

A Study on Fournier's Gangrene

G. Karthikeyan¹, M. Kumarasenthil²

ABSTRACT

Introduction: Fournier's gangrene is a fulminating, rapidly spreading infection which cause thrombosis of blood vessels which results in gangrene of scrotal skin. It affects all age groups and has been reported in both males and females. It is more commonly seen in middle age groups with immunocompromised status like diabetes mellitus, malignancy, alcoholism, chronic renal disease

Material and methods: 35 cases of Fournier's gangrene were analyzed. Patient's history and clinical examination was done to arrive at a diagnosis. Age, etiology, predisposing factors, extent of involvement, Pus culture and sensitivity, lab investigations and surgical outcome were evaluated.

Results: The mean age in this study is 55.3yrs, Its found that major predisposing factors are diabetes mellitus and alcoholism, about 15% of the patients were having chronic kidney disease. Only in 17% of cases where there for which no causes could be found out. Pseudomonas was the causative organism for about 40% of the case and e coil was identified in almost 23% of cases, the first culture was found to be sterile In 26% of cases. All patients are treated with appropriate antibiotics and early debridement, among which 3 of them achieved spontaneous healing. 15 patients that is around 51% needed delayed suturing and 14 patients needed skin grafting.

Conclusion: In Fournier's gangrene early resuscitation of vitals with transfusion of blood and blood products if needed, the adequate antibiotic care and early extensive thorough wound debridement will certainly improve the outcome.

Keywords: Antibiotics, Chronic Renal Disease, Diabetes Mellitus, Fulminating, Immuno Compromised, Perineal Region, Pseudomonas, Pus Culture, Scrotum, Wound Debridement

INTRODUCTION

Fournier's gangrene was first described by Fournier in 1764 as extensive necrotizing soft tissue infection of the perineum.¹ It also involves areas like lower urinary tract, anus, rectum, and colon. It is a fulminating, rapidly spreading infection which cause thrombosis of blood vessels which results in gangrene of the external genital organs.²

It affects all age groups and has been reported in both males and females and various etiological factors have been described. It is more commonly seen in middle age groups with immuno-compromised status like diabetes mellitus, malignancy, alcoholism, chronic renal disease.

The basic treatment involves resuscitation, prompt excision of all non-viable tissue, limiting any infective process, antibiotics and occasional anatomical reconstruction. Orchidectomy may rarely be required. Methods of reconstruction of scrotum includes burying the testes in thigh or in the abdomen, split skin graft or wide surgical

debridement with delayed suturing.

Early recognition with urgent surgical debridement and antibiotics form the mainstay in managing these cases. The course of disease is very rapid and the disease can be lethal if presented lately.

Study aimed to study the age distribution and risk factors of Fournier's gangrene, to study the most common organisms associated with Fournier's gangrene and to study outcome in management of Fournier's gangrene

MATERIAL AND METHODS

Study was conducted in Department of General Surgery, Government Medical College, Thanjavur over a period of 1 yr from Jan 2016 to Dec 2016

All cases of Fournier's gangrene admitted in TMCH during Jan 2016 to Dec 2016 were analyzed. Patient's history and clinical examination was done to arrive at a diagnosis.

A simple random sampling of the cases done and a point estimate of the sample is done

Inclusion criteria

- All patients above 12 years of age who are clinically diagnosed as Fournier's gangrene through detailed history and proper examination

Exclusion criteria

- Patients below 12 years of age
- Patients with traumatic injury to scrotum and scrotal laceration are excluded
- Patients with scrotal wall abscess are excluded

Informed and written consent obtained from all the 35 patients admitted during the study period in their own language and are included in the study

Proper ethical clearance obtained from the ethical committee and the study was started from Jan 2016. Age, etiology, predisposing factors, extent of involvement, Pus culture and sensitivity, lab investigations and surgical outcome were evaluated.

Age of all the patients evaluated and mean age calculated according to statistical tests of significance. Etiology of Fournier's gangrene evaluated and percentage of each cause calculated

Pus culture and sensitivity done in all cases and organisms

¹Assistant Professor, ²Assistant Professor, Department of General Surgery, Thanjavur Medical College Hospital, Thanjavur, Tamilnadu, India

Corresponding author: Dr. G. Karthikeyan MS, North Street, Pudhur (P.O), Orathanadu (T.K), Thanjavur, Tamil Nadu, India

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isolated from swab and cultured in vitro and sensitivity to common antibiotics noted. Percentage of contribution of each organism calculated according to statistical tests of significance.

