

Original Research Article

A simplified prognostic scoring and grading system for Fournier's gangrene

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ABSTRACT

Background: Fournier's gangrene is life threatening, necrotizing fasciitis, affecting external genitalia of male greater than female with mortality 7 to 53%. Fournier gangrene severity, LRINR and LNR scoring used to evaluate morbidity and mortality. Aim and objective of our study was to simplify a system, especially for Indian peripheral health centers which can predict mortality, morbidity.

Methods: This study was conducted in department of surgery of Teerthankar Mahaveer University. Body mass index, blood urea nitrogen and patient demography used to develop the scoring system with minimum and maximum points and correlated our results.

Results: Our simplified scoring system also has a direct bearing on mortality, morbidity, recovery and hospital stay. In our study 3 male and 2 females died.

Conclusions: Simplified scoring and grading system will be helpful in predicting the morbidity and mortality, early surgical intervention, hospital stay, time for reconstruction.

Keywords: Fournier's gangrene, Grading, Scoring system

INTRODUCTION

Fournier's gangrene (FG) is a type of necrotizing fasciitis affecting the external genitalia or perineum. About one per 62500 males are affected every year, although found in females also with a ratio of 40:1, children do suffer.¹ In 1764, Baurienne originally described as an idiopathic rapidly progressive, soft tissue necrotizing process that leads to gangrene, however, Jean Alfred Fournier, a Persian venerologist was associated with the disease and named it after his name with this disease since 1883. Over the years several other terms also have been used like "streptococcus gangrene", "necrotizing fasciitis," "periurethral phlegma-phlegdena" and "synergistic necrotizing fasciitis." Disease is worldwide in distribution. It is a horrendous infection by polymicrobial microorganisms of perineum and genitalia characterized

by end arteritis-obliterance of subcutaneous tissue and skin. The anaerobic micro organisms, that accumulate in subcutaneous tissues produces hydrogen and nitrogen, added by conditions of oxygen pressure and limited vascular supply and bacterial over growth is there, and these are the factors that make crepitus to be felt in the affected areas.¹ Although there is broad age range and mainly affects male patients over the age of 50 years, it is rarely seen in pediatric age group, little is known about the disease in new borne and infancy.²⁻⁴

Predisposing factors

FG develops and fulminates rapidly in immunocompromised.^{5,6} Diabetics, patients, suffering from neoplastic disorders, obese, having local trauma, renal, liver diseases and bone marrow transplantation.⁷ In spite of

modern intensive care units and advances in surgical and medical therapy the current mortality rate has been reported to be 30-50% and even 3-70% in some series. Many prognostic factors and scoring systems have been proposed, advocated and suggested in an effort to predict the survival and prognosis of patients, but no system has been found to be reliable. Fournier gangrene severity index (FGSI), described in 1995, is first scoring system which helps in predicting prognosis and survival but in current literature it has become controversial.⁸⁻¹¹ Laboratory risk indicators for necrotizing fasciitis (LRINEC) system considers lab parameters which were described to distinguish between necrotizing fasciitis and other soft tissue infections, still other neutrophil lymphocyte count ratio (NLR) has been shown to be correlated to the severity of systemic inflammation as increasing ratio as proportional to severity of disease.

Aim of study was to simplify the scoring system and grading of the patients in predicting the prognosis and share our experience in Indian prospective especially in rural and peripheral centers where much facilities are not available and to correlate with mortality and morbidity.

METHODS

A prospective study was conducted in the department of surgery, Teerthanker Mahaveer University Medical College and Research Center. Moradabad from July 2017 to December 2018. 38 patients were admitted in the Department of Surgery through emergency/OPD during said period.

Demographic data of patients was collected and recorded, after full complete physical, biochemical, radiological, microbiological and pathological examination.

Patients were classified according to age, sex, area of lesion, reporting time to the hospital since appearance of first symptom. We divided reporting patients in three groups, Group 1 having pain early inflammatory changes like edema, redness but without gangrenous signs, group 2, of delayed presentation with definite gangrenous changes tachycardia, raised temperature, and foul smelling wound, group 3, included patients were of late group, had massive involvement of abdominal wall, penis, thigh, kidney and liver.

BMI, co morbid conditions like diabetes mellitus, hypertension, and HCV, HIV, level of renal functions by blood urea nitrogen (BUN) and serum proteins were recorded, along with general condition of patient at the time of admission. Pus culture and sensitivity of microorganisms was done so as to administer proper antibiotics.

