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Evaluation and validation of Fournier gangrene severity index and additional mortality related risk factors in patients with Fournier's gangrene in tertiary care setup in Haryana

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ABSTRACT

Introduction: This study is performed to validate Fournier's gangrene severity index and evaluate the risk factors for predicting mortality in patients with Fournier's Gangrene and to evaluate the validity of FGSI scoring system in predicting mortality in FG patients as well as to evaluate additional risk factors/ parameters for predicting mortality in patient with FG.

Materials and Methods : This is a prospective observational study conducted in tertiary care hospital in Gurugram, Haryana under FMHS SGT HOSPITAL over the period of 18 months from January 2021 to Aug 2022. A total of 90 IPD patients with diagnosis of FG fulfilling the inclusion criteria were included in the study and divided in 2 groups of survivor and no survivor, to evaluate the validity of FGSI scoring system in predicting mortality in FG patients and additional risk factors/ parameters for predicting mortality in patient with FG.

Results: Out of all, 66 patients survived (73.33%), while 24 died (26.66%).The mean FGSI score was 4.67-3.44SD in patients who survived, and it was 9.82±5.20SD in patients who died. The difference in the mean FGSI score was found to be statistically significant by test (p=0.001) with higher scores among non-survivors. FGSI score of 9 or more 9 is associated with increased mortality which is highly statistically significant (p-value <0.001). Pain in the genital region was the commonest, which was seen in 69 (76.66%) patients. It was followed by swelling and discoloration in the genitalia, seen in 42(46.66%) and 32 (35.55%) patients respectively. The most common etiology of Fournier's gangrene was idiopathic in origin seen in 33.33% cases.

Conclusion: Fournier's gangrene has high mortality rate in elderly patients with comorbidities. Pain and swelling of genitalia are the two commonest presenting symptoms. Blackish discoloration, and ulceration with discharge are seen in patients presenting late. Disease is idiopathic in majority of patients. Common identifiable causes are ischiorectal/gluteal abscess, urogenital trauma, urinary tract infections and anorectal surgeries. Most common portal of entry of infection is penoscrotal. Anorectal and urogenital route and cutaneous route are other routes in decreasing order of frequency. FGSI is a valid tool for prognosis with increased risk of mortality at score more than 9 with a diagnostic accuracy of 83.3%.

1. Introduction

Necrotizing soft tissue infection was first described by hypocrite in 500BC, as one of the complication of erysipelas.[1] Necrotizing soft tissue infection are the poly microbial bacterial infection that involve fascia, skin, and subcutaneous tissue leading to conditions like cellulitis, fasciitis and myositis.[2] However, when Necrotizing soft tissue infection involves genitals and perineal regions the condition is known as Fournier gangrene.[3] Fournier's gangrene is type 1 necrotizing fasciitis cause by aerobic and anaerobic bacteria (most commonly Clostridium, Streptococcus (11%), E. Coli (33%), klebsiella, Proteus (5%), Staphylococcus aureus (22%)[4] that enter the perineum and scrotum and cause infections beneath the skin and fascia.[5]

Fournier's gangrene is prevalent in all age group it's incidence is more in males and increases with old age (>50 yrs.).[6,7] It is a highly fatal disease with a mortality rate of 88% (decrease by 25% in last 2 year and hence it is considered an urological emergency as the rate of tissue destruction is as fast as 2-3cm/hr.[8]

DM, HIV, poor hygiene, low socioeconomic status, malignancy and chronic alcoholism are the most common risk factor causing an increase susceptibility to develop Fournier's gangrene.[9]

The pro dromal symptoms of Fournier's gangrene are fever, penoscrotal pain, scrotal swelling and hyperemia and ecchymotic rashes with blisters characterized by dead fetid odour as a result of anaerobic infections the skin give a necrotic mottled appearance with bronze to black discoloration. Fournier's gangrene can lead to serious complication like sepsis and hemodynamic instability.[10]

Fournier's gangrene is clinically diagnosed by positive fingered test and greyish dish watered fluid following Incision and drainage of necrotizing tissue.[11] For early detection of NSTI triple diagnostic test is used that include incisional biopsy, fresh frozen section of gram staining of the area involved.[12]

