



Original article

Criteria for admission of odontogenic infections at high risk of deep neck space infection



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ABSTRACT

Objectives: Many patients with odontogenic infections are hospitalised because of the risk of deep neck space infection. The objective of this study was to identify risk factors allowing more reliable selection of patients requiring hospitalisation for both specialists and emergency physicians.

Material and methods: This retrospective study was based on a cohort of 97 patients hospitalised for odontogenic infection in the Department of Otorhinolaryngology and Head and Neck Surgery of Centre hospitalier Sud Francilien, Île-de-France, from January 2008 to June 2012.

Results: The majority of patients presented with dental abscess (66 patients; 68%). Nineteen patients (20%) presented with deep neck space infection. The frequency of deep neck space infection was significantly higher in patients with mandibular odontogenic infection (16/55 patients (29%) than in those with maxillary odontogenic infection (3/42 (7%); $P \leq 0.009$). The incidence of deep neck space infection was significantly higher in patients with dental abscess (17/66, (26%) than in those without dental abscess (2/31 (6%); $P \leq 0.03$).

Conclusion: In addition to the well-known classical criteria (fever, neck swelling, dyspnoea, dysphagia, trismus, leukocytosis, elevated C reactive protein (CRP)), the criteria for admission for odontogenic infection should include mandibular odontogenic infection and/or the presence of dental abscess.

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1. Introduction

Deep neck space infections can spread along the fascial spaces of the head and neck, inducing life-threatening deep space infection associated with a high risk of complications (upper airway obstruction, mediastinitis, thoracic empyema, pericarditis, septic shock) [1–4]. Although the incidence of these infections has decreased considerably as a result of modern antibiotics and improvement of oral hygiene [5], these infections continue to be a source of severe morbidity and high mortality [6–8]. The portals of entry most commonly encountered are odontogenic infections, but tonsillar abscess and foreign bodies may also be responsible [9,10]. Odontogenic infections can spread and evolve very rapidly from a localized infection to deep neck space infection, corresponding to extensive necrotizing fasciitis requiring urgent medical and surgical management [11].

Odontogenic infections are a common medical and surgical emergency in our department (Centre hospitalier Sud Francilien Department of Otorhinolaryngology and Head and Neck Surgery).

Some patients are hospitalised due to an excess of caution, while others are treated on an outpatient basis when they should have been admitted to hospital. However, to our knowledge, no flow chart useful for the management of these odontogenic infections has been published in the literature. Criteria for admission can vary according to each practitioner's experience. The definition of objective criteria for admission of cases of odontogenic infection is important to improve patient management and to limit the risk of deep infections.

The objective of this retrospective study was to identify criteria of severity of odontogenic infections on the basis of identified risk factors for complications, such as the maxillary or mandibular site of infection [12] and the presence or absence of dental abscess.

2. Patients and methods

This retrospective study analysed patients hospitalised for odontogenic infection in the Department of Otorhinolaryngology and Head and Neck Surgery, Centre Hospitalier Sud Francilien, Île-de-France, from January 2008 to June 2012. These patients presented clinical signs such as dyspnoea, stridor, dysphagia,odynophagia, inflammatory neck swelling, fever, painful cervical lymphadenopathy, trismus, soft tissue crepitations (Fig. 1) and

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Fig. 1. Contrast-enhanced head and neck CT, axial section through the thyroid cartilage in a patient with deep neck space infection. Air bubbles may be observed in the soft tissues.

were divided into 2 groups: group 1 comprising maxillary odontogenic infections and group 2 comprising mandibular odontogenic infections.

Clinical, laboratory, radiological data as well as outcome and complications were analysed. Statistical analysis was performed with SPSS statistical software (SPSS for Windows, Version 16.0. Chicago, SPSS Inc.). Results were considered to be statistically significant for $P \leq 0.05$.

2.1. Therapeutic management

After performing a laboratory work-up (complete blood count [CRP]) and dental panoramic radiography, treatment of hospitalised patients consisted of empirical antibiotic therapy with a combination of intravenous amoxicillin and clavulanic acid. Patients allergic to amoxicillin received clindamycin. Therapeutic management also comprised incision and drainage of the abscess under local anaesthesia whenever indicated and extraction of the infected teeth. Deep neck abscesses were drained surgically and broader antibiotic therapy was prescribed with the addition of ceftriaxone 2 g daily and metronidazole 1500 mg daily (Fig. 2). In the absence of clinical improvement or in the presence of signs of extensive deep neck space infection, contrast-enhanced head and neck CT was performed. All hospitalised patients were evaluated by a dentist during the first 48 hours after admission for dental treatment. Patients were discharged according to the local and systemic clinical improvement.

3. Results

Two hundred eighty one patients attended the emergency department with dental symptoms and signs during this period and 97 patients (35%), comprising 35 women and 62 men, were hospitalised. The mean age of hospitalised patients was 41 years (range: 13 to 92) and the mean length of hospital stay was 4.6 days (Table 1).

