SEVERE INFECTION OF THE ANTERIOR ABDOMINAL WALL IN A PATIENT WITH DIABETES MELLITUS – A CASE REPORT

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Introduction

Skin and soft tissue infections encompass a wide spectrum of inflammatory diseases of the skin, subcutaneous tissue, fascia and muscles [1]. The necrotizing soft tissue infection (NSTI) is a life threatening infection, with high mortality rate, especially in patients with comorbidities. Case report. We are presenting a 53-year-old female patient with diabetes mellitus and a severe infection of the anterior abdominal wall resulting from a vulval infection. The treatment consisted of an extensive excision of the abdominal wall necrosis and surgical eradication of the deep infection source, hyperbaric oxygen therapy, and antibiotic conservative therapy. Conclusion. Prompt diagnosis, aggressive medical treatment and radical surgical debridement, as soon as possible, are the key to successful treatment.

Key words: Abdominal Wall; Diabetes Mellitus; Soft Tissue Infections; Skin Diseases, Infectious; Fasciitis, Necrotizing; Anti-Bacterial Agents; Debridment; Hyperbaric Oxygenation

Case Report

A 53-year-old patient, suffering from diabetes, receiving oral hypoglycemic therapy, was admitted to the Surgery Department of the General Hospital Novi Pazar, due to the anterior abdominal wall infection and stomach pain, in October 2015. The symptoms started two days earlier. On admission, the patient was in a bad general condition, confused, febrile, hypotensive, tachycardic, tachypneic, over weight and barely mobile. In the inguinal and vulvar regions, on the left side, there were signs of skin infection, with a purulent foul-smelling discharge. A serohemorrhagic bullous lesion, approximately 10 x 10 cm in size was visible on the front left abdominal wall in the periumbilical region, with local erythema and small epithelial lesions. In the lateral part of the anterior abdominal wall a stiffness zone was palpable, with a smaller area of crepitation. The rest of the skin was without clinically significant changes. The patient suffered from hypertension, which was considered comorbidity. Ten years earlier, the patient underwent left nephrectomy, due to renal calculus of the left kidney.

Common laboratory tests were performed at the department, as well as radiography and ultrasonography. On admission, the laboratory test results were: C-reactive protein (CRP) 308,7 mg/L; white blood cells (WBC) 36,3× 10⁹/l; red blood cells (RBC) 5,02 x 10¹²/l; hemoglobin (HGB) 152 g/l; glycemia 5,2 mmol/l; alkaline phosphatase 140 U/L, urea 6 mmol/L. The treat-
ment started with intravenous application of analgesics, triple antibiotic and supportive therapy, with intensive monitoring of vital parameters. After the general state and hemodynamic parameters were stabilized, 4 hours upon admission, a wide surgical excision of the necrotizing tissue of the anterior abdominal wall up to the zone without visible cutaneous changes was performed under general anesthesia. The surgery was performed and followed by rinsing with hydrogen and other antiseptic solutions, finished by placing a hydrogen peroxide dressing on the wound, and specific and delicate care of the infection-free skin. During the surgery, signs of anterior abdominal wall infection were noticed.

The supportive therapy and conservative antibiotic treatment continued (penicillin G, cephalosporins and metronidazole) empirically, until the specific antibiogram test results came. On the second day of hospitalization, a reoperation was performed with a repeated debridement and necrectomy, due to extensive infection (Figure 1). From the wound smear, Pseudomonas spp. was isolated and the treatment was continued with carbapenem and metronidazole, according to the antibiogram, with regular monitoring of laboratory parameters (Table 1). During the period of treatment, consultations were done with an internist, cardiologist, nephrologist, endocrinologist, and pneumothisiologist, due to the comorbidities.

