

**PROGNOSTIC FACTORS IN FOURNIER'S GANGRENE**S. S. Karbhari<sup>1</sup>, Akshay Kriplani<sup>2</sup>, R. G. Devani<sup>3</sup>**HOW TO CITE THIS ARTICLE:**

S. S. Karbhari, Akshay Kriplani, R. G. Devani. "Prognostic Factors in Fournier's Gangrene". Journal of Evolution of Medical and Dental Sciences 2014; Vol. 3, Issue 36, August 18; Page: 9398-9405, DOI: 10.14260/jemds/2014/3212

**ABSTRACT: BACKGROUND:** Fourniers gangrene is a fatal necrotising fasciitis of the perineal region which requires aggressive medical or prompt surgical treatment. **AIM:** Aim of the study is to study its risk and predisposing factors along with the clinical course and management techniques. Predictive values of Fournier Gangrene Severity Index Score was calculated. **MATERIALS AND METHODS:** In a prospective case review between July 2012 to July 2014, predisposing factors, clinical course and FGSI score for all cases of Fourniers gangrene was evaluated. **RESULTS:** Commonest affected age group was 40-60 years with an average of 50 years and. The disease more commonly affects in lower socio-economic group. Diabetes and alcoholism were significantly associated with the disease and association of co-morbidities gravely influences the prognosis. Average time before referral for treatment was 6.4 days in the survival group and 31.66 days in the non-survival group. FGSI <7 had a better outcome, however FGSI >9 had high mortality rate (20%). **CONCLUSION:** Older age group patients >50 years had significant morbidity and mortality. FGSI is an effective score for mortality assessment with a high predictive value. Early detection of patients followed by adequate surgical debridement and proper antibiotic cover, yields good results.

**KEYWORDS:** Fourniers gangrene, crepitus, streptococci, scrotal skin, thigh implantation.

**INTRODUCTION:** Fournier's Gangrene (FG) is a fulminant infection, including necrotising fasciitis of the genital, perineal and/or perianal regions.<sup>1</sup> It was initially described by Baurinne in 1764 and then was described in 1883 by the French Dermatologist Jean-Alfred Fournier as idiopathic gangrene of the penis and scrotum in five young men.<sup>2,3</sup>

This potentially fatal condition is characterised by rapid spread of microorganisms along the subcutaneous space leading to endarteritis obliterans because of platelet aggregation stimulated by heparinase produced by aerobic and anaerobic bacteria. This leads to impaired local blood supply, local oedema, hypoxia and necrosis of the soft tissues.<sup>4,5</sup> This also favours the development of anaerobic bacteria. These microorganisms produce hydrogen and nitrogen that accumulate in tissues, causing crepitation.<sup>4</sup>

This infective gangrene of the scrotum and the vulva is usually caused by an anaerobic hemolytic strain of streptococci. Other infective agents can be *Bacteroides fragilis* and aerobic *Escherichia Coli*. Thus, it is also called as polymicrobial necrotising fasciitis.<sup>6,7</sup>

Predisposing factor for FG are impaired host defense (diabetes mellitus (DM), chronic alcoholism, malignancy, radiotherapy, chemotherapy, AIDS), local trauma, chronic renal failure (CRF), periurethral urine leak, perineal surgery, and paraphimosis among others<sup>8, 9, 10</sup> It is seen frequently in low socio-economic groups.

The disease occurs in all ages and has been reported in both sexes. But males outnumber females by a ratio of 10:1. Mortality has been reported in different series to range from 16 to 40%.<sup>6,11,12</sup>

## ORIGINAL ARTICLE

---

Its clinical presentation is variable, but often presents with oedema, erythema, pain, fever and increased volume; crepitus may be present in 50-62% of cases.<sup>1,5</sup> It may present as a patch of gangrenous scrotal skin or the entire scrotal skin may slough off. Sometimes the penis alone may be affected with scrotal sparing. Extensions may sometimes reach the thighs, abdominal wall, chest wall, axilla. Testicular involvement is rare because of the different blood supply.

