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Retrospective Study of Fournier Gangrene and it's Co-relation with FGSI Scores in its Management at a Tertiary Hospital in Mauritius

Sarangam Venkata Satyanarayana Rao[1], Matabudul[2], Cahoolessur[3], Saulick[4], Mohammad Suleman[5]

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Abstract

Background: Fournier's gangrene is an acute rapidly progressive necrotizing fasciitis of infectious etiology. It usually affects scrotum, penis, perineum, perianal region and anterior abdominal wall occasionally. It is a poly-microbial infection resulting in thrombotic occlusion of small subcutaneous blood vessels leading to cutaneous gangrene. In spite of low prevalence at present FG carries considerable morbidity and mortality. It affects all age groups and both sexes. It is more prone in individuals with Diabetes Mellitus, chronic alcoholism, urogenital, anorectal diseases and immune-compromised persons. The diagnosis of FG is mostly clinical but radiological imaging was also needed to assess the extent of the disease. The management comprises of mainly aggressive surgical debridement under broad spectrum antibiotics coverage and ICU support.

Material and Methods: It is a retrospective study comprising 30 number of FG cases clinically diagnosed and admitted in Dr Bruno Cheong Hospital, Flacq, Mauritius from 2019-2023. The data collected from hospital records comprising of routine and emergency cases. The preexisting co-morbidities, socio-economic status and outcome of management as per FGSI scores were assessed and recorded.

Statistical Analysis: Standard statistical method, like SPSS was adopted for the analysis.

Results: In the present study FGSI scores were co-related with the clinical picture and biochemical parameters of 30 no. of cases to assess severity of the disease. Moreover, FG being a serious and complicated disease, it was managed by a team comprising of surgeons and ICU team.

Conclusion: FGSI scoring system is an excellent tool to assess the severity of the disease, in terms of mortality risk and outcome of management.

Keywords: Debridement; Fournier gangrene; FGSI scores; Sepsis.

Key Messages: Early Diagnosis of FG and institution of appropriate surgical treatment is the need of the hour.

Author Affiliation: [1]Professor, [3,4]Clinical Tutor, [5]Medical Student, Department of Surgery, Anna Medical College and Research Centre, Flacq, Mauritius, [2]Consultant Surgery, Department of Surgery, Dr Bruno Cheong Hospital, Flacq, Mauritius.

Corresponding Author: Sarangam Venkata Satyanarayana Rao, Professor, Department of Surgery, Anna Medical College and Research Centre, Flacq, Mauritius.

Email: drsatyanarayan1951@gmail.com

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INTRODUCTION

FG is an uncommon poly-microbial infection of sudden onset and hitherto affects healthy young man with rapid progression to cutaneous gangrene and necrotizing fasciitis. It affects genitalia and perianal region and also spreads to anterior abdominal wall and chest wall in some cases. FG was described in 1883 by J. Alfred Fournier, a French dermatologist, as a "Fulminant gangrene of penis and scrotum". It is also known as synergistic necrotizing cellulitis, periurethral phlegmon and phagedena.[1,2,3] A comprehensive and well accepted definition of FG was coined by Smith *et al* as infective necrotizing fasciitis of the genitalia, perineum and peri anal region.[4] His study included the disease in men and women of all ages. Genital Gangrene in women involves the vulva, perineum, thigh and anterior abdominal wall.[5,6,7]

Eka in his large scale meta-analysis reported a male to female ratio of 10:1. There are two important sources of sepsis in FG and one is in the skin and other is in colorectal/perineal region. The cutaneous infection carries better prognosis and survival rate. The colorectal infection was associated with higher morbidity and mortality rate.[8] Some pre-existing conditions like Diabetes Mellitus, Chronic alcoholism, Colorectal Cancer and immuno-compromised persons are more vulnerable to FG. Once it is diagnosed aggressive surgical debridement of necrotic tissues under broad spectrum antibiotic coverage and ICU support care were needed. Loar *et al* in 1995 described the FGSI Score, based on simple physiological parameters like heart rate, respiratory rate and body temperature and basic blood parameters such as serum sodium, potassium, creatinine, WBC count, hematocrit, and sodium bicarbonate to predict the mortality as well as outcome of the treatment in FG cases.[9] FGSI Score of 9 and above had higher chances of mortality with a predictive value of 80%. Scores below 9 had better chances of survival as per the study. This cutoff point has been achieved through ROC Curves in many studies. But in the present study at Dr Bruno Cheong Hospital, the cutoff point was not yet established. The objective of the present study is to validate the FGSI Scores in the outcome of treatment in FG cases.

