Fourier's Gangrene

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Mr. P.G., a 65-year-old male was referred to casualty by his family physician, following the complaint of a painful swelling in his left testicle, that was accompanied by a burning sensation on passing urine. Throughout the course of his admission at the local state hospital, a number of investigations were carried out. An ultrasound scan of both testicles, as well as a computed tomography scan of the abdomen and pelvis, delineated extensive thickening of the scrotal skin, as well as subcutaneous gas formation surrounding both testicles with extension to the penis and the right inguinal region. The patient was diagnosed with Fournier's gangrene, which is likely to be a complication of his uncontrolled Type II diabetes mellitus. This condition is classified as a rare and potentially life-threatening disease. Following the diagnosis, the patient received a right orchidectomy, circumcision, as well as subsequent rounds of scrotal debridement and wound cleaning. Pharmacological therapy was provided to relieve his symptoms.

Fact File on Fournier's Gangrene

Fournier's gangrene is classified as a fulminant form of infective necrotising fasciitis of the perineal, genital, or peri-anal regions, caused by both aerobic and anaerobic bacteria, including coliforms, Klebsiella, streptococci, staphylococci, clostridia, bacteroids, and corynebacteria (Johnin, 2000 & Yaghan, 2000). This rare, but potentially life threatening condition has been shown to have a predilection for male patients with diabetes, as well as long term alcohol misuse (Thwaini, et al., 2006). The synergistic activity of aerobes and anaerobes lead to the production of various exotoxins and enzymes which aid in tissue destruction, impaired phagocytic activity and spread of infection. The platelet aggregation and complement fixation induced by the aerobic flora, as well as the heparinase and collagenase produced by the anaerobic flora lead to microvascular thrombosis and dermal necrosis (Thwaini, et al., 2006). Although antibiotics and aggressive debridement have been broadly accepted as the standard treatment for Fournier's gangrene, the death rate from multiple organ failure remains high, averaging 20-30% of diagnosed cases (Pawlowski, 2004).

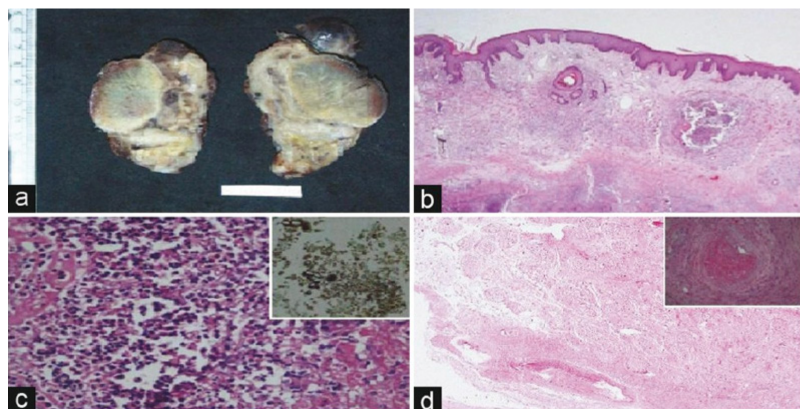

Figure 1: (a) Gross photograph of the testicles showing the cut surface containing extensive necrosis with haemorrhage just below the tunica; (b) Photomicrograph of scrotal skin showing necrotic areas in the dermis and subcutaneous tissue; (c) Photomicrograph showing broad aseptate fungal profiles with right angle branching; (d) Photomicrograph of testicles showing areas of necrosis and infarcted seminiferous tubules. (Retrieved from Kumar, et al., 2011).

This condition was named after the French venereologist, Jean Alfred Fournier, following his presentation of five cases in 1883 (Fournier, 1883). An estimated 2,476 cases of Fournier's gangrene have been reported in the literature worldwide (Vaz, 2006 & Burch, et al., 2007) however, it is difficult to quantify the epidemiology of this disease as the number of unreported cases remains unclear. The most historically prominent sufferers of Fournier's gangrene have been the king of Judea, Herod the Great, as well as the Roman emperor, Galerius.

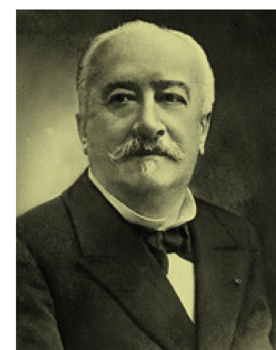

Figure 2: Jean Alfred Fournier (1832-1914), the French dermatologist who specialized in the study of venereal disease, after whom Fournier's gangrene was named.

Case Report on Fournier's Gangrene

Presenting Complaint

The patient was referred to casualty with a left testicular swelling, a right testicular mass and a burning sensation on passing urine. Moreover, these symptoms were accompanied by sudden pain, localized around the left testicle. The patient scored the severity of the pain as 6/10.

