CHAPTER 5

DIAGNOSIS AND TREATMENT OF FOURNIER'S GANGRENE

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Fournier's Gangrene was described in 1883 by Jean Alfred Fournier, a dermatologist, and venerologist from Paris, and is referred to by its specific name (1).

Fournier's Gangrene is a severe disease that affects the genital, perianal, and perineal regions. When the diagnosis and treatment are delayed, it progresses rapidly between the facial planes and causes widespread soft tissue necrosis. The disease typically spreads aggressively between the fascial planes and involves surrounding soft tissue. The spread of the infection causes microemboli in the arterial vessels, causing blood circulation disorder and tissue necrosis in the surrounding soft tissue and facial planes (2).

This process spreads rapidly between Dartos, Colles, and Scarpa fascia planes(2). Due to the involvement of the subcutaneous and facial areas first, doctors may be unable to diagnose it in the early stages of the disease. The overlying skin often appears as uncomplicated cellulitis(2-4).

Urogenital infections, anorectal infections, and trauma are the primary etiologic factors of Fournier's Gangrene. It is a polymicrobial condition usually caused by various aerobic and anaerobic microorganisms(5-7). The most common and cultured organisms are gram-negative bacteria in polymicrobial form. These include Group A Streptococci and Staphylococcus aureus, and E. Coli and Pseudomonas aeruginosa. (8,9).

These bacteria can enter the body from the urinary, intestinal systems, or dermal routes. Sometimes, urinary tract infections and perianal abscesses may also cause infection(2).

In FG, it may first give symptoms as local infection depending on the way of entry into the body. It may start as a local infection around the rectum in the perineum, the urethra, and the scrotum in the genital area (10,11). Although Fournier's Gangrene is more common in men and the elderly, it can affect both sexes and all age groups (12-15).

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Fournier's Gangrene is seen in healthy individuals (26% to 30%) and is more common in immunocompromised patients. It is frequently seen in elderly diabetic male patients with chronic alcohol use (16,17). The prognosis worsens in patients with multiple comorbidities (16).

ETIOLOGY OF FOURNIER'S GANGRENE;

Diabetes (glucosuric drugs used in diabetic patients), Malignant diseases, obesity, chronic alcohol drug addiction, and immunosuppressive chemotherapy are the most common conditions (3,17-20).

Despite advances all over the world in the treatment of sepsis due to the developed antibiotic therapy, the overall mortality rate for Fournier's Gangrene, unfortunately, remained stable at 40% (16,24,26). The reason for worrying death rates is the delay in diagnosis and treatment (8,17,26). The most critical factor affecting mortality is the time to surgery because early surgery can halve the mortality rate (8,26,27).

Although Fournier's Gangrene is an acute and rapidly progressing condition, it can progress slowly over days or weeks. Most studies have shown that the time from the onset of symptoms to hospital admission is approximately five days (28).

FOURNIER'S GANGRENE HAS FIVE STAGES:

Stage 1: Initial complaints include drowsiness, fatigue, and fever. These symptoms can be observed for 2 to 7 days.

Stage 2: The skin in the genital area is painful and edematous.

Stage 3: With increasing skin redness, genital pain, and tenderness are more pronounced.

Stage 4: Subcutaneous crepitation develops and appears dark.

Stage 5: Purulent discharge is observed. There is significant Gangrene in the involved area (29).

LABORATORY:

Evaluation should include a comprehensive metabolic panel (CMP) and a complete blood count (CBC) in suspected Fournier's Gangrene. The CBC will usually show a high white blood count (WBC) with the potential for a left shift. CMP may indicate concomitant renal failure and electrolyte abnormalities such as hyponatremia or metabolic acidosis.

High levels of lactate, c-reactive protein, and procalcitonin in the blood may be helpful in the evaluation of bacteremia and sepsis (30). Arterial blood gases are

used to assess oxygenation and acidosis, base deficit. Blood and wound cultures are required to plan antibiotic therapy. (31,32).

The Fournier Gangrene severity index (FGSI) was found to be inspired by the APACHE 2 score (33). This scoring system includes nine parameters, including vital signs and biochemistry. In most studies, the FGSI score was found to be significantly higher in the deceased group (34).

IMAGING:

The diagnosis of FG is based on clinical findings. In many cases, imaging is either unnecessary or not done because it can delay surgery. Surgical intervention should not be delayed in hemodynamically unstable patients (35).

Imaging can be used to determine the localization of the disease in asymptomatic and non-obvious cases. Simple radiography can show gas formation in soft tissue before the physical examination (36). Gas formation is present in most patients with FG and is specific to this disease (37). Ultrasonography helps detect subcutaneous gas or emphysema developing in the tissue. Gas in the scrotum is pathognomonic for Fournier's gangrene. A hazy appearance caused by infected subcutaneous tissue may appear as dirty shadowing (38).

