Original Research Article

A clinical study on fournier's gangrene

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Abstract
Aims and objectives: Fournier's gangrene is a life threatening condition Is a synergistic infectious disease with necrotizing fasciitis of perineum, scrotum and penis. This study was conducted to evaluate the risk factors, bacteriology of infection, extent of involvement, management and prognosis. **Methods**: Prospective cohort study conducted in Department of General surgery, Govt General Hospital, Ongole, during the period of October 2017 to September 2020 were evaluated . **Results** :Patients diagnosed as fournier 's gangrene were studied in Govt General Hospital Ongole. Diabetes and alcoholism are the common risk factors . Diagnosis is mainly by clinical examination. Most of the cases presented between 48 hrs to 1 week. Radical debridement, antibiotic therapy follow up debridements are needed. FGSI score is helpful in evaluating prognosis. Mortality is high.
Key words: Fournier's gangrene,(FG) necrotizing fasciitis,fournier's gangrene severity index, FGSI.

Inroduction

Fournier's's gangrene (FG) is an acute, rapidly progressive, and potentially fatal infective necrotizing fasciitis affecting the external genitalia. In 1764, Baurienne originally described an idiopathic rapidly progressive soft tissue necrotizing process that led to gangrene of the male genitalia. However, Jean Alfred Fournier's, a parisian venereologist, described as an idiopathic gangrene at the genital level, more commonly associated with this disease, which bears his name. Early surgical debridement of necrotic tissues and antibiotics are fundamental in the treatment of FG. Now a days, FG has been recognized as a kind of life-threatening disease with high mortality. FG tends to occur in patients over 50 years, complicated with diabetics, obesity, malignant tumor and immune disorder. With the increasing populations of these predisposing factors, the incidence of FG also rises accordingly. Due to the specific location, FG is usually accompained by mixed bacterial infections.Most patients exhibit systemic infection symptoms, such as high fever and chills, while some a develop septic shock or organ failure[1-3]

Pathophysiology

Causative Infection represents an imbalance between host immunity and the virulence of the microorganisms.Most authorities believe the poly microbial nature of Fournier's gangrene is necessary to create the synergy of enzyme production that promotes rapid multiplication and spread of infection. These organisms are usual commensals of perineal skin and genital organs, and include Clostridia, Klebsiella, Streptococci, Coliforms, Staphylococci,Bacteriods and Corynebact-erium.

Characteristically in fournier's gangrene exists synergism between theoretically low aggressive bacteria alone.For example, one microorganism might produce the enzymes necessary to cause coagulation of the nutrient vessels. Thrombosis of these nutrient vessels reduces local blood supply.

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Thus, tissue oxygen tension falls.The resultant tissue hypoxia allows growth of facultative anaerobes and micro aerophilic organisms. These latter microorganisms, inturn, may produce enzymes (e.g.,lecithinase, collagenase), which lead to digestion of fascial barriers, thus causing the rapid extension of the infection. The most commonly isolated aerobic microorganisms are Escherichia Coli, klebsiella pneumonia and Staphylococcus aureus. The predisposing and etiologic factors of FG provide a favorable environment for the infection by decreasing the host immunity and allowing a portal of entry for the microorganism into the perineum. The polymicrobial nature of FG is by both aerobic and anaerobic bacteria and they produce various exotoxins and enzymes like collagenase, heparinase, hyaluronidase, streptokinase and streptodornase, which promote rapid multiplication and spread of infection.The aerobic bacteria cause platelet aggregation and induce complement fixation, thereby causing acceleration of coagulation. The anaerobic bacteria promote the formation of clots by producing collagenase and heparinase. Other organisms like *Bacteroides* inhibit the phagocytosis of aerobic bacteria, aiding in further spread of the infection, the microorganism's virulence promotes the rapid spread of the disease from a localized infection near the portal of entry into an obliterative endarteritis with cutaneous and subcutaneous vascular necrosis, leading to local ischemia and further bacterial proliferation. The infection in FG tends to spread along the fascial planes with initial involvement of the superficial (Colle's fascia) and deep fascial planes of the genitalia. Subsequently, there is spread to the overlying skin without involvement of muscles. Infection of Colle's fascia may then spread to the penis and scrotum *via* Buck's and Dartos fascia, or to the anterior abdominal wall *via* Scarpa's fascia. The inferior epigastric and deep circumflex iliac arteries supply the lower aspect of the anterior abdominal wall, whereas the external and internal pudendal arteries supply the scrotal wall. All arteries except internal pudendal artery, travel within Camper's fascia and become thrombosed leading to progression of FG. The Colle's fascia is attached laterally to the pubic rami and fascia lata and posteriorly to the urogenital diaphragm, thus limiting progression of the spread. Testicular involvement in FG is limited by the fact that the blood supply is derived from the aorta. However, involvement of the testis suggests

retroperitoneal origin or spread of infection [Eke, 2000; Chawla *et al*. 2003].

