams N, O'Connell PR. *Bailey & Love's Short Practice of Surgery 26E*: Crc Press; 2013.
6. Anaya DA, McMahan K, Nathens AB. Predictors of mortality and limb loss in necrotizing soft tissue infections. *Arch Surg* (2005)140:151–7.
7. Edlich RF, Cross CL, Dahlstrom JJ, Long WB. Modern concepts of the diagnosis and treatment of necrotizing fasciitis. *The Journal of emergency medicine.* 2010;39(2):261-5.
8. Wong CH, Khin LW, Heng KS, Tan KC, Low CO. The LRINEC (laboratory risk indicator for necrotizing fasciitis) score: a tool for distinguishing necrotizing fasciitis from other soft tissue infections. *Crit Care Med* 2004; 32:1535–41.
9. Goh T, Goh LG, AngCH, Wong CH. Early diagnosis of necrotizing fasciitis. *Br J Surg* (2014) 101:119–25