The lab tests show the possibility of normocytic normochromic anaemia, low platelet count, Increase Total leukocyte count and increase serum creatinine.[13] CT(specificity=81%, sensitivity=100%), MRI (fat suppressed T2 weighted imaging) and USG (high diagnostic accuracy of 91.9%) are important diagnostic tools for investigating the above disease.[14]

Once the diagnosis of Fournier's gangrene is clinically estimated the immediate treatment is started which is broadly divided in 3 phases i.e. early resuscitation, surgical management and supportive treatment. For surgical management, the initial debridement is done as early as possible as studies done by Bilton et Al. showed a lower rate (4.1%) mortality in early debrided group as compared to 38% in delayed as well as inadequately debrided group. The supportive measures include adequate nutrition with vitamins and minerals supplement, chest physiotherapy, prevention of DVT and maintaining glycemic control.[15]

Various scoring system like USGSI (Uludag Fournier gangrene severity index) and FGSI (Fournier gangrene severity index) for predicting the risk factor of FG are used. High CCI, UFGSI and FGSI score (that is more than 9 for the predicting of mortality and high risk factor that are associated with mortality of FG.[4,16]

The scoring system and lab data like RDW, are liable predictors of mortality in patients with Fournier gangrene,[17] however there is still paucity of data/ lacunae in literature regarding the risk factors and the validation, usefulness of scoring system for predicting the mortality in patients with Fournier gangrene. This study is performed to validate Fournier's gangrene severity index and evaluate the risk factors for predicting mortality in patients with Fournier's Gangrene and to evaluate the validity of FGSI scoring system in predicting mortality in FG patients as well as to evaluate additional risk factors/ parameters for predicting mortality in patient with FG.

2. Materials and Methods

The study was conducted in tertiary care hospital in Gurugram, Haryana under FMHS SGT HOSPITAL over the period of 18 months from January 2021 to Aug 2022. A total of 90 IPD patients with diagnosis of FG fulfilling the inclusion criteria were included in the study.

2.1. Inclusion criteria

1. >12 years of age
2. Patient diagnosed with FG

2.2. Exclusion criteria

1. Patient present with < 12 years of age.
2. Necrotizing fasciitis not involving perineum, perianal and genital regions.

2.3. Type of study

It is a prospective observational study.

2.4. Duration of study

18 Months.

2.5. Sample size

According to a study by Orhan Ureynot et.al the sensitivity and specificity of FGSI scoring was 100% and 73.9% respectively for predicting mortality. The total sample size was taken 90 keeping in mind these value as reference. (desired precision of 15%), 80% power of study and 5%

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level of significance

2.6. Methodology

90 patients fulfilling the inclusion criteria with clinical features suggestive of Fournier's gangrene (pain, erythema, swelling, crepitation, ischemic changes of skin involved at perianal, perineal and genital area presenting in OPD and IPD or surgical emergency in tertiary care hospital were included in the study. After admission a detailed clinical study including the history of patients were recorded (Demography, symptoms, onset and duration past medical history of chronic diseases and infections, medication or surgical intervention, History of smoking, alcohol and personal hygiene etc.

The comorbidities were recorded and scored using Chanset's Comorbidities Scoring System, the clinical examination was done which included glass glow coma scale, PR, RR hydration status, arterial pressure, PICCLE. A thorough local examination of perineum, scrotum, penis and gluteal region abdominal wall, rectum and other system were also done.

Assessment of extent of disease:- The extent of disease was calculated for each patient based kn modified body surface area as monograms used routinely for burns injury by palmer et all(scrotum body perineum is 1% and ischiorectal area accounts for 2.5%) and Yilmizlar et al who divided extent of disease into 3 grades on the basis of surgical findings and statistical difference in terms of mortality.

Grade 1: Perianal, perineal and penis, scrotum, vulva.

Grade 2: Grade 1+ pubic to thigh to pelvic

Grade 3: Extent beyond pelvis

Investigation: Blood for ABG and laboratory investigations as mentioned above was collected.