The time interval from onset of symptoms specific to the process until the request for medical care varies widely and this time determines the extent of the necrotic area and a critical influence on the prognosis.<sup>1,13</sup>

Of the imaging studies, X rays are useful in demonstrating the presence of gas in soft tissues; ultrasound is more useful as it can demonstrate the presence of diffuse edema, thickness of the scrotal wall and possibly the penis, and the presence of scrotal gas.<sup>1,5</sup>

It is a situation that warrants urgent radical surgical treatment (debridement), in addition to the use of antibiotics.<sup>1,14</sup>

The management ranges from emergency surgery (debridement), managing topically (sodium hypochlorite, hydrogen superoxide and even honey), and administering antibiotics, to hyperbaric oxygen.<sup>15,16</sup>

Loar et al. have described gangrene severity index of Fournier (FGSI)<sup>4,17,18</sup> which is useful for evaluating the prognosis and to stratify risk in these patients.

FGSI is a numerical score obtained from a combination of physiological hospital admission parameters that include temperature, heart rate, respiration rate, sodium, potassium, creatinine, leukocytes, haematocrit and bicarbonate. They stabilized that an FGSI score above 9 is sensitive and specific as a mortality predictor in FG patients.

### **AIMS AND OBJECTIVES:**

- To study the risk factors, predisposing factors, clinical presentation, and various treatment modalities in patients with Fourniers gangrene.
- To study the predictive value of the Fourniers Gangrene Severity Index (FGSI) Score in the outcome of these patients.

**MATERIALS AND METHODS:** The study is a prospective case review of 30 patients admitted in Basaveshwar Teaching and General Hospital, Gulbarga; from May 2012 to May 2014.

After a careful history and thorough general and physical examination all cases of necrotising fasciitis involving genital, perianal and perineal region were subjected to the relevant investigations and the diagnosed cases of Fourniers gangrene were included in the study. FGSI score was calculated based on clinical features and laboratory investigations. The degree of deviation from normal was graded from 0-4 as described by Loar et al.<sup>4</sup> The individual values were summed to obtain a FGSI score.

The FGSI score was calculated at the time of admission and at the time of death (if any). Patients were stratified according to the FGSI score and the results were compared with the final outcome of survival or death.

Some patients required emergency operative intervention while some patients required conservative treatment. Postoperatively, patients were followed up and complications were noted.

## ORIGINAL ARTICLE

For patients undergoing conservative management, manner of treatment, complications or recovery were noted.

FG patients were divided into two categories: survivors group A (n = 24) and non-survivors group B (n = 6).

Univariate analyses (Fischer exact test, two tailed) were used for comparisons. A P value of <0.05 was considered statistically significant.

Informed consent was taken from the patients and the study had been approved by the ethical committee.

### RESULTS:

Age	No. of cases	Percentage
21-30	2	6.66
31-40	4	13.33
41-50	8	26.66
51-60	13	43.33
61-70	3	10
<b>Total</b>	<b>30</b>	<b>100</b>

**Table 1: Age wise distribution**

Mean age- 50.37 ± 4.24

Range - 28-69

Occupation	No. of cases	Percentage
Farmers	13	43.33
Labourers	10	33.33
Factory workers	2	6.66
Others	5	16.66
<b>Total</b>	<b>30</b>	<b>100</b>

**Table 2: Distribution according to occupation**

Risk factor	Group A (Survivors) 24/30	Group B (non-survivors) 6/30
Diabetes mellitus (13) (43.33%)	8 (33.33%)	5(83.33%)
Hypertension (5) (16.66%)	2(8.33%)	3(50%)
Alcoholism (8) (26.66%)	5(20.83%)	3(50%)
HIV (2) (6.66%)	1(4.16%)	1(16.66%)
None (13) (43.33%)	13(12.5%)	0

**Table 3: Distribution according to co-morbid conditions**

## ORIGINAL ARTICLE

Etiology	No. of cases	Percentage
Perianal/ perirectal	6	20
Srotal abscess	15	50
Trauma	3	10
Idiopathic	6	20
<b>Total</b>	<b>30</b>	<b>100</b>

