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# The value of early intraoral incisions in patients with perimandibular odontogenic maxillofacial abscesses



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## ABSTRACT

Perimandibular abscesses require drainage and removal of the underlying cause of infection. Traditionally drainage was established extraorally, but this can be associated with delay to treatment, because this is done under general anaesthesia. Between July 2008 and June 2013, 205 patients were initially either treated by immediate intraoral incision under local anaesthesia or extraoral incisions under general anaesthesia and prospectively evaluated. Predictors of treatment outcomes and complications were analysed. Fewer secondary procedures were needed for patients with primary treatment under general anaesthesia ( $p < 0.0001$ ), but the overall stay in hospital was shorter after initial treatment under local anaesthesia ( $p < 0.0001$ , Odds Ratio (OR) 0.72, 95% CI 0.62–0.85). Postoperative complications occurred significantly more often under general anaesthesia ( $p < 0.0001$ , OR = 16.63, 95% CI 5.59–49.5). Significant prognostic variable was the administration of amoxicillin combined with clavulanic acid ( $p = 0.016$ , OR = 1.24, 95% CI 1.09–1.41) and adverse prognostic factors were infections with Human Immunodeficiency Virus (HIV) ( $p = 0.048$ , OR 17.45, 95% CI 1.02–298) or diabetes mellitus ( $p = 0.003$ , OR 10.39, 95% CI 2.23–48.41). Amoxicillin combined with clavulanic acid showed a significant impact on the treatment course of patients with perimandibular abscesses.

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## 1. Introduction

Cervicofacial abscesses are frequently observed in general maxillofacial practice and primarily related to dental diseases. Awareness of oral health prevention and services vary with culture and socio-economic status. A substantial number of patients develop odontogenic infections resulting in abscesses; this is increasing in some developed countries with changes in access to general dental services. When infections are associated with a collection of pus they need surgical intervention and antibiotics (Flynn, 2000). This is particularly important in patients with involvement of several fascial spaces which can lead to airway compromise, involvement of deep musculofascial spaces or even the mediastinum, and septicemia (El-Sayed and Al Dousary, 1996; Marra and Hotaling, 1996; Chen et al., 1998; Flynn, 2000; Huang et al., 2004, 2005).

Complications result in prolonged hospitalization of patients and can cause further life-threatening morbidity (Mylonas et al.,

2007; Gonzalez-Garcia et al., 2011). Predisposing factors to increase the risk of complications in these patients are multiple involvements of different spaces, alcoholism, immunosuppression, diabetes mellitus, and multiple underlying medical conditions (El-Sayed and Al Dousary, 1996; Huang et al., 2004, 2005; Sato et al., 2009; Kaehling et al., 2014).

In general, these patients require urgent drainage of the abscess and removal of the cause of the odontogenic infection, such as tooth extractions or sufficient dental (e.g. endodontic) treatment if possible (El-Sayed and Al Dousary, 1996; Marra and Hotaling, 1996; Flynn, 2000). Time to drainage is widely believed to improve outcome (Johnson and Krishnan, 1992). External drainage of is often aggressive using two drains as a minimum (Johnson and Krishnan, 1992). This usually necessitates general anaesthesia, which requires fasting and often a delay in treatment unless it spontaneously ruptures through the skin (Krishnan et al., 1993). In contrast, local incisions in the oral cavity with the application of a surgical drain can be done without undue delay by the surgeon himself under local anaesthesia as the initial step in treatment of the abscess. Although this treatment is not completely sufficient and does not replace further incision externally with additional

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drainage, it might stop further spread into other spaces and reduces pain for the patient.

The purpose of the present study is to prospectively evaluate the outcome of patients presenting with odontogenic abscesses treated by additional intraoral incisions compared with our standard treatment of extraoral double drainage. In addition, the factors for the occurrence of complications and treatment outcome were also investigated.

## 2. Materials and methods

### 2.1. Study design and patient recruitment

All research on enrolled participants has been conducted according to the principles expressed in the Declaration of Helsinki.

Any patient who required abscess incision due to a perimandibular abscess was eligible. There was no difference between patients in the extent of the infection and those needing inpatient health care were included. To identify the extent of abscesses, a CT with contrast enhancement was performed on all patients. A prospective study was initiated from July 2008 to June 2013 in the Department for Oral and Maxillofacial Surgery at the Technische Universität Munich, Klinikum rechts der Isar, Germany. All patients were prospectively assessed. Two groups were randomly selected for initial treatments: (1) Incision of the abscess from the oral cavity and (2) No initial incision of the abscess from the oral cavity. Both groups underwent further extraoral incision if necessary. If initial treatment was successful, further incisions were not performed.