Assessment of FGSI score: To calculate it, 9 parameters were used i.e.Pulse rate, Respiratory rate, temperature, hematocrit, total leukocyte count, serum sodium, serum potassium, serum creatinine, serum bicarbonate

Assessment of additional risk factors/ parameters: To assess additional risk factors blood was also tested for serum albumin, serum calcium, serum magnesium, alkaline phosphatase, total cholesterol, random bled sugar C reactive protein, haemoglobin percentage, differential leukocyte count, platelet count, inacetate dehydrogenase (I.DIT), and Serum lactate. All these investigations were performed at the time of admission and/ or after first debridement as some of the investigations were not available in this institution at emergency department (LDH, serum albumin, Serum calcium)

Management of Fournier's gangrene: Immediately on admission, all patients were adequately resuscitated. Following resuscitation, broad spectrum injectable antibiotics were started. For haemodynamically stable patients, amoxicillin, aminoglycoside (amikacin) and metronidazole combination were administered. For haemodynamically unstable patients, piperacillin minoglycoside, metronidazole and clindamycin were administered. For diabetic patients, combination of linezolid plus clindamycin were administered. Patients were subjected to thorough debridement under general anaesthesia after optimization. The debrided tissue was sent for culture and sensitivity. Urinary diversion was done when necessary. Associated comorbidities like diabetes, deranged renal & hepatic functions were taken care of as per pre-existing institutional guidelines or as advised by respected specialists. Antibiotic was changed as per culture sensitivity reports. The wound was periodically examined and chemical debridement was done and would was irrigated with hydrogen peroxide followed by normal saline. Daily sitz bath was given. Surgical debridement under appropriate anaesthesia as per requirement until all necrotic and devitalized tissues were removed completely. Vacuum assisted suction (VAC) dressing was applied in large wounds after complete debridement.

Then silver colloid dressing was applied once the wound bed became free of any devitalized tissues. In addition to local wound therapy nutritional supplementation was started with high protein diet and other micronutrients. All patients who were devoid of any life support, were ambulated early with chest physiotherapy (incentive spirometry, steamy inhalation, nebulization).

Discharge and follow up of patients: Patients were considered for discharge only when wound showed evidence of healthy granulation tissue, culture from the wound was sterile, and was ready for plastic coverage of wound or likely to heal spontaneously without need of graft. Patient were followed during hospital stay (survivors) or till death during hospital stay (non survivors)

Observation and results:-Data of all patient were entered into excel sheet to prepare a master chart and following observations were made and analysis done.

1. Number of survivors (patients discharged with healthy wound) and number of non survivors (succumbed to death due to Fournier's gangrene).
2. FGSI scores in Survivors and Non-Survivors.
3. Positive and negative predictive value of FGSI for mortality.
4. Analysis of additional risk factors/ parameters for mortality besides FGSI.

2.7. Statistical analysis

The data was entered in MS EXCEL, spreadsheet and analysis was done using Statistical Package for Social Sciences (SPSS) version 21.0. Categorical variables were presented in number and percentage (%) and continuous variables were presented as mean ‡SD and median, Normality of data was tested by Kolmogorov-Smirnov test.

If the normality was rejected then non parametric test was used.

2.7.1. Statistical tests were applied as follows

Quantitative variables were compared using Unpaired t-test/Mann-Whitney Test (when the data sets were not normally distributed) between survivors and non survivors. Qualitative variables were compared using Chi-Square test /Fisher's exact test. Receiver operating characteristic curve was used to find out cut off point of FGSI for predicting mortality and comparison of AUC of both scores will be performed. Diagnostic test was used to calculate sensitivity, specificity, NPV and PPV and agreement statistic was used to assess reliability of two scoring system. Univariate and multivariate logistic regression was used to find out significant risk factors of mortality. A p value of <0.05 was considered statistically significant.

2.8. Analysis plan

The data were collected properly and entries were made. Numeric data are presented as mean±SD Simple mathematical expressions like percentage was also used. Statistical analyses were performed using statistical package for social science (SPSS) software, latest version. Sensitivity, specificity. positive predictive value (PPV) and negative predictive values (NPV) were calculated.

2.8.1. Quality assurance

Quality Assurance was ensured at each and every step. Patients were enrolled in unbiased fashion.

2.8.2. Ethical considerations

The institutional ethics committee's approval for research on human subject was taken. Throughout the study strict ethical norms were maintained. Written informed consentwas taken from patients in their local language (mother tongue).

