International Surgery Journal
Shukla PK et al. Int Surg J. 2016 Aug;3(3):1256-1261
http://www.ijsurgery.com
pISSN 2349-3305 | eISSN 2349-2902

DOI: http://dx.doi.org/10.18203/2349-2902.isj20161472

Research Article

Fournier's gangrene: a prospective study of 57 patients with special reference to validity of Fournier's gangrene severity index in predicting the outcome and mortality

Pushpendra Kumar Shukla*, Ashish Ghanghoria, Vinod Yedalwar

Department of Surgery, Shyam Shah Medical College Rewa, Madhya Pradesh, India

Received: 08 May 2016
Accepted: 12 May 2016

***Correspondence:**
Dr. Pushpendra Kumar Shukla,
E-mail: pushpendra2507@gmail.com

ABSTRACT

Background: Fournier's gangrene is a life-threatening necrotizing fasciitis of the perineal, genital and perianal region, which leads to thrombosis of the small subcutaneous vessels and results in the development of gangrene of the overlying skin. The aim of this study was to analyze the clinical and epidemiological characteristics of the patients with FG, discuss the validity of FGSI for predicting the disease severity and patient survival.
Methods: This is prospective study carried out in department of surgery of our institution between July 2011 to June 2014.The data were evaluated about medical history, symptoms, physical examination findings, vital signs laboratory tests, total body surface area involved, timing and extent of surgical debridement, and antibiotic treatment used. All the patients had radical surgical debridement. The Fournier's gangrene severity Index was used in our study. This index calculates a score relating to the severity of the disease. The data were assessed according to whether the patient survived or died.
Results: Of the 57 patients studied, 13 died and 44 survived; the overall mortality was 22.8%. The survivors (mean age 57.78±11.16 years) were younger than the non-survivors (mean age 63.14±9.97 years) but it did not reach statistical significance (p=0.281). The median extent of the body surface area involved in the necrotizing process in patients who survive and did not survive was 2.8% and 4.8%, respectively (p=0.067). The abdominal wall involvement (22.72% vs 61.53% p=0.015) was associated with patient mortality. DM was most common comorbidity found in 24 (42.1%), most common predisposing factor is anorectal infection present in 21 (36.84%) patients. Mean FGSI score was increased in patients who died compared to survivors (8.14±5.87 vs 4.21±4.3) but this difference was not significant (p=0.126).
Conclusions: Fournier's gangrene is still a very severe disease with high mortality rates. The FGSI score did not predict the disease severity and the patient's survival. For its proper treatment a high diagnostic suspicion and early recognition, surgical treatment and aggressive antibiotic therapy are still necessary.

Keywords: Fournier's gangrene, Fournier's gangrene severity index, Mortality

INTRODUCTION

Fournier's gangrene (FG) is a life-threatening necrotizing fasciitis of the perineal, genital and perianal region, which leads to thrombosis of the small subcutaneous vessels and results in the development of gangrene of the overlying skin.[1] Fournier gangrene is a urological emergency that was first reported in 1764 by Baurienne, although it was not until 1883 that the French venereologist Jean Fournier described the clinical

characteristics of the disease in a series of 5 cases with no apparent cause.[2] He concluded that three findings characterize the syndrome: abrupt onset in a healthy young man, rapid progression, and the absence of a specific causative agent.[3,4] The process mainly affects males, and although it has a broad age range, mainly affects patients over the age of 50.[5] It often originates in the genitals and quickly spreads from Buck's fascia to subcutaneous tissues such as the scrotum, penis, perineum, and anterior abdominal fascia.[6,7] The most common bacteria are Enterobacteriaceae and anaerobic bacteria such as *Bacillus fragilis*. Early clinical symptoms include redness, swelling, heat, and pain, followed by progressive pain, fever, and other symptoms of systemic toxicity (e.g., septic shock).[6,8] Risk factors include diabetes mellitus (DM), chronic alcoholism, malignant neoplasms and HIV.[9]

Despite the development of knowledge regarding the etiology, diagnosis, treatment, and intensive care techniques, the mortality rate of FG is still approximately 50%.[3,10] In a study by Laor et al. effective important factors for survival or death were first described and then they created the Fournier's Gangrene Severity Index (FGSI) for predicting the severity of the disease.[11]

The aim of this study was to analyze the clinical and epidemiological characteristics of the patients with FG and discuss the validity of FGSI for predicting the disease severity and patient survival.

