

Original Research Article

A prospective application of LRINEC score in necrotising soft tissue infections

Tupaki Prasad, Srinivas Margam, Narender Nakka*

Department of General Surgery, Osmania General Hospital, Hyderabad, Telangana, India

Received: 17 April 2025

Revised: 29 April 2025

Accepted: 03 May 2025

*Correspondence:

Dr. Narender Nakka,

E-mail: drnarender.narender@gmail.com

Copyright: © the author(s), publisher and licensee Medip Academy. This is an open-access article distributed under the terms of the Creative Commons Attribution Non-Commercial License, which permits unrestricted non-commercial use, distribution, and reproduction in any medium, provided the original work is properly cited.

ABSTRACT

Background: Necrotising soft tissue infections are hastily progressing skin and soft tissue infections associated with necrosis of the dermis, subcutaneous tissue, superficial fascia, deep fascia or muscle. This includes a variety of conditions, such as Fournier's gangrene affecting the perineum and genitalia, Meleney streptococcal gangrene and clostridial myonecrosis.

Methods: Prospective observational study. Patients presenting to hospital with clinical features of cellulitis will be included in the study. Patients and their caretakers will be explained the procedure and written consent obtained. All the patients will be investigated and LRINEC score measured.

Results: A total of 119 cases were included in the study of which 17 cases were necrotising soft tissue infections and 102 cases were diagnosed with cellulitis with no systemic complications.

Conclusions: In conclusion, the LRINEC score is a valuable tool for diagnosing necrotizing fasciitis. Its high sensitivity and specificity make it an ideal tool for clinicians to identify patients at high risk of this severe infection.

Keywords: Cellulitis, CRP, LRINEC score, Necrotising soft tissue infection

INTRODUCTION

Necrotising soft tissue infections are hastily progressing skin and soft tissue infections associated with necrosis of the dermis, subcutaneous tissue, superficial fascia, deep fascia or muscle. This includes a variety of conditions, such as Fournier's gangrene affecting the perineum and genitalia, Meleney streptococcal gangrene and clostridial myonecrosis. The incidence of necrotising soft tissue infections appears to be increasing worldwide. This is often attributed to the increased prevalence of obesity, type 2 diabetes mellitus and people affected with chronic immunosuppression, all of which can predispose the patients to necrotising soft tissue infections. Henceforth, there is a dire necessity to evaluate these patients in our hospital settings. They have in common characteristics of aggressive progression, irreversible tissue necrosis, more

rates of sepsis and mortality rates ranging between 10% and 25%.^{1,2} Since the progression of NSTI is most commonly fulminant, patient's outcomes depend on early diagnosis and prompt administration of appropriate treatment as early as possible. Crepitus, skin necrosis and bullae are much more indicative of NSTI but usually are present in less than 40% of the time, rendering them hardly ever useful in diagnosis.³

The laboratory risk indicator for necrotizing fasciitis scoring system was frame worked based on laboratory values commonly becoming abnormal in NSTIs, it has been studied to be useful in diagnosing accurately NSTI from other infections, in spite of correlation of laboratory risk indicator for necrotizing fasciitis score with outcome in NSTI is less cumbersome and recent meta analyses have deferred its value.⁴ The sensitivity of CT in

identifying NSTI was 100%, the specificity 98%, the positive predictive value 76% and the negative predictive value 100% in one series of 184 patients.⁵ There are numerous factors that indicate that patients should be managed in the intensive care unit, including the need for fluid resuscitation, strict monitoring, regular wound dressing and frequent optimal debridement.⁶ Immediate and optimal surgical debridement of all necrotic tissue is the necessity to achieve successful management of necrotizing fasciitis. It is the single most important treatment modality for determining the patient's clinical outcome.

Surgery that controls the source of infection prevents the spread of necrotizing fasciitis and prevents the release of inflammatory mediators that cause systemic sepsis.⁷ The debrided wounds are usually kept to heal by secondary intention or delayed primary wound closure. Vacuum-assisted closure has shown successful results. However, patients with large clean wound defects are deferred for reconstructive surgery with skin grafts or local skin flaps.⁸

Objectives

Role of LRINEC score in management of necrotising soft tissue infections among the patients presenting with lower limb cellulitis.

To identify the comorbid conditions associated with cellulitis leading to necrotising soft tissue infections and LRINEC correlation.

