THE EVOLUTION OF THE DIFFUSE EFFUSIONS OF THE CEPHALIC EXTREMITY IN PATIENTS SUFFERING FROM DIABETES MELLITUS

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Abstract

The diffuse infections of the facial bones are serious disorders with a fulminant evolution localized at the level of the soft tissues of the head or of the neck. The association of these disorders with diabetes mellitus is unfortunate since it seriously aggravates the treatment and the evolution of these patients. In this paper we will present the cases of two patients with such a pathology, but one of them was suffering from diabetes mellitus as a fundamental disease. The postoperative evolution of the patient suffering from diabetes mellitus is unfavourable, and this is greatly determined by the decompensated fundamental disorder. Most cases of diffuse infections localized at the level of the cephalic extremity have diabetes mellitus as a fundamental disease. The postoperative evolution is unpredictable and requires the correction of the glycemia values as soon as possible in order to obtain a favourable result. The presence of these severe infections requires an early diagnosis and a radical surgical attitude associated with a hydroelectrolytic counterbalance treatment and with the treatment of the fundamental disease.

keywords*: necrotizing fasciitis, diffuse infection, mediastinitis, diabetes mellitus*

Introduction

The diffuse infections localized at the level of the soft tissues of the head and of the neck are severe non-specific infections, caused by an aggressive bacterial flora and with marked tendency of local, regional or at distance spread. The last years' studies indicate a tendency of increasing in proportion of this disorder in patients presenting infections of the perimaxillary spaces [1].

The dynamic of the facial bones infections is subject to the control of the local factors involved in restraining their spread, and of the general factors especially, expessed by the response of the host's immune system. Among the general factors involved in the evolution of the infections of the facial bones, diabetes mellitus has a fundamental role. Besides other systemic modifications, it is well known that diabetes mellitus, especially when it is decompensated, determines a

marked diminishing in the body's capacity of protection against infections. At the same time, patients suffering from diabetes mellitus are, most of the times, overweight and present different degrees of obesity. The association of this pathological characteristic with diabetes mellitus is unfortunate because the adipose tissue presents a low resistance to infections and favours the spread of the effusions.

The aim of the research

In this paper we present the cases of two patients presenting diffuse infections of the facial bones, associated with cervical fasciae necrosis, which determined the spread of the infection at the level of the mediastinum accompanied by a septic state.

The two cases are self-evident for the understanding of the way in which facial bones infections can spread and of the role that the presence of the systemic conditions have in the evolution of the disease for which these patients have been treated.

Patients and approach

For this research we have chosen two patients hospitalized and treated in The Oral and Maxilofacial Surgery No 1 Clinic in Cluj-Napoca. The two patients presented diffuse infections of the floor of the mouth. We have selected the case of a patient with a systemic pathology represented by diabetes mellitus and the case of a patient without a systemic pathology.

Case I

The patient C.I., aged 46 is hospitalized in The Oral and Maxilofacial Surgery Clinic Nr.1 in Cluj Napoca with the diagnosis of: diffuse infection of the floor of the mouth, necrotizing fasciitis, suspected descending acute mediastinitis.

From the anamnesis we would like to mention that the patient was aware of the fact that he was suffering from type 2 diabetes mellitus, but he had not followed the hygienic-dietary directions or the prescribed medical treatment. Also, the patient presented second degree obesity.

The disease history reveals its sudden onset five days before, manifested by the appearance of a tumefaction at the level of the floor of the mouth with a tendency of spreading into both latero cervical spaces. The patient complains of pains at the level of the swollen part accompanied by dysphagia and trismus. Two days after the onset of the disease the patient is hospitalized in The Negresti Oas Town Hospital where he is prescribed a medical treatment with 4000000 U.I./day Penicillin administered intravenously and perfused Metronidazol 2g/day. The evolution is unfavourable, characterized by the accentuation of the tumefaction of the floor of the mouth and of the bilateral laterocervical regions, reason why the patient is directed to The Oral and Maxilofacial Surgery Clinic Nr.1 in Cluj Napoca, where he is hospitalized with the above mentioned diagnosis.