Even though thrombosis of the corpus spongiosum and cavernosum has been reported, corpora involvement is rare while the penile skin sloughs off .

Clinical features

The clinical features of fournier's's gangrene include sudden pain in the scrotum, prostration, pallor,and pyrexia.At first only the scrotum is involved, but if unchecked, the cellulitis spreads until the entire scrotal coverings slough, leaving testes healthy.One overwhelming feature of presentation is the strong "repulsive, fetid odour" that is associated with the condition.Patients can present with varying signs and symptoms including fever greater than 38^0Celsius, scrotal swelling and erythema, purulence or wound discharge, crepitus. Usually, the infection starts as a cellulitis adjacent to the portal of entry, commonly in the perineum or perineal region, with an insidious presentation. The affected area is often swollen, dusky and covered by macerated skin and presents with a characteristic feculent odor, which is attributed to the role of anaerobes in the infection [Alonso *et al*. 2000]. Patients also may have pronounced systemic signs, usually out of proportion of local disease. In those with severe clinical presentation, progression of the gangrenous process to malodorous drainage and sloughing in affected area results in deterioration of the patient's general condition. The most common presentations were scrotal swelling, fever and pain followed by tachycardia (61%), purulent discharge from the perineum (60%), crepitus and fever[4-6]

Materials and Methods

A Prospective cohort study conducted in Govt General Hospital, Ongole from October 2017 to September 2020. Total 68 patients who attended surgical OP and Casualty were under suspicion and diagnosed as Fournier's gangrene and are included in the present study, and were evaluated .

A detailed history was taken from all patients and consent was taken. Investigations such as Complete Blood Picture, Blood Sugar, Blood Urea, Serum Creatinine, Serum Electrolytes and C - reactive protein were done at the time of admission for all patients. Source of infection was analysed. Thus, culture sensitivity was taken at the time of debridement. All patients were placed urinary diversion either by transurethral catheter or supra pubic catheter. All patients underwent debridement and antibiotic treatment within 6 hours of admission under spinal or local anaesthesia. All patients were followed post operatively until wound became healthy. Reconstructive procedures like secondary closure, transposition of testes, flap covering or split skin grafting done appropriately. A prognostic index known as Fournier's Gangrene Severity Index(FGSI) by Labor and colleagues was applied to know the prognosis.

The data analysis was done with MS Office 2019. Data involving history, signs and symptoms at the time of admission, aetiological factors, co- morbid conditions were evaluated in the present study[7-9]

Analysis and results

This study was conducted on patients who came to outpatient department and casualty, Govt General Hospital Ongole from October 2017 to September 2020. 68 patients were diagnosed with Fournier's gangrene.

Table 1: Age distribution of study population: (n = 68)

S .no	Age group (in years)	No of patients	Percentage
1	21-30	03	4.41%
2	31-40	08	11.76%
3	41-50	18	26.47%
4	51-60	26	38.23%
5	>60	13	19.11%
		TOTAL = 68	

Table 2: risk factors for fournier's gangrene

Risk factors	No of cases	Percentage
Diabetes	26	38.2
Alcoholism	28	41.17
Trauma/postop	6	8.8
HIV/immunocompromised	8	11.7

Table 3: Extent of involvement in study population

Part involved	No of cases	Percentage
Penis only	18	17.6
scrotum	42	47.5
perineum	8	11.7
Both penis & scrotum	4	5.8

Table 4: Time interval between onset of symptoms and presentation at hospital

Time interval	No of patients	percentage
<48	6	8.8%
48hrs-1wk	43	63.25%
>1wk	19	28%

Table 5: Biochemical abnormalities in Fournier's gangrene

Investigation	No.of patients	percentage
Leukocytosis	17	25
Anaemia	18	26.4
Increased s. creatinine	15	22.4
hyperglycemia	26	38.2
Low s. albumin	8	11.7
Hypocalcemia	15	22.5

Table 6: Bacteriology of Fournier's Gangrene

Organism	no of cases	percentage
Staphylococci	17	25.7
streptococci	11	16.1
E coli	44	64.3
Klebsiella	11	16.1
Proteus	07	10.02
Pseudomonas	12	17.2
Bacteroides	06	8.8

Table 7: Complications of fournier's gangrene

complication	No.of cases	percentage
sepsis	17	25.02
pnuemonia	11	16.2
Renal failure	07	8.3
Cardiac failure	07	8.3

Table 8: Reconstruction of scrotal skin after debridement (n=56)

Procedure	No of cases	percentage
secondary closure	32	57.2
Transposition of testis in thigh	09	16.1
Split skin grafting	12	21.4
Orchidectomy with secondary closure	3	5.3

Table 9: Prognostic index using FGSI (n=68)

FGSI	Number of patients	Percentage	No of deaths
FGSI <9	49	72.1	3
FGSI >9	19	17.9	9