Computed tomography is the most sensitive and specific imaging modality for FG diagnosis. Thickening in the affected area, fluid collection, subcutaneous emphysema, and abscess development are specific CT is also valuable for excluding perineal abscess, fistula formation, and various intra – and retroperitoneal disease processes (39). Magnetic resonance imaging is excellent for soft tissue imaging (40). Due to cost and time, its use is severely restricted (41).

TREATMENT / MANAGEMENT

When the diagnosis is sure, or the patient is not stable, emergency surgery should be performed immediately without waiting. Laboratory results should not be expected. Delaying intervention may result in the progression of a life-threatening infection. Fournier's Gangrene is a genuine surgical emergency. Since patients will usually be septic and in shock, managing the disease should be done with surgical and medical resuscitation (42). The first step in medical intervention is to start empirical broad-spectrum antibiotics without waiting for culture antibiogram results. Antibiotherapy should include triple therapy involving gram-positive, gram-negative, and anaerobic organisms where Fournier's Gangrene is most common. The most common microorganisms include staphylococci, streptococci, coliforms, Pseudomonas, Bacteroides, Clostridium, and yeast (43).

A combination of broad-generation cephalosporin, aminoglycoside, penicillin, and metronidazole is used as standard. Medical treatment is continued for at least two weeks(43).

HEMODYNAMIC RESUSCITATION AND PATIENT STABILIZATION

Fluid resuscitation plays an essential role in the treatment of FG patients. Patients with FG may present with hypotension and septic shock, and aggressive fluid resuscitation and hemodynamic support are required as this is associated with end-organ failure (44).

The patient's vital signs, urine output, and blood biochemistry should be closely monitored. Vasoactive agents such as norepinephrine should be started in patients with hypoperfusion to protect them from end-organ failure (45). If the patient's hypotension does not respond to fluid resuscitation, vasopressors may be added to the treatment. (43).

Electrolyte voids should be corrected with crystalloid fluids such as Lactated Ringer's solution (9,43,46,47). Diabetic patients with Fournier's Gangrene must correct their blood glucose abnormalities(15).

SURGICAL DEBRIDEMENT

As critical as these antibiotic and resuscitation measures are, these treatments should not delay the definitive and critical treatment for Fournier's Gangrene: urgent, early, and aggressive surgical exploration and debridement. Delaying the surgery will increase patient morbidity and mortality (48,26,49). The principle of surgical debridement is based on resectioning all dead, infected, and necrotic tissue. Removal of unhealthy tissue may be necessary. In this way, premature closure of the wound is prevented before the underlying tissues heal sufficiently. The removal of inanimate tissues in the first intervention is considered the most critical factor in the patient's survival. Ventilation of living tissues by fenestration is recommended in most studies. Close monitoring of the wound and repeated surgical debridements are necessary to control infection. Extensive debridement in FG surgery results in extensive tissue loss at the site. The choice of flap or graft in surgical reconstruction depends on the defect's location and the local tissue's presence (51).

HYPERBARIC OXYGEN THERAPY

Hyperbaric oxygen therapy is a beneficial option in the postoperative period. Occlusion developing in the vascular structure causes necrosis by disrupting tissue

nutrition. Therefore, oxygenation of the tissues will help the treatment. Oxygen therapy stimulates the immune system by increasing fibroblast proliferation and neutrophil functions and accelerating the passage of antibiotics into the cell, which accelerates wound healing (52).

VACUUM ASSISTED CLOSURE

Vacuum-assisted closure (VAC) method accelerates wound healing by reducing edema and increasing blood flow. This system increases angiogenesis and accelerates tissue nutrition and healing. Thanks to this system is the primary mechanism of the system to drain the infected fluid and debris (53).

TREATMENT SUMMARY

• Success in the treatment of Fournier's Gangrene is early diagnosis and surgical debridement.

•Hemodynamic resuscitation and broad-spectrum antibiotics should be added to the treatment.

• Early surgical intervention is essential for survival, imaging and laboratory tests should not delay intervention in critical cases.

• Postop debrided areas should be treated with sterile dressings or vacuum wound pressure systems.

• As the vascular structure of the testicles is not affected, it is usually preserved.

• If there is urethral involvement, a suprapubic catheter should be placed instead of the urethral catheter.

• If the rectum or anus is affected, a temporary colostomy may be required.

• Hyperbaric oxygen therapy can help reduce morbidity and mortality.

Reconstructive surgery should be performed when the debrided wound is completely healed. (35).

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