Laboratory examinations illustrate the presence of decompensated diabetes mellitus with degree 1 dehydration and a glycemia of 412 mg/dl. Consequently, specialist examination is required, and 16 U.I. of rapid action insulin is administered intravenously to the patient during hydro-electrolytic counterbalancing period, followed by a subcutaneous administration of rapid insulin in 4 doses/ day of 16-14-14-10. Laboratory

tests also illustrate an increase of the leucocytes number (12900) with values of the P. of 82%, the L. of 7% and the M. of 11% and the V.S.H. 81-118/mm.

General clinical examination at hospitalization reveals an altered general condition, with degree 1 dehydration, the patient being apathetic and presenting difficulty of breathing, while at the level of the lateral walls of the pharynx we notice a big tumefaction and vicinity edema. The breathing frequency is increased to 35 breathings a minute and the oxygen saturation varies between 75 and 85%. The pulse is hardly perceptible and the heart rate is increased to 112 beats/minute.

This requires an immediate surgical intervention under general anaesthesia with naso-tracheary intubation with sevofluorane inhalation pivot and we perform a horizontal juxtahyoidian incision so that we can approach the bilateral spaces of the floor of the mouth. After the sectioning of the integuments and of the subcutaneous tissues we notice the presence of necrotizing tissues at the level of the floor of the mouth (figure 1).

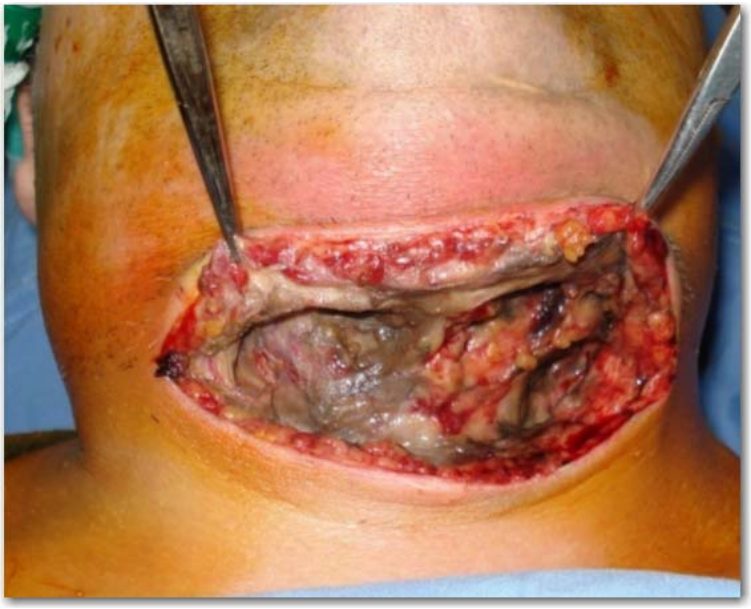

Figure 1. Performing the incision for the approach of the floor of the mouth tissues, with the illustration of the septic necrosis zone.

We notice an extensive necrosis of the content of the bilateral submandibular and submental spaces, and of the bilateral laterocervical fascial system, including the adipose conjunctiva tissue at the level of the latero-pharynx and retro-pharynx area. We perform necrectomy extended up to the healthy tissue (figure 2), followed by the installation of several drainage tubes. There is no visible purulent secretion at the level of the floor of the mouth or in the laterocervical space, but we notice quantitatively reduced brownish, fetid secretions.

The intraoperative clinical aspect reinforces the suspicion of descendent acute mediastinitis. That is why we perform an aspiration puncture by means of a trochar at the level of the left hemithorax. We can notice purulent collections at the mediastinum level and we aspirate about 140 ml of pus (figure 3), but the patient will be transferred to the thorax surgery department for a wider cut.

