Fournier's gangrene. Immediate diagnosis and multimodality treatment is the cornerstone for successful outcome



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BACKGROUND: Fournier's gangrene is a synergistic necrotic fasciitis or myositis of genitalia, perineum and abdominal wall. Several etiologic factors have been reported, microorganisms isolated and co-morbidity factors identified. Immediate and accurate diagnosis decreases mortality rate, which ranges from 3-67%. Aggressive resuscitation and surgical debridement consist the appropriate treatment.

MATERIAL AND METHODS: Six cases of Fournier's gangrene treated the last ten years were reviewed. Three of them presented with mild infection while the other three with severe. The mean time interval between first symptoms and initial treatment was 2.1 days. The diagnosis was set immediately and the treatment included fluid-electrolyte resuscitation, aggressive surgical debridement, and broad-spectrum antibiotics administration. RESULTS: All patients survived. The defects healed by second intention in four patients and only in two patients speci-

RESULTS: All patients survived. The defects healed by second intention in four patients and only in two patients specific plastic reconstructive techniques were required. Hyperbaric oxygenation administrated in one patient induced surprisingly the healing of the lesion.

CONCLUSIONS: The Authors confirm that Fournier's gangrene is a rare and potentially fatal disease. Early suspicion, accurate diagnosis and multimodality treatment including aggressive surgical intervention are essential for successful outcome.

KEY WORDS: Fournier's gangrene, Necrotic fasciitis.

Introduction

In 1863 JA Fournier, a French venereologist described 5 cases of penis and scrotum gangrene without obvious cause. This pathology occurred in previously healthy young males, without obvious cause and developed rapidly and progressed in gangrene. Since then more than 500 cases have been reported in the literature, and the features of this pathology have been identified. Fournier's gangrene is a rare, rapidly progressing and potentially fatal soft tissue synergistic infection of the genitalia (scrotum and penis in males and vulva in women), perineum, perianal region and abdominal wall.

Several co-morbidity factors have been identified, as diabetes mellitus, lupus erythematosus and immuno-supression ¹⁻⁴.

Correct and immediate diagnosis of the pathology is the corner stone of the treatment. The most common clinical findings are perianal pain and swelling, tenderness, crepitus, emphysema, fever and the findings of septic shock ⁵. Appropriate treatment includes resuscitation, antibiotic therapy and surgical intervention, which is the radical therapy. The goal of the surgery is the radical debridement of all necrotic tissues in order to stop the progression of the infection and to ameliorate systemic oxygenation. Several procedures have been developed to approximate the skin, protect the testicles, wash the trauma, avoid or not colostomy, and divert urine. It has been suggested by several authors, that hyperbaric oxygenation, which affects anaerobic bacteria as clostridiums, may possess a significant role as adjunctive therapy ⁶⁻⁸.

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Material and Method

luated, as well as the medication patients received. in shock (Figure 1). Postoperative course, hospital stay, morbidity and mortality were recorded. Laboratory tests included white cell count, serum sodium, potassium, glucose, buon, albumin, creatinine and CK. Antibiotics were administrated following culture sensitivity. Surgical intervention aimed in wide resection of macroscopically nonviable tissues and fascia resection, when there was evidence of involvement. The wound was left open and washed continuously with normal saline and povidoneiodine solution. A colostomy was performed when fecal diversion was needed (Table I).

Results

All patients were male with a mean age of 49.3 years (range 32-72). Two patients had scrotal scratches, one had perianal abscess, one had perirectal abscess, and the fifth had undergone dilatation of the anus for hemorrhoids. There was no obvious cause in the sixth patient. Co-morbidity factors were identified in three patients. Two of them had diabetes mellitus and the third was alcoholic. None of the patients was immunosuppressed (Table I).

of the Hospital while the sixth was transferred from and pH < 7.32), while the others had almost normal another district hospital in septic shock. The mean ti- values.

me interval between the first relative symptom and the initiation of the treatment was 2.1 days (range 1-4 days). Six patients were treated for Fournier's gangrene during Presenting symptoms were pain (perianal and scrotal), the last ten years. We retrospectively reviewed these swelling and pyrexia. All patients had necrotic lesions patients. Age, background, causes, predisposing factors, in the affected areas, while crepitus was present in two laboratory measurements and clinical findings were eva- of them. Three patients were septic and two of them



Fig. 1: Fournier's gangrene clinical presentation, with penis and scrotum swelling, redness, crepitus and pain.

