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Chapter 4

Perineal Gas Gangrene: Two Cases Report and Review of the Literature

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Additional information is available at the end of the chapter

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1. Introduction

Gas gangrene or clostridialmyonecrosis is a necrotic infection of skin and soft tissue and it is characterized by the presence of gas under the skin which is produced by clostridium. It is a potentially lethal disease which spreads quickly in soft tissues of the body.

Tissue necrosis id due to production of exotoxins by spore forming gas producing bacteria in an environment of low oxygen.

Herein we report two cases of perineal gas gangrene which were treated early with surgical debridement, antibiotics and hyperbaroxygenotherapy. Additionally, a review of the literature regarding gas gangrene is presented.

2. Case n°1

A 57 –year-old male presented to the emergency department reporting three days of worsening perineal and scrotal pain and swelling. He denied diabetes or trauma. His genitourinary examination revealed a draining lesion in his left inguinal region with surrounding indurations and cellulites extending onto his scrotum. His perineum was edematous and tender with a distinct region of ecchymosis and crepitus. The patient's blood pressure was 100/56 mmhg; his body temperature rose to 39°C. The laboratory data demonstrated severe infection with white blood cell count of 27000/mm3, a C-reactive protein level of 158mg/dl and a blood sugar level of 14,09mmom/L. Computed tomography showed a perineal collection extended to the left ischio rectal region with emphysematous gangrene extended to the

pelvis among the left iliac muscle and to the left inguinal region (Fig. 1). These results confirmed a diagnosis of gas gangrene of the perineum due to ischio rectal abscess. Shortly after arrival, the patient was transferred to the operating room for surgical debridement (Fig.2) with broad spectrum antibiotics (intravenous ampicillin-Sulbactam and metronidazole). Blood cultures were negative, and Gram stain of pus and necrotic tissue showed Gram positive rods, which were later confirmed as C. Perfingens. The patient was also treated with hyperbaric oxygen therapy postoperatively. We began HBOT five days after surgical debridement. He was exposed to pure oxygen at 2, 5 atmospheres absolute pressure for 100 to 120 min. This procedure was repeated three times weekly for one month.He had an uneventful recovery and was discharged after 15 days of hospitalization.

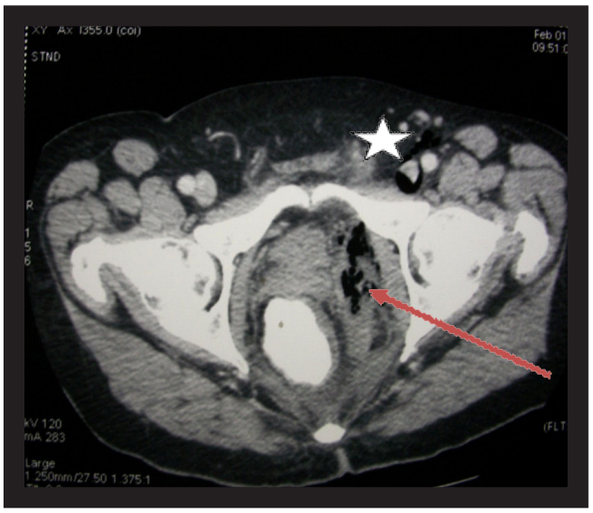
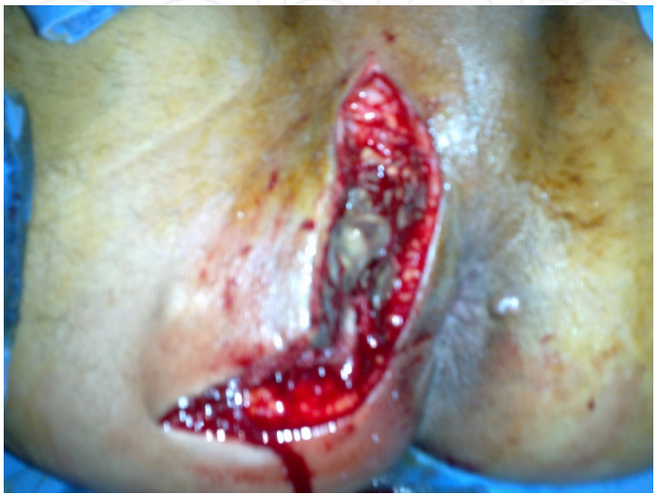


Figure 1. Computed tomography showed a perineal collection extended to the left ischio rectal region (red Arrow) with emphysematous gangrene extended to the pelvis among the left iliac muscle and to the left inguinal region (Asterix)



