

Original Article: Narayan's Grading of Fournier's Gangrene

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Abstract: *Aim:* Fournier's gangrene is a fulminating form of infective necrotizing fasciitis of the perineal, genital or perianal regions which commonly affects men but can also occur in women and children. Case series have shown a mortality rate of 20% to 40% with an incidence of as high as 88% in some reports. This study was aimed to share my experience in the management of Fournier's gangrene and to identify the risk factors that affect mortality with a Grading system introduced.

Method : The retrospective study was done on 64 patients with Fournier's gangrene who presented in Nalanda Medical College and Hospital and Anupama Nursing Home from January 2001 to December 2012 and hospital records were reviewed and analyzed for the outcome and identify the risk factors and prognostic indicators of mortality. Data extracted were age, sex, hospital stay, pre morbid diseases, morbidity, mortality, laboratory investigation and treatment protocol carried out in surgical set-up of a Tertiary University Hospital at Patna, Bihar and Surgical super facility Pvt. Hospital in Patna.

Result: 64 patients comprised 57 males and 7 females with a mean age of 57.5 years. The mean duration of hospitalization was 26.9 days. Overall mortality was 24.8%. Diabetes Mellitus(41.7%), hypertension (32.1%) chronic liver disease, chronic renal insufficiency and Body Mass index of > 30 were five leading risk factors. The most common isolated pathogens were Escherichia Coli 57.1% and Klebsiella 33.8%. Narayan Grade II presentation seen in 37.52% and Grade III in 26.56% Major complications of Fournier's Gangrene were respiratory failure, renal failure, septic shock, hepatic failure and disseminated intravascular coagulopathy.

Conclusion: Fournier's gangrene is a rapidly progressive, fulminant poly microbial synergistic infection of the perineum and genitals. Early diagnosis, intensive medical care, aggressive resuscitation and broad spectrum antibiotics, prompt and repeated surgical intervention are the mainstays of treatment. Higher Grades involvement was associated with high mortality. Patients with co morbid condition, serious infection and major complications should be treated carefully and aggressively.

Keywords: Fournier's gangrene, Necrotizing fasciitis, Mortality, Outcome.

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I. Introduction

Fournier's gangrene (FG) is a fulminant necrotizing fasciitis of the genital, perianal and perianal region was first reported by Baurienne in 1764 [1]. A French dermatologist and venereologist, Jean Alfred Fournier gave this infectious disease its eponymous name in 1883 [2]. He first described idiopathic rapidly progressive necrotizing gangrene of the male genitalia in 1883 and emphasized three characteristics; abrupt onset of scrotal pain and swelling in a healthy young man, rapidly progression to gangrene and the absence of a definitive cause. FG is a polymicrobial synergistic infection caused by aerobic, anaerobic, gram positive and gram negative bacteria, yeast and sometimes mycobacteria [3] [4] The course of infection is identifiable in 95% of cases, mainly arising from anorectal, genitourinary and cutaneous sources.[5][6] The mortality rate of FG is high 20-50% with increased mean age of the population and patients on increased prevalence of diabetes and immunosuppressive therapy, genitourinary and cutaneous infection [7]. Predisposing factors such as diabetes and immune suppression lead to vascular disease and suppressed immunity that increase susceptibility to polymicrobial infection. Diagnosis is based on clinical signs and physical examination. Dissemination of the disease reflects the aggressiveness of the degree of patient's immune suppression. Several reports evaluate the usefulness of Fournier's Gangrene [8] [9] [10]. Aggressive team work with a multidisciplinary approach, early diagnosis, aggressive resuscitation of the patients, administration of broad spectrum antibiotics and aggressive radical surgical debridement are the key to successful treatment. [11] [12][13] [14] Several reports evaluate the usefulness of Fournier's Gangrene Severity Index (FGSI) as a good predicting tool for outcome of the disease [15] [16].

II. Materials And Methods

The medical records of 64 patients admitted in Nalanda Medical College Hospital, Patna and Anupama Nursing Home, Patna with a diagnosis of Fournier's Gangrene during the 10 years period between January 2001 and December 2012 were retrospectively reviewed. The inclusion criteria included patients undergoing wide surgical excision of scrotal and/or perineal necrosis along with other involved areas with a postoperative diagnosis of Fournier's Gangrene. Excluded were patients who had a local superficial inflammation of the perineal or urogenital regions. Mortality was defined as disease-related death during the hospital stay and survival was measured in days. The prognostic variables used in the outcome analysis were patient's age, female gender, history of diabetes, the interval between the onset of symptoms and the initial debridement, renal failure need for postoperative mechanical ventilation and occurrence of septic shock. The correlation of prognostic variables and mortality were studied by univariate analysis using chi-squared test. The study was performed according to the declaration of Helsinki. Extracted data were analyzed using SPSS 10.01.