MATERIALS AND METHODS

The present study was a hospital based retrospective and observational study conducted at Dr Bruno Cheong Hospital, Mauritius from July 2019 to June 2023. 30 number of FG cases were enrolled in the study. Ethical clearance from the Hospital Committee has been obtained before the study.

Selection Criteria

Inclusion Criteria

1. Patients clinically diagnosed as Fournier's gangrene above the age of 18 years and got admitted to surgery ward of the Flacq Hospital.

Exclusion Criteria

1. Patients with traumatic injuries to scrotum and scrotal lacerations.
2. Patients operated outside the hospital for FG.
3. Patients whose retrospective data were missing.

Patients with FG treated at surgery department were identified from the Hospital records during the study period. FGSI scores would be calculated for each patient based on pre-debridement clinical parameters and lab values as per available records. The summation of all parameters and a follow up of 30 days period would enable to predict the high risk category of cases among the enrolled cases.

Outcome Parameters

1. 30 days of follow up to assess the cause of death
2. Number of days of Hospital stay
3. Number of days at ICU
4. Need for mechanical ventilation
5. Organ failure
6. Need for extensive debridement of extra scrotal tissue, orchidectomy, penectomy, anterior abdominal wall, perineum and anal canal.
7. Need for re-debridement
8. Need for diversion procedures like fecal diversion/supra pubic catheterization.

Statistical Analysis

Standard statistical method, like SPSS was adopted for the analysis.

RESULTS

30 Cases of Fournier's gangrene were enrolled in

the present study.

Table 1: Age distribution

Age Group	No. of Cases	Percentage
<20	1	3.33
21 to 30	2	6.67
31 to 40	4	13.33
41 to 50	5	16.67
51 to 60	4	13.33
61 to 70	6	20.00
>70	8	26.67
Total	30	100
Mean	53.83	-
SD	17.18	-

The mean age group of cases were 53.83 years and majority of cases were 70 years and above.

Table 2: Sex Incidence

Sex	No. of Cases	Percentage
Male	29	96.67
Female	1	03.33
Total	30	100.00

Majority of cases were Males (96.67%) in the study group.

Table 3: Predisposing/Precipitating conditions

Predisposing conditions	No. of Cases	Percentage
Alcohol Intake	18	60
Diabetes Mellitus	15	50
Low Socioeconomic Status	10	33.33
Paraplegia	1	3.3
HIV Infection	2	6.67
Hypertension	5	16.67
Post Renal Transplant or Chronic kidney Disease	2	6.67
Covid-19 Infection	1	3.3
Smoking	2	6.67
Associated Fracture	1	3.3
Morbid Obesity	1	3.3
Pulmonary Tuberculosis	3	10
Associated Malignancy	1	3.33
Stroke Cases	1	3.33

The most common Precipitating conditions in the present study are alcohol abuse (60%) followed by Diabetes Mellitus (50%)

Table 4: Mortality rate in 30 days follow up of FG cases

Results of follow up	No. of Cases	Percentage	FGSI Score
Number of Non-Survivals	10	33.33	13.10 + 2.64
Number of Survivals	20	66.67	6.75 + 2.65
Total	30	100.0	-

In the present study, 10 cases were non-survivors (33.33%) with higher FGSI scores as shown above.

Table 5: Duration of Hospital stay in co-relation with FGSI score

FGSI score	Duration				P value
	<14 day		>15 days		
Total Score was 8.87 + 4.01	Mean	SD	Mean	SD	P=0.414
	9.438	4.32	8.214	3.66	

The duration of Hospital stay was 13-15 days in the most of the cases.

Table 6: Duration of ICU stay

FGSI score	Duration				P value
	<2 days		> 3 days		
Total Score was 8.87 + 4.01	Mean	SD	Mean	SD	P=0.017
	6.923	3.90	10.353	3.50	

The average duration of stay in the ICU was 3.70 days in the majority of the cases

Table 7: Co-relation of organ failure and FGSI score

FGSI Score	Organ Involvement				P value
	Organ failure		No failure		
Total score was 8.87 + 4.01	Mean	SD	Mean	SD	P=0.001
	11.571	3.65	6.500	2.58	

In the present study, 14 no. of cases had organ failure. 40% had circulatory failure, 20% renal and 6.6% had respiratory failure. Organ failure was associated with higher FGSI score and more mortality.