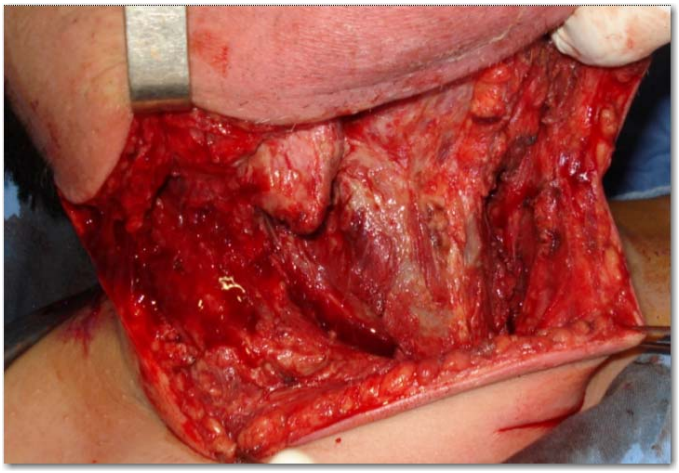

Figure 2. Intraoperative aspect after removing the necrosis zones.

Figure 3. The evidence of the purulent secretions at mediastinum level

We decide upon a sustained local antiseptic treatment by means of slight antiseptic and oxygenated solutions in order to combat the anaerobe bacterial flora. The dressings are changed every 60 minutes, moment when we perform the antiseptic and oxygenated lavage as well.

In parallel we initiate an antibacterial chemotherapeutic treatment with perfused Metronidazol 2g/day, i.v. Ceftriaxon 4g/day. Nonsteroidal anti-inflammatories are administered in order to combat the pain and the edema. The values of glycemia remain stable, increased (over 400mg/dl), suggesting an evolution towards a toxicoseptic condition with severe dehydration.

The postoperative evolution of the patient is unfavourable, with progressive alteration of the general condition and the onset of a multiorganic insufficiency 12 hours after the operation. The patient dies 24 hours after the surgical intervention because of cardiorespiratory arrest.

Case II

The pacient T.V., aged 22, is hospitalized in The Oral and Maxilofacial Surgery Clinic Nr.1 in Cluj Napoca with the diagnosis of: diffuse infection of the right side of the floor of the mouth with odontogenous starting point (3.8).

The anamnesis reveals the presence of some vicious habits (smoker-two packets a day and regular alcohol consumption), but no other systemic disorder is revealed.

The disease had a sudden onset 7 days before when odontalgia appeared at the level of the tooth 3.8 followed by left submandibular tumefaction. The patient undergoes an antibacterial chemotherapeutic treatment with penicillin, as a result of which the left submandibular tumefaction diminishes, but an evident right submental and submandibular tumefaction appears. The general condition of the patient alters presenting inspiratory dyspnea (SpO2=93-94%), tachycardia and mild fever. The trismus is present from the beginning and is accompanied by dysphagia and odinophagia.

The patient is hospitalized urgently and the clinical examination reveals an obvious right submandibular, submental and laterocervical tumefaction. We take quick action performing general anaesthesia with naso-trachaery intubation with halotane inhalation pivot, a right submandibular incision, continued around the mandibular angle until we reach the anterior edge of the sternocleidomastoidian muscle and a presternocleidomastoidian incision. We reveal the content of the left submandibular, submental and laterocervical spaces where there is a necrotizing tissue accompanied by quantitatively reduced brownish, fetid secretions (figure 4).

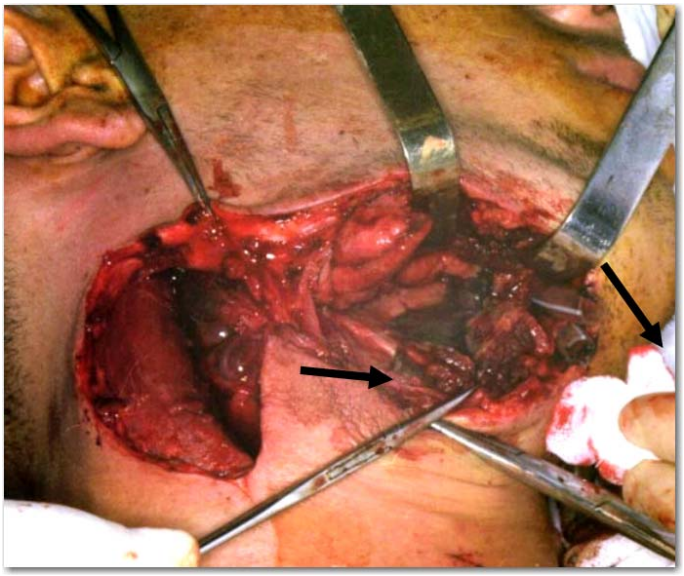

Figure 4. Revealing the right submandibular and laterocervical spaces with the septic necrosis zones