Although various scoring systems have been proposed, to predict morbidity and mortality, we used a very simple scoring as well as grading system for our aim of

prediction. We considered following parameters for the scoring system (Table 1).

Table 1: Grading system used in the study.

Age (in years)	<40
	>40
BMI	<30
	>30
	>35
Pulse	<90
	90-120
	>120
Temperature	<98
	98-102
	>102
Area involved	Inflammation
	Pregangrenous
	Full gangrene
Duration and presentation	Early
	Delayed
	Late
Surgical intervention	Early
	Delayed
Microorganism	Single
	Multiple
Associated co morbidity	Nil
	D.M
	Multiple
Toxemia	No
	Present

On the basis of the scores, we graded all patients in three grades. Majority of patients expired were in grade 3.

Surgically wide excision of dead and necrotic tissue was done after stabilizing the general condition of patients especially, who reported late and were toxic. Mostly patients needed multiple sittings, testicular pouches were created for reposition, in few cases while in rest scrotal skin was sufficient enough for approximation.

RESULTS

Maximum numbers of patients were in age group of 31 to 50 years. In Table 2, only 5 female reported to our center in study period, majority of patients were in delayed group. Pulse rate was normal in 8 patients, while 17 had tachycardia toxemic signs were depending on the area involved, 6 patients had single site lesion while rest were with multisite pathology, area involved had direct bearing with morbidity and mortality. Co morbid conditions, DM, kidney involvement, hypertension, were also recorded (Table 7), bacterial culture from the site are shown (Table 8). We, in our study, found that morbidity and mortality was low in patients scoring 8-10 points while the risk of mortality was highest in those having 20 or

more point's. Hospital stay was also of shorter duration in low scoring patients.

Table 2: Age.

S. no.	Age (in years)	No. of patients
1	<30	3
2	31-50	21
3	>50	14

Table 3: Presentation.

S. no.	Presentation	No. of patients
1	Early	4
2	Delayed	26
3	Late	8

Table 4: Pulse.

S. no.	Pulse	No. of patients
1	<90	9
2	90-120	12
3	120 and above	17

Table 5: BMI.

S. no.	BMI	No. of patients
1	<25	13
2	25-30	17
3	>30	8

Table 6: Area involved.

S. no.	Area involved	No. of patients
1	Single site	6
2	Multiple sites	32

Table 7: Co- Morbidities.

S. no.	Co-morbidities	No. of patients
1	Diabetes mellitus	14
2	BUN	10
3	Proteins-albumin	
	Normal	22
	Low	16

Table 8: Microorganism.

S. no.	Microorganism	No. of patients
1	<i>Staph aureus</i>	7
2	<i>Streptococcus</i>	6
3	<i>E. coli</i>	15
4	<i>Klebseilla</i>	5
5	<i>Proteus</i>	3
6	<i>Pseudomonas</i>	2
7	Mixed infections	6

Table 9: Site.

S. no.	Site	Male	Female	Total
Genetalia	Scrotum	33		33
	Penis	26		26
	Labia	--	5	5
Perianal area		11	3	14
Perineum		28	2	30
Abdominal area		2	2	4

Genetalia (scrotum) are the commonest primary sites in males and labia in females (Table 9). In present study five patients died of primary disease and associated complications, three were males and two females. Depending on our scoring system, we graded all patients in three grades - grade 1:- 1-12, grade 2:- 13-19, grade 3:- >20 point.

Ours is an easily calculated and simplified scoring system, also has a direct bearing on mortality, morbidity, recovery and hospital stay of patients.