METHODS

Prospective observational study. Patients presenting to hospital with clinical features of cellulitis will be included in the study. Patients and their caretakers will be explained the procedure and written consent obtained. All the patients will be investigated and LRINEC score measured. The diagnosis of necrotising fasciitis will be done clinically based on finger test and dish wash pus drainage.

Based on scoring and clinical findings patients will be prognosticated. Study done at government medical college, Sangareddy. Study period is from 01-07-2023 to

30-06-2024. Ethical committee clearance was taken EC/NEW/INST/2022/3113. Statistical analysis was done calculating sample percentage and correlation analysis.

Inclusion criteria

Patients aged 18 years or older patients with suspected necrotizing fasciitis (NF) or cellulitis, patients presenting with signs and symptoms of NF or cellulitis, such as pain, swelling, redness and warmth, patients who have undergone laboratory tests, including complete blood count (CBC), electrolyte panel and liver function tests (LFTs).

Exclusion criteria

Patients under 18 years old, pregnant women, patients with a previous diagnosis of NF or cellulitis, patients with incomplete medical records or laboratory data, patients with non-bacterial infections, such as fungal or viral infections, patients with trauma or burns that may affect the accuracy of the LRINEC score.

RESULTS

In the present study patients admitted to surgery wards with clinical diagnosis of cellulitis and necrotising soft tissue infections were investigated as per LRINEC score and a score of more than 6 was considered as bad prognosis. A total of n=119 cases were included in the study of which n=17 cases were necrotising soft tissue infections and n=102 cases were diagnosed with cellulitis with no systemic complications.

All of the 17 cases included in necrotising soft tissue infections had comorbidities diabetes mellitus (n=12), hypertension (n=10), coronary artery disease (n=4). Of the 102 cases of cellulitis 57 cases gave history of trivial trauma, 62 cases were found to be suffering from diabetes mellitus and 34 patients were on antihypertensive medication. Majority of NSTI patients were in age group of 51-70 years (n=7). Cheng et al, through a meta-analysis have disputed the role of LRINEC score but mentioned it as less robust⁶. NSTI had male predominance 12:7. Most of NSTI patients had positive CRP resulting in high scores in LRINEC.

Table 1: LRINEC score.

Variable	Unit	Score
CRP	>150 mg/dl	4
WBC	15-25	1
	>25	2
Haemoglobin	11-13.5	1
	<11	2
Serum sodium	>135	1
	<135	2
Serum creatinine	>1.6 mg/dl	2
Serum glucose	>180 mg/dl	2

Table 2. Risk of NSTI.

Risk	LRINEC score	Probability of NSTI
Low	5 or <5	<50
Intermediate	6-7	50-75
High	>7	>75

Table 3: Age distribution.

Age (years)	Cellulitis	NSTI
20-30	5	0
31-40	27	0
41-50	36	5
51-60	19	4
61-70	16	3

Table 4: Sex distribution.

	Cellulitis	NSTI
Male	57	12
Female	55	7

Table 5: comorbidities.

	Cellulitis	NSTI
Diabetes mellitus	62	12
Hypertension	34	10
Coronary artery disease	0	4

Table 6: LRINEC score distribution among cellulitis and NSTI.

LRINES score	NSTI	Cellulitis
More than 6	14	20
Less than or equal 6	3	82

Table 7: Step by step solution.

LRINEC	NSTI	Cellulitis	Total
More than 6	14	20	34
Less than or equal 6	3	82	85
Total	17	102	119

Table 8: Expected frequencies.

LRINEC	NSTI	Cellulitis
More than 6	4.857	29.143
Less than or equal 6	12.143	72.857

Table 9: Chi square points.

LRINEC	NSTI	Cellulitis
More than 6	17.21	2.868
Less than or equal 6	6.884	1.147

Chi-square=28.1097, p value is 0.00000. significant at $p < 0.01$.