**Table 4: Distribution according to etiological factor**

Technique	No. of cases	Percentage
Conservative	9	30
Secondary suturing	13	43.33
Split skin grafting	6	20
Thigh implantation	2	6.66

**Table 5: Distribution of patients according to management**

	Group A (Survivor) 24/30	Group B (non- survivor) 6/30	P value Two tailed	
Age >50 (16)	10/24	6/6	0.0185	S.S
Duration of presentation >48 years	14/24	5/6	0.3717	N.S
Predisposing factors present	11/24	6/6	0.0237	S.S
Site of origin				
-scrotum	20/24	4/6	0.5705	N.S
-Perianal	4/24	2/6	0.5705	N.S
No. of debridements >1	7/24	3/6	0.3717	N.S
FGSI score ≥ 9	7/24	5/6	0.0256	S.S
Hospital stay >30 days	15/24	4/6	1.0	N.S

**Table 6: Comparison of results between two groups**

S. S- Statistically significant, N.S- Not statistically Significant.

Assigned numerical score	4+	3+	2+	1+	0	1+	2+	3+	4+
Temperature °C	>41	39-40.9	-	38.5-38.9	36-38.4	34-35.9	32-33.9	30-31.9	<29.9
Heart rate	>180	140-179	110-139	-	70-109	-	56-59	40-54	<39
Respiratory rate	>50	35-49	-	25-34	12-24	10-11	6-9	-	<5
Serum sodium (mmol/l)	>180	160-179	155-159	150-154	130-149	-	120-129	111-119	<110
Serum potassium (mmol/l)	>7	6-6.9	-	5-5.4	3.5-4	3-3.4	2.5-2.9	-	<2.5
Serum creatinine (mg/100 ml)	>3	2-3.4	1.5-1.9	-	0.6-1.4	--	<0.6	-	-
Haematocrit %	>60	-	50-50.9	46-49	30-45.9	-	20-29.9	-	<20
Leukocytes (total/mm <sup>3</sup> ×1000)	>40	-	20-39.9	15-19.9	3-14.9	-	-	1-2.9	-
<1 Serum bicarbonate (venous, mmol/l)	>52	41-51.9	-	32-40.9	22-31.9	-	18-21.9	15-17.9	<5

**Table 7: FOURNIERS GANGRENE SEVERITY INDEX**

## ORIGINAL ARTICLE

---

**DISCUSSION:** Of the 30 cases included in the study, maximum number (13) of cases (43.33%) belonged to 61-70 year age group followed by 51-60 years age group (8) (26.66%). The overall mean age was 50.37±4.24. The patients of group B (non-survivors) belonged a comparatively older age group (>50yrs) (P value- 0.0185, statistically significant).

Most of them were farmers (13) (43.33%) by occupation followed by labourers (10) (33.33%) and factory workers (2) (6.66%). Thus, all patients belonged to the low socioeconomic class.

In this study the commonest risk factor was diabetes mellitus (13) (43.33%). 83.33% of non-survivors suffered from diabetes mellitus. This was followed by alcoholism (8) (26.66%) and 50% of non survivors were alcoholic. 50% of non-survivors had hypertension. 100% of the non-survivor population had an individual or a combination of predisposing factors (P value- 0.02337, Statistically significant)

Morpurgo E, et al,<sup>19</sup> Korkut M, et al<sup>20</sup> also stated that Diabetes mellitus has been shown to exist in high proportions in those with FG, while alcoholism has also been shown to be a poor predictor of survival as per Clayton MD et al.<sup>21</sup>

Y eniyol CO et al<sup>22</sup> also highlight other predisposing factors on survival rates, notably cardiac failure, hypertension and renal insufficiency. Interestingly, diabetes mellitus was not implicated.

But the association of these co-morbidities with increased mortality is controversial<sup>23, 24, 25</sup> There is similar uncertainty about the association of age and mortality.<sup>23,26</sup>

The most common site of infection origin was scrotum in 83.33 % in group A and 66.66 % in group B. The perianal origin was found in 16.66 % in group A and 33.33 % in group B (though the relation of the site of origin and mortality was not found to be statistically significant).