METHODS

This prospective analysis included data on 57 consecutive patients of fourniers gangrene admitted in Department of Surgery, Shyam Shah Medical College Rewa between July 2011 and June 2014. The diagnosis of FG was established clinically based on presenting history and physical examination, and supported by investigations in select cases. Patient demographic information, presenting symptoms, vital signs, physical examination findings, laboratory values and operative records were recorded and analyzed. The results of all biochemical, hematologic, and microbiologic tests were recorded. The criteria for the onset of the symptoms were fever >38 ◦C, scrotal erythema or swelling, purulence or wound discharge, and fluctuation or crepitus.

The extent of involvement total body surface area (TBSA), was calculated per nomograms routinely used to assess the extent of burn injuries. The penis, scrotum and perineum each accounted for 1% surface area, and each ischiorectal fossa 2.5%, respectively.[11]

Preoperatively all patients received supportive fluid resuscitation and were treated with broad spectrum parenteral antibiotics. All patients underwent immediate aggressive debridement, with resection of all necrotic skin, subcutaneous tissue, fascia and muscle until viable tissue was identified. Further antibiotics tailored according to culture and sensitivity report. Additional debridements were performed when necessary and the wounds were followed up for secondary healing.

The Fournier's gangrene severity index (FGSI) was created by modifying the acute physiology and chronic health evaluation II severity score (APACHE II) by Laor et al. in 1995, was used in our study.[11] The index was developed in an attempt to assign a numerical score that describes the severity of the FG. In the FGSI, nine parameters are measured, and the degree of deviation from normal is graded from 0 to 4. The individual values are summed to reach the FGSI score (FGSIS). These parameters are temperature, heart rate, respiratory rate, serum sodium, potassium, creatinine, and bicarbonate levels, hematocrit, and leukocyte count (Table 1). The data were assessed according to whether the patient survived or not.

Table 1: The Fournier's gangrene severity index (FGSI) score.

Physiological points	High abnormal value				Normal	Low abnormal value			
	+4	+3	+2	+1	0	+1	+2	+3	+4
Temperature (^{o}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	-	55-69	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 potasium (mmol/l)	>7	6-6.9	-	5.5-5.9	3.5-5.4	3-3.4	2.5-2.9	-	<2.5
Serum creatinine (mg%)	>3.5	2-3.4	1.5-1.9	-	0.6-1.4	-	<0.6	-	-
Hematocrit (%)	>60	-	50-59.9	46-49.9	30-45.9	-	20-29.9	-	<20
WBCs (/mm^3 X 1000	>40	-	20-39.9	15-19.9	3-14.9	-	1-2.9	-	<1
Serum bicarbonate (mmol/l)	>52	41-51.9	-	32-40.9	22-31.9	-	18-21.9	15-17.9	<15

Statistical analysis was performed with the Statistical Package for Social Science (SPSS) for Windows, version 8.0 software. A comparison of the mean age, mean presentation time, mean extent of the body surface area involved in the necrotizing process, and admission parameters between survivors and nonsurvivors were performed with the Mann-Whitney U test for continuous data and fisher exact test for categorical data.

RESULTS

Of the 57 patients studied, 13 died and 44 survived; the overall mortality was 22.8%. There were 54 men and 3 women with a mean age 59.57± 10.84 years (range 37 to 75). The survivors (mean age 57.78± 11.16 years) were younger than the non-survivors (mean age 63.14±9.97 years) but it did not reach statistical significance ($p = 0.281$). Mean time to presentation and definitive therapy was not significantly associated with mortality when comparing survivors and nonsurvivors (5.6±4.7vs6.1± 4.5, $p = 0.17$) (Table 2).

Table 2: Comparison of the patients' characteristics.