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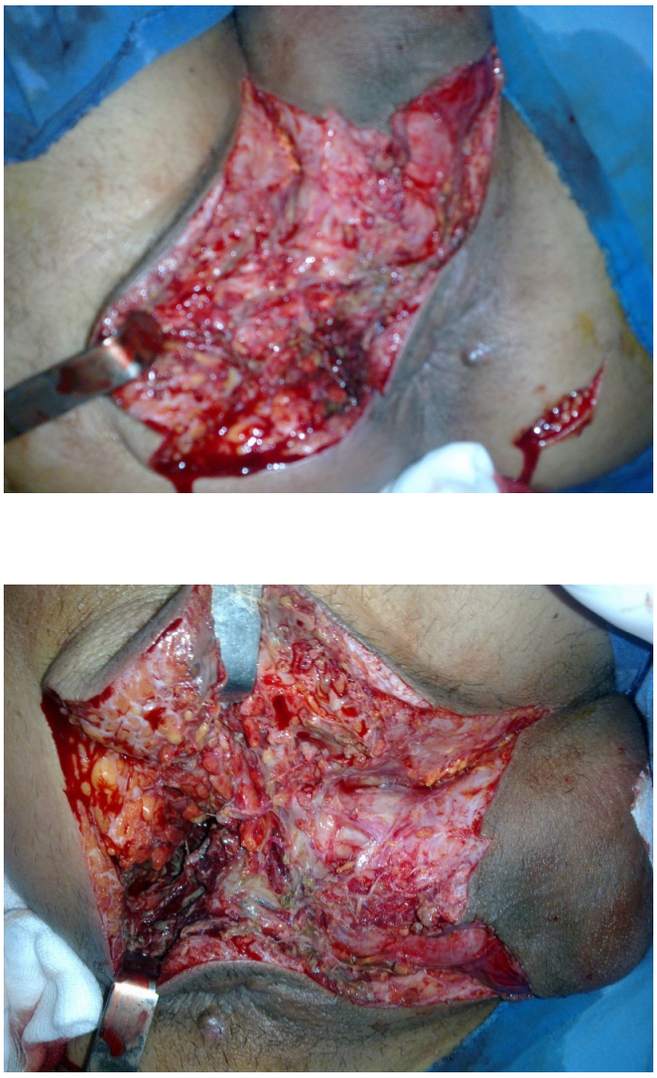

Figure 2. Perineal gangrene: Aggressive approach with extended surgical excision.

3. Case n°2

A 45-year-male was admitted with a three-day history of persistent perineal pain after initial intervention for anal abscess. There was no medical history of diabetes or others abnormalities.On examination, he was normotensive, tachycardic, and pyrexial at 39, 4°C. Cardiovascular, respiratory and neurological examinations were no contributory. Abdominal examination revealed a non tender abdomen with no sign of peritonism. A balloon-like induration with retract-pain was found in the perineum and extended to the left scrotum with redness of the skin. Manual rectal examination demonstrated a very tender rectum. Blood tests revealed a slightly elevated white blood cell count of 11700/mm3, a C-reactive protein level of 118mg/dl and serum glucose was normal. A CT pelvis demonstrated collection in the bilateral ischio-rectal fossa, with gas in the perirectal region extended to the high pelvis

(Fig.3). Theses appearances were consistent with those of gas gangrene. The patient was commenced on IV benzylpznicillin, metronidazole with aggressive fluid resuscitation and was immediately subjected to wide debridement, necrotic tissues excision. Examination of the rectum revealed bilateral ischiorectal abscess, which were drained and necessitated a temporary diverting colostomy. Culture of tissue specimens obtained intraopeartively was negative. Postoperatively he remained septicaemic, inotrope dependent, and ventilated for the next three days. Daily surgical debridement with resection of additional necrotic tissue was performed with two times performed in the operating room under general anesthesia.. Over the next 8 days, he gradually improved, and weaned off the inotropes. Treatment was continued with tazocillin-metronidazone for two weeks. Additionally, hyperbaric oxygen therapy was performed starting two weeks after the operation for three weeks. We performed the same protocol like the first case reported. He was discharged from the hospital on postoperative day 40 with satisfactory and progressive healing of the injured wound. The patient successfully recovered within three months after the initial operation.

