

Original Article

Fournier's Gangrene : An Analysis of 50 Cases and Validation of a Modified Severity Scoring System

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Abstract

Background : The aim is to enhance the scoring system for Fournier's Gangrene patients, thereby facilitating the creation of more effective and feasible management strategies.

Materials and Methods : We analyzed 50 patients who underwent surgery for Fournier's gangrene in the last 5 years using logistic regression and a prospectively maintained database. We then adopted a novel scoring system that combined this data with Fournier's Gangrene Severity Index (FGSI). We created a novel predictive scoring system based on the physiological score, age score and the extent of gangrene.

Results : The 50 patients had a mortality rate of 21%. The new scoring system (MFGSI), with a threshold value of 9, observed a 94% probability of death with a score greater than 9. When the score is 9 or less, there is an 81% probability that death will occur ($P < 0.001$). The Receiver Operating Characteristics (ROC) analysis concluded that the new scoring system was more powerful than the FGSI ($P = 0.002$).

Conclusions : The power of the modified scoring system introduced in this study proves that in patients with Fournier's gangrene, the extent of the gangrene as well as the patient's age and physiological status have a significant effect on the outcome.

Key words : Fournier's Gangrene, Necrotizing Fasciitis, FGSI, MFGSI, Extent of Gangrene, APACHE II, Prognostic Scoring.

Fournier's Gangrene (FG) is a life-threatening necrotizing soft tissue infection of the perineum, genitalia, and perianal regions. First described by Baurienne in 1764 and later characterized by the French venereologist Jean Alfred Fournier in 1883, it continues to be recognized as one of the most dreaded surgical emergencies. Despite advances in critical care, antibiotics, and surgical techniques, mortality remains unacceptably high, ranging between 20-67% in different series¹⁻⁴.

The disease originates from anorectal, urogenital, or cutaneous infections that spread along fascial planes with alarming rapidity. The synergistic action of aerobic and anaerobic organisms leads to fulminant tissue necrosis, systemic sepsis, and multiorgan dysfunction. Factors such as diabetes mellitus, immunosuppression, alcoholism, chronic renal failure, and advanced age worsen prognosis^{5,6}.

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Editor's Comment :

- Necrotizing fasciitis is a serious, rapidly advancing infection that can be fatal if not treated promptly.
- Early diagnosis and aggressive surgical intervention are crucial for survival.
- Clinicians should maintain a high index of suspicion and prioritize immediate action over waiting for diagnostic confirmation.
- Additionally, ensuring satisfactory environmental hygiene and keeping blood glucose levels under control are key preventive measures against this life-threatening condition.

Need for Prognostic Scoring :

Because FG is highly unpredictable, clinicians rely on severity indices to stratify risk and guide management. The APACHE II and FGSI are widely used scoring systems. FGSI, derived by Laor, *et al* through modifications of APACHE II, considers physiological and laboratory parameters. A cut-off score of >9 correlates with 75% mortality, whereas ≤ 9 indicates improved survival⁷.

While valuable, FGSI does not fully account for extent of disease, which intuitively influences outcomes. Patients with localized perineal involvement fare better than those with thigh or abdominal wall extension. Researchers including Uludag and Yilmazlar have

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proposed incorporating disease extent and age into modified indices for better prognostication^{8,9}.

AIMS AND OBJECTIVES

Our study aimed to :

Analyze clinical characteristics, management and outcomes of 50 patients with Fournier's gangrene.

Validate a Modified Fournier's Gangrene Severity Index (MFGSI) incorporating:

Acute physiological status (from FGSi).

Patient age.

Anatomical extent of gangrene.

Compare predictive accuracy of FGSi *versus* MFGSI using statistical modeling and ROC curve analysis.

By developing a more robust tool, we sought to aid surgeons in early identification of high-risk patients and optimize resource allocation in critical settings.

MATERIALS AND METHODS

Study Design and Population

This was a retrospective analysis of prospectively maintained records from the General Surgery Department, conducted between January, 2019 – August, 2024.