Patients characteristics	Survivors (n=44)	Non-survivors (n=13)	p Value
Age (Years)	57.78±11.6 (37-75)	63.14±9.97 (46-67)	0.28
TBSA (%)	2.8±0.97 (1.2-3.8)	4.8 ±0.9 (2.2-7.6)	0.067
Duration of symptoms (mean value in days)	4.28± 2.72 (1-10)	6.85±3.07 (3-12)	0.173
Diabetes Mallitus	17 (34.88%)	7 (53.84%)	0.356
Extension to abdominal wall	10 (22.72%)	8 (61.53%)	0.015
Anorectal Infection	14 (31.81%)	7 (53.84%)	0.195
Perineal Infection	11 (25%)	3 (23.07)	1.00

TBSA= Total Body Surface Area.

The mean extent of the body surface area involved in the necrotizing process in patients who survived and did not survive was 2.8% and 4.8%, respectively ($p= 0.0672$). The abdominal wall involvement (22.72% vs 61.53% $p = 0.015$) was associated with patient mortality. Patient comorbidities included diabetes mellitus (42.1%, 24 of 57), hypertension (29.82%, 17 of 57), obesity (26.13%, 15 of 57), chronic alcoholism (21.04%, 12 of 57), chronic obstructive pulmonary disease (10.52%, 6 of 68), and hepatic dysfunction (7.01%, 4 of 57). No significant differences in patient comorbidities were observed between survivors and nonsurvivors.

Predisposing factors were evaluated in these patients. Anorectal infection was most common found in 21 (36.84%) patients (14 survivors and 7 non survivors), 15(26.31%) patients presented with perineal infection (11survivors and 3 non survivors), 12 patients (21.05%) had history of urethral manipulation (9 survivors and 3 non survivors).

All patients in this study were treated with extensive surgical debridement, broad-spectrum antibiotics and topical wound care during admission. Thirty-one patients (54.38%) required reoperation, mainly in the first 96 hours. Colostomy was required in 6 (10.52%) of cases. Suprapubic cystostomy was also performed in 8 (14.03%) of patients and orchiectomy in 4 (7.01%) patients.

Table: 3 Comparision of FGSI parameters between survivors and non-survivors group (Value= Mean±Standard deviation (Median, Range).

Variables	Survivors	Non-survivors	P- value
Temperature (◦C)	38.55±0.654 (102, 68-126)	39.15±0.85 (39.2, 37.9-40.6)	0.1164
Heart rate (bpm)	101.5±17.71 (102, 68-126)	121±19.09 (124, 92-144)	0.0472
Respiratory rate (rpm)	21.92±4.73 (21, 14-30)	28±5.74 (27, 18-36)	0.0403
Serum sodium (mmol/l)	140.85±7.75 (140, 128-152)	141±9.23 (140, 126-155)	0.9124
Serum potassium (mmol/l)	4.33±0.81 (4.1, 3.2-5.9)	4.78±1.1 (3.1-6.2)	0.3897
Serum bicarbonate (mEq/l)	24.79±5.51 (23.6, 18.2-32.1)	21.16±4.2 (20.1, 17.6-27.2)	0.1556
Serum creatinine (mg/dl)	1.49±0.53 (1.4, 0.8-2.5)	2.12±0.97 (1.9, 0.9-3.5)	0.1472
Hematocrit (%)	38.62±5.49 (38.9, 30.1-47.2)	35.48±7.71 (35.6, 26-47.2)	0.3321
White blood count (10^3 cells/l)	15.92±6.6 (13.30, 6.4-29.20)	18.37±8.29 (18.2, 8.7-33.2)	0.4354
FGSI	4.21±4.33 (3.5, 0-12)	8.14±5.87 (5, 3-18)	0.1263

Bpm= beats per minute, rpm= rate per minute,
FGSI= Fournier's Gangrene Severity Index

In 51 of the 57 cases the cultures of the samples harvested during surgery were positive and in most of these cases (77.19%) 2 or more microorganisms were isolated. By groups, the most frequently isolated organisms were *Enterobacteriaceae* (56.86%), followed by anaerobic of any type (35.29%) and polymicrobial cultures without predominance of any particular microorganism (23.52%). The most frequently isolated species was *E. coli* (41.17%).