We perform necrectomy in the left submandibular and submental spaces, in the laterocervical space and in the big left vessels spaces. We install several drainage tubes for lavages with slight antiseptic and oxygenated solutions every 2 hours. The clinical spread of the effusion correlated with respiratory difficulties leads to the supposition of a mediastinum septic involvement, reason why we demand a CT thorax examination. This will reveal the presence of the purulent collections at the level of the mediastinum (figure 5).

The patient is transferred to the Thorax Surgery department in Cluj Napoca, where he will undergo a right lateral thoracotomy with pneumolysis, wide cutting and anterior and posterior mediastinum drainage.

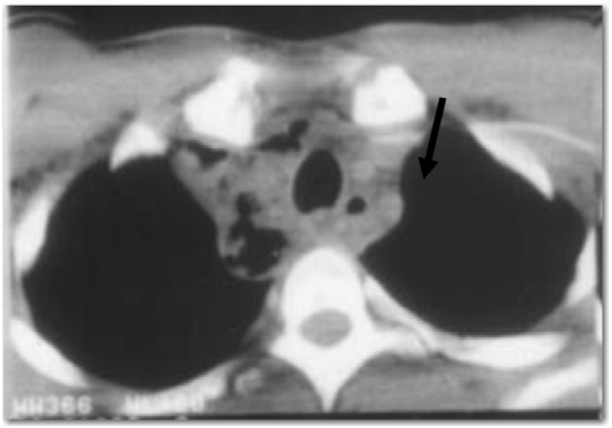

Figure 5. The CT revealing the mediastinum septic determinations

The antibacterial treatment is achieved with i.v. Clindamicina 2.4 g/day and perfused Metronidazol 2g/day. The general treatment has in view the analgesia with nonsteroidal anti-inflammatories, a hepatoprotective, gastric anti-secretory treatment, and hydro-electolytic counterbalancing.

The postoperative evolution is favourable, and the patient will leave the hospital completely recovered after 18 days in hospital, and after following the casual treatment. (figure 6)

Figure 6 – Clinical aspect when leaving the hospital

Discussions

The diffuse infections of the cephalic extremity are severe non-specific infections localized at the level of the tissues of the floor of the mouth or of a hemiface, characterized by the presence of the extensive tissular septic necrosis with or without pus and the absence of any limit from the vecinity tissues. The association of these infections with necrotizing fasciitis localized at the level of the neck fasciae is frequent and represents an element of negative prognosis for the patient. The presence of the fascial system determines to a great extent the limits and the possibilities of spreading of these infections [2]. Along the cervical fasiae the effusions can spread until they touch mediastinum or until they reach the skull base. Klabacha et al. [3] propose a classification of the necrotizing fasciitis into four stages: type I – inflammations of the epidermis, type II – extensive inflammation at the level of the derma, type III – inflammation localized at the level of the muscular and superficial aponevrosis structures and type IV – extensive infections at the level of the deep muscular and fascial structures. The necrotizing fasciitis associated with the diffuse infections of the head could be included according to this classification in type IV, the structures of the derma and of the epidermis being more rarely affected by the inflammatory process in comparison to the structures of the deep cervical fasciae. Both cases presented in this paper presented necrosis of the deep cervical fasciae. The fact that the inflammation is rather deeply localized is logical consequence of its evolution, the infection extending to the level of the fascial system in the latero-pharynx space and in the infratemporal fossa and not at the level of the integuments.

