Refractory Odontogenic Infection Associated to Candida Albicans: A Case Report

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Abstract

Background: Multifascial space infections from an odontogenic origin have been attributed to a different number of microorganisms. These infections can be serious, involving multiple deep spaces in the head and neck, and potentially compromising the airway. Fungal etiology including C. albicans has been reported in the past as a rare agent involving multifascial space infections.

Case Description: We present an unusual case of a severe deep space infection associated with carious teeth numbers 31 and 32. This specific infection proved to be resistant to multiple antibiotic therapy and required incision and drainage on two different occasions. After the initial surgery, the patient remained febrile with an elevated white blood cell count; thus, the patient was taken to the operating room again for a re-drainage and new cultures. Cultures obtained during the second surgery were positive for C. albicans. The patient was responsive to antifungal therapy, showing quick improvement in his condition.

Conclusion: Although multiple factors could have contributed to this patient’s vulnerability to odontogenic infection of fungal etiology including history of alcoholism and broad spectrum antibiotic therapy, it remains an infrequent finding in the literature. This case illustrates the need to consider a fungal cause in patients with odontogenic infections who are not responsive to broad spectrum antibiotics and surgical drainage.

Keywords: Odontogenic infection; Candida albicans; Microorganisms

Introduction

Many microorganisms have been identified in multifascial space infections of the head and neck region. These infections are most commonly caused by bacteria [1] and can be life-threatening with potential loss of airway and drainage to the mediastinum requiring immediate attention and treatment.

Fungal etiology has been reported in the past as a rare causative factor. Badiee “et al.” [2] reported a case of mediastinitis caused by C. albicans in an immune competent patient occurring after dental extractions. The most commonly occurring mycoses are caused by commensal fungi of the human body [3]. In healthy individuals, Candida species can be found in the oral cavity, and other areas of the human body such as the gastrointestinal tract, groin and vaginal canal [3]. Most these fungi are opportunistic pathogens, causing infections in the event of a change of normal microbiota following administration of broad-spectrum antibiotics, in immune compromised individuals, and when protective mechanisms have been disrupted [3].

We present a rare case of severe multi space infection, which proved to be resistant to multiple antibiotic therapy and surgical drainage. The patient was taken to the operating room for a re-drainage and new cultures. Cultures obtained in the second surgery were positive for C. albicans. Antifungal therapy was subsequently implemented and a favorable response and improvement of the patient’s overall condition ensued. This case illustrates the need to consider a fungal cause in patients with odontogenic infections who are not responsive to broad spectrum antibiotics and surgical drainage.

Case Presentation

A 45-year-old male with a history of uncontrolled hypertension and severe alcohol abuse presented to the emergency department with a complaint of worsening right facial swelling. The patient reported that he started to develop a tooth pain on the right lower quadrant one week prior to admission. Two days before presenting to the hospital he was seen by his dentist who diagnosed...
him with facial cellulitis from an odontogenic origin likely associated to tooth #32. At that time, the patient was prescribed amoxicillin and Percocet. The morning of admission he awoke with increased right facial swelling and pain, and sought treatment in the Emergency Department.

At the time of admission vital signs were: Heart rate 93, blood pressure 115/75, and O₂ saturation 96% on room air. Laboratory findings at time of admission showed White blood cell count (WBC) of 29.4, hemoglobin of 16, hematocrit 46%, platelets 342,000. Clinically the patient was alert, in no evident distress, and tolerating his secretions. Extraoral exam revealed significant swelling of the right temporal, buccal, masseter, submandibular and submental spaces, generalized cellulitis with erythema and warmth to touch was notable. Intraoral examination showed severe swelling on the right buccal mucosa, trismus and no signs of active drainage. The floor of mouth was soft and not elevated. The tongue had free range of motion, mild edema in the posterior right oropharynx, the pterygomandibular raphe was slightly swollen and tooth #32 had severe caries most likely the source of the infection (Figure 1).

Computerized tomography with contrast of the face and neck revealed extensive soft tissue infection extending in the right sub-masseteric space and right parapharyngeal space, and severe enlargement of right parotid gland with no fluid collection and slight airway deviation (Figure 2).

