

# Maxillary third molar and Subperiosteal abscess of the orbit: unusual and unnoticed complication

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## ABSTRACT

**Oral and maxillofacial surgery involves few procedures that may show severe complications with potential of life threatening problems. Subperiosteal abscess of orbit is an extremely rare complication arising spontaneously or after dental surgery. Till date, the occurrence of severe infections following surgical removal of third molars has not been clearly understood. Cellulitis of the orbit is one of the less common complications of odontogenic infections. The purpose of this article is to discuss a much unknown complication occurring following maxillary third molar.**

**Keywords: Subperiosteal abscess, maxillary third molar, orbit, odontogenic infection.**

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## INTRODUCTION

The surgical removal of third molars is one of the most common procedures performed in oral and maxillofacial surgery. The overall complication ratio associated with this surgery is 7% to 10% and the risk of postoperative infection varies from 1% to 15% [1,2]. A retrospective analysis conducted by oral surgeons of 1000 mandibular and 500 maxillary third molar extractions showed that the rate of postoperative complications was 4.3% for the mandibular extractions and 1.2% for the maxillary extractions [3]. Recent advances in the imaging techniques have allowed the recognition of the Subperiosteal orbital abscess (SPA) as a specific condition within the general clinical setting of the “orbital cellulitis” [4]. In 1970 Chander et al proposed the clinical system to classify periorbital and orbital inflammation [5]. They grouped these complications into following groups: (1) inflammatory edema (2) orbital cellulitis (3) subperiosteal abscess (SPA), (4) orbital abscess and (5) cavernous sinus thrombosis. The SPA results from the accumulation of purulent material between the periorbita and the orbital bones [6]. Its rare complication following routine dentoalveolar surgery but early diagnosis and management are important to avoid sequellae. Subperiosteal abscess is a serious problem that is capable of both rapid progression and intracranial extension [7].

## SCANNING AND CLINICAL PRESENTATION

The orbital abscess is usually caused by extension of the infection to the pterygopalatine and infratemporal regions progressing next to the inferior orbital fissure. Proptosis and extraocular muscle dysfunction are marked but no decrease in visual acuity is observed. Echography, computed tomography scan and magnetic resonance imaging allow distinction from other types of orbital inflammation. In such cases, patient’s cheek, temporal and periorbital regions get swelled. Echographic study determines the site and extension of infection. Computed tomography study demonstrates the extension of inflammatory process i.e. extension from the maxilla to the deep anatomic spaces including the pterygomaxillary, parapharyngeal, and deep temporal spaces. MRI helps to confirm this diagnosis. The evolution of new orbital imaging techniques in past few years has facilitated the diagnosis of SPA [8, 9]. The orbital echography allows distinction of SPA from diffuse cellulitis and intra-orbital abscess and can aid in the surgical management of this disorder [4].

On orbital echograms, the purulent content reveals an acoustically low reflective space between the high spikes of a dense periorbita and the bony orbital walls with minimal ultrasound attenuation. However, the surgical treatment should be planned according to the results of computed tomography. This radiological technique can clearly differentiate between cellulitis and abscess formation, showing a homogeneous elevation of the periorbita. A subperiosteal collection could usually be differentiated from simple inflammatory edema by a layer with the radiodensity of normal fat between the periorbita and the inferior rectus muscle. MRI has offered no particular advantage over computed tomography in depicting SPA and the former has disadvantages in evaluating the shared bony walls [10]. Radiological study helps for surgical

drainage through a subciliary incision. Using this approach, the periosteum can be elevated posteriorly and pus drained. A small Penrose drain can be left in place and the pus sent to microbiology for culture and sensitivity. Generally, these cultures of this area yield growth of *Streptococcus sanguis* and *Pasteurella multocida*. The *S. sanguis* is sensitive to clindamycin and erythromycin and *P. multocida* is sensitive to beta lactam antibiotics, ciprofloxacin, and cotrimoxazole. Considering this pattern of antibiotic sensitivity, the therapy can be altered to intravenous clindamycin and cefotaxim.

