

Diagnostic Value of the LRINEC Score and Microbiological Stratification in Necrotizing Fasciitis: A Retrospective Study with Histopathological Confirmation

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INTRODUCTION

The diagnosis of necrotizing fasciitis (NF) remains a clinical challenge, as its initial presentation may be nonspecific and delayed diagnosis is associated with high morbidity and mortality.

The Laboratory Risk Indicator for Necrotizing Fasciitis (LRINEC) has been proposed as a diagnostic tool to facilitate early identification; however, its actual diagnostic performance remains controversial.

Aim of the study: To evaluate the diagnostic performance of the LRINEC score and microbiological findings, as well as the behavior of combined models (OR and AND), using histopathological confirmation as the reference standard.

METHODS

- **Study Design:** Retrospective analysis of 30 patients with clinical suspicion of necrotizing fasciitis who underwent surgical treatment. Patients were divided into 2 groups depending on histopathological findings either compatible (n=20) or not compatible (n=10) with necrotizing fasciitis.
- **Microbiological stratification:** microbiological cultures were separated into high-risk vs low-risk microorganisms typically associated to NF
- **Evaluated Strategies:** Sensitivity (Se), specificity (Sp), positive predictive value (PPV), and negative predictive value (NPV) were calculated for overall microbiological positivity, stratified cultures, LRINEC >6, and combined AND/OR logical models.
 - Combined AND: Positive culture AND LRINEC>6 with compatible histology
 - Combined OR: Positive culture OR LRINEC>6 with compatible histology
- **Statistical Modeling:** Firth penalized logistic regression was performed to identify independent predictors and calculate odds ratios (OR) while protecting against small-sample bias.

RESULTS

Microbiological stratification significantly improved diagnostic performance compared to overall microbiological positivity and the LRINEC score ($\kappa=0.52$; OR=12).

Below is the diagnostic performance matrix:

Diagnostic Strategy	Se	Sp	PPV	NPV
Overall Microbiology	100.0%	30.0%	74.1%	100.0%
Stratified Microbiology	88.2%	61.5%	75.0%	80.0%
LRINEC Score > 6	85.0%	20.0%	68.0%	40.0%
Combined Model (AND)	70.0%	80.0%	87.5%	57.1%
Combined Model (OR)	90.0%	20.0%	69.2%	50.0%

Multivariate predictors:

In Firth penalized multivariate logistic regression, overall *microbiological positivity* emerged as the only independent predictor significantly associated with histopathological confirmation of disease (OR 11.1; $p < 0.01$).

Importantly, the *LRINEC* >6 did not demonstrate a statistically significant independent association in the multivariate model (OR 0.52; $p = 0.54$).

The final combined model demonstrated an area under the curve (AUC) of 0.795.

CONCLUSIONS

Stratified microbiology demonstrated better diagnostic performance than the LRINEC score for predicting histopathological confirmation of necrotizing fasciitis.

LRINEC >6 was not an independent predictor, and combined models did not improve upon the performance of stratified microbiological analysis.