Inclusion criteria :

All patients diagnosed with Fournier's gangrene involving urogenital or anorectal regions.

Exclusion criteria :

Isolated abscesses without necrotizing fasciitis.

Ethical Considerations :

The study was approved by the Institutional Ethics Committee. Confidentiality was maintained and patient identifiers were excluded.

Clinical Management Protocol

All patients were managed as per departmental protocols:

Immediate resuscitation with IV fluids, correction of electrolyte imbalances, and broad-spectrum antibiotics.

Early surgical debridement within 12 hours of admission. Repeated debridements were performed until healthy granulation tissue appeared.

Microbiological cultures obtained intraoperatively guided antibiotic modification.

Supportive care included blood transfusions, nutritional supplementation, urinary diversion (Foley catheter/cystostomy), and fecal diversion (colostomy) in select patients.

Patients with severe sepsis or organ dysfunction were admitted to ICU and received vasopressors or ventilatory support as indicated.

Study Variables

Demographic and clinical variables included :

Age, sex, comorbidities, symptom duration, referral status.

Laboratory parameters: serum sodium, potassium, creatinine, hematocrit, bicarbonate, WBC count.

Clinical severity indices : APACHE II, FGSi.

Extent of gangrene (classified into 3 grades) (Fig 1):

Grade I : confined to perianal/urogenital/perineal regions.

Grade II : extended to pelvic/pubic region.

Grade III : beyond pelvis into thigh/abdominal wall.

Outcomes : survival, ICU admission, ventilator requirement, hospital stay.

Modified Fournier's Gangrene Severity Index (MFGSI).

MFGSI = FGSi (physiological + lab parameters) + Age score (+1 if ≥ 60 years) + Extent score (1 for Grade I, 2 for Grade II, 3 for Grade III).

Statistical Analysis

Chi-square and Fisher's exact tests for categorical variables.

Wilcoxon and Kruskal-Wallis tests for continuous data.

Logistic regression for mortality predictors.



Fig 1 — Anatomical limit-based grading. (A) Grade I dissemination. (B) Grade II dissemination, front view in man and woman and back. (C) Grade III dissemination, extension of the disease to all other parts was considered

ROC curve analysis to determine mortality cut-off scores and compare predictive accuracy of FGSI versus MFGSI.

Analyses were performed using SPSS v15 and MedCalc v7.2.1.0. Statistical significance was set at $p < 0.05$.

RESULTS

Demographic and Clinical Profile

50 patients included: 36 males (72%) and 14 females (28%).

Median age : 57 years (range: 24-85).

Survivors had significantly lower median age (55 years) compared with non-survivors (62 years; $p = 0.002$).

Comorbidities : 58% had type II diabetes mellitus; others included hypertension and chronic kidney disease.

Symptom duration : median 7 days before admission.

Referral status: 68% referred from secondary centers.

Outcomes

Mortality: 11/50 patients (22%). Causes included septic shock (5), multiorgan failure (4) and cardiogenic shock (2).

ICU care: 13 patients required ICU, with 8 requiring mechanical ventilation. Mortality was significantly higher in ventilated patients ($p < 0.001$).

Hospital stay: median 14 days for survivors versus 7 days for non-survivors ($p = 0.002$).

Gangrene Extent and Mortality

Grade I (21 patients): 100% survival

Grade II (15 patients): 4 deaths (27%)

Grade III (14 patients): 7 deaths (50%)

Mortality correlated significantly with extent of disease ($p < 0.001$).

Microbiology

Polymicrobial growth: 48% cases.

Common isolates: E coli, Proteus, Enterococci, Streptococci, Staphylococcus aureus.

One patient with *Candida albicans* infection succumbed.

Scoring Systems

FGSI:

Median score survivors: 4 (range 0-11).

Median score non-survivors: 14 (range 3-23).

ROC AUC = 0.843 (cut-off 11; sensitivity 64.7%, specificity 100%).

