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Case Report

The Surgical Management of Oroantral Communications: Recommendations for Routine Practice Combined Endoscopic and Intraoral Approach

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Abstract

An oroantral communication (OAC) is a common complication in alveolar surgery that usually occurs as a result of the extraction of maxillary posterior teeth, which do not usually resolve spontaneously. Other causes may include trauma, maxillary cysts and tumours, and infections. The practicing oral and maxillofacial surgeon treating patients with oroantral communication (OAC)/oroantral fistulas should be familiar and competent with the various treatment options available. . In most cases, surgery is performed via a Tran's oral approach and the fistula is closed with local flaps, but the results are often unsatisfactory. Although different procedures have proved to be successful, all are premised on the treatment of any underlying sinusitis, which is associated with a higher risk of recurrent OAC.

Objective: To evaluate an alternative technique for the treatment of oroantral fistula, using a combined endoscopic and intraoral approach

Keywords: Oroantral Fistula; Ostiomeatal Complex; Chronic Maxillary Sinusitis; Functional Endoscopic Sinus Surgery (FESS); Middle Antrostomy

Introduction

Oroantral communication (OAC) can be defined as a pathologic space created between the maxillary sinus and the oral cavity. This communication and subsequent formation of a chronic oroantral fistula is a common complication often encountered by oral and maxillofacial surgeons. Closure of a long-standing oroantral fistula presents a surgical challenge [1]. The decision of which treatment modality to use is influenced by many factors, such as the amount and condition of tissue available for repair, the size and location of the defect, the presence of infection, the time to the diagnosis of the fistula [2]. Oroantral communications are often iatrogenic following the extraction of antral or sinus teeth. Indeed, the inferior wall of the maxillary sinus has an anatomical relationship with the maxillary premolar area (antral teeth). The distance between the apex and the sinus is 1 to 7 mm for a sinus floor thickness of 2 to 3 mm. Thus, sinus refraction can be observed in 3.8% to 1.3% of cases after maxillary molar extraction [3]. OACs can also be induced by tumour surgery, implant surgery, trauma, or orthogenetic surgery involving the maxilla. Surgical treatment of OACs should be performed as early as possible. Indeed, in the face of extensive untreated oroantral communication, 50% of patients develop sinusitis after 48 hours and 90% after two weeks with a filling of the sinus on radiological examination [4]. In the healthy sinus, OACs less than 5 mm close spontaneously [5]. Nevertheless, it is difficult, if not impossible, to evaluate the diameter of an OAC in the clinical setting, which is why it is necessary to intervene surgically in the majority of clinical situations. Different surgical

techniques have been described, such as surrounding soft tissues (vestibular flap, palatal flap, buccal fat pad). The choice of the appropriate treatment depends on several factors, including the time of consultation, the presence of associated sinusitis, or the size of the communication. Attempts to surgically close an oroantral fistula should be proceeded by a complete endoscopic radiological exploration of the ostiomeatal complex to identify its morphological and functional features. The collaboration by dentists, ENT specialists, and radiologists is crucial to providing definitive treatment with long-term efficacy [6]. The main symptoms related to OAC are facial pain or pressure, nasal congestion, purulent rhinorrhoea that may be unilateral, cacosmia, and postnasal drip. The authors report that study of patients with OAC presented rhinorrhoea in 66.7% of cases cheek pain in 33.3% and cacosmia in 25.9% [7]. However, these symptoms do not distinguish OAC from other causes of sinusitis, as some patients experience sinusitis-like symptoms, such as dental pain and nasal congestion, whereas others present with minimal sinusitis symptoms and dental pain, because the osteomeatal complex is not obstructed and allows drainage and relief of pressure. The diagnosis of OAC should be based on a thorough dental and medical examination, including evaluation of patient's symptoms and past medical history. Patients with history of extractions of the maxilla molars or an endodontic therapy may have OAC. Clinical examination includes inspection of the buccal mucosa and vestibule for swelling or erythema. In addition, the pulp is tested by using electric or thermal pulp vitality testing, percussion, and palpation in order to determine if the tooth is hale. If there are teeth with existing root canal therapy, the dentist should examine for any untreated or sub-optimally filled root canals, inappropriate core restorations or leaking coronal restorations. The maxilla sinus itself can also be evaluated with intranasal examination with anterior rhinos copy or flexible nasolaryngoscopy [8,9]. The practicing oral and maxillofacial surgeon treating patients with oroantral communication (OAC)/oroantral fistulas should be familiar and competent with the various treatment options available. Multiple techniques are available from purely soft tissue flaps, which have proved to be successful over time, to a combination of hard tissue grafts (autologous, alloplastic, or allograft), which can prove to be useful with the increased demand for implant restorations. Although different procedures have proved to be successful, all are premised on the treatment of any underlying sinusitis, which is associated with a higher risk of recurrent OAC [10].