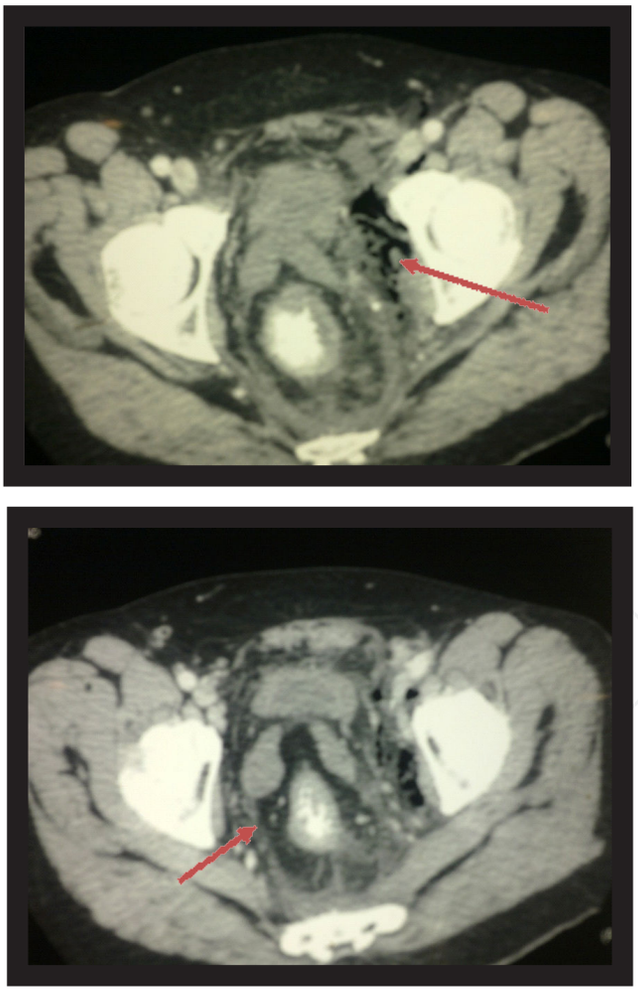

Figure 3. CT pelvis demonstrated collection in the bilateral ischio-rectal fossa, with gas in the perirectal region extended to the high pelvis

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4. Discussion

Gas gangrene and perineal necrotizing fasciitis or Fournier's gangrene are rare but serious infections with acute onset, rapid progression, systemic toxemia and a high mortality rate [1,2]. It is defined as a synergistic, polymicrobial necrotizing fasciitis of the perineal, perirectal or genital area. The bacterial synergism of aerobic and anaerobic organisms, indigenous commensal below the pelvic diaphragm, results in the production of exotoxins that lead to tissue necrosis and the synthesis of insoluble substances gases that give rise to the characteristic, though not constant, subcutaneous emphysema of perineal gas gangrene or Fournier gangrene [1-5].

It is well known that usual causative organisms in gas gangrene are clostridial species. However, a variety of other organisms: coliforms, anaerobic streptococci, and bacteriodes may also produce infection in which gas is demonstrable. Fermentation of glucose in tissues is thought to be the source of the gas in gangrenous infections.

The most common predisposing factors are diabetes mellitus and alcohol abuse [1,5-9]. In a review of 1726 cases, published in the literature, diabetes mellitus was a factor in 20% [1]. Others important predisposing factors include indwelling catheters, localized trauma, surgical procedure, malignancy, steroids, chemotherapy and human immunodeficiency virus [9-13].

Nowadays, the cause of this perineal gangrene is usually identified, with only 10% of cases being idiopathic. The necrotizing process commonly originates with an infection in the anorectum, the urogenital tract, or the skin. The disease is most often due to a local infection adjacent to a point of entry, including abscess (particularly in the perineal, perirectal, and ischio rectal regions), anal fissures and colonic perforations [1, 5, 7, 14, 15]. It has also been reported secondary to rectal carcinoma and diverticulitis. The urologic forms include urethral strictures, chronic urinary tract infection, and epididimitis. Insect bites, burns, trauma, and circoncision, have been reported as causes of pediatric Fournier gangrene, which is rarely seen [14].

Pain is a common presenting complaint and may be the first sign in patients with gas gangrene. Bullae and the bluish skin discoloration are classic findings. Edema and crepitus are usually present at the time of diagnosis. The triad of pain, tachycardia out of proportion to fever and crepitus is highly suggestive of clostridialmyonecrosis. Crepitus is identified at physical examination in 19 -64% [14]. Soft-tissue gas may be present prior to the detection of clinical crepitus.Fournier gangrene is classically associated with ecchymotic changes, edema, erythamatous and drainage from wounds.Systemic findings may include leukocytosis, dehydratation, tachycardia, thrombocytopenia, anemia, and hyperglycemia [3, 6, 14, 15].

Perineal gas gangrene tends to be polymicrobial in nature, with synergy of aerobic and anaerobic bacteria. The most commonly found bacteria are Escherichia Coli, followed by Bacteriodes and Streptococcal species. Other bacteria involved include Staphylococcus, Enterococcus, Clostridium, Pseudomonas, Klebsiella and proteus species [1, 8, 10, 14].

Infection in perineal gas gangrene tends to spread along the fascial plans. Infection arising from the anal triangle can spread along the Colles fascia (superficial perineal fascia) and

progress anteriorly along the Dartos fascia to involve the scrotum and penis. It can pass also superiorly along the Scarpa fascia to involve the anterior abdominal wall. If the Colles fascia is interrupted, the infection can spread to the ischiorectal fossa and subsequently to the buttocks and thighs [14].