The most common presenting feature in the present study was gangrene of the scrotum with pain and swelling 25(84%) and fever 7(24%). 2(8%) landed in hypotension and shock.

The average time of the symptoms prior to referral to the treatment was 6.4 days (range 2–15 days) in group A and 31.66 days in group B (range 20-45 days). this delay may be due to lack of knowledge in the lower socioeconomic strata or due to social stigma. Its impact on survival was not found to be statistically significant in our study (P value- 0.3717).

The organism commonly isolated includes E-coli, pseudomonas pyocynae, staphylococcus, either in combination or synergistic to other organisms. Klebsiella and Pseudomonas were also identified in some cases.

Culture and sensitivity revealed sensitivity to cefotaxime, metronidazole, ofloxacin in the majority of cases. Amikacin, cefoperazone, cefuroxime and Cloxacillin sensitivity was seen in comparatively few cases. The commonest antibiotic resistance was to older penicillins (crystalline penicillin, procaine penicillin, ampicillin, amoxicillin, cephalixin and gentamycin).

Surgical debridement under cover of antibiotics, controlled most of the infection. 13 (43.33%) required secondary suturing after thorough debridement, thigh implantation was done in 2 (6.66%) patients, whereas split skin grafting was done in 6 (20%) patients. 29.16% people in group A and 50% people in group B underwent debridement more than once. (P value-0.3717, not statistically significant).

Hyperbaric oxygen therapy is considered as a promising modality, but was not used in our study due to the lack of this facility at our institute. Other surgical procedures such as diversion procedures (cystostomy and colostomy) and orchidectomy were not required in our study.

## ORIGINAL ARTICLE

The average stay in the hospital in group A is 31.5 days (29-35 days) and 35 days in group B, though its impact on prognosis was not found to be statistically significant. (P value- 1.0)

The FGSi index calculated ranged from 2 to 11, with average of 7.2 in group A and 12 to 18 (avg-14.33) in group B, at the time of admission ( $P < 0.05$ ).

Laor et al<sup>4</sup> first introduced the FGSi score and concluded that a threshold parameter of 9 predicts survival. FGSi score  $>9$  had 75% probability of death and  $\leq 9$  had 78% probability of survival. Since then, several studies were published regarding the validity of FGSi, but the results are still controversial. Kara et al<sup>24</sup> found that FGSi scores  $\geq 7$  were factors affecting the mortality rates with statistical significance ( $P < 0.05$ ). Altarac et al<sup>27</sup> found FGSi score to be significantly higher among non-survivors (11 vs. 6,  $P < 0.0001$ ).

On the other hand, Janane et al<sup>28</sup> found that median admission FGSi scores for survivors and non-survivors were not significantly different ( $2.1 \pm 2.0$  vs.  $4.2 \pm 3.8$ ,  $P = 0.331$ ).

Tuncel et al<sup>17</sup> did not find a significant association of FGSi to mortality.

Findings of another study by Luján Marco S, et al<sup>29</sup>, showed that FGSi did not reflect the severity of FG but factors like low bicarbonate and high sodium levels and old age were factors that predicted the outcome.

Despite aggressive wide-spectrum antibiotic treatment and aggressive surgical debridement, of this polymicrobial infection, the mortality rates are as high as 43% in some series.<sup>30</sup>

The overall mortality in our study was 20%, which is comparable with other studies, like by Hari Gopal Vyas et al (20%)<sup>6</sup>, Satyageet Varma et al (26.5%).<sup>1</sup>

Janane et al<sup>28</sup> found that the extent of body surface area involved by the disease process has a significant impact on the mortality ( $P = 0.001$ ).



**Fig. 1: Pre and Post debridement images of a case of Fournier's gangrene**

**CONCLUSION:** Commonest affected age group was 40-60 years with an average of 50 years and older age group patient's  $>50$  years had significant morbidity and mortality. The disease more commonly affects the lower socioeconomic group. Diabetes and alcoholism were significantly associated with the disease and association of co-morbidities gravely influence the prognosis. FGSi  $<7$  had a better outcome, however FGSi  $>9$  had high mortality rate (20%). Orchiectomy was not done in our study.