The patient was transferred to a tertiary medical center on the fifth day of hospitalization with stable vital parameters and early signs of wound stabilization. The conservative treatment continued, with a daily wound treatment, as well as hyperbaric oxygen therapy (HBOT). Twenty days later, the patient was referred to our department, for further treatment. After 7 days, the patient was released from the hospital, with advice on bandaging the wound and occasional check-ups with the surgeon. Five months after the release, the anterior abdominal wall healed, and presented without signs of infection (Figure 2).

**Discussion**

Necrotizing soft tissue infection is a severe, multifactorial, life-threatening condition with diverse microbiological etiology characterized by rapid spread of infection which may cause extensive soft tissue damage [4]. Globally, the prevalence of NSTI has been reported to be 0.40 cases per 100,000 populations; it commonly affects men, with a male-to-female ratio of 3:1. The disease affects all age groups, but it occurs commonly among those over 50 years of age [3, 5]. The age is a very important predictor of lethal outcome of necrotizing infection and older patients have the poorest survival rate [6]. The most common comorbidity is diabetes mellitus (up to 60%). Other risk factors are comorbidities such as cirrhosis, obesity, alcohol abuse, corticosteroid therapy, smoking, immunodeficiency, hypertension, chronic renal failure [3, 7, 8]. There are differences between studies; Wong et al. reported 70.8% of patients with diabetes, but van Stigt et al. reported only 24.1% of patients with diabetes. Van Stigt et al. found cardiovascular disease to be the most frequent comorbidity in almost 40% of patients [7, 9].

Stone et al. and Yanar et al. reported 40–63% of deaths from NSTI [3, 10, 11]. The age of patients was considered to be an essential predicting factor in the potential lethal outcome. However, Kalaivani et al. believe that older age, combined with more comorbidities...
leads to an increased risk of lethal outcome with a more frequent occurrence of severe forms of diseases [12].

We are presenting a 53-year-old female patient with several risk factors: 10-year history of diabetes mellitus, hypertension, obesity and only one kidney (left nephrectomy 10 years ago). This case is in the group of higher risk patients, which is in correlation with other studies.

A great amount of microorganisms (microbes), aerobes as well as anaerobes, with a synergistic effect cause infections. Elliot et al. reported that NSTIs are commonly polymicrobial, while a single pathogen was responsible for causing an infection in 28 out of 182 patients [13]. There was no possibility of isolating anaerobic microorganisms out of the tissue sample in our facility. Therefore, it may be the reason why merely Pseudomonas spp. was isolated from the necrotizing samples.

The etiology of NSTIs is usually associated with a pathological process from cutaneous sources, anorectal or genital region [14]. The disease usually involves the perineum (50%), scrotum (30%), and the anterior abdominal wall (20%) [14, 15]. Chalia et al. [5] reported that scrotum was the most frequent anatomical site involved in more than 75% of patients in their study. In women, the most common entry site for infections and the basis for wide spreading are Bartholin abscesses and vulval skin infections [3].

The infection begins in the above mentioned areas and progresses as an inflammatory reaction that involves the superficial and deep-tissue planes. The extension of the infection and necrosis is facilitated by the synergy between different bacteria and toxins, and the enzymes they produce. The fasicl and hypodermic necrotic spread is greater than the overlying skin changes [3]. The microorganisms produce various endotoxins and exotoxins. These toxins are also released into the systemic circulation, resulting in systemic inflammatory response syndrome (SIRS) and septic shock [14]. The detection of microorganisms is essential for the implementation of a causal therapy for infectious diseases. The knowledge of the pathogen and its antibiotic susceptibility enables a targeted antimicrobial therapy to be conducted and guides the subsequent patient management [16].

Patients with this kind of infection usually have symptoms such as local pain, local warmth, erythema, tachycardia and fever, followed by hypotension and tachypnea. The infected site displays tenderness, skin necrosis, and hemorrhagic bullae [3, 17].

In our patient, the entry site for infection was the vulval infection, which spread in the left inguinal region, from where it expanded to the other parts of the anterior abdominal wall. Clinical signs and local findings on admission are in agreement with the mentioned studies.

