

## NECROTIZING SOFT TISSUE INFECTION CASE STUDY (ADVANCED TREATMENT TECHNIQUES)

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### Abstract

Necrotizing soft tissue infections are likely lethal and the key points in their management are: prompt diagnosis, aggressive use of empiric antibiotics and most importantly, early radical debridement of affected tissue. One of several new strategies includes the use of negative pressure devices, which eliminates the need of daily dressing changes and promotes an enhanced vascularization. Our paper is based on a case study of necrotizing fasciitis, sepsis of a 70-year-old patient with undiagnosed comorbidities. Treatment of this pathology is time intensive and multidisciplinary. The basic treatment implies repeatable surgical interventions involving the debridement of the necrotic zones and aggressive use of broad-spectrum antibiotics, rigorous supportive care and application of the negative pressure device strategy, leading to a positive evolution of the patient, as well as a reduction in the hospitalization time.

**Keywords:** Infection; necrosis; soft tissue; sepsis; negative pressure device.

## 1. INTRODUCTION

Diagnosis of necrotizing fasciitis is rare but with fulminant progression to death. These infections occur within the soft tissue compartment from the dermis to the fascia and deep to the muscle layer, and are associated with necrotizing changes, they progress rapidly and can occur at any location in the body. The patient must be urgently admitted to the operating room where incisions, rapid debridement, lavage and drainage will be performed. The treatment is long-lasting, multidisciplinary and aggressive. [1, 2]

There are two different types of necrotizing fasciitis: type 1, caused by multiple organisms (streptococci, staphylococci, enterococci, etc.) and type 2, which involves the group A streptococci.

The mainstays of management are prompt diagnosis, aggressive use of empiric antibiotics and most important, early radical debridement of affected tissue. [3]

## 2. EXPERIMENTAL (MATERIALS AND METHODS)

The patient's treatment involved an advanced technique used to create negative pressure, a pressure that is below normal atmospheric pressure.

Negative Pressure Wound Therapy (NPWT) is a therapy utilizing topical negative pressure on the wound surface to enhance wound healing for the management of many acute and chronic wound

types, as well as various preemptive uses in term of prophylaxis of surgical site infections (SSI) or anastomotic dehiscence.

The device, used in the Intensive Care Unit (ICU), generates a vacuum that transports the extracted fluid, by suction, via tube to the canister.

Negative pressure wound therapy reduces these negative effects by: reducing bacterial load, increasing local blood flow, reducing edema, removing exudate from the wound, formation of granulation tissue, cell proliferation, angiogenesis (formation of new blood vessels), wound edges approximation, stabilization of wound environment [4, 5]

Data given by the firm which owns this device (Hartmann) was used (device is shown in

below).



Figure 1

Figure 1 VivanoTec Pro Negative Pressure Device

### 3. RESULTS AND DISCUSSION (CASE DETAILS)

A 70-year-old patient presents himself at the surgery emergency room with inappetence, fever and chills, hypotension, tachycardia, perianal pain (rectal abscess after observation). All these signs lead us to the suspicion of sepsis.

The patient reported perianal pains going back for approx. 1-2 weeks. During this period, he had been treated at home with homeopathic medication.

The patients' medical history shows him as being without prior surgeries, former smoker, chronically alcoholic, overweight and with neglected hypertension.

Upon admission, the patient presents mild anemia (Hemoglobin of 10.3 g/dL), signs of infection indicated by mild leukocytosis ( $11.24 * 10^3$  g/mm<sup>3</sup>), high fibrinogen (1321 mg/dL), high C reactive protein, hyperglycemia (379 mg/dL), hepatic dysfunction and signs of dehydration, all in the context of overall bad general condition.

The patient undergoes computer tomography scan for thorax, abdomen and pelvis at admission and during hospitalization. The scans highlight the following:

- bilateral pleural fluid
- pulmonary condensation
- enlarged liver
- thickening of left perianal fat
- small amount of fluid in the peritoneum
- infiltration of mesenteric and pelvic fat

During surgical interventions necrotizing fasciitis extended to the left lumbar spine, scrotal and retroperitoneal areas is diagnosed.

An empirical treatment with antibiotics (meropenem, linezolid, metronidazole and fluconazole) was initiated until completion of antibiograms. Bladder pleural drainage is placed, and pleural effusion reveals bilateral transudation.

Necrotizing fasciitis is caused by several bacteria that work in symbiosis and synergy, and the polymorphonuclear cells defense of the affected patients is influenced by under trauma hypoxia, recurrent surgery and other associated diseases (diabetes, atherosclerotic diseases, venous insufficiency, edema).

The nature of the disease requires several consecutive surgical interventions to remove the infected tissue. This is because the bacteria causing the disease is not cured only by surgery, which only removes the infected tissue but does not eliminate the bacteria (treated with antibiotics) which can, and most frequently does infect the remaining healthy tissue.

Controversy exists regarding how much tissue should be initially excised because the skin may often appear normal. Examinations of the normal-appearing tissues microscopically showed that the tissues had extensive early vascular thrombosis as well as vasculitis. These findings indicate that these tissues, though they have a normal appearance, have a high potential for full-thickness loss.

Following forty-eight hours after admission, repeated surgeries are performed during which repeated necrotomies are undertaken together with lavage and drainage of the wound by using vacuum-assisted closure system (VACs). Cultures reveal *Clostridium Perfringens*, *Escherichia coli*, *Klebsiella* and *Pseudomonas aeruginosa*.

From the first postoperative day, parenteral and enteral nutrition and hydro-electrolytic rebalancing are administered. Psychological support is offered and prophylaxis of eschars is performed.

On the tenth day of admission to the ICU, delirium develops with severe psychomotor agitation which responds to treatment after two days.

Treatment with antibiotics (colistin, biseptol and levofloxacin) is adapted to the cultures and antibiograms.

During intensive care, the wounds are treated with the vacuum-assisted closure system.

After about thirty days of ICU hospitalization, the patient was released with leukocytes of  $7.4 * 10^3$  g/mm<sup>3</sup>, hemoglobin of 10 g/dL, hydro electrolytically stable, afebrile, conscious and cooperative.

The mainstays of management are the prompt diagnosis, the aggressive use of empiric antibiotics and the most important early radical debridement of affected tissue.

In this case, emergency surgery, repeated necrotomies, VAC use, and broad-spectrum antibiotics were key milestones in the patient's favorable progression.

It is essential for such a diagnosis that patients should be operated by an experienced surgeon and that the necrotic tissue should be completely removed from the first intervention.

#### 4. CONCLUSIONS

This technique was used for the first time in the Intensive Care department and the results were very good. The disease is complex, and the successful treatment depends on cooperation, early diagnosis, debridement of the wounds and intensive care treatment with aggressive ant biotherapy. [6, 7]

Three key points were drawn from this case:

1. An overweight patient with elevated blood glucose, possibly undiagnosed diabetes, is a risk factor for fasciitis.
2. The VAC increased local blood flow, helping granulation tissue formation and promoting contraction of the wound edges.
3. Without a doubt, a decisive factor in the rehabilitation of the patient was the multidisciplinary treatment.

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