The patient was admitted to ICU and was started on intravenous (IV) 900 mg clindamycin. On hospitalization day 2, he was taken to the operating room for incision and drainage of multifacial space abscess. Extraoral and intraoral approaches were used to drain right sub-masseteric space and right parapharyngeal space, purulent discharge was noted in both spaces, Penrose drains were left in place. Teeth #31 and #32 were extracted and, a significant amount of purulence was evacuated from the extraction site of tooth #32. During drainage, it was noted that there was frank purulence coming through the patient’s right ear exiting his auditory canal (Figure 3). The patient remained intubated post operatively due to severe swelling and possible compromise of airway. Ciprofloxacin and Vancomycin were added to the antibiotic regimen per Infectious disease recommendations. ENT consultation was requested; upon evaluation, it was deemed that the EAC discharge was an extension of the facial abscess.

No significant improvement was noticed after two days post operatively. Culture and sensitivity showed “rare growth of Streptococcus viridans isolated group and no anaerobe microorganisms”, however, the patient showed minimal clinical response to treatment, had continuous spikes in fever and a maintained leukocytosis. No fungal cultures where collected from the first surgery since multiple studies in the past an associated multifacial space infections to be bacterial in nature.

A repeat CT (Figure 4) of head and neck was done and showed persistent phlegmonous cellulitis with abscess of the right face associated with adenopathy. Swelling and edema did extend to and involve the deeper soft tissues medial to the right mandibular ramus. Fluid was seen around the ramus laterally and medially representing abscess collection. When compared to the previous CT, there is evidence of obstruction of the right EAC as well as well as a well differentiated collection adjacent to the mandibular condyle; this finding has significant relevance do to drainage noted from the right ear explained before (Figure 5).

Post operative day number 4 decision was made to take the patient...
However, there have been rare case reports of odontogenic infections attributed to bacterial etiology [1]. The literature is replete with antimicrobial recommendations for surgical incision and drainage showing growth of aerobes and anaerobes, and right parapharyngeal spaces. The infection was unresponsive to conventional treatment with broad-spectrum antibiotics and surgical incision and drainage. Purulent content was evacuated in all spaces. New cultures for aerobic, anaerobic and fungus were taken. Patient remained intubated post operatively and was transferred back to ICU.

Intraoperative cultures from the second surgery were positive for Candida albicans growth. Empirical therapy with intravenous antifungals micafungin and fluconazole were started as part of the antifungal therapy. There was progressive improvement in swelling and WBC. The patient was extubated on postoperative day four following the second surgery and discharged day eight from admission.

Discussion

Bacteria are the most frequent cause of odontogenic infections [1]. The literature is replete with antimicrobial recommendations for treatment of odontogenic infections attributed to bacterial etiology. However, there have been rare case reports of odontogenic infections caused by fungi, namely C. albicans. Farmahan "et al." [1] showed that C. albicans was seen in 3 cases (5%) of their patients. Candida species can cause a broad range of infections in humans, ranging from mild to dangerously wide spread diseases [3,1]. The most commonly occurring mycoses are caused by commensal fungi of the human body [3].

We present an unusual case of severe deep fascial spaces infection of odontogenic origin with purulent discharge through the external auditory canal. The infection was unresponsive to conventional treatment with broad-spectrum antibiotics and surgical incision and drainage. Fungal culture was requested at the time of the second surgical incision and drainage showing growth of C. albicans. Antifungal therapy was started with micafungin and fluconazole following and the patient’s condition began to resolve.

The present case exemplifies the importance of considering both bacterial and fungal etiology of odontogenic infections even when patients are otherwise healthy. A review of the literature revealed only one other case, by Badiee "et al." [2], of widespread odontogenic infection associated to C. albicans. The case report involves an immune competent man who presented with Candida mediastinitis due to a retropharyngeal abscess following a dental extraction [2]. The patient did not show improvement following administration of broad-spectrum antibiotics and surgical drainage. The second culture obtained indicated C. albicans growth and the patient’s condition subsequently responded to antifungal treatment [2].

Odontogenic infections are very rarely associated to fungal etiology, thus, fungi are not commonly included in the initial differential diagnosis. However, due to the lack of response to initial treatment, other possible etiologies should be included such as fungus.

