

# Evaluation of different treatments for oroantral/oronasal communications: experience of 112 cases

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**Abstract.** This retrospective study analyzed the etiologic factors, location and treatments for patients with oroantral or oronasal communications (OAC or ONC). Data analysis extended to gender, age, etiology, location, type of treatment and short-term complications from January 1988 to May 2004. A total of 112 patients with 101 (90%) OAC and 11 (10%) ONC were included. The main etiology for OAC was tooth extraction (95%) with similar prevalence between right (49%) and left (51%) side. For ONC, pathological conditions (27%) and exodontia (27%) were the most prevalent. For the treatment of OAC, suture was the technique most frequently used (60%), followed by buccal fat pad (28%), buccal flap (9%), palatal flap (2%) and one dental transplant (1%). For ONC, the following treatments were used: suture (46%), buccal flap (36%) and palatal flap (18%). Failure to eliminate the communication occurred in six (6%) patients of the OAC group and three (27%) of the ONC group. The results confirm that tooth extraction was the most common etiologic factor for ONC and OAC. Suture, when the communication was small (3–5 mm), and the use of a buccal fat pad (100% successful), when a larger communication existed (>5 mm), seemed to be the two best choices for treatment.

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Communication is defined as the space created between the maxillary sinus and the buccal cavity (oroantral, OAC) or between the nasal cavity and buccal cavity (oronasal, ONC). There are many causes of OAC and ONC. They may be the result of cysts, traumas, tumors, pathological entities or even minor surgery<sup>8</sup>. The

extraction of maxillary posterior teeth, however, is the most common cause of OAC, because of the anatomically close relationship between the root apices of the premolar and molar teeth and the maxillary antrum, and the thinness of the antral floor in that region, which ranges from 1 to 7 mm<sup>19</sup>.

An OAC of less than 2 mm in diameter tends to close spontaneously, whereas those larger than 3 mm require surgical closure<sup>10</sup>. Various methods for the closure of communications have been reported in the literature, such as local flaps, distant flaps, grafts<sup>3</sup> and the buccal fat pad (BFP)<sup>10</sup>. This anatomical structure was

Table 1. Prevalence of patients with OAC and ONC according to decade of life

Age (years)	Number of OAC (%)	Number of ONC (%)
11–20	20 (20)	1 (9)
21–30	40 (39)	3 (27)
31–40	17 (17)	2 (18)
41–50	13 (13)	4 (37)
51–60	8 (8)	1 (9)
61–70	3 (3)	0 (0)
Total	101 (100)	11 (100)

first described by BICHAT<sup>6</sup> in 1802, and EGYEDI<sup>7</sup> in 1977 was the first to report the use of BFP for oral reconstruction. After that, it became usual for the closure of OAC/ONC and fistulas. Various buccal mucoperiosteal flaps have been described, including the rotated flap<sup>4</sup>, advancement flap<sup>23</sup>, sliding flap<sup>23</sup> and transversal flap<sup>9</sup>. REHRMANN'S technique is the common buccal flap procedure for closure of a minor alveolar communication<sup>16</sup>. Having a broad base, it ensures adequate blood supply to the flap. Flap mobility is improved by making parallel incisions in the periosteum at the base of the flap.

Palatal flap procedures are based on the greater palatine vessels and can usually be classified as straight advancement<sup>22</sup> or rotational advancement<sup>12</sup>. The straight-advancement flap does not offer much greater mobility for lateral coverage and thus it is suitable for the closure of minor palatal or alveolar defects. The palatal rotational-advancement flap, first described by ASHLEY<sup>2</sup> in 1939, provides the flap with adequate mobility and tissue bulk.

If the communication is not treated or diagnosed, an epithelial tissue may develop around its track, which in this situation is defined as a fistula. In this study, the terms communication and fistula are used as being the same, although they have different features.

## Material and methods

Of all the patients who were submitted to oral surgical procedures at the Division of Oral and Maxillofacial Surgery, State University of Campinas—Piracicaba Dental School from January 1988 to May 2004, 112 were selected for this study. The data recorded included patient gender, age, etiology, location, method of surgical treatment and short-term complications. Success was considered to be the complete closure of the communication.

The surgical methods used for communication closure varied, from sutures (approach of the wound edges), palatal flap (rotational advancement<sup>12</sup>), buccal flap (REHRMANN'S technique<sup>16</sup>) to the

BFP<sup>10</sup>, especially for large communications. In all these techniques, epithelialization of the fistula tract, osteitis on fistula margins and infected and degenerated polypoid mucosa, when present, were removed before closure of the communication. Antral infection was first controlled with antibiotics and antral irrigation carried out with physiological solution.

Among the 112 patients, there were 101 OAC (61 men and 40 women, mean age 31.2 years, female-to-male ratio 1:1.52) and 11 oronasal communications (ONC) (seven men and four women, mean age 35.6 years, female-to-male ratio 1:1.75). The highest number of communications occurred in the third decade of life for OAC and the fifth decade for ONC (Table 1).