### 2.2. Surgical technique

#### 2.2.1. Intraoral incision

Intraoral incisions were performed immediately after diagnosis and informed consent of the patient. Nerve block anaesthesia was performed of the inferior alveolar and lingual nerve at the ipsilateral site. A marginal incision of the mobile mucosa was performed and subperiosteal preparation was performed down to the border of the mandible. Afterwards a rinsing was performed and a drainage was put inside the wounds to leave it open for further treatments.

#### 2.2.2. Extraoral incision

Extraoral incisions were performed under general anaesthesia with a skin incision at least 2.5 cm below the lower border in the dominant cervical crease of about 2.5–4 cm length. Afterwards, the platysma was incised and a blunt dissection was performed up to the lateral and medial part of the mandible after opening of the subperiosteal space and the abscess. Drains were inserted in both spaces and rinsed. A swab was taken for further analysis of the bacteria and possible antibiotics resistances.

### 2.3. Data analysis

Recorded parameters included: age, sex, preoperative medical history, additional diseases and infections, number of teeth affected, type of teeth affected, localisation, type of antibiotic treatment, rate and number of operative revisions, stay on intensive care unit, length of hospital stay, and length of complete treatment until no further treatment was necessary.

Descriptive statistics for quantitative variables are given as the mean  $\pm$  standard deviation. The data were analysed with the "Statistical Package for the Social Sciences" (SPSS for Windows, release 21.0.0. 2013, SPSS Inc, Chicago, IL, USA). Logistic regression analyses were used to determine factors independently associated with the dependent variable overall stay in hospital, overall time of

treatment, or additional operation necessary. 95% confidence intervals (95% CI) are also given. Differences were considered to be statistically significant with respect to a two-sided significance level of 0.05.

## 3. Results

### 3.1. General characteristics

From July 2008 to June 2013, 205 patients with perimandibular abscesses were treated and included in this study. There were 113 men (55.1%) and 92 woman (44.9%), with a mean age of  $47.5 \pm 18.1$  years (range 6–90 years). 56 (27.3%) patients were initially treated by incision under local anaesthesia. Swallowing problems were present in 103 (50.2%) patients and upper airway obstruction was declared by 75 (36.6%) patients at the time of presentation. At initial presentation of patients 111 patients were randomly selected for extraoral incision and 94 patients for intraoral incision. Additional incision from the extraoral site was performed in 37 (18%) patients after completion of the intraoral treatment. Intraoral incisions only were mainly (98.2%, 56 of 57 patients) performed under local anaesthesia. Complications after treatment under general anaesthesia were found in 12 (5.9%) patients: Bleeding in 5 (2.4%) patients, sepsis in 3 (1.5%) patients, 2 (1%) patients developed postoperative pneumonia, 1 patient (0.5%) had intraoperative heart infarction, and fracture of the mandible in 1 (0.5%) patient. In 199 (97.1%) patients the reason for the abscess was tooth-related, whereas in 6 (2.9%) patients no cause was found. The dental focus was based on the premolars in 8 patients (3.9%), molars in 108 patients (52.7%), and the wisdom teeth in 59 (28.8%) patients. In the remaining 30 patients more than one tooth caused the abscess (14.6%), all at the molar and wisdom teeth site. All focusses were at the mandible. No complications were detected under local anaesthesia.

The type of antibiotics used for additional treatment of the abscesses were penicillin in 97 (47.3%) patients, Amoxicillin combined with clavulanic acid in 93 (45.4%) patients, Metronidazole in 23 (11.2%) patients, Clindamycin in 16 patients (7.8%), and Cefuroxim in 7 (3.4%) patients. Multiple allergies were present in 16 (7.8%) patients and therefore no additional antibiotics were administered.

9 (4.4%) patients reported diabetes mellitus, 11 (5.4%) patients were treated by immunosuppressive agents, 4 (2%) patients had previous infection with hepatitis C, and 2 (1%) patients had previous infection with human immunodeficiency virus.

Patients treated stayed a mean of  $7.1 \pm 3.71$  days (range 1–27) in hospital and were treated in the outdoor patient-department for  $2.2 \pm 2.17$  days (range 0–8), resulting in an overall treatment of  $9.3 \pm 4.22$  days.

### 3.2. Multivariate analysis

After incision of abscesses under general anaesthesia 17 (11.4%) patients needed additional surgery and revision of the drainage, whereas 18 (32.1%) of patients after incision under local anaesthesia needed further surgery from the extraoral site. There was a significant difference between both types of incision with less secondary incisions needed for patients with primary treatment under general anaesthesia ( $p < 0.0001$ , Odds Ratio (OR) = 9.2, 95% CI 4.17–20.31).

In the logistic regression analysis of patients treated the overall stay in hospital was dependent on the type of incision (local anaesthesia immediately after presentation vs. incision under general anaesthesia) with a better outcome of patients treated under local anaesthesia immediately after presentation ( $p < 0.0001$ , OR = 0.72, 95% CI 0.62–0.85). The overall treatment of patients in

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