

EFFICIENCY OF EMPIRICALLY ADMINISTERED ANTIBIOTICS IN PATIENTS WITH CERVICAL INFECTIONS OF ODONTOGENIC ORIGIN

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Abstract

Background and aims. Odontogenic infections are among the main types of disorders located in the cephalic extremity. The aim of this study was to determine the efficiency of empirically administered antibiotics on the bacterial strains identified at the infection sites.

Patients and method. The study included 10 randomly selected patients with odontogenic cervical soft tissue infections, who received antibiotic treatment prescribed by the family doctor or the dentist. The bacterial flora involved in the development of the septic process, the type of antibiotic administered to the patient and the sensitivity of the identified bacterial flora to the administered antibiotic were determined.

Results. In the 10 selected patients, 14 bacterial strains were detected; 7 patients had a single bacterial strain, and 3 patients had two or three types of bacteria. Of the administered antibiotics, amoxicillin was the most widely used (33.3% of the cases), followed by amoxicillin with beta-lactamase inhibitors (25% of the cases). In half of the patients, there was no sensitivity of the bacteria detected in the septic focus to the empirically administered antibiotic, and in 10% of the cases, partial sensitivity was evidenced.

Conclusions. Empirical administration of antibiotics without the association of surgery did not prove to be effective in the treatment of cervical infections of odontogenic origin.

Keywords: odontogenic infections, odontogenic bacteria, antibiotic therapy, abscess, soft tissue infections.

Background and aims

Non-specific odontogenic infections are among the most frequent disorders of bacterial origin that

affect individuals during the course of their life [1]. Before antibiotic treatment was available, the mortality rate of these disorders was 10-40%, but the discovery of antibiotics led to a significant improvement of this rate [2]. However, the last 10-15 years have witnessed a rebound of severe odontogenic infections caused by

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highly aggressive antibiotic-resistant bacteria [2]. The main cause indicated by the literature for the development of bacteria resistant to antibiotic therapy is the incorrect or inefficient administration of antibiotics [3]. Currently, a number of antibiotics for inflammatory dental pulp disorders or established abscesses are administered. The efficiency of these antibiotics is extremely limited because of the circulation disorders present in the inflammatory focus and, in addition, there is a high risk for inducing adverse reactions and antibiotic resistance of the bacteria involved in the development of the septic process [4]. For this reason, we believe that it is extremely important to evaluate the way in which antibiotics are administered and their efficiency on the bacterial flora involved in the development of odontogenic suppurations, in the absence of surgery.

The aim of this study is to prospectively determine the type of antibiotics used by patients with odontogenic head and neck soft tissue infections, from the point of view of their efficiency on the bacterial flora involved in the development of the septic process.

Patients and method

The study included 10 randomly selected patients with suppurations of odontogenic origin who presented to the Clinic of Oral and Maxillofacial Surgery Cluj-Napoca in the period January 2014 – July 2014.

The patient selection criteria were: perimaxillary soft tissue infections of odontogenic origin, disease duration of at least 5 days, antibiotic treatment duration of at least 4 days, known type and mode of administration of antibiotic medication, antibiotic treatment prescribed by the family doctor or the dentist, patient treated under continuous hospitalization, patient from which biological samples were taken for bacteriological examination and antibiogram determination, no other systemic pathology types with a possible influence on the immune response, adult patient having signed an informed consent for participation in the study.

The variables monitored for each patient were: general data (age, sex), location of infection, time from onset to presentation, type of antibiotic treatment and route of administration used, bacteriological examination and antibiogram result, postoperative evolution.

After the emergency admission of the patients, surgery was performed under locoregional anesthesia. After the asepsis and antisepsis of the operative field, biological samples were collected in a closed environment and were subsequently sent for bacteriological examination and antibiogram determination. The results obtained were centralized in the study data base.

For the development of contingency tables, Microsoft Excel software was used, and the statistical interpretation of the results was performed using Microsoft Excel.

Results

Of the patients included in the study, 6 were males and 4 were females. The mean age of the patients was 35.4 years, with a minimum age of 22 years and a maximum age of 49 years. The mean age of female patients was 28.75 years and that of male patients 39.83 years.