Mean FGSI score was increased in patients who died during the initial hospital stay compared to survivors (8.14±5.87 vs 4.21±4.3), but this difference was not significant p = 0.126). (Table 3) Comparing survivors and nonsurvivors isolated admission parameters associated with inpatient mortality included heart rate (101.5±17.71 vs 121±19.09 bpm, p= 0.047) and respiratory rate (21.92±4.73 vs 28±5.74, p-0.0403). Except heart rate and respiratory rate no significant differences were found between survivors and non-survivors in other FGSI parameters.

DISCUSSION

Fournier's gangrene is also described as dermo hypodermitis of the perineal, genital or perianal regions. The etiology of this disease has not been completely clarified.[3] In the present study, the mean age of our patients was 58.44yrs., consistent with the literature. In a study by Clayton et al, surviving patients were significantly younger than non-survivors.[12] This result was also confirmed by Laor et al.[11] In present study, significant difference in terms of age between the survivors and non-survivors was not noticed.

FG has a high mortality rate, (20-50%) in most contemporary series despite an increased knowledge of the etiology, diagnosis and treatment, and intensive-care techniques.[13] The high mortality is due to aggressive nature of the infection and the destructive effects of accompanying predisposing factors. Several factors affecting the mortality were studied such as increasing age, primary anorectal infections, existence of diabetes, delay in treatment, evidence of systemic sepsis at presentation, extent and depth of involvement, a low haematocrit, a high leukocytosis and blood urea nitrogen and many others.[3,13,14] In our series mortality rate was 22.8%.

A number of underlying systemic disorders have been identified frequently in the FG and, in some series, have been associated with mortality.[9,15,16] Among them, DM (20%-70%) is worth to mention. Most authors consider DM as a risk factor although there is some disagreement on whether it is associated with increased mortality. According to Nisbet, diabetes is a risk factor for the occurrence of FG, but does not affect the prognosis.[15] In contrast, Yanar et al found no increased mortality among diabetic patients.[16] In our series, diabetes is found as underlying pathology in 42.1% of patients, data that agrees with the literature, but has not been found significantly related to mortality.

The clinical presentation of the disease starts with a prodromal period of genital discomfort or pruritis, followed by genital erythema with or without crepitus and swelling of the scrotum, often associated with fever and pain. The gangrenous process will lead to drainage of the affected areas and demarcation between viable and dead tissue.[17] In present study most of the patients were admitted with complaint of erythema, perianal or scrotal swelling, serous discharge, pain, and fever (Figure 1, 2, 3). It is important to recognize, that patients in the early stages can present with minimal cutaneous manifestations of the underlying infection, making prompt diagnosis difficult. Several symptoms and signs should increase the index of suspicion for a necrotizing subcutaneous infection. For example, an apparent cellulitis that does not respond to appropriate antibiotic therapy should raise a suspicion of FG.[8]

Figure 1: Fournier's gangrene extending into thigh.

Figure 2: Fournier's gangrene with abdominal wall cellulitis.

FG begins as an area of infection adjacent to the portal of entry. The infection then progresses to a spreading inflammatory reaction that involves the deep fascial planes. There is a characteristic obliterative endarteritis causing cutaneous and subcutaneous vascular thrombosis and necrosis of tissue. This in turn allows the commensal flora to enter previously sterile areas. Tissue destruction then results from a combination of ischemia and the synergistic action of various bacteria.[8,18] In our study, the mean extent of the body surface area involved in the necrotizing process was lower in patients who survived than that in those who died but, we did not find a significant difference (p = 0.067).The studies by Laor et al and Clayton et al suggested that the extent of disease was not predictive of outcome. However, in a study by Spirnak et al a greater extent of the disease was associated with a greater mortality rate for patients who had more frequent operations.[10]

FG represents a polymicrobial infection, although not all implicated organisms are necessarily cultured in individual cases. Both aerobes and anaerobes are almost invariably present, but anaerobes are less frequently

isolated.[21] Blood cultures are usually negative. Overall, the most commonly isolated species are *Enterobacteriaceae, especially E. coli*, followed by *streptococcal species; Staphylococci, P. aeruginosa, Peptostreptococci. Bacteroides*, and clostridia are also frequently identified.[8,19] Paty and Smith[20] reported E. coli, *Bacteroides* and *streptococci* to be the most common organisms in FG. Laor et al[11] determined the most common organisms to be E. coli and Streptococcus species. In the present study *E.coli* was most common organism isolated in wound cultures from the patients. Chawla et al[21] stated that if the results of wound culture revealed viridans *streptococci*, the patients had a longer duration of hospital stay, but this was not significant in our study.