DISCUSSION

Necrotizing soft tissue infections are rare, difficult to diagnose and require immediate surgical intervention plus administration of antimicrobial agents. Failure to rapidly recognize and treat these infections results in an extremely high mortality rate (~80-100%) and even with expedient therapy mortality rates are high (16-24%).⁹ The common thread among these host factors appears to be compromise of the fascial blood supply and if this is coupled with the introduction of exogenous microbes, the result can be devastating. Debridement controls the source of infection and prevents sepsis in these patients.¹⁰

In the present study, prevalence of diabetes was more in necrotizing soft tissue infection group (n=12) out of (n=19) 63% compared to cellulitis group (n=69) out of (n=102) 60.78%, this finding is in favor of study done by Woo et al, a nested case control study on Modified Laboratory Risk Indicator for Necrotizing Fasciitis (m-LRINEC) Score System in Diagnosing Necrotizing Fasciitis.¹¹

In the present study, there was difference in incidence of necrotizing soft tissue infection in males and females (M:F=12:7) this finding is in favor of study published in Clinical presentations and outcomes of necrotizing fasciitis in males and females over a 13-years period according to which NSTI is more common in males by a ratio upto 3:1.¹²

The main limitation of this study was the number of patients. To come to a conclusion, we need a greater number of patients in necrotizing soft tissue infection group. It is also found that most patients had chronic illness and comorbidities. The scoring might get more weightage if otherwise healthy subjects are also included in the study. Most of the patients presented to us with cellulitis had taken treatment elsewhere.

CONCLUSION

Necrotizing fasciitis is an uncommon, rapidly progressive and often fatal soft-tissue infection. Clinicians should have a high index of suspicion of necrotizing fasciitis for its diagnosis. The LRINEC score is a useful adjunct in the clinical diagnosis of necrotizing fasciitis particularly with the addition of clinical parameters such as pain, pyrexia and comorbidities. Early decision to explore and extensively debride the necrotic tissue is important for successful clinical outcome. Proper antibiotics therapy, fluid resuscitation and adequate wound care are crucial. Patients with generalized sepsis should be carefully monitored in the intensive care unit and managed by a multidisciplinary team.

Funding: No funding sources

Conflict of interest: None declared

Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Liu V, Escobar GJ, Greene JD. Hospital deaths in patients with sepsis from 2 independent cohorts. *JAMA*. 2014;312:90–2.
2. Ban KA, Minei JP, Laronga C. American College of Surgeons and Surgical Infection Society: surgical site infection guidelines, 2016 update. *J Am Coll Surg*. 2017;224:59–74.
3. Wong CH, Chang HC, Pasupathy S. Necrotizing fasciitis: clinical presentation, microbiology and determinants of mortality. *J Bone Joint Surg Am*. 2003;85:1454–60.
4. Fernando SM, Tran A, Cheng W. Necrotizing soft tissue infection: diagnostic accuracy of physical examination, imaging and LRINEC score: a systematic review and metaanalysis. *Ann Surg*. 2019;269:58–65.
5. Martinez M, Peponis T, Hage A. The role of computed tomography in the diagnosis of necrotizing soft tissue infections. *World J Surg*. 2018;42:82–7.
6. Sroczyński M, Sebastian M, Rudnicki J, Sebastian A, Agrawal AK. Complex approach to the treatment of Fournier's gangrene. *Adv Clin Exp Med*. 2013;22:131–5.
7. Ord R, Coletti D. Cervico-facial necrotizing fasciitis. *Oral Dis*. 2009;15:133–41.
8. Huang WS, Hsieh SC, Hsieh CS, Schoung JY, Huang T. Use of vacuum-assisted wound closure to manage limb wounds in patients suffering from acute necrotizing fasciitis. *Asian J Surg*. 2006;29:135–9.
9. Kao LS, Lew DF, Arab SN. Local variations in the epidemiology, microbiology and outcome of necrotizing soft-tissue infections: a multi-center study. *Am J Surg*. 2011;202(2):139–45.
10. Sultan HY, Boyle AA, Sheppard N. Necrotising fasciitis. *BMJ*. 2012;345:4274–9.
11. Hoatian Woo. a nested case control study on Modified Laboratory Risk Indicator for Necrotizing Fasciitis (m-LRINEC) Score System in Diagnosing Necrotizing Fasciitis. *Infection and Drug Resistance* 2021;14 2105–12.
12. Ma WG, Zheng J, Sun LZ, Elefteriades JA. Open stented grafts for frozen elephant trunk technique: technical aspects and current outcomes. *Aorta*. 2015;3(04):122-35.

Cite this article as: Prasad T, Margam S, Nakka N. A prospective application of LRINEC score in necrotising soft tissue infections. *Int Surg J* 2025;12:931-4.