There is a tendency of an increase in the number of effusions localized around the facial bones which have a tendency of diffusing. In a previous study developed over a period of five years by the same authors, we have discovered a greated number of complicated diffuse infections with a systemic pathology similar to the one in the current study [1]. This tendency of the infections of diffusing appears mainly on the basis of some systemic disorders that have as a result a decrease in the protection capacity of the body or as a consequence of an incorrect antibiotherapy, by means of which the bacterial flora, resistent to antibiotics and with a higher virulence can be selected. The most common starting point of the facial bones diffuse infections is represented by the dento-parodontal disorders, followed at distance by pharynx disorders and the radiotherapy of the fascial tissues [4].

The infection can extend from the maxillofacial territory in two ways: along the fasciae or hematogenously. By means of the fascial system the infection spreads most frequently towards the mediastinum, the anterior and the posterior mediastinum being affected. The mediastinum involved in the septic process can better be revealed by means of CT imagistic examinations where even gas accumulations resulting through the necrosis process can be detected [5]. The hemato-genous spreading leads to the septic involve-ment of the liver or the kidneys most frequently accompanied by an insufficiency of the affected organs. T.Lung and col. [6] present the case of a patient with a diffuse infection localized at the level of the genian

region aggravated by necrotizing fasciitis and septic determinations at the level of the thigh and toes integument. Most patients developing such disorders present systemic disorders which seriously diminish the protection capacity of the body by their direct or indirect actions, by means of the immunosuppressant medication administered for treating the fundamental disease.

Diabetes mellitus represents a pathological condition with major implications in the dynamics of the facial bones diffuse infections. The association of this state with the presence of the aggressive bacterial flora (especially the anaerobic one) at the level of the infection centre can have unfavourable influences upon the evolution of the effusions and represents a major vital risk for the patient. Kantu and col., during a research performed on patients presenting cervico-facial necrotizing fasciitis, discovered decompensated diabetes mellitus as main systemic disorder responsible for immunosuppression, but without specifying the values of glycemia of the patients in the study group [7]. Because of the association of these morbid states, we have noticed an incidence of the necrotizing diffuse infections (with or without pus) of about 50% greater in patients suffering from decompensated diabetes mellitus irrespective of type. Other important risk factors are: the diabetes duration older than 10 years, the lack of insulin therapy as well as the total or partial absence of the corresponding metabolic balance (as it can be seen in the first case presented).

The therapeutic attitude has to be a rapid and radical one in such cases. The wide surgical opening of the regions affected by the septic process is obligatory. Thus, we have to perform an efficient drainage, to remove the necrotizing areas and last, but not least, to air the tissues in order to combat the main anaerobe bacterial flora responsible for the presence of the necrotizing fasciitis in a proportion of 71% of cases according to some authors [8]. Hyperbaric oxygenotherapy associated to the surgical treatment and to the antibiotherapy has been reported as a beneficial factor in the treatment of the necrotizing fasciitis [9], which draws the attention again on the importance of the anaerobe flora in the appearance and the evolution of these disorders. In parallel we have to treat the septic complications at distance by means of thoracotomies with mediastinum drainage and massive antibiotic treatment. Even in such circumstances the disorder can be refractory to treatment, reason why the seriate surgical interventions are essential for the necrectomy of all the tissues affected by the septic process [10].

Another important component in the management of the facial bones diffuse effusions is the treatment of the systemic disorders or of those maintaining the general condition. The correction of the glycemia under the attentive supervision of the diabetologist and the improvement of the plasmatic protein values is obligatory. The hydroelectrolytic balancing, especially of the ionic calcium, which drops rapidly as a consequence of its combination with fatty acids resulted from the fatty septic necrosis with formation of insoluble soap is absolutely necessary [11].

Conclusions

The presence of the systemic disorders which diminish the body capacity of protection is a factor that significantly aggravates the evolution of facial bones diffuse infections.

The selected treatment for these severe non-specific infections is the surgical one, but we must pay special attention to the balance of the homeostatic values in order to create the necessary conditions for the body to recover. Balancing glycemia both before and after the surgical intervention is absolutely necessary for a favourable evolution.

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