The most important laboratory findings of the patients included WBC > 15x109/l, serum glucose > 210 mg/dl (range 110-960), serum sodium < 134 mmol/l (range 126-138), serum creatinine > 1.9 mg/dl (range 1.6-3.1), and serum CK > 500 IU/l (310-1100). In the patients who were in shock blood gases values were abnormal Five patients proceeded in the Emergency Department $(pO_2 < 55 \text{ mmHg}, PCO_2 > 39 \text{ mmHg}, O_2\text{sat} < 80\%$

TABLE I – Patients' characteristics

Age (years)	Duration of symptoms prior therapy	Etiology	Co-morbidity factors	Antibiotic	Surgical treatment	Cultured microorganism	Days in Hospital
42	2	Anal dilatation for hemorrhoids		Ceftriaxone Amikasin	Debridement Colostomy	S. Aureus C. Difficilis	145
32	4	Scrotal scratches		Metronidazole Penicillin Metronidazole	Debridement	E. Coli S. Aureus	7
72	1	Undetermined	Diabetes Mellitus	Ceftriaxone Amikasin Metronidazole	Debridement	S. Aureus C. Difficilis E. Coli	74
45	1	Perirectal abscess		Penicillin Netilmicin Metronidazole	Debridement	E. Coli	10
48	3	Perianal abscess	Diabetes Mellitus	Ceftriaxone Metronidazole	Debridement	E. Coli S. Aureus	15
57	2	Scrotal scratches		Ceftazidime Metronidazole	Debridement Colostomy	E. Coli Auroginosa	45

The patients can be divided in 2 groups according to the disease severity and their clinical and laboratory findings. Four of them presented mild symptoms (probably due to initial stages of the infection), while two of them were severely infected. Cultures derived from the affected areas showed that the most common pathogenic microorganisms were E. Coli and S. Aureus, while clostridium difficilis was isolated in two patients. In the severe ill patients all previous microorganisms were isolated. It's possible that Cl. difficilis isolation increases the severity of the infection.

Initial treatment included transurethral catheter insertion; aggressive fluid and electrolyte resuscitation, haemodynamic and pulmonary support, while combinations of broad-spectrum antibiotics were administrated. Administration of the appropriate antibiotic followed cultures and sensitivity tests. All patients had surgical debridement in the first 12 hours after their admission (Figs. 2 and 3). In patients



Fig. 2: Incision of scrotum, drain of pus, and cleaning of testicles. The incision continuous perianally till the back of the patient.

Fig. 3: The genitalia trauma after the second debridement with multiple drains, for continuous washing.

with mild infection, after surgical debridement, clinical and laboratory findings were improved significantly. In these patients there was no need for re-intervention. In three patients repeated debridements of the scrotum were required in combination with colostomy, and in one of them excision of the scrotum and placement of the testicles in the femurs for protection (Figs. 4 and 5). In the patients with severe disease 4 and 5 debridements were performed. The sixth patient stayed in ICU for 72 days, due to several complications including pneumonias and renal failure. After discharge from ICU, he received hyperbaric oxygen therapy for 25 days (1 hour per day). None of the patients died.

In the four patients the defects healed by second intention. In two patients plastic reconstruction techniques were required.



Fig. 4: In this patient fecal diversion achieved with colostomy. Urinary bladder had been necrotized, incised and urinary diversion achieved with a silastic catheter connected in continuous suction. The trauma closure needed several specific plastic reconstructive techniques.



Fig. 5: A patient after the last reconstructive plastic operation. You can see the skin areas, from where skin grafts received, while obvious are the areas left for secondary healing.

Discussion

Fournier's gangrene is a rare, rapidly progressing and potentially fatal, soft tissue synergistic infection of the genitalia (scrotum and penis in males and vulva in women), perineum, the perianal region and the abdominal wall ³. This infection (myositis or fasciitis) is usually caused by a mixture of aerobic and anaerobic microorganisms. The most commonly isolated microorganisms are E. Coli, Bacteroides and Streptococcus^{8,9}. The reported mortality of the disease ranges from 3% to $67\%^5$. In our series there was no mortality. A possible explanation may be that the severity of the disease was mild in four patients, while one who was seriously infected was supported for a long time in ICU. Most of our patients proceeded immediately to the hospital, which led to less extensive disease.

The infection leads to small subcutaneous vessels thrombosis, due to obliterative endarteritis, which results in the development of gangrene of the skin. Most common causes of Fournier's gangrene are anorectal and genitourinary infections and traumatic injuries.