Diagnosis

Patient usually complains of nasal regurgitation of liquid, altered nasal resonance, difficulty in sucking through straw, unilateral nasal discharge, bad taste in the mouth and whistling sound while speaking. Pain may be present at malar region. At later stage, there is formation of antral polyp, which is visible through the defect intra-orally. However, some patients may be asymptomatic. Clinically, a large fistula is easily seen on inspection. However, diagnosis of small defect scan be made by the nose blowing test. The patient is asked to close his nostrils and blow gently down the nose with the mouth open. Presence of OAFC appears as a whistling sound as air passes down the fistula into the oral cavity. It can also be seen as air bubbles, blood or mucoid secretion around the orifice. Panoramic radiograph gives an accurate estimation of the dimension of the bony defect of the fistula and reveals about the presence and location of dental roots or implants or any foreign body that may have been dislodged into the antrum. Computed tomography can be done to rule out the presence of maxillary sinusitis [1].

Discussion

Several techniques can treat OAC. The choice of method must take different factors into account: the size of the communication, the presence or absence of an infection, and, especially, the time of exposure. Indeed, in the presence of a healthy sinus, when the treatment is early (within 48 hours), the management will only be surgical to close the OAC. In the case of deferred care, treatment has two stages: First of all, medical treatment to cleanse the sinus [11]. Some authors recommend the following protocol: antibiotic therapy: association of amoxicillin/clavulanic acid twice a day; clindamycin 300 mg 4 times a day or moxifloxacin 400 mg once a day for at least ten days combined with a decongestant and rinse of the sinus with physiological serum through OAC [12]. On the other hand, with the cleaned sinus, the treatment is surgical, closing the OAC. There is no consensus regarding a specific technique. Each of these techniques has its pros and cons. It is therefore essential to choose the method according to the clinical situation. Before describing the different surgical options, it is essential to remember that in the presence of a healthy sinus, OACs smaller than 5 mm tend to close spontaneously .Therefore, after tooth extraction, when an OAC is suspected, it would be wise to suture the surgical site with or without collagen sponges. The patient is advised to avoid all iatrogenic movements, such as the violent blowing of the nose, which could increase the size of the OAC [11]. Traditional surgical methods are as follows: Rehrmann's Flap. The coronal advanced flap is the most common and oldest technique known in the treatment of OAC It remains today the most accepted technique by the authors. This technique consists of making a vestibular flap of trapezoidal shape advanced coronal to close the bone defect [13]. Buccal Fat Pad Graft. This technique is suitable for small and medium volume OAC. The Buccal fat pad graft is located between the masticatory muscles with three arterial trunks to ensure vascularization: the superficial temporal, maxillary, and facial arteries. One of its extensions, called the buccal extension, is close to the maxillary premolar molar zone. The size of this ball is constant regardless of the body

mass. Egyedi described this technique for the first time in 1977 [14]. Autogenic Bone Graft. In 1969, Proctor [15] was the first to suggest the use of autogenous iliac bone grafts in the closure of large OACs. Given the additional costs and comorbidity linked to this technique, it was abandoned. Haas et al. recommend using monoblock bone grafts for the closure of OAC [16]. These blocks are prepared to adapt to the bone defect and remain stable. Otherwise, they will have to be stabilized using miniscrews. A Rehrmann-type vestibular flap covers both the bone defect and the graft. Allogenic and Xenogeneic Materials. Some authors use these materials for closing oral communications. Marković reported a case of OAC treated with a collagen membrane. After completing a mucoperiosteal vestibular flap and elimination of the mucosal pathway of the fistula, the technique consists of placing the membrane on the bone defect. The flap is thus returned to its original position without covering the collagen membrane [17]. Clinical experience has shown an increased risk of secondary infection when the membrane is exposed to the oral cavity, hence the decision to cover it entirely with the mucoperiosteal flap. This method is known as a double-layer closure technique. It is close to the triple-layer closure technique reported by George [18], which closes an oroantral communication by three levels of structure: the mucoperiosteal flap associated with a buccal fat pad and a fibrin membrane rich in platelets. The cost of this therapy remains a critical limit. On the other hand, OAC may be effectively closed using lyophilized fibrin glue of human origin. After preparing fibrin for 15 to 20 minutes, it is placed at the level of the OAC associated with a collagen membrane [12]. The advantage of this technique is the absence of a flap and, therefore, of post operational effects. In the same way, the anatomy of the oral cavity also remains intact. On the other hand, the risk of disease transmission and the preparation time are significant drawbacks.