Past Medical & Surgical History

The patient is a known case of hypertension, hyperlipidaemia and Type II diabetes mellitus. He suffered from a peri-anal abscess 3 years ago. Furthermore, he underwent a left eye Schwannoma resectomy, circa 25 years ago. Recently, he received radiotherapy after having a tumour resected out of the right eye.

Drug History & Allergies

The patient is currently being prescribed the medications listed in Table 1. He is allergic to sulphonamide antibiotics.

Family History

The patient has a strong family history of diabetes mellitus. His mother developed gestational diabetes that ultimately progressed into Type II diabetes mellitus. She eventually died of multiple sclerosis. His sister is also affected with Type II diabetes mellitus.

Social History

The patient is an independent, retired civil servant, who lives with his wife who has been recently diagnosed with rectal carcinoma. He is an ex-smoker, and tends to engage in occasional alcohol intake during social events.

Systemic Inquiry

General Health: Obesity;

Cardiovascular System: Hypertension, hyperlipidaemia;

Respiratory System: Occasional shortness of breath, pleural effusion, pulmonary atelectasis;

Gastrointestinal Tract: Diverticular disease;

Genitourinary System: Burning sensation on urination, left testicular swelling, right testicular mass, urinary incontinence;

Central Nervous System: Peripheral neuropathy;

Musculoskeletal System: Left foot hyperkeratosis;

Endocrine System: Uncontrolled Type II diabetes mellitus.

Physical Examination & Preliminary Investigations

Upon admission to casualty, the examinations and routine investigations listed in Table 2 were carried out on the patient.

Differential Diagnoses

1. Fournier's gangrene;
2. Varicocoele;
3. Hydrocoele;
4. Strangulated inguinal hernia;
5. Testicular carcinoma.

Diagnostic Investigations

Requested investigation: **Ultrasound scan of both testicles;**

Justification for procedure: To exclude or confirm the presence of orchitis;

Result: The scrotal skin overlying both testicles is thickened, with accompanying extensive gas formation in the surrounding subcutaneous tissue. The right testicle is enlarged, measuring 2.2cm x 3.2cm, compared to the left testicle, which measures 1.4cm x 2.7cm. It contains an in-homogenous irregular mass, measuring 1.4cm x 1.7cm x 2cm, which demonstrates internal Doppler flow. The right epididymis is also enlarged with increased Doppler flow. A high grade varicocoele and small hydrocoele are also present. The left testicle and epididymis are unremarkable (Figure 3).

Conclusion: A right testicular mass is present, in which a malignant process cannot be excluded; a less likely differential would include inflammatory changes involving the right testicle. Fournier's gangrene is suspected.

Generic Drug Name	Dosage	Frequency	Formulation	Reason for Prescription
Metformin	1g	Trice Daily, Indefinite	Oral Tablet	Control of Type II diabetes
Simvastatin	20mg	Once Daily, Indefinite	Oral Tablet	Prevention of hyperlipidaemia
Aspirin	75mg	Once Daily, Indefinite	Oral Tablet	Anti-coagulation
Valsartan	140mg	Once Daily, Indefinite	Oral Tablet	Anti-hypertensive
Clexane	40mg	Once Daily	Subcutaneous Injection	Prevention of thrombus formation
Oxybutynin	2.5mg	Twice Daily	Oral Tablet	Treatment of urinary incontinence
Bromhexine	10mls	Trice Daily	Oral Solution	Mucolysis

Table 1: Medications currently being prescribed to the patient.

Examination / Investigation	Result
Pulse Rate	100 bpm
SpO_2	100 %
Blood Pressure	110/80 mmHg
Temperature	Afebrile
Heart Sounds	S1 + S2 + 0
Chest	Clear
Abdomen	Soft and non-tender
Electrocardiography	No abnormality detected
Chest X-Ray	No abnormality detected
Arterial Blood Gases	• pO_2: 180 mmHg • pCO_2: 33 mmHg • pH: 7.4
Blood Analysis	• Hb: 10.2 g/ dL • Na+: 127 mmol/l • K+: 3.2 mmol/l • Cl-: 101mmol/l • Glucose: 7.9 mmol/l

Table 2: Examinations and routine investigations carried out on the patient upon admission to the casualty.

Requested investigation: **Computed tomography scan of the abdomen and pelvis;**

Justification for procedure: To determine the extent of spread of Fournier's Gangrene (if present);

Result: There is extensive thickening and gas bubbles in the wall of the scrotum extending to the penis and the right inguinal area. The right testicle is larger in size with heterogeneous enhancement. No free gas is detected in the pelvis. There is sigmoid colon diverticulosis.

Conclusion: The findings are in keeping with Fournier's Gangrene.

Diagnosis

The history of the presenting complaint, as well as the visibility of subcutaneous gas formation surrounding both testicles on the Computed Tomography scan of the abdomen and pelvis indicated a possible infectious disease process. The presence of a strangulated inguinal hernia was excluded upon the physical examination of the groin. Moreover, testicular carcinoma was excluded after an ultrasound scan of both testicles. Thus, it was concluded that the patient was experiencing complications of Type II diabetes mellitus, leading to Fournier's gangrene, with an accompanying high grade varicoele, and a small hydrocoele formation in the right testicle.