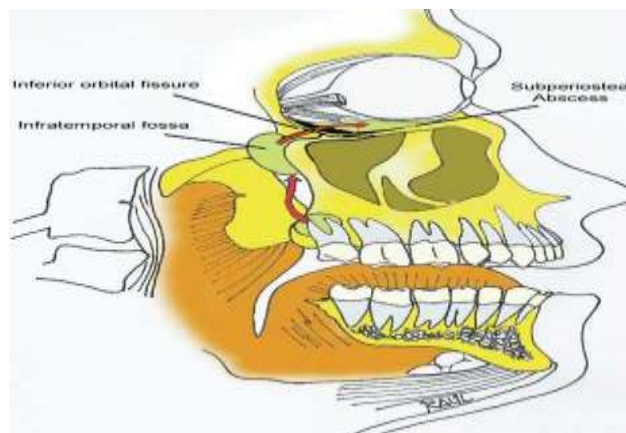
*S. sanguis* and *P. multocida* are known mouth commensals and an uncommon cause of complications after oral surgery. *S. sanguis* is a member of the “viridans group” of streptococci, which has been increasingly recognized as a pathogen of endocarditis and prosthetic joint infections [11, 12]. This bacteria has been reported also in relation with brain abscesses [13, 14]. *P. multocida*, a small, gram-negative coccobacillus, is part of the normal oral flora of many animals including the dog and cat. This organism is a rare but potentially serious cause of ocular infection and has been reported previously as an unusual cause of periorbital cellulitis [15]. It is also recognized as a pathogen in a variety of systemic infections including bacteremia, meningitis, brain abscess, spontaneous bacterial peritonitis, and intra-abdominal abscess [16].

### DISCUSSION

The oral and maxillofacial surgeon needs to be aware of the situations especially in cases of patients with background of systemic pathology. The increased chances of inflammatory complications in patients with systemic diseases can be explained by a phenomenon of neutrophil chemotactic alterations [17]. The clinical signs of such type of entity are usually nonspecific and can make the diagnosis difficult. However, the rapid development of eyelid edema, proptosis and pain suggests an orbital complication. The displacement of the globe in a superior direction should raise suspicion of a SPA. Generally most of the reports about complications after oral surgery focus on alveolar osteitis and rarely there are studies who have addressed the details of severe infection [18]. Other problems following molar extraction have been reported occasionally such as submasseteric abscess [19] serious deep neck infection [20] mediastinitis [21] pneumothorax [22] peripheral facial palsy [23] epidural abscess [24] brain abscess [25] and cavernous sinus thrombosis [26].

The chance of serious problems in relation to orbital cellulitis exists such as meningitis, brain abscess, cavernous sinus thrombosis or blindness. Orbital inflammation may also lead to permanent disability and death [27]. This inflammatory process may extend posteriorly in the subperiosteal space and produce an orbital apex or sphenoidal fissure syndrome mimicking cavernous sinus thrombosis [28]. SPA may lead to rapid elevation of orbital pressure that causes visual impairment and further intracranial extension of the infection [29]. Emergency drainage has been suggested for patients with compromised vision, regardless of patient age. Even if criteria for early surgery are present, close followup is needed because prompt drainage does not always guarantee a favorable outcome [10]. Although surgical drainage is of primary importance, administration of antimicrobial therapy is an essential part of the management of patients with SPA.

Generally in cases of SPA, the orbital abscess results of the infection traveling from the region of the extracted tooth toward the posterior region of the maxilla to the infratemporal fossa and through the inferior orbital fissure to the subperiosteal region of the orbit (Fig. 1). Neurovascular foramina, congenital and acquired bony dehiscences and valveless venous anastomoses allow direct and phlebotic extension of bacteria into the subperiosteal space. The absence of valves does permit the transmission of elevated pressure in the sinus veins to the vascular bed of the orbit and eyelids with resultant transudation and local edema [4]. Anatomic studies have demonstrated that the venous system of the paranasal sinuses anastomoses freely with that of the eyelids, the periorbita, and the deep orbital tissues [30].



**Figure 1: Diagrammatic presentation of the pathway in the formation of orbital SPA.**

The line of treatment for SPA in the orbit and its usual cause includes the intravenous administration of antibiotics and surgical drainage. There are substantive reasons for considering early surgical approach in all cases even when vision is not obviously impaired. Prompt drainage of SPA might prevent alterations in the visual acuity and extraorbital complications. Expansion of the potential subperiosteal space may be rapid and the infection is sequestered within a relatively avascular zone raising doubts about antibiotic penetration and suppression of bacterial growth [4].

Moreover, the thing of importance is the difficulty in initially selecting drug that will be effective against the subperiosteal infection. Surgical treatment should be considered not only to normalize orbital pressure but also to establish aerobic conditions [29]. Emergency surgical drainage is recommended for patients whose optic nerve or retinal function is compromised [6] especially in patients with infections of known dental origin. As per the approach, the wound should be deepened to the periosteum, which is then incised. Next, periosteal elevation is continued until the abscess cavity is encountered. One should be aware of that orbital complications may occur following maxillary third molar surgery. The clinician should be familiar about the clinical presentation and have a high rate of suspicion because late recognition and delay in the treatment can increase the associated morbidity.

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