Early aggressive debridement, intravenous higher antibiotics, blood transfusion, hyperbaric oxygen are all used as modalities of treatment and their efficacy in terms of outcome noted.

STATISTICAL ANALYSIS

Microsoft office 2007 was used for the analysis and descriptive statistics were used for the interpretation of data.

RESULTS

35 male patients admitted with diagnosis of Fournier's gangrene were included in the study. The observations were

Age distribution

The age of patients varied from 36 to 72 years with majority of patients in 61 to 70 yrs age group. This goes along with the reports that the mean age of patients appear to be increased from 40 years previously to more than 50 years in recent studies.

The mean age in this study is 55.3 years. About 31.4% cases are in age group 61-70years. 34.3% were in age group 51-60years. 25.7% cases were in age group of 41-50 and only 5.7% were in age group of 31-40. There were no patients below 30years of age

Etiology and predisposing factors

17% idiopathic and 83% etiological factors.

14 patients gave history of trauma as initiating factor, the most striking features over recent years is that patients now always found to have underlying systemic disorder (figure-1).

Clinical factors

In this study patients were admitted with history of fever and malaise for about 1 week. There was history of trauma in 14 patients and 2 patients had history of perianal abscess. The patients complain of severe perineal pain with progressive erythema of skin. Obvious gangrene of portion of genitalia and purulent foul smelling discharge was noted in majority of patients.

The systemic effect varied from local tenderness with no toxicity to florid septic shock. Toxic features were mainly noted in elderly patients with delayed consultation and co morbid disease. Being a spreading infective process, gangrene was either involving the part or whole of scrotum and some with extension to penis perineum and thigh. Out of 35 patients gangrene was confirmed to scrotum in 26 patients with extension to penis in 9.

Soft tissue crepitations, tenderness, foul smelling discharge was noted in whole patients.

Lab studies

ECG and chest x ray were taken routinely and basic investigation were done. There were 15 patients who were diabetic with uncontrolled blood sugar values. Wound swab and pus culture sensitivity were sent for all patients (figure-2).

Treatment

Is mainly 3 fold. Firstly the patient should be resuscitated with fluids and blood transfusion should be given if needed and higher antibiotic should be started, after that patient should be taken for emergency wound debridement which is done under iv sedation or spinal Anaesthesia. Wound debridement done was extensive and all necrotic tissues were removed. Wound debridement was done until fresh oozing of blood was noted. Patient was initially started on ceftriaxone and metronidazole and later antibiotics were changed according to culture sensitivity. For all patients urinary catheterization was done, blood culture and urine culture was done routinely. Blood culture was sterile in all patients Regular cleaning and dressing was done with hydrogen peroxide, betadine and normal saline. Once granulation tissue develop normal saline was alone used

51% Delayed suturing

40% SSG

9% Spontaneous healing

Complication

Complications like pneumonia bed sore and raised renal parameters were observed and treated accordingly.