All patients were treated by intravenous antibiotics. Dental extraction was performed in 73 patients (maxillary teeth in 30 cases, i.e. 31% of hospitalised patients, and mandibular teeth in 43

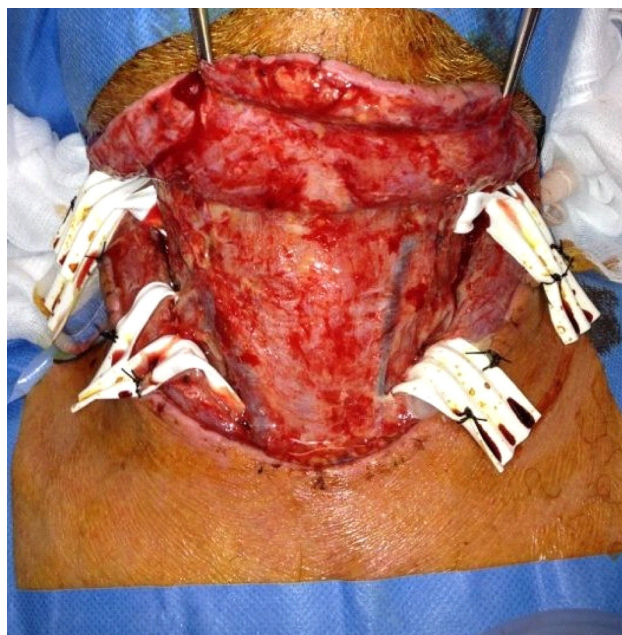


Fig. 2. Clinical appearance of deep neck space infection secondary to odontogenic infection after surgical drainage.

Table 1
Study population and characteristics.

Characteristics	Values	Percentage
Number of patients	97	
Age (years)	41 ± 18 (13–92)	
Gender		
Male	62	64
Female	35	36
Anatomical site		
Mandibular	55	57
Maxillary	42	43
Dental abscess with surgical drainage		
Total number	19/97	20
Mandibular	16/55	29
Maxillary	3/42	7
Length of hospital stay (days)		
Mean	5 ± 8	
Mandibular	6 ± 11	
Maxillary	3 ± 3	
P value	0.02	
Treatment in hospital		
Antibiotics	97	100
Dental extraction	73	75

Data expressed as number, mean ± standard deviation (range), percentage in parentheses (%), or number per subgroup (%).

cases, i.e. 44%) (Table 1). Eighty-five patients (88%) had a dental abscess, requiring local drainage in 66 cases and surgical drainage under general anaesthesia in 19 cases. Three patients (5%) presented extensive deep neck space infection, including 2 cases of mediastinitis treated by bilateral neck incision with drainage, repeated dressings and intensive care (Table 1). Of the 19 patients requiring surgical drainage of a dental abscess under general anaesthesia, the odontogenic infection arose in the mandible in 16 cases and in the maxilla in 3 cases.

3.1. Criteria of severity according to the site of infection

Group 2 had a significantly higher risk of dental abscess requiring surgical drainage ($P=0.009$) and a significantly longer hospital stay ($P=0.01$). All patients admitted to the intensive care unit with deep neck space infection belonged to group 2.