FG is a surgical emergency. Many patients may present with only minor skin lesions in the early stages of the disease. Previous reports have shown that delay in the first debridement of a necrotizing tissue infection worsens outcome.[22,23] Early admission, rapid diagnosis, and effective treatment are crucial components in achieving a successful outcome. Large incisions through the skin and subcutaneous tissues should be made, which must overpass affected areas until normal fascia are found.[1,23] Abundant washes of the debrided area are performed and the wound is left open. A combination of antibiotics targeting all three of the main bacterial groups must be used. Many studies have recommended the use of penicillin against streptococci, metronidazole for anaerobes, and third-generation cephalosporins against staphylococci and Enterobacteriaceae.[3,7] Aminoglycosides, clindamycin, and chloramphenicol are the antibiotics of choice until the results of culture sensitivity reports are obtained. If the presence of clostridia is suspected, intravenous penicillin G must be administered. A second surgical procedure, similar to that observed in our series, should be indicated, if there is persistence of areas affected by necrosis after 24-48 hours.

FGSI was created by Laor et al. in an attempt to assign a numerical score that describes the severity of the disease. This index includes nine metabolic and physiologic parameters. In their study, the mean FGSI scores for survivors and non-survivors were 6.9 and 13.5, respectively.[11] The difference was significant and the score in the non-survivors was correlated with the death rate. Also, they found that when an FGSI score of 9 was used as threshold parameter to predict the outcome, those with a score ≥ 9 had a 75% probability of death and an index score of ≤ 9 was associated with a 78% probability of survival. In our study, the median admission FGSI scores were 4.21 for survivors and 8.14 for those who died. The difference was not significant (p=0.126). In a study by Yeniyol et al the accuracy of this index was tested. They found that the duration of symptoms before presentation was statistically important.[17] Out of the nine parameters, temperature, heart rate and respiratory rate were considered to be the most important by these authors. In patients who died, however, all the parameters were abnormal. The authors also found that lower serum albumin and total protein levels indicated the degree of debilitation and a poor prognosis. Lin E, and others suggested that a FGSI cutoff of 9 was an excellent predictor of outcome of cases.[24] However, diagnosis, treatment and the arrest of the gangrene at an early stage markedly improve outcome. A study conducted by Tuncel et al on 20 Fournier's gangrene patients concluded that FGSI did not predict the disease severity and the patient survival.[14] We found disease extent beyond the perineum, heart rate and respiratory rate to be important prognostic findings. However, we did not find any comorbid conditions to be significantly associated with mortality. A new scoring system known as the Uludag FGSI (UFGSI) was proposed by Yilmazlar and others.[25] This score takes into account the age and the extent of disease, in addition to the routine FGSI. Although this score was thought to be more useful than the routine FGSI, a study by Roghmann and others concluded that although UFGSI contains more variables, but it is not more powerful than the FGSI proposed by Laor and others.[25,26]

CONCLUSION

Fournier's gangrene is still a very severe disease with a high mortality rate. In the present study, except for Heart rate and respiratory rate, no significant difference was found among the FGSI parameters between survivors and nonsurvivors at the time of admission. Furthermore, the extension of the disease to abdominal wall was significantly higher in the nonsurvivors. Our results indicate that FGSI did not reflect the disease severity and treatment outcome in our patients. For its proper treatment a high diagnostic suspicion and early recognition, surgical treatment and aggressive antibiotic therapy are still necessary.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the institutional ethics committee

REFERENCES

1. Smith GL, Bunker CB, Dinneen MD. Fournier's gangrene. Br J Urol. 1998;81:347-55.
2. Fournier A. Gangrènefoudroyante de la verge. Semaine Med. 1883;3:345-8.
3. Eke N. Fournier's gangrene: a review of 1726 cases. Br J Surg. 2000;87:718-28.
4. Kilic A, Aksoy Y, Kilic A. Fournier's gangrene: etiology, treatment, and complications. Ann Plast Surg. 2001;47:523-7.
5. Alonso AR, Perez Garcia MD, Nunez Lopez A, OjeaCalvo A, Alonso Rodrigo A, Rodriguez Iglesias B, et al. Fournier's gangrene: anatomo-clinical features in adults and children. Therapy update. Actas Urol Esp. 2000;24:294-306.

