Case Report

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Ludwig's angina, a rare complication of mandibular fractures

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Abstract

Traumas are a major problem worldwide. A considerable proportion of traumas are located in the cephalic extremity. Neglect of these disorders by patients or those responsible for patient management may result in particularly serious consequences. This paper presents the case of a 58-year-old male patient with an intraorally open mandibular fracture, which left untreated for 3 days, was complicated by Ludwig's angina. Following aggressive surgical treatment during which the mandibular fracture was manually reduced and immobilized with a metal splint fixed with circumdental wires and effective antibiotic therapy, the septic process was terminated and the patient's fracture and infected wound were healed. The correct and rapid treatment of open mandibular fractures is mandatory in order to avoid severe septic complications.

Keywords

Ludwig's angina, mandibular fractures, head trauma

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Introduction

Traumatic lesions are a major public health problem; almost 16 000 persons die from

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traumas every day worldwide.[1] The most frequent causes of traumas are road traffic accidents, falls and interpersonal aggression.[2] The maxillofacial region is frequently affected by traumatic lesions and the mandible is the most frequently fractured bone in this area.[3]

The absence of specialized treatment, the nature of the trauma or incorrect treatment may lead to a number of complications that affect up to a quarter of patients with mandibular fractures.[4] The most frequent complications of mandibular fractures are sensitivity disorders, dysocclusion and infections.[4] The majority of the infections secondary to mandibular fractures are limited and have a standardized treatment; severe suppurations such as Ludwig's angina or necrotizing fasciitis are exceptional.[5]

Diffuse suppurations of the cephalic extremity such as necrotizing fasciitis or Ludwig's angina are major life-threatening disorders, regardless of their starting point.[6] The association between traumatic lesions and diffuse cervical suppurations is rare and complicates their treatment, significantly aggravating the prognosis of patients with these conditions. Based on these considerations, this case report describes the presentation of a clinical case in which the two diseases are associated as it is believed that this will be of interest to those involved in their treatment, as well as for those responsible for the management of traumatized patients.

Case report

A 58-year-old male patient was admitted on 3 October 2014 as an emergency case to the Department of Oral and Maxillofacial Surgery, Iuliu Haţieganu University of Medicine and Pharmacy Cluj-Napoca, Cluj-Napoca, Cluj, Romania with a diagnosis as follows: Ludwig's angina, maxillofacial trauma as a result of interpersonal aggression that was 3 days old at the time of presentation, an open fracture of the lateral mandibular body with teeth 3.5 and 3.4 in the fracture focus, osteitis in the fracture focus, left anterior cervical haematoma and a septic state.

The disease history showed the presence of a trauma by contusion in the cephalic extremity, occurring 3 days before the patient's presentation to the specialized service. Immediately after the trauma, the patient had presented to the emergency department in his local residential area, where a general clinical examination and imaging investigations were performed, which showed the presence of a mandibular body fracture. The patient was referred to the Department of Oral and Maxillofacial Surgery, Iuliu Haţieganu University of Medicine and Pharmacy Cluj-Napoca, Cluj-Napoca, Cluj, Romania for treatment of the mandibular fracture. The patient refused treatment and went home, despite medical indications, although he had postoperative oedema, functional disorders with the alteration of mastication, deglutition and phonation and pain during mandibular movements. Three days after the trauma, a marked alteration of his general state occurred, with an increase in pain and functional disorders, which is why the patient presented again to the Department of Oral and Maxillofacial Surgery, Iuliu Haţieganu University of Medicine and Pharmacy Cluj-Napoca, Cluj-Napoca, Cluj, Romania for specialized treatment.

At the time of presentation on 3 October 2014, a general clinical examination showed an alteration of his general state with tachycardia (heart rate 105 beats/minute), subfebrility (peripheral temperature 37.5°C) and dehydration without the onset of respiratory problems. A locoregional clinical examination showed the presence of submandibular tumefaction with the bilateral involvement of the submental and submandibular region, tending to extend to the right laterocervical area without the involvement of

Figure 1. A 58-year-old male patient presented with trauma caused by contusion in the cephalic extremity that had occurred 3 days previously. Clinical appearance at the time of presentation for specialized treatment showed the presence of submandibular tumefaction with the bilateral involvement of the submental and submandibular region, tending to extend to the right laterocervical area without the involvement of the sublingual space. The overlying skin was distended, shiny, congested and left submandibular and submental cyanosis was present. The colour version of this figure is available at: http://imr.sagepub.com.

the sublingual space. The overlying skin was distended, shiny, congested and left submandibular and submental cyanosis was present (Figure 1). The palpation of the cyanotic areas was accompanied by pain complaints and evidenced the presence of high consistency inflammatory infiltrate.