Although the diagnosis of gas gangrene is often made clinically, emergency computed tomography (CT) can lead to early diagnosis with accurate assessment of disease extent. CT not only helps evaluate the perineal structures that become involved by gangrene, but also helps assess the retroperitoneum; to which the disease can spread[14,15]. Findings at CT include asymetric-fascialthickening, subcutaneous emphysema, fluid collections, and abscess formation. Subcutaneous emphysema is the hallmark of gas gangrene but is not seen in all cases.

Initial plain film may show moderate –to - large amounts of soft tissue gas. At radiography, hyperleucencies representing soft tissue gas may be seen in the region overlying the scrotum and perineum. Radiographic evidence of soft tissue gas may be present before clinical crepitus is detected, and its absence at physical examination should not exclude the diagnosis of Fournier gangrene. Ultrasonography (US) can be used to detect fluid or gas within the soft tissue. The thickened scrotal wall contains hyperchoic foci that demonstrate reverberation artifact [14-17].

CT imaging can detect smaller amounts of soft tissue gas than plain radiographs and can demonstrate fluid collections that track along the deep fascial planes. It often demonstrate the underlying cause of Fournier gangrenesuch as perineal abscesses, fistulous tracts, incarcerated inguinal hernias, and sources of infection due to intra-abdominal and retroperitoneal processes.

The management included surgical debridement of the necrotic tissue with incisions and drainage of the involved areas, antibiotic therapy and surgical intensive care [1, 5, 8, 14-20]. Early diagnosis and aggressive management are essential as overwhelming sepsis may quickly develop and is associated with a significant mortality rate reported as 16% in the Meta analysis of Eke [1]. The Fournier's gangrene severity index (FGSI) score is a numeric score proposed by Laor et al in 1995 to prognosticate on the outcome of the disease [4, 10, 21-22]. It is obtained from a combination of admission physiologic parameters, including temperature, heart and respiration rates, sodium, potassium, creatinine, WBC counts, hematocrit, and sodium bicarbonates. It has been proposed that a FGSI score> 9indicates a 75% probability of mortality and score < 9 is associated with a 78% probability of survival [21].

The radical removal of all necrotic tissue at the first operation is crucial to the survival of the patient. A second look operation should be performed at 24-48 hours to ensure that all necrotic tissue has been cleared. Multiple debridements may be necessary to remove all nonviable tissue.Patients with incomplete drainage and debridement or who undergo treatment with antibiotics alone have a poor prognosis [1, 18, 21, 22].

Antibiotic choice is variable and may be institutionally dependent. Prompt initiation of antimicrobial treatment covering arobic and anaeorobic organism is critical. Ampicillin-sulbactam or piperacillin-tazobactam or ticarcillin-clavulateare suggested empiric regimens, whereas antibiotic treatment should be tailored according to the susceptibility results. Neutralization of clostridial or streptococcal circulating toxins by the use of intravenous immune

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globulin has shown promising results but there are no data to support strong recommendations for its regular use in patients with gas gangrene [6].

Some authors have demonstrated that sugars (sucrose, glucose) inhibited the production of the main protein toxin (alpha toxin, theta toxin), responsible for the onset and progression of gas gangrene [23].

Adjunctive hyperbaric oxygen therapy (HBOT) has been shown to increase survival in animal model and in humans, to suppress alpha toxin of clostridium, enhance leukocyte-killing activity, enhance destruction of anaerobic bacteria and improve tissue repair in poorly vascularized tissues [1,18,24,25]. HBOT has shown some promise in shortening hospital stay, increasing wound healing, and decreasing the gangrenous spread in conjunction with surgical debridement and antibiotics. It may decrease the number of debridement required. It increases tissue oxygen issue tension to a high level that in turn inhibits and kills anaerobic bacteria while suppressing aerobic bacteria proliferation [6,14, 24, 25].

After healthy granulation has appeared, the healing time can be shortened with reconstructive procedures.

5. Conclusion

Gas gangrene of the genitalia and perineum continues to be a diagnostic and therapeutic challenge. Physician and emergency medicine personnel should always maintain high index of suspicion of this severe infection even in the absence of diabetes or others co morbidities and predisposing factors. CT scan defines the extent of the disease and is of greatest benefit in planning the surgical debridement. Early diagnosis and complete surgical debridement of all necrosis tissue are the most important prognostic factors. In addition, we may also consider consulting for HBOT and intensive care if appropriate.

Computed tomography showed a perineal collection extended to the left ischio rectal region (red Arrow) with emphysematous gangrene extended to the pelvis among the left iliac muscle and to the left inguinal region (Asterix)

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