Consequently, there has been significant research in attempt to identify the bacterial population of infected root canals and periradicular lesions. Vigil “et al.” [4] analyzed the periradicular tissues of 28 refractory endodontic cases and found the most common isolates to be Propionibacterium acnes, Staphylococcus epidermidis, Streptococcus intermedius, Wolinella recta, Fusobacterium species, and Clostridium species. Though their sample size was small, one culture was also positive for C. albicans [4]. Several other studies have also reported that C. albicans is more frequently encountered in these lesions that was previously expected [5,6,3]. C. albicans is the most commonly isolated fungal species in the oral cavity and is found in both healthy and immune compromised individuals [5,3]. However, infections arising from C. albicans usually occur in immune suppressed individuals and are not commonly seen in otherwise healthy patients.

Though uncommon, there are a few studies in the literature reporting instances of C. albicans found in infected root canals. Baumgartner “et al.” [5] identified C. albicans in 5 of 24 infected root canal samples. Waltimo “et al.” [6] isolated 48 strains of fungi out of 692 root canal samples positive for microorganisms (7%). The fungi were mostly isolated together with bacteria (87%) but pure cultures were also obtained (13%) [6]. C. albicans comprised 80% of the identified yeasts [5]. Moreover, Portela “et al.” [7] demonstrated a direct correlation between collagen degradation and C. albicans due to type I collagen degradation in HIV-infected children. These reports illustrate that C. albicans may be involved in root canal infections more often than believed.

In healthy individuals, Candida species can be found in the oral cavity, the gastrointestinal tract, anus, groin, vaginal canal, and vulva [3]. The incidence of C. albicans has been reported to be 30% to 45% in healthy adults and 95% in HIV patients [3,7]. The majority of these fungi are opportunistic pathogens in nature, causing infections in the event of change in normal microbiota as well as the event of the administration of broad-spectrum antibiotics, or by immune compromised hosts [3].

Our patient’s history of alcohol abuse could have played a role in predisposing him to the C. albicans infection. Molina et al. [8] reported that alcohol abuse impairs various aspects of the human immune response giving way to an increased risk of infections. Additionally, the C. albicans infection could have resulted from the initial administration of broad-spectrum antibiotics, leading to modification of the patient’s normal microbiota and increased susceptibility to fungal colonization [9].

An important aspect to highlight in this case is the fact that at the time of the first surgical drainage, frank purulence was noted to be draining from the right external auditory canal. A review of the literature revealed only two other reported cases of odontogenic infections attributable to fungal etiology, with one case being due to C. albicans [5,6]. The incidence of C. albicans has been reported to be 30% to 45% in healthy adults and 95% in HIV patients [3,7]. The majority of these fungi are opportunistic pathogens in nature, causing infections in the event of change in normal microbiota as well as the event of the administration of broad-spectrum antibiotics, or by immune compromised hosts [3].

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Figure 5: A. EAC clear and patent on initial CT. B. Repeat CT scan shows obstruction of canal.
Infections involving drainage from the external auditory meatus, though not associated to C. albicans. Pepato et al. [10] reported a case of a mandibular third molar fascial abscess with purulent secretion through the left external auditory meatus. They attributed this phenomenon to two possible etiologies: multiple fissures in the anterior wall of the cartilaginous portion of the external acoustic meatus, and congenital defects sometimes present in the anterior-superior aspect of the external acoustic meatus, known as the foramen of Huschke [10]. The foramen allows communication between the external acoustic meatus and the mandibular fossa. Biron "et al." [11] reported a similar occurrence of a deep neck abscess of dental origin draining through the external ear canal.

Although multiple factors could have contributed to this patient’s vulnerability to odontogenic infection of fungal etiology, it remains an infrequent finding in the literature making this case a noteworthy manifestation.

**Conclusion**

*Candida albicans* is an opportunistic pathogen, most frequently causing disease in those individuals who are immune suppressed. Although it is a rare etiology of odontogenic infections, it should be suspected in individuals that present with this type of odontogenic infections with possible immune compromised state who show no improvement to broad-spectrum antibiotics and surgical incision and drainage. This case illustrates the need to consider a fungal cause in patients with odontogenic infections who do not respond to conventional treatment.

Further studies are required to evaluate fungal cultures at the initial presentation to establish a baseline treatment in immune compromised individuals, since fungal super infection can also be associated to broad spectrum antimicrobial treatment.

**References**