3. Results

A total of 90 patients diagnosed with Fournier gangrene were analyzed in a period of 1 year in the General Surgery ward of SGT Medical College and Hospital, Gurugram, Haryana, India. Out of this, majority of the patients (43.33%) were in the age group of 41-60 years, followed by the age groups of 61-80 years (30%) and 21-40 (23.33%) years respectively. The patients were analyzed and followed up and on the basis of final outcome, the patients were divided into 2 groups i.e. survivors and non survivors. Out of all, 66 patients survived (73.33%) while 24 died (26.66%). The youngest patient among the survivor group was 22 years old and the oldest one was 81 years old. The mean age of survivor groups was 46.5±14.59SD. The youngest patient in non-survivor group was 41 years and the oldest was 74 years with mean age of patients being 61.52±9.36SD.

There were various clinical presentation among the patients. Pain in the genital region was the commonest, that was seen in 69 (76.66%) patients. It was followed by swelling and discoloration in the genitalia, seen in 42(46.66%) and 32 (35.55%) patients respectively.

Fever was present in 12.22% patients. Redness and ulceration was only presented in 5.5% and 4.4% patients respectively. 3 patients showed involvement of abdominal wall as an extension of disease. The duration of symptoms ranged from 2 to 30 days with majority presenting with duration of 7 to 14 days (56.66%) patients. The mean duration of symptoms at presentation among survivor group and non-survivor group was 8.21±4-5SD days and 7.92±3.86SD days respectively. No statistical significant relation was found between duration of symptoms and mortality (P value 0.7222).

The most common etiology of Fournier's gangrene was idiopathic in origin seen in 33.33% cases. Ischiorectal, scrotal, perineal abscesses accounted for 28.88% cases, while trauma to urethra and testis itself was responsible for 16.66% cases. Remaining 8 to 10% cases resulted from poor hygiene, lower limb gangrene, UTI, hemorrhoid excision, abscess drainage and excision. In the non-survivor group, idiopathic origin was the most common cause (14.44%) whereas, in the survivor group ischiorectal or gluteal abscess was the most common (21.11%). There was not much difference observed among the other causes and risk factors in the 2 groups. In our study the most common portal of entry of infection was through penoscrotal route (41.44%). It was followed by anorectal and urogenital route seen in 44.44% and 20% cases respectively. The most common route among the survivor group was anorectal (23.33%) and in non-survivor group was penoscrotal that was seen in 20% cases. It showed statistically significant relation between portal of entry of infection and mortality (P value 0.004). 67% of patients involved only 5% Body surface area while 26% patients involved 5 to 10% of the total body surface area. Only 7% had >10% involvement of the total body surface area. The mean body surface area involvement in survival and non-survival group were 4.63±4.32SD % and 3.94±2.7SD % respectively. There was no statistically significant relation between the percentage of body surface area involved and mortality (P value 0.77). Our study also involved various clinical and laboratory parameters including the Glass Glow Coma Scale, pulse rate , respiratory rate, extent of disease score, need of ventilator, urinary diversion at the time of treatment. 65.5% of the survivor group had a glass glow coma scale >14 while only 6% of the non-survivor group had a glass glow coma scale of >14. The mortality was higher in patient with low glass glow coma scale and was found to be statistically significant (P value 0.001). The mean pulse rate and respiratory rate in survivor and non-survivor group were 96.32±9.58SD %

and 112.41±12.6. 84SD % patients of the survival group had respiratory rate between 12-14 and only 15% had it in non-survivor group 15.25% patients were in the need of ventilator support. The average number of debridement was 3.3±0.3SD. The maximum patients of the survivor and non-survivor group had only 1-2 debridement in our study.

Data was entered in the master chart for calculation of FGSI score. Minimum score recorded was 0 and maximum score was 16 out of 36 total score. The score was calculated for all the patients and comparative analysis was done to validate the score and predicting the mortality rate. Mean FGSI score was 4.67-3.44SD in patients who survived and it was 9.82±5.20SD in patient who died. The difference in the mean FGSI score was found to be statistically significant by test (p=0.001) with higher score among non survivors. Forward logistic regression analysis was done to find out cut-off score to predict mortality. FGSI score of 9 or more than 9 is associated with increased mortality which is highly statistically significant (p-value <0.001). Overall sensitivity of this score was found to be 70.6% and specificity of 88.4%. The positive and negative predictive value of the cut-off score was 70.6% and 88.4% respectively with a diagnostic accuracy of 83.3%. The ventilator support on admission was required in 15.25% while 45.75% did not require any ventilator support. There was no of urinary diversion or additional procedure in 86% of cases.