Table 8: Co-relation of mechanical ventilation and FGSI score

FGSI score	Mechanical ventilation				P value
	Required		Not Required		
Total score was 8.87 + 4.01	Mean	SD	Mean	SD	P<0.017
	11.917	3.67	6.833	2.77	

In the study group 12 cases required mechanical ventilation and were associated with higher FGSI score.

Table 9: Details of extensive surgical debridement performed in FG cases

Anatominal Region of Debridement	No. of Cases	Percentage
Anal canal, Perineum	1	3.33%
Ant abd wall	2	6.67%
Ant abd wall, Perineum	2	6.67%
B/L Orchidectomy, Perineum	1	3.33%
Left Orchidectomy	2	6.67%
Left orchidectomy, Anal canal, Perineum	1	3.33%
Penectomy	1	3.33%
Penectomy, ant abd wall	1	3.33%
Penectomy, Perineum	1	3.33%
Penile debridement, Urethral injury	1	3.33%
Perineum	6	20.00%
Perineum, anal canal	3	10.00%
Perineum, anal canal, ant abd wall	1	3.33%
No Debridements	7	23.33%
TOTAL	30	100.00%

23 needed extensive surgical debridement in the present study. Higher mortality was associated with extensive debridement, as compared to non-debridement. However, few survivors also had extensive debridement for severe sepsis and eventually recovered.

Table 10: Diversion procedures needed in FG cases

Name of the Procedure	No. of Cases	Percentage
No Procedures needed	20	66.67
Supra pubic catheterization (SPC)	3	10.00
Transverse colostomy	5	16.67
SPC and Transverse colostomy	1	3.33
SPC followed by percutaneous nephrostomy (PCN)	1	3.33
-	30	10.00

10 cases only required diversion procedures as detailed above in the present study.

Table 11: Microorganism isolated in wound culture

Organisms Isolated	No. of Cases	Percentage
E. Coli	15	50.00
Streptococcus	4	13.33
Polymicrobial	3	10.00
MSSA	3	10.00
Enterococcus	2	6.67
E Faecalis	1	3.33
Klebsiella	9	30.00
MRSA	1	3.33
Bacteroids	2	6.67

The most common organism isolated in wound culture was E. coli (50%).

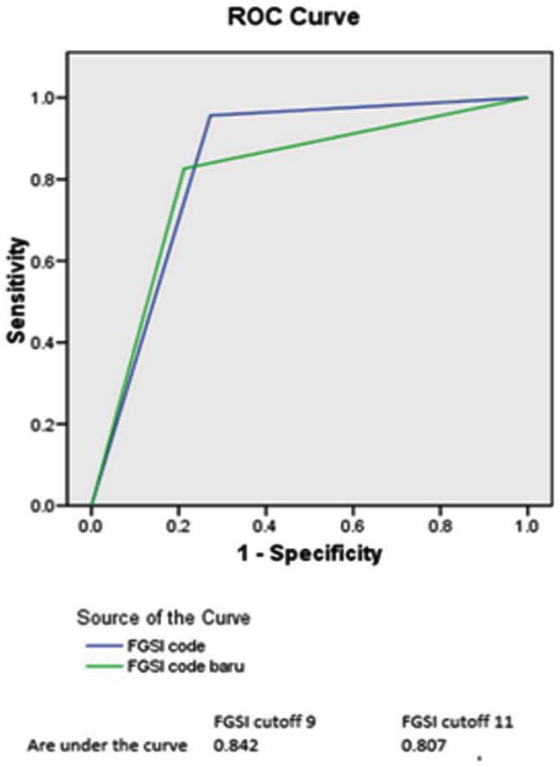


Table 12: Reliability of FGSI based on cutoff score

-	Cutoff Score >= 9	Cutoff Score >=11
Sensitivity	72.73%	78.79%
Specificity	95.65%	82.61%
Positive likelihood ratio	18.25%	4.65%
Negative likelihood ratio	0.28%	0.25%
Positive Predictive Value (PPV)	97.96%	92.86%
Negative Predictive Value (NPV)	55%	57.58%

Table 13: Co-relation of FGSI score in FG cases

FGSI Score	No. of Cases	Percentage
Score 2	1	3.33%
Score 4	3	10.00%
Score 5	3	10.00%
Score 6	2	6.67%
Score 7	4	13.33%
Score 8	4	13.33%
Score 9	1	3.33%
Score 10	1	3.33%
Score 11	3	10.00%

table cont.....