Regarding the location of the septic process in perimaxillary soft tissues, the majority of the infections were located in the submandibular gland area, followed by those located in the genial region (Figs. 1, 2).

In the case of the patients included in the study, a time period between 5 and 12 days, with a mean of 7.4 days, lapsed from the onset of the septic process to the presentation for specialized treatment. During this time period, all patients used antibiotic treatment, with a mean of 1.2 antibiotic types; 8 of the 10 patients had one antibiotic type, and 2 patients had 2 antibiotic types. Amoxicillin was the most frequent type of antibiotic used (Fig. 3), and the most frequent route of administration was the oral route, only in two cases the antibiotics being administered by intravenous route.

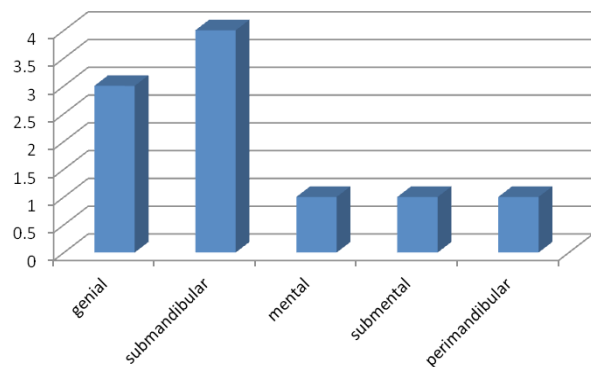


Figure 1. Distribution of patients according to the location of the septic process.



Figure 2. Preoperative clinical appearance of a patient included in the study group, with an abscess in the submandibular salivary gland area.

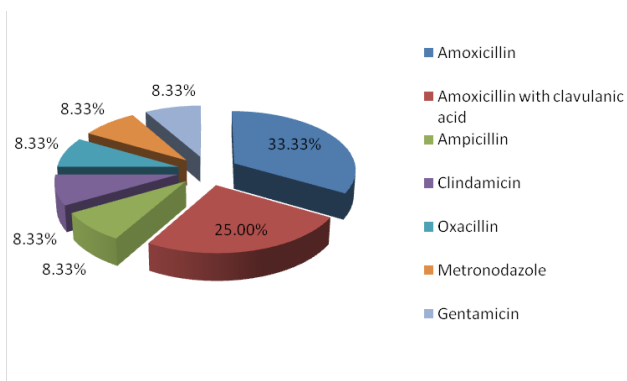


Figure 3. Percent distribution of the main types of antibiotics used by the patients included in the study group.

The bacteriological result obtained from the purulent secretion samples collected from the septic focus evidenced microbial polymorphism (Tab. I).

In half of the patients included in the study, the identified bacterial flora had no sensitivity to the antibiotics used prior to the presentation for specialized treatment (Fig. 4), and in one patient in whom several bacterial strains were detected, some of these were sensitive to the antibiotic administered to the patient.

After the incision and the drainage of the suppuration were performed, along with the change of the antibiotic scheme according to the antibiogram, the patients' postoperative evolution was favorable.

Discussion

The objectives of the study were reached and the main types of antibiotics administered to patients with odontogenic septic processes complicated by perimaxillary suppurations were determined. It can be seen that the majority of the patients included in the study were young adults, which is confirmed by other literature studies [5,6]. Authors analyzing extensive groups of patients evidence the fact that odontogenic infections mainly affect patients in the third decade of life [1], which is confirmed in this study only by female patients, male patients having a more advanced age, but without a significant difference.

Of the patients included in the study, the majority

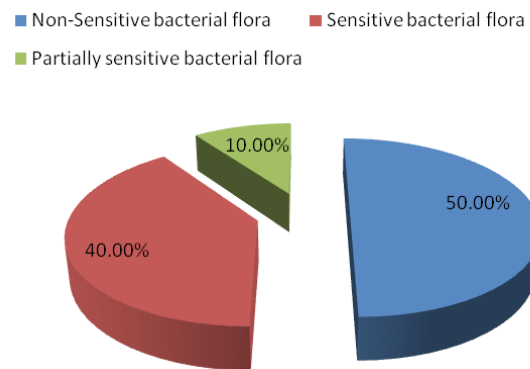


Figure 4. Type of bacterial flora.

were males. However, it cannot be concluded based on the presented data that the male sex is more frequently affected by cervical inflammatory disorders of odontogenic origin, because the patient inclusion criteria were very restrictive and the number of patients included in the study was limited. Most authors opine that there is a higher incidence of odontogenic infections among male patients, but the differences between the two sexes are extremely varied [1,2,7].