Inadequately diagnosed and treated ischiorectal, perianal and intersphincteric abscesses are the leading causes for the disease. Several less common causes have been reported, including rectal biopsy, anal dilatation, hemorrhoid banding, anorectal carcinoma, anastomotic leaking, appendicitis, diverticulitis, urinary tract infection epifisiectomy, hysterectomy, septic abortion and foreign body injuries ¹⁰⁻¹².

In our study the causes were dilatation of the anus for hemorrhoids, scrotal scratches, perianal and perirectal abscesses and in one patient no obvious cause was identified. No obvious causes of Fournier's gangrene are referred also in other published series. It's very interesting that a middle-aged patient who presented with the most severe disease, had undergone dilatation for hemorrhoids. The symptoms in this patient occurred 4 days after dilatation and 2 days before his transfer ¹³⁻¹⁵.

Predisposing co-morbidity factors are diabetes mellitus (most frequent), age, prolonged hospitalization, alcoholism, malignancy cortisone therapy, malnutrition, radiotherapy, chemotherapy, immunosuppression, renal failure, heart disease, cirrhosis, HIV infection, lymphoma, and lupus erythematosus ^{2,3,6,14}.

In our series the only existing predisposing co-morbidity factor was diabetes mellitus in two patients. One of them presented severe infection while the other had a mild clinical course.

Laboratory findings in our series were similar to those referred in other published series, including WBC, serum glucose, creatinine and CPK increase and serum potassium decrease. Haemodynamic alterations depended on disease's severity while blood gas changes were found in two patients with severe infection, and complicated clinical course ^{2,15}.

Fournier's gangrene treatment should be multimodal. The appropriate combination of the surgical intervention, with the antibiotics administration, the reconstruction techniques, and finally with the hyperbaric oxygenation reduces morbidity and contributes to the better and quicker rehabilitation of the patient.

Fluid and electrolyte resuscitation depended on patients' needs while for initial treatment broad-spectrum antibiotics were used. The appropriate antibiotics were administrated after cultures and sensitivity tests.

Surgical intervention aimed in wide resection of macroscopically non-viable tissues and fascia resection if there was evidence of involvement. In one patient a colostomy was performed for fecal diversion. The scrotum was excised in two patients. In one of them the testicles were left in place while in the other they were placed in the femurs for protection. Specific plastic reconstructive techniques were used in two patients. The extent of debridement depended on the local conditions, the severity of the infection and the extent of the necrosed tissues. In all cases the wound was left open, covered with gauzes and washed continuously with normal saline and povidone-iodine solution ^{2,12,14,15}.

Our therapeutic strategy comes to agreement with the strategy current opinions ^{8,14}. Selection of the surgical procedure depends on the severity of the infection and the extent of necrosis. If the patient does not exhibit improvement, the debridement is considered to be inadequate, and there is need for further exploration. Many authors support the value of imaging studies, including CT or MRI. In our series only one patient underwent CT evaluation. In the rest, diagnosis was set clinically and their course was uncomplicated so there was no need for further evaluation ^{11,12,14}.

Hyperbaric oxygenation (HO) as adjunctive therapy is proposed by several authors, that recognize the prominent role of anaerobic microorganisms. In our series HO was performed in only one patient, with large defects and complicated clinical course. The healing of the traumas induced incredibly during the treatment, which lasted for 20 days, but due to lack of adequate sample we cannot extract certain results ^{16,17}.

Conclusions

Our sample is small and the severity of the disease is mild in most of the patients, to exceed significant results. Our experience indicates that Fournier's gangrene remains a surgical emergency. Most of the patients present only minor clinical signs in the skin and the immediate and correct diagnosis holds a key role in achieving a successful outcome. Multimodality treatment including early aggressive debridement, antibiotic administration, haemodynamic resuscitation, nutritional support, and hyperbaric oxygenation are essential for the disease's successful treatment ¹⁴.

Riassunto

La gangrena gassosa dei tessuti molli, nota come gangrena di Fournier, rappresenta una fasciite o/e miosite sinergica necrotica dei genitali, del perineo e della parete addominale. Diversi ne sono gli agenti causali ormai riconosciuti, vari i microorganismi coinvolti nella patogenesi della malattia ed infine moltissimi i fattori predisponenti.

La prognosi è direttamente rapportabile alla tempestività della diagnosi ed al precoce inizio del trattamento.

In questo lavoro presentiamo la nostra esperienza nel trattamento di 6 casi di gangrena di Fournier.

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