Score 12	2	6.67%
Score 13	3	10.00%
Score 16	1	3.33%
Score 17	2	6.67%
Total	30	100.00%

FG cases with FGSI scores between 10 and 12 had higher mortality in the study group. Out of 30 cases, 20 cases were survivors and 10 cases were non-survivors in the present study.



Fig. 1: Fournier Gangrene showing necrotizing fasciitis with discoloration of the scrotum.



Fig. 2: Fournier gangrene after debridement of necrotic tissue (***Source:*** DermNetNZorg)



Fig. 3: Female patient of FG after debridement



Fig. 4: FG of Anorectal region

DISCUSSIONS

Fournier's Gangrene is a fulminant synergistic microbial infection affecting genital, perianal, perineal, colorectal and genitourinary systems and spreads rapidly.[10] This condition is potentially fatal and affects all age groups and both sexes. The disease starts with a prodromal symptoms such as genital discomfort or pruritis with erythema. At times, patients also present with scrotal or perianal

swelling with pain and fever. Hence, early and prompt diagnosis of this condition is essential to institute the aggressive treatment. Despite the aggressive surgical debridement under broad spectrum antibiotic coverage, improved wound care, availability of excellent ICU facilities, the mortality rate FG ranges from 16% to 50% in some reported series. The higher mortality indicates the aggressiveness of the infection and associated predisposing conditions such as Diabetic ketoacidosis, Multi organ failure, acute renal failure, coagulopathies and severe sepsis. In the present study, the mean age of FG cases were 53.83 years and higher proportion of cases seen in 70 years and above. Verma *et al* in a retrospective study had reported a mean age to be 46.5+- 15.6. Spirmak *et al* reported the average age to be 54.5 years in their study.[11] In the present study 29 were males (96.67%) and 01 was female (3.33%). The female case was suffering from anorectal carcinoma with secondary infection and eventually got spread to labia majora leading to Fournier's gangrene. There are many isolated case reports of FG in females. The most common predisposing conditions in the present study were Alcohol abuse (60%) followed by Diabetes Mellitus (50%).[12]

The average Hospital stay was 14.5 days. The patients were divided into two groups based on 14 days and 15 days stay and co-related with FGSI scores and found to be statistically not significant. Hence, duration of Hospital stay does not co-relate with mortality. The average ICU stay was 3.7 days. The FGSI score and ICU stay were co-related and discussed in Table 6. Moreover, patient staying more than 3 days in ICU had complications like severe sepsis, multi organ failure and circulatory failure requiring ventilator support. Hence, cases of organ failure were associated with higher FGSI score and mortality. It was also observed, the need for repeated debridement to improve the survival in severe sepsis following initial surgery. Chawla et all in 2003 reported in their study the need for repeated debridements in survivals.[13] In the present study 10 cases needed diversion procedures as detailed (Table 10). A higher proportion of mortality was observed in participants with diversion procedures. The most common microorganism isolated in wound culture was E.coli (50%) followed by Klebsiella (30%). In another study conducted by Cemal Goktas, FGSI score were calculated before each debridement and the one with higher scores needed multiple debridement to control the infection.[14]

In the present study, 30 days follow up and co-relation with mortality indicated that there were 10 non-survivors with FGSI scores 13.10 +- 2.64 and 20 survivors with FGSI score of 6.75 +-2.65 and this was statistically significant.[15] Hence, FGSI scores can predict the mortality above 9.5 with sensitivity of 100% and specificity of 90%.

CONCLUSION

The present study concludes that the FGSI scores are excellent tools available to predict the mortality and outcome of the disease.

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Conflicts of Interest

The authors declare that they have no conflicts of interests.

Key Messages

Early diagnosis of Fournier's Gangrene and immediate surgical debridement with ICU support under supervision of expert surgical team are the gold standards in the management.

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