Regarding the antibiotics prescribed to the patients included in the present study, it can be seen that more than half of the patients received amoxicillin treatment with or without beta-lactamase inhibitors. The majority of the patients took the antibiotic without beta-lactamase inhibitors, which is contrary to literature studies, which show that the main antibiotic administered for odontogenic infections is amoxicillin with beta-lactamase inhibitors [3]. The administration of an effective antibiotic in odontogenic infections is particularly important in the attempt to limit the septic process. When the antibiotic has no effect on the main bacterial strains involved in the development of the infection and only eliminates less aggressive pathogens, the premises for extremely severe and very difficult to control infections are created [2,6,7,8].

Bacteriological examination evidenced the presence of a varied bacterial flora, but in the majority of the cases, a single bacterial strain in each patient was obvious. The presence of a single bacterial strain in each patient is

Table I. Type of bacterial strains identified in the septic focus.

Bacterial flora (no. of strains x no. of subjects)	FAc aerobic G-	FAc aerobic G+	Anaerobic G-	FAc aerobic G- & fac aerobic G+	Total no. of subjects
<i>S. sanguis</i> + <i>MSSA</i> (2x1)	0	2	0	0	1
<i>MRSA</i> * (1x2)	0	3	0	0	2
<i>MSSA</i> ** (1x1)	0	1	0	0	1
<i>MSSA</i> + <i>S. Pyogenes</i> + <i>E. coli</i> (3x1)	1	1	0	1	1
<i>S. epidermidis</i> (1x1)	0	1	0	0	1
<i>S. mitis</i> (1x1)	0	1	0	0	1
<i>S. sanguis</i> + <i>MRSA</i> (2x1)	0	3	0	0	1
<i>S. sanguis</i> (1x1)	0	1	0	0	1
<i>S. viridans</i> (1x1)	0	1	0	0	1
Total	1	14	0	1	10

surprising, given the fact that at the level of the infected dental pulp or periodontal space, the main sources of bacterial flora for odontogenic suppurations, an increased number of bacterial species are concomitantly identified [2,9,10]. The presence of a single bacterial strain can be explained by two mechanisms. Thus, it is possible that the early administration of bacterial therapy may select the majority of the bacterial species sensitive to the administered antibiotic and a single bacterial species may remain in the septic focus. This hypothesis is also supported by the antibiogram result, which evidenced no sensitivity of the identified bacteria to the administered antibiotic. Another possible cause of the identification of a single bacterial strain might be the technical limitations of microbiology laboratories or the way of collecting biological samples, which pose difficulties in identifying some bacterial strains, particularly anaerobic ones.

The fact that most of the administered antibiotics were not active on the identified bacterial flora is an alarm signal. The lack of efficiency of the antibiotic on the main bacterial strains involved in the development of the septic process implicitly leads to an increase of the difficulty of treatment of these infections. Some authors indicate the use of antibiotics as a single treatment, in the absence of a preliminary bacteriological examination, as the main factor favoring the development of severe odontogenic infections such as necrotizing fasciitis [11,12]. The exhaustion of the action of common antibiotics on the bacteria involved in the development of common cervical infections leads the practitioner to use niche antibiotics that should not be used under normal conditions [8]. A limitation of this study is the fact that it does not take into account possible cases of patients with odontogenic infections who received antibiotic treatment alone and who had a favorable evolution. These cases cannot be monitored in such studies because these patients do not ask for specialized help.

Conclusions

Most common antibiotics used as a single therapy for the treatment of cervical infections of odontogenic origin have a limited action, and the association of antibiotic treatment with surgery is recommended.

The administration of antibiotics according to the bacteriological examination and antibiogram, associated with surgery, led to a favorable evolution of the patients included in this study.

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