Intraoral clinical examination showed that mouth opening was limited, with a maximum range of motion of 1.2 cm, accompanied by increased pain during mandibular movements. The oral floor mucosa was tumefied, congested and covered with fibrin deposits. In the fracture focus, there was an intraoral open wound, whose instrumental exploration evidenced bone stumps in the fracture focus.

The patient was admitted as an emergency case and surgery was carried out under general anaesthesia with nasotracheal intubation without other preoperative investigation. A left submandibular incision was performed and access was gained to the left submandibular and submental region, where a small amount of fetid secretion was drained. The blunt dissection of the underlying tissues was performed and the submental and sublingual region was also approached contralaterally. Intraoperatively, necrotic left mandibular areas were found, mostly located where the teguments where cyanotic, which were removed. Secretions were collected from the septic focus, which were sent for microbiological examination and for obtaining the antibiogram, and peripheral tissue was taken for histological examination. Subsequently, washing with weakly antiseptic substances was carried out and drain tubes were placed. Intraoperatively, the mandibular fracture was manually reduced and immobilized with a metal splint fixed with circumdental wires.

Surgery was paralleled by drug treatment with 2 g/day metronidazole intravenously (i.v.) twice daily, 1.8 g/day clindamycin

i.v. twice daily and 0.5 g/day gentamicin i.v. once daily for 10 days. Nonsteroidal anti-inflammatory treatment was administered with 0.2 g/day ketoprofen i.v. twice daily and his electrolyte balance was restored by the administration of Ringer's solution and physiological serum. Weakly antiseptic oxygenated washes were administered through drain tubes every 4 h.

Microbiological examination demonstrated the presence of *Staphylococcus aureus*, *Staphylococcus epidermidis* and *Bacteroides fragilis* in the septic focus. Following bacteriological examination and the antibiogram, 3 g/day Tienam® i.v. was also added to the patient's treatment regime. Tissue samples were taken from perilesional skin, which showed the presence of purulent infiltrate with an expanding tendency and an increased number of polymorphonuclear cells.

The patient's postoperative recovery was favourable, with the diminution of fetid secretions in the septic focus and the improvement of his general state. After the improvement of his general state, imaging investigations were performed to visualize the fracture focus for an optimal treatment plan. As a result of his favourable recovery with an improvement in his general state, 8 days after the drainage of the septic area and the necrectomy of the submandibular tissues, it was decided to undertake surgery to reduce and immobilize the mandibular fracture.

Under general anaesthesia with nasotracheal intubation, the left submandibular and submental incision was enlarged and access was gained to the basilar edge of the mandible. The fracture focus was evidenced and the granulation areas and fibrosed tissue were removed. Subsequently, the fracture was manually reduced and osteosynthesis plates and screws were placed to immobilize the fracture focus (Figure 2). At the level of the postoperative wound, a closed suction drain was placed and suturing in three layers was performed; with resorbable threads for the periosteal and subtegumental layers; and with non-resorbable threads

Figure 2. The patient underwent surgery to reduce and immobilize the mandibular fracture. Intraoperative clinical appearance after the placement of the first osteosynthesis plate. The colour version of this figure is available at: http://imr.sagepub.com.

Figure 3. Appearance of the postoperative wound on the day of discharge from hospital. The colour version of this figure is available at: http://imr.sagepub.com.

for the tegumental layer. The patient's postoperative recovery was favourable. Postoperative control radiography was performed to check the correctness and stability of the reduction and immobilization of the fracture focus.

After the diminution of postoperative inflammatory phenomena and the disappearance of secretions from the surgical wound, suction drainage was suppressed. The patient was discharged 4 days after the reduction and immobilization of the mandibular fracture, with a favourable recovery, with a normal appearance of the postoperative wound (Figure 3) and a general good state.