III. Results

There was male preponderance with Male: Female ratio of 8.14:1. The mean age of patients was 57.5 years (range 38 years -80 years). The patients had a mean hospital stay of 26.9 days. The most common symptoms at the time of admission were deterioration of the general state 48% perineal necrosis 90%, fever 52% perineal or genital pain 72% septic shock 20%. The average time of symptoms prior to refer for treatment was 13 days, ranging from 4 to 28 days. Complete blood count showed the presence of leucocytosis ($>10,000\text{mm}^3$) in 48 patients. Renal failure on admission was higher amongst the patient who died when compared to the survival group ($P < 0.001$). FG was confined to the perianal area in 12%, affecting the scrotum in 74% and extended to the abdominal wall in 14%. It was found that the extension of the infection to the abdominal wall was a predictor of mortality ($P < 0.003$). The most frequent bacterial organisms cultured from the wounds were Escherichia Coli. Cultures from the wound commonly show polymicrobial infections by aerobes and anaerobes. On average, at least three organisms are cultured from each diagnosed patients. The overall mortality was 23.44% (15 of 64). The commonest source of sepsis was anorectum 53.7%, urological in 28.2%, dermatological in 13.4% and unknown infection source in 4.7% cases. Diabetes was present in (37/64), hypertension (6/64) chronic liver disease (5/64). Body Mass index greater than 30 in (47/64) other risk factors include heart disease, alcoholism, smoking renal failure and corticosteroid users. Pus culture revealed a polymicrobial infection in 64.9%, 19.5% had only one organism identified the most commonly isolated organisms from the wounds were Escherichia coli in 57.1% Bactericides fragilis in 16 patients, Klebsilla 33.8% Proteus mirabilis in 19.7%. The location and extent of the disease showed confinement to the perineal area in 14% affecting the scrotum and labia majora 72% and extension to the penis in 7% and to the abdominal wall in 4%.

Table 1. Etiology of Fournier's Gangrene

Etiology	Patients	%
Anorectum	39	60.94%
Urologic	9	14.06%
Dermatological	7	10.94%
Unknown	9	14.06%
Total	64	100%

The myth of Fournier's gangrene to be idiopathic have demystified as known cause are defined after proper analysis.

Table 2 Patient Characteristics of Non Survivors

Patient Parameters	Survivor	Non Survivor	P Value
Age (Years)	42.3+-15.6	59.5+-18.6	<0.001
Duration	11	14	<0.83
Diabetes	30.5%	44.66%	0.078
Abdominal Wall Involvement	4%	47%	<0.003
Number Of Debridement	3.5	2.1	0.086
Renal Failure	16.4%	88.3%	<0.001
Mechanical Ventilatory Support	0%	88.9%	<0.001

As a result, evaluation of the outcome variables by univariate analysis demonstrated for statistically significant predictors of mortality which were the advanced age, extension of the infection to the abdominal wall, renal failure and mechanical ventilator support. However the presence of diabetes, female gender, interval between the symptoms and surgical intervention and repeated debridement did not appear as predictors of mortality.

Table 3 Narayan's Grading System in Fournier's Gangrene

Narayan's Grade	Patients	%
Grade I	4	6.25%
Grade II	24	37.52%
Grade III	17	26.56%
Grade IV	13	20.31%
Grade V	6	9.36%



Fig. I : Narayan Grade I Fournier Gangrene



Fig. II : Narayan Grade II Fournier Gangrene



Fig. III : Narayan Grade III Fournier Gangrene



Fig. IV : Narayan Grade IV Fournier Gangrene



Fig. V: Narayan Grade V Fournier Gangrene

IV Discussion

Scrotum is supplied by the following arteries

- (i) Superficial external pudendal
- (ii) Deep external pudendal
- (iii) Cremastic branch of inferior epigastric
- (iv) Scrotal branches of internal pudendal