DISCUSSION

When host immunity is compromised, dormant microorganisms get an upper hand and this allows and provides a favorable environment to initiate infection and microorganism fulgurates rapidly. Most authorities are of opinion and believe that polymicrobial nature of FG is necessary to create the synergy of enzymes production that promote rapid multiplication and spread of infection.¹⁰ These organisms are the usual commensals of perennal skin and genital organs, include *Clostridia*, *Klebseilla*, *Streptococcus*, *Staphylococcus Bactearoids* etc.¹¹ Low aggressive bacteria exist in FG in synergism. One of microorganism may produce enzymes necessary to cause coagulation of nutrient vessels which lead to reduction in blood supply, thus the level of tissue oxygen falls, allowing facultative anaerobes to grow, and these microorganism in turn produce Lacithinase and collagenase, which digest the fascial barrier and thus rapidly spreading the extent of infection, and rate of infection as high as 2-3 cm/hr has been noted in some reports.^{12,13} Horta et al described four characteristics phases of FG, first phase (24-48 hr).¹⁴ Nonspecific symptoms associated with local hardening, pruritis, oedema, and erythema of tissue. Second (Invasive phase), short phase with local and regional inflammatory manifestations. Third phase (necrotic phase); rapidly worsening general condition leads to septic shock in 59% cases necrosis can some time spread to anterior abdominal wall, perineum and thigh. Fourth phase (spontaneous restoration phase): Healing with deep granulation followed by epithelisation.

The mortality rates of FG ranges between 7-53% and this variable outcome of disease points, to it being a multifactorial disease, but in general morbidity and mortality depends on factors related to disease and host. Lore et al established a prognostic index FGSI to

determine the severity, morbidity, mortality, progress and prognosis of disease.^{8,15-17} This index includes patients vital signs and metabolic parameters like temp, heart rate, respiratory rate, serum sodium and potassium creatinine, bicarbonates, hematocrit, white cell count and computes a score relating to severity of disease at that time. This index was validated by Yeniyol and Tuncer, however its accuracy has been controversial and hence cannot be relied upon to predict survival.^{18,19} Janane et al on 70 patients was of opinion that FGSI score did not predict severity and patients survival but Unalp was in favor of FGSI scoring system.^{20,21} LRINEC (Laboratory Risk Indicator for Necrotizing Fasciitis) is a weighted system of multiple laboratory markers often used to satisfy patients into low, moderate and high risk of Necrotizing soft tissue infection.^{9,22} Yilmazlar et al. Suggested a new scoring system, adding age and extent of disease score to FGSI.⁹ Both scoring system lack the timing of patients presentation, BMI, and co-morbid conditions.^{23,24} Saber at el advocated a simple scoring system in 68 patients, simplifying the prognostic scoring system. Patients having a maximum score of 18 were with highest risk while having 8 points carrying low risk.



Figure 1: A case of Fournier's gangrene extending from scrotum to anterior abdominal wall and thigh.

Many studies found obesity, timing of presentation, and co morbid conditions, as important parameters for morbidity.²⁵⁻²⁹

In our present study, we not only used scoring system, but also graded the patients in three grades depending on the scores, we included ten scales in a very simplified way, and these parameters can be calculated at any healthcare center even at rural primary care unit, particularly in rural India. Our parameters were age, BMI, pulse rate, area involved, reporting time to health center, co-morbidity, microorganism, surgical intervention time, and toxicity.

The mortality rate in FG is usually high and depends on many risk factors, in present study five patients expired (13.1%) three were males and two females.

In some studies, the overall mortality rate was 23-30% and may reach up to 88% and higher in females, the higher mortality rate is commonly observed with age > 50 yrs. and time interval between first symptom and surgical intervention.²⁷⁻³⁰

Our results were matched with almost all studies except the mortality rates which was much lower in our series.

The extension of disease beyond primary site and multiple sites have been controversial in all series. Some studies reported that the spread of disease is related to higher mortality rates, while some other conclude that extent of spread is not proportional to death rate but it has been mostly reported that involvement of thigh and abdominal wall bears a high mortality.²⁹

Associated medical illness particularly diabetes carry patients to higher mortality, and has been recorded in present study likewise in other series also, still others have a different opinion declaring it to be controversial.³⁰⁻³² In most series majority of patients were suffering from diabetes mellitus.³³

CONCLUSION

FG, not an uncommon, is a lethal disease and co-morbidities like diabetes mellitus increase the risk of life. Multidisciplinary care, good nutrition, repeated surgical aggressive interventions, all contribute to its successful outcome. There still remains to be a reliable tool to predict morbidity and mortality of the disease. In Indian conditions especially in peripheral centers where many facilities for investigations are not available, we have tried to simplify a scoring and grading system to predict the prognosis of these patients and also a target for further research. In future we anticipate that, our scoring and grading system, will track early surgical intervention, prevent mortality, may shorten the hospital stay and may help in shifting towards survival, early reconstruction and more so a better quality of future life.

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