Presentation of this case was approved by the Ethics Committee of the Clinical Emergency County Hospital-Cluj, Cluj, Romania (no. 31). The patient consented to the reporting of the case and the authors respected his confidentiality by using anonymous information and pictures that do not expose the patient's facial features.

Discussion

Soft tissue suppurations of the cephalic extremity represent one of the most frequent disorders present at this level.[7] In the majority of the cases, these have a relatively limited evolution and a dental or pharyngeal origin.[8] The most common cause of cervical necrotizing fasciitis is odontale or pharyngeal and other causes are seldomly reported in the literature.[9] In one case, periorbital scratching lesions evolved into necrotizing fasciitis.[9]

The presence of a severe cervical infection secondary to a trauma is an exception because the majority of patients who suffer from traumas of the cephalic extremity are treated by specialized emergency services, which leads to the prevention of severe posttraumatic suppurations. In the current case, the patient was reluctant to start specialized treatment. It is not clear whether his reluctance was due to his ignorance of the possible complications of his trauma or

to a lack of information regarding these possible complications provided by the medical staff who first had contact with the patient. It is clear that the absence of treatment for the mandibular fracture led to a severe infection located in the oral floor.

The bacterial flora of dental or pharyngeal origin is most frequently responsible for severe cervicofacial suppurations.[8] Some authors identify the presence of a single bacterial strain in the septic focus in the majority of severe cases of infection.[10,11] Other authors identified multiple bacterial strains with extremely different characteristics in the septic focus.[6] In this current case, several bacterial strains were detected in the septic focus, but the role of each of them in the development of severe suppuration was difficult to establish. The presence of multiple bacterial strains in the septic focus, regardless of the origin of suppuration, was logical because inflammatory periodontal as well as pharyngeal pathology is caused by a large variety of bacterial species.[12] It is very likely that the multitude of bacterial species present in the oral cavity explains the fact that several bacterial strains responsible for Ludwig's angina were identified in this current case.

Severe cervical infections are associated with the presence of systemic immunosuppressive diseases.[6,13–15] Of these, metabolic disorders such as diabetes mellitus or obesity, hepatic disorders, haematological disorders or the consumption of toxic agents have been most frequently incriminated.[13–16] In this current case, no immunosuppressive diseases leading to a decrease of the patient's immune response were identified. In contrast, the presence of purulent inflammatory infiltrate at the periphery of the septic necrotic areas demonstrates some reaction of the immune system, although this was unable to limit the extension of the infection. The appearance of severe posttraumatic septic complications was associated with the late presentation of the patient for specialized treatment, not with the presence of systemic immunosuppressive disorders. Late presentation of patients with septic cervical disorders has also been found in patients with immunosuppressive comorbidities such as diabetes mellitus, which makes it impossible to determine whether severe infections are caused by the underlying disease or late treatment in these patients.[7] Studies undertaken in larger groups of patients seem to suggest that neglecting the initial treatment of the infection is the primary factor in the appearance of necrotizing fasciitis.[17,18]

In the present case, surgery proved to be a determining factor in stopping the septic process and obtaining a favourable outcome for the patient. Other authors consider that early surgery with extensive drainage of the septic area and necrectomy up to the limit of the clinically healthy tissues is mandatory for a favourable outcome.[19–21] Some authors maintain that effective drainage of these severe infections and effective necrectomy can be obtained through a less invasive approach by percutaneous catheterization[21] and later through negative pressure wound therapy.[22,23] Our personal experience with percutaneous catheterization drainage is limited, which does not allow us to objectively assess this method, but we can say that extensive drainage of the affected tissues with the complete removal of necrotic areas has proved to be efficient and is the most recommended type of surgical approach for the treatment of Ludwig's angina and necrotizing fasciitis.

In conclusion, the rapid and correct treatment of intraorally open mandibular fractures is mandatory in order to avoid severe septic complications such as Ludwig's angina and necrotizing fasciitis. Patients with traumas of the viscerocranium should be informed about the complications that may occur if these are neglected and about the life-threatening risk that these complications pose.

Declaration of conflicting interest

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