MFGSI:

Cut-off = 9 points.

Patients >9 had 94% mortality probability.

Patients ≤ 9 had 81% survival probability.

ROC AUC = 0.947, significantly superior to FGSI ($p = 0.002$) (Fig 2).

DISCUSSION

Fournier's gangrene continues to challenge surgeons despite modern advances. Our analysis of 50 patients revealed three principal independent predictors of mortality: age, physiological derangement (FGSI), and extent of gangrene.

Role of Age

Consistent with Clayton, *et al*¹¹ and Laor, *et al*¹² we observed significantly higher mortality among older patients. Advanced age impairs immune function, wound healing and tolerance to sepsis, thus worsening prognosis. Patients ≥ 60 years had nearly 10-fold higher odds of mortality.

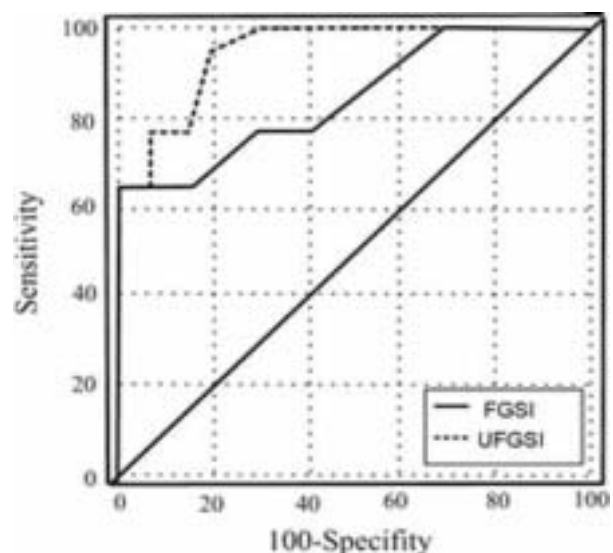


Fig 2 — Displays the results of the ROC analysis comparing the two scoring systems

Extent of Gangrene as a Prognostic Factor

While previous studies hinted at disease extent influencing outcome, few integrated it into predictive scoring. Our findings strongly support Yilmazlar, *et al*¹⁵ who emphasized anatomical spread as a major determinant. Grade III disease (extension beyond pelvis) carried a 50% mortality risk.

Comparison of FGSI and MFGSI

The FGSI has been widely validated but remains imperfect: some low-score patients die, while some high-scorers survive. By incorporating age and gangrene extent, our MFGSI markedly improved predictive accuracy (AUC 0.947). Thus, MFGSI offers clinicians a practical, more reliable bedside tool for risk stratification.

Implications for Clinical Practice

Patients with MFGSI >18 invariably died, underscoring the need for early aggressive resuscitation, extensive debridement and possible prioritization for ICU admission.

Scores ≤9 predict survival with high probability, allowing resource optimization by safely managing such patients in wards rather than ICUs.

The tool can assist surgeons in counseling families, triaging referrals and planning staged reconstructions.

Limitations

Retrospective, single-center study.

Limited sample size (n=50).

Lack of long-term follow-up regarding functional or reconstructive outcomes.

Validation in larger multicentric cohorts is warranted.

CONCLUSION

Fournier's gangrene remains a rapidly progressive, potentially fatal infection with substantial morbidity and mortality. Traditional indices such as FGSI provide useful prognostic guidance but fail to consider disease extent, a crucial determinant of outcome.

Our study validates a Modified Fournier's Gangrene Severity Index (MFGSI) incorporating age and anatomical extent of gangrene in addition to physiological parameters. The MFGSI demonstrated superior predictive power compared to FGSI, with a clear cut-off at 9 points for mortality risk stratification.

By offering a more accurate prognostic framework,

the MFGSI can guide timely surgical aggressiveness, critical care allocation, and patient counseling. Future prospective multicentric studies are recommended to further validate and refine this scoring system.

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Conflict of Interest : None

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