P value using chi square test p= 0.001627 (significance p=<0.5)

Discussion

Fournier's gangrene is a necrotizing fasciitis of soft tissues of the scrotum and perineum of rapid growth effecting men. We must consider it as a surgical emergency requires immediate aggressive management. If not treated aggressively mortality is high. In the present study, highest cases of Fournier's gangrene were seen in 5th decade, followed by 4th decade of life. In the present study all patients presented with pain in the swelling, (100%) and erythema (100%). These findings are similar to studies conducted by Lamb RC and Juler GL et al. Altered renal parameters and altered mental status are found in severe cases i.e in 21 cases. Out of 68 cases 28 cases (41%) were presented with complications of renal failure, and sepsis. Out of 68 patients 6 patients (8.8%) presented with less than 48 hrs duration and 43 patients 63.2% of patients presented with in 48 hrs to 1 week duration and 19 patients (28%) presented after 1 week.According to Stamenkovie I and Lew PD et al, 53% reported to hospital within 48 hrs to 1 week and in present study 63.2% presented in 48 hrs to 1week. In present study diabetes as a risk factor is seen in 26 patients(38.2%). Alcoholism is seen in 28 patients (41.1%) HIV is found in 8 cases (11%) of cases . In studies conducted by Spirnak IP and Resnick MI et al,[11] diabetes was present in 50% of cases and alcoholism is found in 50% of cases and HIV is found in 9.3% of cases. In our study commonest source of infection is idiopathic in 32 patients (47.2%), and genitourinary in 19 patients (27.9%), and anorectal in 23 patients (19.2%) and postoperative in 1 case. According to Asci R and Sarikya S et al, genitourinary site of origin is more common (35.3%) than any other cause. In our study localized disease is found in majority of patients 47 patients (69.2%) and extended disease is found in 21patients (30.1%). According to Clayton and Flower JE jr et al, localized disease is found in 72% of patients but in our study localized disease is found in 69.2% of patients. The most common abnormalities in blood investigations found in our study is anaemia in 41 patients(60.4%),leukocytosis in 29 patients (41.86%), hyperglycemia in 26 patients (38.2%) and increased creatinine in 22 patients (34.2%).A study by Miller JD et al, leucocytosis was seen in 93% of patients and hyper glycemia in 82% of patients. In our study, E coli was found in 44 patients (64.3%),followed by staphylococci in 17 patients (25.7%) and klebsiella in 11patients (16.1%). According to Paty R and Smith AD et al,E coli is found in 51% and streptococci in 42%. In the present study testis was involved in 3 cases (5.3%) requiring orchidectomy among 56 cases. In a study conducted by Vick R et al, 21-24% of cases required orchidectomy. Multiple surgical debridements were needed with an average of 3.5 procedures per patient.Involvement of corpus spongiosum and urethra was rare. In the present study 1 case presented with this complication. Similar finding was recorded by M. Basoglu et al. Uncomplicated FG is found in 40 patients (58.8%). Complications were seen in 28 patients (41%). In the present study FGSI score was calculated among 68 patients. FGSI <9 was noted in 49 patients (72.1%) and FGSI score >9 was noted in 19 patients. Among the 49 cases with FGSI <9, 3 cases expired and among the 19 patients with FGSI >9, 9 cases expired. The difference was statistically significant (p=0.001627).

Kabay and colleagues analyzed patients using this index and showed those with FGSI greater than 10.5 had 96% mortality whereas those with a score less than 10.5 had 96% survival[10-12]

The mortality rate associated with fournier's gangrene in studies conducted by M .Basoglu et al was 8.8% but in our study the rate is 17%, but in studies conducted by Col.Bras.Cir et al mortality rate is 20%. [13-15]

Conclusion

Fournier's gangrene is a fulminant form of infective necrotising fascitis of perineal, genital and perianal regions. The disease is commonly seen in fourth and fifth decade of life.The common presenting features are scrotal pain, erythema, scrotal swelling and fever. The commonest source of origin is idiopathic. Alcoholism and diabetes are major risk factors. Majority of patients presented between 48hrs to 1week. The common derangements observed in our study were anaemia, leukocytosis, hyperglycemia, hypocalcemia, and altered renal parameters. Commonest organism isolated in present study is E coli. The diagnosis is based on clinical examination. Initial resuscitation,antibiotic therapy, radical surgical debridement are important measures of management. Follow up surgical exploration and regular dressings are important until raw area develops. Testicular involvement is rare in fournier's gangrene. Mortality rate in present study is 17.64%. FGSI score >9 is associated with increased mortality. Mortality is mainly due to delayed presentation,diabetes, sepsis and multiorgan dysfunction. Reconstruction is mainly done with secondary closure of remnant scrotal skin, split skin grafting and transposition of testes.

Ethical approval

Approval has been taken from the ethical committee, government medical college, Ongole.

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