The mean duration of hospital was  $30 \pm 16$  days. No significant difference between duration of hospitalisation of survivors and non-survivors was found. The survivors and the non-survivors had significant difference in FGSi scores. A high FGSi score strongly suggests a poor prognosis. Early detection of patients followed by adequate surgical debridement and proper antibiotic cover, yields good results.

**REFERENCES:**

1. Verma S, Sayana A, Kala S, Rai S; Evaluation of the Utility of the Fournier's Gangrene Severity Index in the Management of Fournier's Gangrene in North India: A Multicentre Retrospective Study; *Journal of Cutaneous and Aesthetic Surgery* - Oct-Dec 2012; 5(4).
2. Rodríguez Alonso A, Pérez García MD, Núñez López A, Ojea Calvo A, Alonso Rodrigo A, Rodríguez Iglesias B, et al. Fournier's gangrene: anatomico-clinical features in adults and children. Therapy update. *Actas Urol Esp* 2000; 24: 294-306.
3. Alejandro GM, Juan Atianio AL, Jesus DG, Rafael MM, Laura SG. Fournier's gangrene: Our experience in 5 years, bibliographic review and assessment of the Fournier's gangrene severity index. *Arch EspUrol* 2009; 62: 532-40.
4. Laor E, Palmer LS, Tolia BM, Reid RE, Winter HI. Outcome prediction in patients with Fournier's gangrene. *J Urol* 1995; 154: 89-92.
5. Eke N. Fournier's gangrene: A review of 1726 cases. *Br J Surg* 2000; 87: 718-28.
6. Vyas H G, Kumar A, Bhandari V, Kumar , Jain A, Kumar R; Prospective evaluation of risk factors for mortality in patients of Fournier's gangrene: A single center experience; *Indian Journal of Urology*, Jul-Sep 2013; 29(3).
7. Eke N. Fournier's gangrene: A review of 1726 cases. *Br J Surg* 2000; 87: 718-28.
8. Carvalho JP, Hazan A, Cavalcanti AG, Favorito LA. Relation between the area affected by Fournier's gangrene and the type of reconstructive surgery used. A study with 80 patients. *Int Braz J Urol* 2007; 33: 510-4.
9. Schaeffer AJ, Schaeffer EM. Infections of the urinary tract. In: Wein AJ, editor. *Campbell-Walsh Urology*. 10th ed., Philadelphia: Elsevier Saunders; 2012. p. 324.
10. Ersoz F, Sari S, Arikan S, Altioek M, Bektas H, Adas G, et al. Factors affecting mortality in Fournier's gangrene: Experience with fifty-two patients. *Singapore Med J* 2012; 53: 537-40.
11. Sorensen MD, Krieger JN, Rivara FP, Klein MB, Wessells H. Fournier's gangrene: Management and mortality predictors in a population based study. *J Urol* 2009; 182: 2742-7.
12. Morpurgo E, Galandiuk S. Fournier's gangrene. *Surg Clin North Am* 2002; 82: 1213-24.
13. Fournier JA. Overwhelming Fournier's Gangrene. *Semin Med* 1883; 3: 345.
14. Korkut M, Icoz G, Dayangac M, Akgun E, Yenyay L, Erdogan O, et al; Outcome analysis in patients with Fournier's gangrene: Report of 45 cases. *Dis Colon Rectum* 2003; 46: 649-52.
15. Schaeffer AJ. Urinary tract infections: Fournier's gangrene. *Campbell's Urology* 8th ed. Editorial Panamericana; Argentina; 2007. p. 641-3.
16. Clayton MD, Fowler JE Jr, Sharifi R, Pearl RK. Causes, presentation and survival of fifty-seven patients with necrotizing fasciitis of the male genitalia. *Surg Gynecol Obstet* 1990; 170: 49-55.
17. Tuncel A, Aydin O, Tekdogan U, Nalcacioglu V, Capar Y, Atan A. Fournier's gangrene: Three years of experience with 20 patients and validity of the Fournier's Gangrene Severity Index Score. *Eur Urol*. 2006; 50: 838-43. [PubMed: 16513250]
18. Yenyol CO, Suelozgen T, Arslan M, Ayder AR. Fournier's gangrene: Experience with 25 patients and use of Fournier's gangrene severity index score. *Urology* 2004; 64: 218-22.
19. Morpurgo E, Galandiuk S. Fournier's gangrene. *Surg Clin North Am*. 2002; 82: 1213-24.
20. Korkut M, Icoz G, Dayangac M, Akgün E, Y eniyay L, Erdoğan O, et al. Outcome analysis in patients with Fourniers gangrene: Report of 45 cases. *Dis Colon Rectum*. 2003;46:649-52.