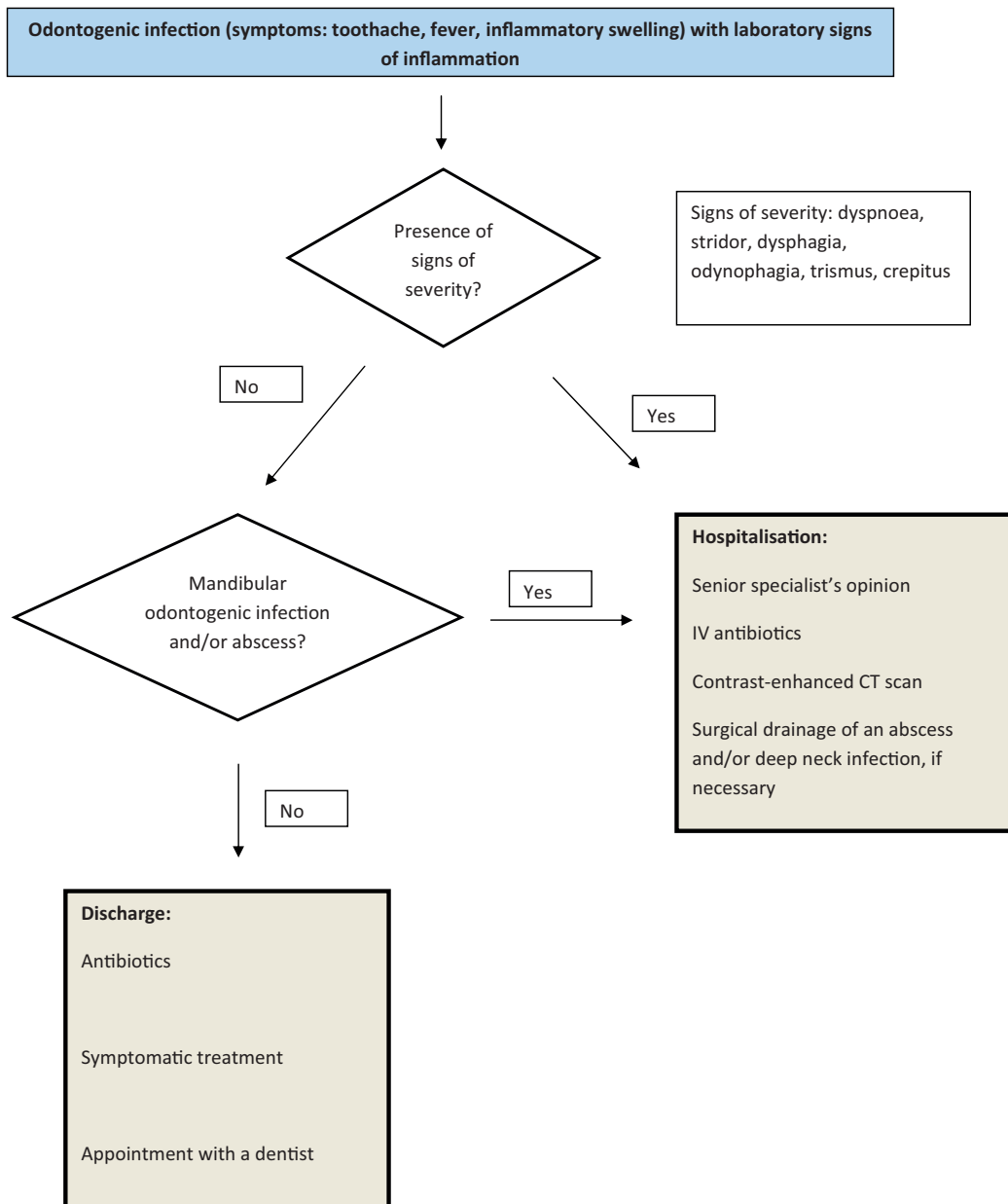


Fig. 3. Flow chart for patients with odontogenic infection attending the emergency department.

The frequency of deep neck space infection was significantly higher in patients with mandibular odontogenic infection (16/55 patients, 29%) than in those with maxillary odontogenic infection (3/42, 7%), ($P \leq 0.009$). Deep neck space infection was significantly more frequent in patients with dental abscess (17/66, 26%) than those without dental abscess (2/31, 6%), ($P \leq 0.03$). The length of hospital stay was significantly longer in patients with mandibular odontogenic infection (mean: 5.6 days) than in those with maxillary odontogenic infection (3.2 days) ($P \leq 0.02$). No significant difference in the incidence of dental abscess or deep neck space infection was observed according to age or gender.

4. Discussion

Odontogenic infections are very common infections and can be either benign or responsible for very serious deep neck space infections. The clinical features, laboratory work-up and radiological

assessment may provide a set of arguments to evaluate the severity of the infection.

Flynn showed that fever, swelling, dysphagia and trismus were the symptoms most commonly observed in patients hospitalised for odontogenic infection [13]. It has also been demonstrated that elevated white blood cell count and CRP are key findings in the decision to admit patients with odontogenic infection [13–15]. The combined presence of these symptoms and inflammatory markers is a classical criterion indicating the need for admission to ensure clinical surveillance and treatment.

Dental panoramic radiography is particularly useful to identify the cause of infection by providing good visualization of maxillary and mandibular dental structures [16], but provides little information about the severity of the infection. Contrast-enhanced head and neck CT scan is indicated when the presence of an abscess in the fascial spaces of the head and neck, involving the parapharyngeal, submandibular, sublingual or masticator spaces, is suspected

[12,17]. CT also allows visualization of deep expansion of these spaces during extensive infection due to subcutaneous emphysema or abscess.

The results of the present study showed that the incidence of dental abscess requiring surgical drainage and the mean hospital stay were significantly higher for mandibular odontogenic infections compared to maxillary odontogenic infections (Table 1). Furthermore, all deep neck space infections requiring admission to the intensive care unit in our series were derived from mandibular odontogenic infections.

In the light of these findings, we propose criteria for admission that could contribute to more rapid identification of odontogenic infections at high risk of complications (deep neck space infection or abscess). These recommended admission criteria could be useful as they constitute potential signs of deterioration and should be used in combination with standard admission criteria to provide maximum guidance for practitioners with a more limited experience of these infections compared to specialists [18]. We therefore propose a simple flow chart including data concerning the initial site of infection and the presence or absence of abscess (Fig. 3).

The main limitations of this study concern the absence of evaluation of the patients' comorbid conditions and their use of non-steroidal anti-inflammatory drugs, as some studies suggest that certain comorbid conditions such as diabetes or the use of anti-inflammatory drugs are associated with more severe odontogenic infections and an increased risk of deep neck space infection and associated complications (tracheotomy, septic shock, mediastinitis, etc.) and that these factors must therefore also be taken into account in the decision to admit the patient [19].

Further prospective, comparative studies are necessary to provide stronger evidence to define the clinical and therapeutic management of patients with odontogenic infection.

Disclosure of interest

The authors declare that they have no conflicts of interest concerning this article.

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