Joint management by the oral surgeon and the ENT surgeon

In certain circumstances, surgical treatment turns out to be difficult or even impossible for the closure of OAC. Attempts to surgically close an oroantral fistula should be proceeded by a complete endoscopic radiological exploration of the ostiomeatal complex to identify its morphological and functional features. The collaboration by dentists, ENT specialists, and radiologists is crucial to providing definitive treatment with long-term efficacy. Odontogenic sinusitis represents by definition a border condition between otolaryngology and dental science and, from a holistic perspective, cannot be managed without a promiscuous collaboration between specialists. The sheer variety of scenarios that may be encountered should be enough to encourage mutual collaboration between ENTs and dentist. Such collaboration is required both to perfect diagnostic and treatment and to provide a solid scientific and medico-legal foundation for each intervention proposed to patients. The strong recommendation emerging from the literature [19] is that both sinusitis and the odontogenic focus need to be identified for a correct diagnosis of OAC. Consequently, a strict collaboration between the ENT surgeon and an oral surgery specialist is strongly recommended in order to combine the expertise required to avoid OAC over diagnosis (blatantly inducing consequent overtreatment) and underdiagnoses (which is a known frequent cause of treatment failures in sinus surgery). While the clinical examination, both dental and otolaryngological, is straightforward, and the use of nasal endoscopy mandatory, the choice of imaging exams is more complex. Computed tomography (CT) and cone-beam CT (CBCT) are both commonly used for diagnosing sinusitis and identifying the dental problem [20] albeit with different peculiarities (as a general rule, standard CT scan provide a better resolution and contrast for the sinonasal cavities and a better visualization of soft tissues alike, while CBCTs-which represent nevertheless a continuously evolving technology usually allow for easier diagnosis of dental conditions). However, dental specialists may further require employing techniques such as orthopantomography and periapical radiographs to complete the dental study. Such examination should surely be ordered only by the dental surgeon in selected cases, as not to expose the patient to unnecessary radiation.

General principles of OAC treatment

While endoscopic sinus surgery has an undebated role in OAC treatment, the extent of said surgery is still a matter of debate, since some authors [21] proposed that middle antrostomy is enough to warrant patient healing. While prospective validation of these approaches is required, at present opening all sinuses involved in OAC, while being the most frequent approach, is recommended only in case of OAC with orbital or intracranial complications [9]. Again, opening the maxillary sinus together with the anterior ethmoid, which represents another frequently adopted surgical choice aimed at restoring a good osteomeatal complex patency, needs further prospective validation before entering routine clinical use. It seems reasonable to raise a warning to the ENT specialist dealing with OAC, a warning that may sound redundant to specialists used to approach this condition. While OAC may appear as a "simpler" version of RS, where the aetiology can be rapidly identified without resourcing to endotypes and interleukin-mediated inflammatory responses, the interplay between teeth and sinuses is extremely complex, and dental causes are often elusive or uncertain. Furthermore, teeth represent an irreplaceable health asset for patients, while dental and/or implant logical treatments impose hefty financial and healthcare costs, so any dental procedure, avulsions first, have to be supported by case-specific clinical evidence. Following these considerations, the statement "a shared decision-making process between the otolaryngologist, dental provider, and patient, where the benefits and risks of dental

treatment and endoscopic sinus surgery (FESS) are discussed" opening Craig and colleagues' consensus [9] should become a mantra in treating OAC.

Conclusions

Attempts to surgically close an oroantral fistula should be proceeded by a complete endoscopic-radiological exploration of the ostiomeatal complex to identify its morphological and functional features. The collaboration by dentists, ENT specialists, and radiologists is crucial to providing definitive treatment with long-term efficacy.

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