Early diagnosis, aggressive resuscitation of the patient, administration of broad spectrum antibiotics, and aggressive radical surgical debridement, as soon as possible, are the key to successful treatment [5]. The shorter the interval between the infection onset and initiation of the treatment, the greater are the odds for better prognosis.

Although the diagnosis is based on clinical signs and physical examination, laboratory tests and radiological methods may help to delineate the extent of the disease.

The most important laboratory scoring system for early diagnosis is the Laboratory Risk Indicator for Necrotizing Fasciitis (LRINEC) score. A LRINEC score ≥ 6 indicates high rates of mortality [6, 9, 18]. In our patient the LRINEC score was six on admission, placing her in the high-risk group.

Emergency surgical debridement is the primary management modality for NSTI. Surgical intervention is life-saving and must be performed as early as possible. It can be repeated in the next 24 h or later, depending on the clinical course of the necrotizing infection [3]. In the study of Benjelloun et al., all patients underwent radical surgical debridement, ranging from 1 to 10 procedures, with an average of 2.5 [19]. Glass et al. reported that the median number of debridements in their study was 2, and the median number of total surgical procedures was 5 (range: 1 – 17) [2]. Aggressive surgical debridement (< 24 h) is associated with a lower mortality [7, 20].

The utility of HBOT in the treatment of NSTIs, as an essential part of treatment, has not been proved. The study of Shaw J. J. et al. showed that using HBOT was associated with increased survival in the severe cases, whereas in all other patients HBOT was associated with increased cost, without an immediate survival benefit [21].

Before surgery, our patient underwent fluid resuscitation and treatment with parenteral broad-spectrum triple antimicrobial agents, continuous monitoring and other conservative therapy. Bearing

### Table 1. Laboratory test results during the first hospitalization

<table>
<thead>
<tr>
<th>Date</th>
<th>CRP (mg/l)</th>
<th>WBC (x10^3/l)</th>
<th>RBC x10^12/l)</th>
<th>HGB (g/l)</th>
<th>Glycemia (mmol/l)</th>
<th>Creatinine (Umol/l)</th>
</tr>
</thead>
<tbody>
<tr>
<td>09.10.2015.</td>
<td>308.7</td>
<td>36.3</td>
<td>5.02</td>
<td>152</td>
<td>5.2</td>
<td>76</td>
</tr>
<tr>
<td>10.10.2015.</td>
<td>310.1</td>
<td>40.1</td>
<td>4.71</td>
<td>144</td>
<td>8.8</td>
<td>73</td>
</tr>
<tr>
<td>11.10.2015.</td>
<td>300.2</td>
<td>34.0</td>
<td>4.43</td>
<td>136</td>
<td>9.1</td>
<td>80</td>
</tr>
<tr>
<td>12.10.2015.</td>
<td>276.5</td>
<td>31.3</td>
<td>4.28</td>
<td>125</td>
<td>20.1</td>
<td>72</td>
</tr>
<tr>
<td>13.10.2015.</td>
<td>208.3</td>
<td>22.7</td>
<td>4.42</td>
<td>122</td>
<td>7.5</td>
<td></td>
</tr>
</tbody>
</table>

Legenda: CRP – C-reaktivni protein, WBC – bela krvna zrnca, RBC – crvena krvna zrnca, HGB – hemoglobin
in mind that the patient was admitted two days after the symptoms onset, the first surgical intervention was made within 4 hours after admission, after correction of her general condition. The reintervention, with additional debridement, was done in the next 24 hours, due to the expansion of the infection. The following treatment included referral of the patient into the tertiary healthcare center, where the wound treatment was continued with daily use of HBOT. The patient reacted well to the prescribed therapy.

**Conclusion**

Necrotizing soft tissue infection is a very severe and unpredictable disease. It requires fast diagnosis and aggressive treatment, which primarily means wide surgical excision of the infected tissue and use of wide spectrum antibiotic treatment. A multidisciplinary approach to the treatment is crucial, in order to increase the odds of full recovery.

**References**