Table 1: Age distribution

Age	No of patients	Percentage
21-40	21	23.33%
41-60	39	43.33%
61-80	27	30.0%
>80	3	3.33%

Table 2: Distribution of patients according to outcome

Outcome of the disease	No. of patients	Percentage
survivors	66	73.33%
Non Survivors	24	26.66%

Table 3: Clinical presentation

Symptoms	No of patients	Percentage
Pain	69	76.66%
Redness	5	5.55%
Swelling	42	46.66%
Fever	11	12.22%
Purulent discharge	27	30.0%
Discoloration	32	35.55%
Ulceration	4	4.44%
Involvement of abdominal wall	3	3.33%

Table 4: Duration of the symptoms

Duration	No of patients	Percentage
<7days	24	26.66%
7-14 days	51	56.66%
15-28 days	15	16.66%

Table 5: Duration of symptoms between survivors and non survivors

Duration	Survivors	Non survivors
Mean±SD	8.21±5.45	7.92 ±3.86
Min-Max	2-30	3-16
Median (iqr)	7	8

Table 6: Etiology and risk factors

Risk factor and etiology	Survivors (%)	Non survivors (%)	
Trauma	11(12.22%)	4 (4.44%)	15(16.66%)
Ischeorectal /gluteal abscess	19 (21.11%)	1 (1.11%)	20(22.22%)
Scrotal/ perineal abscess	3 (3.33%)	3(3.33%)	6(6.66%)
Epididymo orchitis/uti	9 (10%(	2 (2.22%)	11(12.22%)
Poor hygiene	5 (5.55%)	1 (1.11%)	6(6.66%)
Lower limb gangrene	2 (2.22%)	0	2(2.22%)
Idiopathic	17 (18.88%)	13 (14.44%)	30(33.33%)
Total	66 (73.33%)	24 (26.66%)	90

Table 7: Relation between portal of entry of infection and mortality

Portal of entry	Survivors (%)	Non survivors (%)	
Penoscrotal	19 (21.11%)	18 (20%)	37(41.11%)
Urinogential	15 (16.66%)	3(3.33%)	18(20.00%)
Cutaneous	11 (11.22%)	2 (2.22%)	13(14.44%)
Anorectum	21 (23.33%)	1 (1.11%)	22(24.44%)
Total	66	24	

Table 8: Total body surface area involved

0-5	67%
5-10	26%
10-15	5%
15-30	2%

Table 9: Clinical and laboratory parameters :- Glassgow coma scale

GCS	Survivor	Non survivor	
>14	59 (65.55%)	6 (6.66%)	65(72.22%)
<=14	7 (7.77%)	18 (20%)	25
Total	66	24	

Table 10: Pulse rate

	Survivors	Non survivors
Pulse rate	96.32±9.58	112.41±12.6 P<0.001

Table 11: Respiratory rate

Respiratory rate	Survivors (%)	Non survivors (%)
12-24	76 (84.44%)	14 (15.55%)
25-34	13 (14.44%)	10 (11.11%)

Table 12: Extent of disease

Extent of disease	Survivors	Non survivors
1	39 (43.33%)	12 (13.33%)
2	15 (16.66%)	7 (7.77%)
6	12 (13.33%)	5 (5.55%)
Total	66	24

Table 13: No of debribement

No of debridement	Survivors	Non survivors
0	2	1
1	38	8
2	18	5
3	5	3
4	2	6
8	1	1
Total	66	24
Fgsi score	**Survivors**	**Non survivors**
Mean±SD	4.58±3.44	9.78±5.20
Min-Max	0-11	2-16
Median	4	9 p<0.001
Fgsi score	Survivors	Non survivors
<9	56	10
>=9	10	14

Table 14: Duration of hospital stay

	Survivor	%	Non survivor	%	
Upto 1 day	5	5.55%	6	6.66%	11
2-6 days	29	32.22%	12	13.33%	41(45.5%)
>6days	32	35.55%	6	6.66%	38(42.22%)
Total	66		24		