Out come

Mortality nil, following are the poor prognostic factors

1. Age
2. Diabetes mellitus
3. CKD
4. Extent of involvement

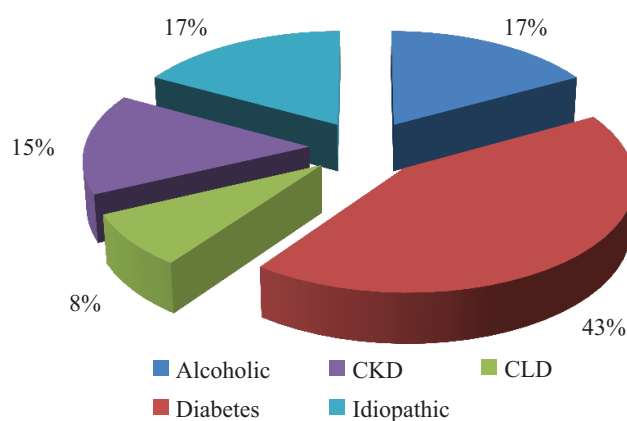


Figure-1: Causes

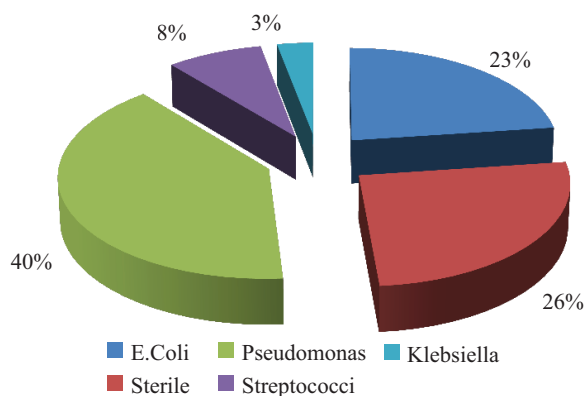


Figure-2: Lab studies



Figure-3: A case of Fournier's gangrene



Figure-4: After wound debridement day 5

DISCUSSION

Fournier gangrene is necrotizing infection affecting the soft tissues of external genitalia. Even though the term Fournier gangrene was used to describe idiopathic gangrene of external genitalia; it also has been used to describe soft tissue necrotizing infection of perineum, whatever is the cause. Now the term Fournier gangrene is restricted to describe infections that primarily involve the external genitalia.

Epidemiology

Sex

Male : Female = 10:1

The mean age of occurrence of the disease is in between 40-50 year group. It is seen both in males and females, but more common in male

Disorders which are associated were Chronic alcoholism: 25-50%, Diabetes: 40- 60%, Immunosuppressant

HIV infection has resulted in the formation of a new group of patients which are prone for developing Fournier's in Africa and other developing nations. Fournier's gangrene has been noticed as a presenting feature in case of undiagnosed HIV infections.

Etiology

- Perianal infections, manifesting due to colorectal

injuries or colorectal carcinoma or appendicitis are included as Anorectal causes.

- Bulbourethral gland infections, iatrogenic injuries secondary to urethral injury, or lower urinary tract infections are been included under urogenital tract causes.
- Dermatologic causes are ulceration from scrotal pressure hidradenitis suppurativa, trauma, complication from surgery.
- Other causes, even though is not common, Fournier's gangrene can develop as a consequence of bone marrow malignancy, SLE, HIV infection, Crohn's disease.⁴ It may also result from iatrogenic injuries in the perineum.

Pathophysiology

Infection indicates a delicate balance between:

1. patient immunity, which is frequently compromised by co morbid systemic illness
2. Virulence of infective agent.

The production of toxins or enzymes as the result of virulence will result in the formation of an environment which favours the rapid multiplication of organism

Common causative organisms includes;

1. Streptococcal species¹¹
2. Staphylococcal species
3. enterobacteriaceae species
4. Anaerobic organisms
5. Fungi

Clinical features

The distinctive feature of Fournier gangrene is intense pain and tenderness in the genitalia

The clinical course of the disease is as follows:

1. Prodromal symptoms: fever and lethargy, 2-7 days
2. Intense genital pain and tenderness associated with oedema, erythema and dusky appearance of the overlying skin, subcutaneous crepitations.
3. Macroscopic gangrene of portion of the genitalia; pus discharge from wounds.

There also occurs systemic effect due to Fournier's gangrene which includes localized tenderness with features of inflammation to profound shock with multiorgan failure. Generally greater the degree of necrosis, greater the systemic effects. It usually affects males of 60-70yrs with co-morbid diseases females are affected less frequently.

Investigations

Clinical diagnosis

- "Finger test"/ "frozen section"
- Plain X-ray: Air in soft tissues
- USG: scrotal wall thickening and subcutaneous air/ peri-testicular air⁷
- CT:
 - Accurately defines the extent of necrosis
 - Elucidates the cause

Lab studies

- Complete history and physical examination
- Biochemistry workup:

- Electrolyte disturbances
- Laboratory evidence of dehydration [elevated BUN/creatinine ratio]
- Glucose intolerance [in case of pre-existing diabetes or any sepsis induced metabolic disturbance].
- Blood tests:
 - Complete blood count: look for any infection induced immunologic stress, the adequacy of the red cell mass, also check for any possibility for sepsis induced thrombocytopenia.
 - Blood culture: check for septicaemia
 - Coagulation profile: Prothrombin time, activated partial thromboplastin time, platelet count and fibrinogen level → for sepsis induced coagulopathy
 - If surgical exploration is undertaken consider type and screen.

