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Oral soft tissue infections: causes, therapeutic approaches and microbiological spectrum with focus on antibiotic treatment

Carolin Götz [a, *], Edeltraud Reinhart [b], Klaus-Dietrich Wolff [a], Andreas Kolk [a]

[a] Department of Oral and Maxillofacial Surgery (Head: Prof. Dr. Dr. Klaus-Dietrich Wolff), Technische Universität München, Klinikum Rechts der Isar, Ismaningerstraße 22, 81675 München, Germany
[b] Department of Oral and Maxillofacial Surgery, Julius-Maximilians-Universität Würzburg, 97070 Würzburg, Germany

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ABSTRACT

Introduction: Intraoral soft tissue infections (OSTI) are a common problem in dentistry and oral surgery. These abscesses are mostly exacerbated dental infections (OIDC), and some emerge as postoperative infections (POI) after tooth extraction (OITR) or apicoectomy (OIRR). The main aim of this study was to compare OIDC with POI, especially looking at the bacteria involved. An additional question was, therefore, if different antibiotic treatments should be used with OSTI of differing aetiologies. The impact of third molars on OSTI was evaluated and also the rates of POI after removal of third molars were specified.
Material and methods: Patient data was collected from the patients' medical records and the results were statistically evaluated with SPSS (SPSS version 21.0; SPSS, IBM; Chicago, IL, USA). The inclusion criterion was the outpatient treatment of a patient with an exacerbated oral infection; the exclusion criteria were an early stage of infiltration without abscess formation; and a need for inpatient treatment.
Results: Periapical exacerbated infections, especially in the molar region were the commonest cause of OIDC. In the OITR group, mandibular tooth removal was the commonest factor ($p = 0.016$). Remarkably, retained lower wisdom teeth led to significant number of cases in the OITR group ($p = 0.022$).
Conclusions: In our study we could not define differences between the causal bacteria found in patients with OIDC and POI. Due to resistance rates we conclude that amoxicillin combined with clavulanic acid seems to be the antibiotic standard for exacerbated intraoral infections independent of their aetiology.

1. Introduction

Even with the availability of modern treatment strategies, the relevance of oral soft tissue infections should never be underestimated; nevertheless, severe maxillofacial infections play a minor role today (Opitz et al., 2015). Several studies have demonstrated that this disease affects up to 30% of all oral and maxillofacial surgery patients (Eckert et al., 2000). The main causes are odontogenic factors such as apical periodontitis (Cope et al., 2014) associated with a high diversity of the oral microbiome (Belibasakis and Mylonakis, 2015), or wound infections such as postoperative complications after tooth extraction or apicoectomy (Voegelin et al., 2008). The removal of teeth, especially of lower wisdom teeth, plays a significant role; third molars compose the majority of removed teeth (Knutsson et al., 2000).

Surgery needs to be performed for every purulent infection, with an intra or extraoral incision being the treatment of choice because of the localization and expansion of the infection (Flynn, 2000; Mucke et al., 2014). The necessity and the modalities of antibiotic treatment are often a topic of discussion in oral surgery (Figueiredo et al., 2012). Recently, an often-asked question is whether antibiotics should be given routinely preoperatively or postoperatively in a prophylactic manner or only in case of manifest oral infections (Arteagoitia et al., 2015). Nevertheless severe head and neck infections are decreasing (Poeschl et al., 2010), these severe infections might become difficult to treat as a result of the increasing rate of antibiotic resistance (Figueiredo et al., 2008; Leverstein-Van Hall et al., 2002; Warnke et al., 2013). General disorders such as diabetes, which influence the immune response of the patient, could also be a challenge in therapy (Kudiyirickal and Pappachan, 2015). Only a few trials have compared the various

* Corresponding author. Tel.: +49 89 4140 2932; fax: +49 89 4140 2934.
E-mail address: cg.goetz@tum.de (C. Götz).

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causes of oral soft tissue infections, including postoperative infections, with regard to patient-specific data, the involved bacteria, their resistance and treatments used (Table 1). Outpatient treatment of oral infections (OIs) is a main focus of maxillofacial units. To our knowledge, the most important published studies of OI only focus on inpatients (Table 1). Therefore, the aim of the present study has been to correlate the different aetiologies, the involved microbiome and the antibiotic resistances, and to formulate a conclusion on the treatment modalities and involved oral pathogen bacterial spectrum in oral soft tissue infections of outpatients. The most interesting question is: should antibiotic treatment differ for OSTI of different aetiologies, such as oral infections of dental origin (OIDC) and postoperative oral infections (POI)?

2. Materials and methods

2.1. Patients

The study comprised 244 outpatients who were treated between 2006 and 2009 by oral and maxillofacial surgeons. The group of oral soft tissue infections was subdivided into two main groups: I – oral infections of dental origin (OIDC) consisting of 186 patients; II – a group of 58 patients with postoperative oral soft tissue infections (POI). Inclusion criteria were patients with non-delayed onset infections, which occurred before suture removal, and outpatient treatment. Exclusion criteria were: the necessity of hospitalization; or if the OI was still at an early stage of infiltration and an abscess was yet not clinically seen. Orthopantomograms (OPGs) served for evaluation of the dental and bony status of all patients.

2.2. Study design

All authors who participated in the present study read the Declaration of Helsinki and the study was designed according to its guidelines. It was a retrospective study, approved by the institutional ethical committee.

As described before, the included patients were divided into two groups based on the aetiology of the intraoral abscess in OIDC and POI. The latter group was divided into oral infections after teeth removal (OITR) and OI after apicoectomy (OIRR).

2.3. Collected data

The following data were collected: basic patient data such as age, sex and smoking habits from the initial anamnesis of the patients. Clinical data relating to symptoms attributable to the infection, such as swelling of the mucosa, pain and suppuration

Table 1
Odontogenic infections: review of literature.

Author	Focus	Year	Results
Eckert et al., 2005	OI	2005	65/-* H AN+
Uluibau et al., 2005	SOI	2005	48/8* H NMB
Rega et al., 2006	HNI, OI	2006	103/-* H AE+
Al-Nawas and Maeurer, 2008	SOI, LOI	2008	60/-* H AN reduced in severe infections
Sanchez et al., 2011	SOI	2011	151/18* H AE/AN
Bahl et al., 2014	OI	2014	100/-* H AE/AN
Chi et al., 2014	DNI	2014	148/-* H AE+
Kityamuwesi et al., 2015	OI	2015	130/31 H/OU(106) AE/AN
Opitz et al., 2015	SOI	2015	814 H AE/AN

Comparable studies of odontogenic infections of the last 10 years.
Inclusion criteria: > 40 patients, odontogenic infections, comparable study protocols to the present study.
OI: Odontogenic infections.
SOI: Severe odontogenic infections.
HNI: Head and neck infections.
LOI: localized odontogenic infections.
DNI: Deep neck infections.
*numbers of patients divided due to aetiology.
First number: whole collective.
Second number: patients with postoperative oral infections (relating to the OITR group of our study).
H: patients were hospitalized/OU: number of patients treated outpatient.
AE/AN: mixed aerob-anaerob bacteria was mostly cultivated.
AN+: Anaerob bacteria dominated.
AE+: Aerob bacteria dominated.
NMB: cultivated bacteria was not mentioned in the article.