Management

Pharmacological Therapy

Upon admission to the hospital, the patient's glucose levels were excessively high so he was started on insulin injections to prevent further complications related to this condition. In light of his underlying infectious disease process, the patient was started on beta-lactamase antibiotics. Pain relief, anxiolytic and anti-emetic agents were also provided, as documented in Table 3.

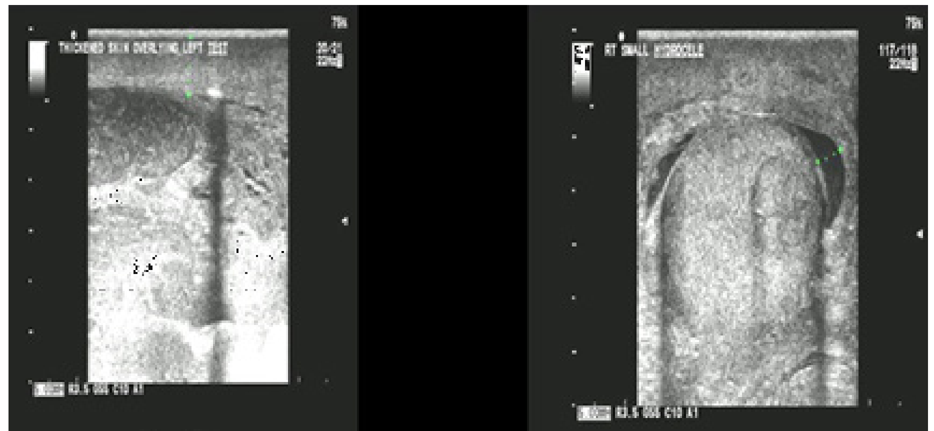

Figure 3: Mr. P.G.'s ultrasound scan images of the left and right testicles.

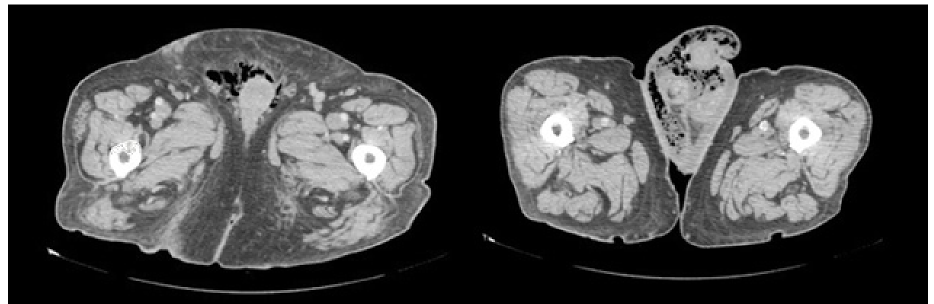

Figure 4: Mr. P.G.'s computed tomography scans of the abdomen and pelvis.

Generic Drug Name	*Dosage*	*Frequency*	*Formulation*	*Reason for Prescription*
Mixtard	*56 units*	*Twice Daily*	*Subcutaneous Injection*	*Control of Type II Diabetes*
Paracetamol	*1g*	*PRN*	*Intravenous Injection*	*Analgesia*
Pethidine	*50mg*	*PRN*	*Intramuscular Injection*	*Analgesia*
Haloperidol	*5mg*	*Once Daily*	*Intramuscular Injection*	*Anxiolytic*
Stematil	*12.5mg*	*PRN*	*Intramuscular Injection*	*Prevention of nausea and vomiting*
Amoxicillin	*500mg*	*Twice Daily*	*Oral Tablet*	*Antibiotic*
Tazocin	*4g*	*Trice Daily*	*Intravenous injection*	*Antibiotic*

Table 3: Medications given upon admission to the hospital.

Surgical Therapy

The patient has received subsequent rounds of scrotal debridement and wound cleaning, followed by a right orchidectomy. At the request of the plastic surgeons, circumcision was also performed, which involved penile skin excision along with elimination of oedematous foreskin and any underlying adhesions. Moreover, post-operative care following these procedures included monitoring of vital parameters and glucose levels every four hours, urinary catheter input/output charting, pain relief as well as nutritional planning of an improved diabetic diet.

Follow Up

As part of his continuous wound care regime, the patient was educated on how to change the tight packing dressing around the scrotum using Calcium Manginate, and disinfect the genital area with Betadine spray. Moreover, the patient was advised to follow a strict diabetic diet following discharge from the hospital to reduce the risk of developing further complications. Furthermore, the patient and his wife were educated about self- administration of insulin and the importance of hypoglycaemia monitoring was emphasized. A follow-up appointment at plastic surgery outpatients was booked.

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