Imaging studies

Radiography: Considered If the findings from the clinical examinations are not conclusive. Imaging techniques helps in easy identification of air within the tissues than by physical examination

Initially imaging studies should start from plain film radiography. It is helpful in revealing moderate to large amount of gas filled area of soft tissue or foreign bodies.

Ultrasonography: Ultrasonography is useful in detecting fluid or air within the tissue. Other than that it can also be used to assess the blood flow to the testes, in the condition where testicular torsion is considered as a differential diagnosis.

CT scanning: CT scanning is helpful in detecting small amount of gas than in case of plain radiography. It can be also used to track fluid collection along the deep fascial planes CT scan showing extensive inflammatory soft tissue swelling of scrotum and minimal amount of air in soft tissue (arrow). Inflammatory can also involves the penis.

MRI: MRI studies yields more details about soft tissue than in CT scanning, but it causes more logistical challenges, especially in critically ill ones

Histological findings

The pathological evaluations reveal the following finding

- Superficial and deep fascial planes undergone necrosis
- Nutrient arterioles undergone fibrinoid coagulation
- Infiltration of polymorphonuclear cells
- Presence of organisms in the affected tissue

Treatment

Medical Therapy

Fournier gangrene can be treated by several techniques, one of them being restoring the normal organ perfusion.

Broad spectrum antibiotic therapy is also used. The spectrums covered are: Staphylococci, Streptococci, Enterobacteriaceae family and anaerobes. Ciprofloxacin and Clindamycin are considered as an empiric regimen for therapy.

Anti-fungal agents [Amphotericin-B or Caspofungin] can be used if the initial tissue stains [i.e. KOH stain] shows

fungi. In cases associated with sepsis syndrome there is a heightened cytokine response due to the super antigens like streptotoxins [A,B]. These antigens can be counterbalanced by intravenous immunoglobulin therapy [IVIG]

If obtainable hyperbaric oxygen can be administered as it has shown to have some favorable results.^{8,9}

Surgical Therapy

1. Authenticating the Diagnosis
 - i. The tentative diagnosis based on clinical examinations or investigations is verified by incision into the area of greatest clinical concern with the patient under anesthesia.
 - ii. The diagnosis can be established if obvious gangrenous tissue present or if any purulence is drained (Figure-3).
2. Excision of the necrotic tissue
 - i. Once the diagnosis is validated all necrotic material needs to be excised.
 - ii. Tissue specimens are collected for aerobic and anaerobic cultures and also for histological assessment.
 - iii. If the overlying skin has been markedly debilitated due to impaired blood supply, because of characteristic thrombosis of the nutrient vessels it also should be excised.
 - iv. Repeated aggressive debridement procedures (Figure-4) should be carried out for complete eradication of the infection taking into consideration the fulminant nature of this necrotizing process.¹⁰
 - v. The appropriate antibiotic regimen against the causative organisms can be administered to the patient once the results of the tissue cultures are known. The antibiotic therapy should be continued for about 10-14 or until the reconstruction has been accomplished.
 - vi. Fecal diversion is considered in subsequent operative procedures if the perineal involvement is extensive
 - vii. Urinary diversion is usually done using a urethral catheter, suprapubic cystostomy is used when it's impossible to drain the bladder through the urethra because of some underlying pathology (e.g. stricture disease, prostatic hypertrophy).
 - viii. Most of the times the testicles are spared from the necrotizing process. If they are not affected, the exposed testicle is placed in a subcutaneous pocket so that desiccation can be avoided. If they are affected in the necrotic process or their viability is challenged orchidectomy is performed.
3. Options for reconstruction
 - i. Primary closure of skin [if possible].
 - ii. Local skin flap coverage.
 - iii. Split-thickness skin grafts.
 - iv. Medial thigh flap.¹¹

Complications

- Acute Renal failure

- ARDS/Pneumonia
- Gastrointestinal Bleeding
- Heart failure
- Hypocalcaemia

CONCLUSION

Fournier's gangrene is a rare emergency disorder that needs early diagnosis and treatment. So even minor infection to perineal region should be given due attention. Negligence may lead to life-threatening complications.

So in Fournier's gangrene early resuscitation of vitals with transfusion of blood and blood products if needed, the adequate antibiotic care and early extensive thorough wound debridement will certainly improve the outcome.

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