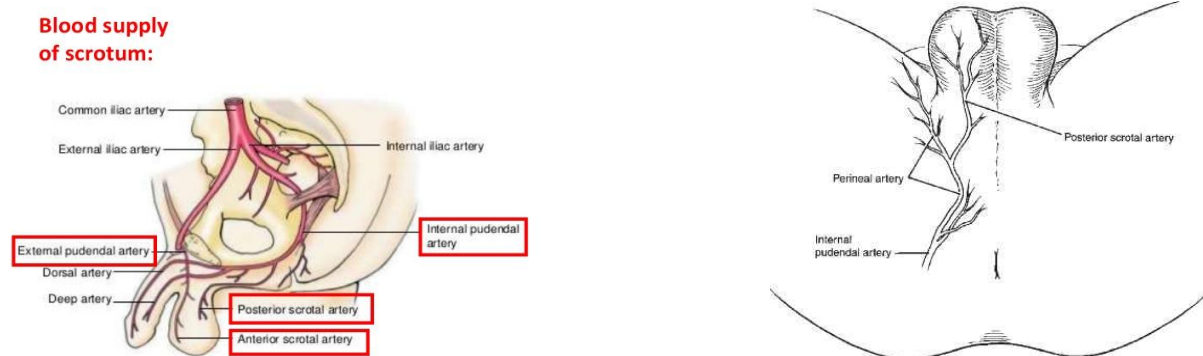


Fig. VI : Schematic Representation of scrotal Blood Supply

The scrotal veins follow the arteries

Narayan's Grading System in Fournier's Gangrene (FG)

Grade I Fournier's Gangrene involving the scrotum/Labia Majora

Grade II Fournier's Gangrene Extending to Pen scrotal Junction/ Labia Majora + Labia Minora.

Grade III Fournier's Gangrene extension into scrotum and penile skin/ Both Labia + Mons Pubis.

Grade IV Fournier's Gangrene involving the scrotum / Both Labia+ Perianal + perineum.

Grade V Fournier's Gangrene involving lower abdominal wall with/without involvement of the testes.

Fournier's gangrene caused by synergistic aerobic and anaerobic organism is a life-threatening disorder in which infection of the perineum and scrotum spreads along fascial planes, leading to soft tissue necrosis. In its early reports Fournier's gangrene was described as an idiopathic entity, but in my cases a perineal infections, urinary tract and local trauma of skin can be identified. The mortality rate for FG is still high 20-50% despite an increased knowledge of the etiology, diagnosis and treatment and intensive care techniques. The high mortality reflects both the 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 evidence of systemic sepsis at presentation extent and depth of involvement, a low hematocrit, a high leukocytosis, blood urea nitrogen, a high alkaline phosphates and serum albumin influence the outcome of patients with FG. Sorensen et al. found that an increasing patient's age was the strongest independent predictor of mortality. Diabetes mellitus is the most reported co-morbid disease associated with FG, with an estimated prevalence of DM among FG between 50-70%. Poor prognosis of FG in patients with a delay between time of presentation and treatment are seen. This factor has been reported in a study by Jeong et al. (2012). The spread of the disease is related to a higher death rate. Extension of the disease to the abdominal wall is directly related to mortality, which was confirmed in my series. Occurrence of septic shock and postoperative mechanical ventilator support demonstrated a powerful factor of mortality. Fournier's gangrene is a rare emergent condition that affects the perineum and urogenital region. The disease is believed to the urogenital region the disease is believed to the obliterative endarteritis caused by the spread of micro-organisms. Inflammation and edema from infection results in an impaired local blood supply leading to vascular thrombosis in the cutaneous and subcutaneous overlying tissue ensues. The rate of fascial necrosis has been estimated to be 1-3 cm/hr. making early diagnosis crucial. Testicular, Bladder and Rectal are remarkably spared due to their separate blood supply which is directly from the aorta in male or female. The mortality rate for FG is still high 20-50% in most contemporary series despite an increased knowledge of the etiopathogenesis, diagnosis, treatment and intensive-care techniques. The high mortality reflects both the aggressive nature of the synergistic infection and the destructive effects of co-morbidities. FGSI was developed to help clinicians predict the outcome of patients with FG. Sorensen et al. found that an increasing patient age was the strongest independent predictor of mortality. My result is in keeping with the study of Sorensen Male predominance is seen in 87.7%. Diabetes prevalence was reported on admission was statistically significant for mortality. Extension of the disease was associate with higher death rate. Extension to abdominal wall has been reported to be directly related to mortality. Patients on

postoperative mechanical ventilation were factors of mortality. LRINEC (Laboratory Risk Indicator for Necrotizing fasciitis) is a robust laboratory measurement score for early diagnosis of necrotizing fasciitis (Wong et al 2004) LRINEC score of >6 based on biochemical and hematologic changes in necrotizing fasciitis can stratify patients into high and moderate risk categories even when the clinical pictures still equivocal. Laor et al 1995 proposed a Fournier's gangrene severity index, using a threshold of 9 on the severity index there was a 75% probability of death with a score >9 while of a score less than 9 was associated with a 78% probability of revival.

IV. Conclusion

Fournier's gangrene which is a rapidly progressive, fulminant polymicrobial synergistic infection of the perineum and genitals is now changing pattern prompt diagnosis extensive surgical debridement broad spectrum antibiotic and good supportive care with multidisciplinary approach is necessary. Proactive management of the diabetic and immune suppressed patient with perineal infection is of extreme importance to prevent presence of co morbidities. Early recognition of infection associated with invasive and aggressive treatment is essential for reducing mortality.

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