4. Discussion

This prospective observational study was conducted in the Department of General Surgery, FMHS,SGT UNIVERSITY, HARYANA,INDIA. A total of 90 patients were included in the study diagnosed with Fournier's gangrene on the basis of clinical signs and symptoms and signs whob presented in emergency or OPD. On the basis of outcome the patients were divided into 2 groups i.e. survivors and non survivors. 66 patients belonged to the survivor group whereas 24 patients were belong to non survivors group Eliahu Laor, Lane S Palmer et al's study showed the outcome prediction rate that is the mortality rate of 43.3%,[18] while Faruk Pehlivanl and Oktay Aydin observed the mortality rate in fournier gangrene as 21.7%.[19] Minhahn et al showed a similar mortality rate in Fournier's gangrene 28%.[20] The age distribution of patients in our study ranged from 22-81 years with the mean age of 53.35±11.4 SD. This result is similar to the study by Atilla Aridogan where the mean age was 61.3 years with a range between 36-92 years.[5] Pain was the most common presenting symptom in our study [76.6%], followed by swelling in the genitalia 46.66%. The result is similar to the case series and observation made by Ferreira et al, where scrotal pain swelling and fever were the most common presentations.[10]

According to Ersay Et al, tachycardia (61.4%) and pain (78.6%) were the most common presenting symptom.[21] In this study around 24 patients presented with a duration of symptoms <7 days (56.66%). The majority had a duration of 7 to 14 days. Toru Sugihara in their study also concluded that early intervention i.e. within 2 days of onset of symptoms was associated with a lower mortality rate,[22] however in our study there was no statistical significant correlation found between duration of symptoms and mortality rate. Out of our 90 patients idiopathic causes and ischiorectal or gluteal abscess was the most common etiological and risk factor that was observed to be present in 33.33% and 22.22% cases respectively. Trauma was the 3rd most common cause. The correlation between etiological factors and mortality was not significant (p value 0.076). El Bachir Benjellon Et al observed anorectal pathway to be the most common portal of entry of infection and mortality.[23] This result is not similar to our study where we observed penoscrotal route to be the most common portal of entry for infections (41.11%) and anorectal route still remain the most common portal of entry in the survival group (23.33%). In our study 67% patient had less than 5% of total body surface area (BSA)involvement and Henrique Morais Et alin's study showed that an addition of BSA >3.25% to FGSI can lead to an improvement of FGSI score. In clinical parameters we observed that 72.22% patients has Glass Glow Coma Scale of > 14. It was statistically significant with mortality (P value <0.001) as 65.55% of the survivor group had GCS >14, while the maximum no. Of non survivors had GCS <14. Pulse rate was also the important parameter for the FGSI score in our study ,tachycardia of more than 110 was associated with mortality (p value<0.001). A significant correlation were found between respiratory rate and mortality (P value 0.001). Ureyen O ETAL did not find a positive correlation between extend of disease which is similar to our study.[24]

By multivariate analysis, few other additional independent parameters were found to be associated

with mortality. These were, Haemoglobin %, serum total calcium, serum albumin, serum ALP, CRP, total cholesterol, LDH, serum magnesium and platelet to lymphocyte ratio.

Altug Tuncel et al, in their study related Hb% to mortality. In their study at admission, Hb% was 10.5+1.2SD gm/dl was associated with mortality. In our study that mean was 8.64=1.93. Sang Un Yim et al also showed that less NLR and PLR were associated with mortality more than FGSL.[25–27] Tissue cultural characteristic of wound of Fournier's gangrene showed that out of 90 patients 55 (61.11%) had polymicrobial culture. 18 (20%) patients had monomicrobial culture. 9 patients (10%) had no growth while 2 patients had inadequate sample. Among 90 patients, 55 had Escherichia coli, 18 had klebsiella sp., 15 had enterococcus sp. Acinetobacter sp., Pseudomonas sp., Proteus sp, was found in culture with frequency of 4 in each group. Among monomicrobial wound most commonly found organism was MRSA, in 6 patients. Gram (+) cocci in cluster and gram (+).