6. Saffle JR, Morris SE, Edelman L. Fournier's gangrene: management at a regional burn center. J Burn Care Res. 2008;29:196e203.
7. Saenz EV, Hernandez-Magro PM, Ovalle MV, Vega JM, Alvarez-Tostado FJF. Experience in management of Fournier's gangrene. Tech Coloproctol. 2002;6:5e13-11e13.
8. Tahmaz L, Erdemir F, Kibar Y, Cosar A, Yalcýn O. Fournier's gangrene: report of thirty cases and a review of the literature. Int J Urol. 2006;13:960e7.
9. Morpurgo E, Galandiuk S. Fournier's gangrene. Surg Clin North Am. 2002;82:1213-24.
10. Spirnak JP, Resnick MI, Hampel N. Fournier's gangrene: report of 20 patients. J Urol. 1984;131:289-92.
11. Laor E, Palmer LS, Tolia BM, Reid RE, Winter HI. Outcome prediction in patients with Fournier's gangrene. J Urol. 1995;154:89-92.
12. Clayton MD, Fowler JE, Sharifi R. Causes, presentation and survival of fifty-seven patients with necrotizing fasciitis of the male genitalia. Surg Gynecol Obstet 1990;170:49-53.
13. Morua AG, Lopez JA, Garcia JD, Montelongo RM, Guerra LS. Fournier's gangrene: our experience in 5 years, bibliographic review and assessment of the Fournier's gangrene severity index. Arch Esp Urol. 2009;62(7):532-40.
14. Tuncel A, Aydin O, Tekdogan U. 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.
15. Nisbet AA, Thompson IM. Impact of diabetes mellitus on the presentation and outcomes of Fournier's gangrene. Urology. 2002;60:775-9.
16. Yanar H, Taviloglu K, Ertekin C, Guloglu R, Zorba U, Cabiogl N et al. Fournier's gangrene: risk factors and strategies for management. World J Surg. 2006;30:1750-4.
17. Yeniyol 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.
18. Smith GL, Bunker CB, Dinneen MD. Fournier's gangrene. Br J Urol. 1998;81:347-55.
19. Laucks SS. Fournier's gangrene. Surg Clin North Am. 1994;74:1339-52.
20. Paty R, Smith AD. Gangrene and fournier's gangrene. Urol Clin North Am. 1992;19:149-62.
21. Chawla SN, Gallop C, Mydlo JH. Fournier's gangrene: an analysis of repeated surgical debridement. Eur Urol. 2003;43:572-5.
22. Baskin LS, Carrol PR, Cottolica EV. Necrotising soft tissue infections of the perineum and genitalia: bacteriology, treatment and risk assessment. Br J Urol. 1990;65:524.
23. Elliott DC, Kufera JA, Myers RAM. Necrotizing soft tissue infections: risk factors for mortality and strategies for management. Ann Surg. 1996;224:672-83.
24. Lin E, Yang S, Chiu AW, Chow YC, Chen M, Lin WC et al. Is Fournier's gangrene severity index useful for predicting outcome of Fournier's gangrene? Urol Int. 2005;75:119.
25. Yilmazlar T, Ozturk E, Ozguc H, Ercan I, Vuruskan H, Oktay B. Fournier's gangrene: an analysis of 80 patients and a novel scoring system. Tech Coloproctol. 2010;14(3):217-23.
26. Roghmann F, von Bodman C, Löppenberg B, Hinkel A, Palisaar J, Noldus J. Is there a need for the Fournier's gangrene severity index? Comparison of scoring systems for outcome prediction in patients with Fournier's gangrene. BJU Int. 2012;110(9):1359-65.

Cite this article as: Shukla PK, Ghanghoria A, Yedalwar V. Fournier's gangrene: a prospective study of 57 patients with special reference to validity of Fournier's gangrene severity index in predicting the outcome and mortality. Int Surg J 2016;3:1256-61.