## ORIGINAL ARTICLE

21. Clayton MD, Fowler JE, Jr, Sharifi R, Pearl RK. Causes, presentation and survival of fifty-seven patients with necrotizing fasciitis of the male genitalia. *Surg Gynecol Obstet.* 1990; 170: 49-55.
22. Y eniyol CO, Suelozgen T, Arslan M, Ayder AR. Fournier's gangrene: experience with 25 patients and use of Fournier's gangrene severity index score. *Urology.* 2004; 64: 218-22.
23. Ersoz F, Sari S, Arikan S, Altiok M, Bektas H, Adas G, et al. Factors affecting mortality in Fournier's gangrene: Experience with fifty-two patients. *Singapore Med J* 2012; 53: 537-40.
24. Kara E, Müezzinoğlu T, Temeltas G, Dinçer L, Kaya Y, Sakarya A, et al; Evaluation of risk factors and severity of a life threatening surgical emergency: Fournier's gangrene (a report of 15 cases). *Acta Chir Belg* 2009; 109: 191-7.
25. Luján Marco S, Budía A, Di Capua C, Broseta E, Jiménez Cruz F. Evaluation of a severity score to predict the prognosis of Fournier's gangrene. *BJU Int* 2010; 106: 373-6.
26. Unalp HR, Kamer E, Derici H, Atahan K, Balci U, Demirdoven C, et al. Fournier's gangrene: Evaluation of 68 patients and analysis of prognostic variables. *J Postgrad Med* 2008;54:102-5.
27. Altarac S, Katušin D, Crnica S, Papeš D, Rajković Z, Arslani N. Fournier's gangrene: Etiology and outcome analysis of 41 patients. *Urol Int* 2012; 88: 289-93
28. Janane A, Hajji F, Ismail TO, Chafiqui J, Ghadouane M, Ameer A, et al. Hyperbaric oxygen therapy adjunctive to surgical debridement in management of Fournier's gangrene: Usefulness of a severity index score in predicting disease gravity and patient survival. *Actas Urol Esp* 2011; 35: 332-8.
29. Luján Marco S, Budía A, Di Capua C, Broseta E, Jiménez Cruz F. Evaluation of a severity score to predict the prognosis of Fournier's gangrene. *BJU Int* 2010; 106: 373-6.
30. Spirnak JP, Resnick MI, Hampel N, Persky L. Fournier's gangrene: Report of 20 patients. *J Urol* 1984; 131: 289-91.

### AUTHORS:

1. S. S. Karbhari
2. Akshay Kriplani
3. R. G. Devani

### PARTICULARS OF CONTRIBUTORS:

1. Associate Professor, Department of Surgery, M. R. Medical College, Gulbarga.
2. Post Graduate, Department of Surgery, M. R. Medical College, Gulbarga.
3. Professor and HOD, Department of Surgery, M. R. Medical College, Gulbarga.

### NAME ADDRESS EMAIL ID OF THE CORRESPONDING AUTHOR:

Dr. S. S. Karbhari,  
Associate Professor,  
Department of Surgery,  
M. R. Medical College,  
Gulbarga.  
Email: sharankarbhari@gmail.com

Date of Submission: 07/08/2014.  
Date of Peer Review: 08/08/2014.  
Date of Acceptance: 12/08/2014.  
Date of Publishing: 16/08/2014.