Bulent O Erol et in their study showed that polymicrobial infection was identified in 28.57% of patients. The same study showed, most commonly isolated organisms from the wound were Escherichia coli (33.3%). Marc A et al in 2013 did a study on causative pathogen and showed, in 83% of patient the culture was polymicrobial. Most common pathogen isolated was Bacteroides sp. in 43.9%, Escherichia coli was detected in 36.6%.[4]

5. Fournier's Gangrene Severity Index

In our study, FGSI had sensitivity of 70.6% and specificity of 88.4%. A score more than or equals to 9 in predicting mortality. Diagnostic accuracy was 83.3%.Laor et al first described that scoring system. With the initial evaluation there were 75% probability of death with score>9.[28] Hari Gopal Vyas et al found FGSI mean of 10+0.89 at admission was associated with increased mortality, with a threshold value of more than 8.[18,28]

6. Conclusion

Finally from our study we conclude that Fournier's gangrene has high mortality rate in elderly patients with comorbidities. Pain and swelling of genitalia are the two commonest presenting symptoms. Blackish discoloration, and ulceration with discharge are seen in patients presenting late. Disease is idiopathic in majority of patients. Common identifiable causes are ischiorectal/gluteal abscess, urogenital trauma, urinary tract infections and anorectal surgeries. Most common portal of entry of infection is penoscrotal. Anorectal and urogenital route and cutaneous route are other routes in decreasing order of frequency. GCS, Haemoglobin, serum albumin, serum total calcium, serum alkaline phosphatase, C-reactive proten, total cholesterol, LDH, serum magnesium and platelet to lymphocyte ratio are independent risk factors for mortality in patients with Fournier's gangrene. FGSI is a valid tool for prognosis with increased risk of mortality at score more than 9 with a diagnostic accuracy of 83.3%.

7. Ethical Clearance

Ethical Clearance has been taken from institutional ethical committee, Department of surgery , Faculty of medicine and health, SGT University, Haryana (SGTU/FMHS/Gen Surgery/23/449)

8. Patients Consent

Informed consent has been taken from the patients involved

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References

1. Deschamps V, Aitken J, Lee MG. Hippocrates on necrotising fasciitis. *Lancet*. 1994;;344(8921):556. doi:10.1016/s0140-6736(94)91956-9.
2. Trent JT, Kirsner RS. Diagnosing necrotizing fasciitis. *Adv Skin Wound Care*. 2002;15(3):135–8.
3. Fournier JA. Gangrène foudroyante de la verge. *Medicine Pratique*. 1883;4:589–7.
4. Erol B, Tuncel A, Hanci V, Tokgoz H, Yildiz A, Akduman B, et al. Fournier's gangrene: Overview of prognostic factors and definition of new prognostic parameter. *Urology*. 2010;75(5):1193–8.
5. Andogan LA, Izol V, Abat D, Karsli O, Bayazit Y, Satar N, et al. Epidemiological characteristics of Fournier's gangrene: a report of 71 patients. *Urol Int*. 2012;89(4):457–61.
6. Smith GL, Bunker CB, Dinneen MD. Foumier's gangrene. *Br J Urol*. 1998;81(3):347–55.
7. Czymek R, Frank P, Limmer S, Schmidt A, Jungbluth T, Roblick U, et al. Fournier's gangrene: is the female gender a risk factor? *Langenbecks Arch Surg*. 2010;395(2):173–80.
8. Roghman F, Bodman CV, Loppenberg B, Hinkel A, Palisaar J, Noldus J, et al. Is there a need for the Fournier's gangrene severity index? Comparson of scoring systems for outcome prediction in patients with Fournier' s gangrene. *BJU Int*. 2012;110(9):1359–65.
9. Slater DM, Smith GT, Mundu K. Diabetes mellitus with keto-acidosis presenting as Fourier's gangrene. *J Roy Soc Med*. 1982;75(7):530–2.

10. Ferreira PC, Reis JC, Amarante JM, Silva A, Pinho CJ, Oliveira IC, et al. Fournier's gangrene: a review of 43 reconstructive cases. *Plast Reconstr Surg*. 2007;119(1):175–84.
11. Andreasen TJ, Green SD, Childers BJ. Massive infectious soft-tissue injury: diagnosis and management of necrotizing fascitis and purpura fulminans. *Plast Reconstr Surg*. 2001;107(4):1025–35.
12. Sartelli M, Gurao X, Hardcastle TC, Kluger Y, Boermeester MA, Raşa K, et al. WSES/SIS-E consensus conference recommendations for the management of skin and soft-tissue infections. *World J Emerg Surg*. 2018;13:58. doi:10.1186/s13017-018-0219-9.
13. Bechar J, Sepehripour S, Hardwicke J, Filobbos G. Laboratory risk indicator for necrotising fascitis (LRINEC) score for the assessment of early necrotising fasciitis: a systematic review of the literature. *Ann R Coll Surg Engl*. 2017;99(5):341–6.
14. Yen ZS, Wang HP, Ma HM, Chen SC, Chen WJ. Ultrasonographic screening of clinically-suspected necrotizing fasciitis. *Acad Emerg Med*. 2002;9(12):1448–51.
15. Bilton BD, Zibari GB, Mcmillan RW, Aultman DF, Dunn G, Mcdonald JC, et al. Aggressive surgical management of necrotizing fascitis serves to decrease mortality: a retrospective study. *Am Surg*. 1998;64(5):397–400.
16. Yilmazlar T, Ozturk E, Ozguc H, Ercan I, Vuruskan H, Oktay B, et al. Fournier's gangrene an analysIS of 80 patients and a novel scoring system. *Tech Coloproctol*. 2010;14(3):217–23.
17. Karaali C, Salimoglu S, Emiroglu M, Budak GG, Calik B, Aydin C. Is it possible to estimate the mortality rate of Fournier Gangrene with new parameters? *J Kuwait Med Assoc*. 2019;.
18. Laor E, Palmer LS, Tolia BM, Reid RE, Winter H. Outcome prediction in patients with Fournier's gangrene. *J Urol*. 1995;154(1):89–92.
19. Pehlivanl F, Aydin O. Factors Affecting Mortality in Fournier Gangrene: A Single Center Experience. *Surg Infect*. 2018;19:1–5.
20. Hahn HM, Jeong KS, Park DH, Park M, Lee J. Analysis of prognostic factors affecting poor outeomes in 41 cases of Fourmier gangrene. *Ann Surg Treat Res*. 2018;95(6):324–32.
21. Ersay AG, Yilmaz Y, Akgun Y, Celik Y. Factors affecting fournier's gangrene: review of 70 patients. *ANZ J Surg*. 2007;77(1-2):43–8.
22. Sugihara T, Yasunaga H, Horiguchi H, Fujimura T, Ohe K, Matsuda S, et al. Impact of surgical intervention timing on the case fatality rate for Fournier's gangrene: an analysis of 379 cases. *BJU Int*. 2012;110(11 Pt C):1096–100.
23. Benjelloun EB, Souiki T, Yakla N, Ousadden A, Mazaz K, Louchi A, et al. Fournier's gangrene: Our experience with 50 patients and analysis of factors affecting mortality. *World J Emerg Surg*. 2013;8(1):13. doi:10.1186/1749-7922-8-13.
24. Ureyen O, Acar A, Gokcelli U, Atahan MK, Ilhan E. Usefulness of FGSI and OrUsi scoring systems for predicting mortality in patients with Fournier's gangrene: A multicenter study. *Ulus Travma Acil Cerrahi Derg*. 2017;23(5):389–94.
25. Tuncel A, Keten T, Aslan Y, Kayali M, Erkan A, Koseoglu E, et al. Comparison of different scoring systems for outcome prediction in patients with Fournier's gangrene: Experience with 50 patients. *Scand J Urol*. 2014;48(4):393–9.
26. Yim S, Kim SW, Ahn JH, Cho YH, Chung H, Hwang EC, et al. Neutrophil to Lymphocyte and Platelet to Lymphocyte Ratios Are More Effective than the Fournier's Gangrene Severity Index for Predicting Poor Prognosis in Fournier's Gangrene. *Surg Infect (Larchmt)*. 2016;17(2):217–23.
27. Baskin LS, Caroll PR, Cattolica EV, Mcaninch JW. Necrotising soft tissue infections of the perineum and genitalia. Bacteriology, treatment and risk assessment. *Br J Urol*. 1990;65(5):524–9.
28. Vyas HG, Kumar A, Bhandari V, Kumar N, Jain A, Kumar R, et al. Prospective evaluation of isk factors for mortality in patients of Fournier's gangrene: A single center experience. *Indian J Urol*. 2013;29(3):161–5.

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