The causes of ONC were pathological lesions (periapical cyst) (three), tooth extraction (three), blastomycosis (one), sequelae of gun-shot wound (two), congenital (one) and removal of a dental implant that had been pushed into the nasal cavity (one). The involved teeth were left and right impacted canines, periapical lesion of the left lateral incisor and mesiodens. Five repairs were treated by suture, two by palatal flap and four by buccal flap.

The cause of OAC was tooth extraction in 96 patients, pathological lesion in three, trauma in one, and periapical infection in one. The incidence of OAC on the right and left sides was similar (Table 2).

## Results

### Oronasal communication

Eight patients were successfully treated without complications but in the other three patients, treatment failed. In one

Table 2. Prevalence of OAC related to site

Region	Number of patients		
	Right	Left	Total (%)
Canine	1	2	3 (02)
First premolar	2	0	2 (02)
Second premolar	3	3	6 (06)
First molar	12	17	29 (29)
Second molar	6	10	16 (16)
Third molar	25	20	45 (45)
Total	49	52	101 (100)

patient, who was suffering from anemia and tuberculosis, tissue healing was altered and the surgical procedure failed. The second patient, in whom the communication originated from a dental implant removal, was unsuccessfully treated because of suture dehiscence. A second surgical procedure was not attempted because the bone defect was too large and the patient did not want to undergo a bone-grafting procedure. In the third patient, further surgery using a palatal flap was tried, but it failed resulting in necrosis. An obturator prosthesis was the definitive treatment, for all of these three patients. These three patients denied the consumption of alcohol or smoking.

### Oroantral communication

Treatments consisted of 61 sutures, 28 BFPs, 9 buccal flaps, 2 palatal flaps and 1 dental transplantation. A second surgical procedure was necessary in six patients (Table 3). Two palatal flaps, two buccal flaps and two BFPs were used in the second successful procedures. Only one patient, who needed a second surgery, had a noxious habit (smoker).

The chosen approach for exposing the BFP was a horizontal vestibular incision in the maxillary molar region. In some cases, the BFP was already visible through exposure. The BFP was mobilized by blunt dissection and grasped with a thin hook, transposed into the defect, expanded and sutured to the margins. One patient was treated with a BFP in the anterior region. The communication occurred during an impacted canine extraction. The surgical procedure using the BFP was possible because this patient was edentulous on the side of the communication.

Table 3. Treatment modality and complications in OAC patients

Surgical technique	Number of patients (%)	Number of complications
Suture	61 (60)	4
Buccal fat pad (BFP)	28 (28)	0
Buccal flap	9 (9)	1
Palatal flap	2 (2)	1
Dental transplantation	1 (1)	0

## Discussion

There are many techniques describing the closure of an OAC and ONC<sup>3</sup>. When determining how to treat a communication, the surgeon must take into account its size, the presence of infection and the time of diagnosing the communication.

The presence of maxillary sinusitis, epithelialization of the fistula tract, osteitis or osteomyelitis on fistula margins, a foreign body, dental cysts, a dental apical abscess, or tumors prevents spontaneous healing and results in chronic fistulas. Sinusitis may occur as a result of an oroantral fistula, and it is important that it should be treated first. Any foreign bodies, infected and degenerated polypoid mucosa, or infected bone should immediately be removed. A Caldwell-Luc procedure, with nasal anastomosis, is indicated in only those few cases where severe sinusitis is present prior to the antrum being exposed. None of our cases of OAC required such radical surgical intervention.

VON BONDSORFF<sup>21</sup> studied 84 human skulls and found that second molar roots have the most intimate relationship with the maxillary antrum floor, followed by the first molar, third molar, second premolar, first premolar and the canine. In spite of this, the present study showed that the tooth most often related to an OAC was the third molar; this may be because of the great number of third molar extractions performed. This finding is also contrary to the study of PUNWUTIKORN et al.<sup>14</sup>, who found the highest incidence of OAC after the first molar extraction.

Data analysis showed the highest number of cases of OAC to occur in the third decade of life, followed by the second. This may also be explained by the fact that orthodontists generally refer patients for extraction of the third molar teeth. PUNWUTIKORN et al.<sup>14</sup> found the highest incidence in the 60 years and older age group; however, there was no statistically significant difference between the different age groups in their study. The maxillary sinus reaches its greatest size during the third decade of life; consequently, the incidence of OAC should be higher after that<sup>18</sup>. The incidence of ONC was highest in the fifth decade. Those of advanced age respond less favorably and with more postoperative sequelae.

Some authors claim that buccal flap techniques are preferable for closure of small OAC, and palatal flaps are better for large bone defects<sup>2,11</sup>. The level of experience and dexterity of the surgeon is very important, because great care is required

while manipulating the pedicle. When the defect is located in the third molar region, rotation is hindered by the vascular pedicle. Although the surgical procedure is easier, buccal flap perfusion is poor and this is why it is not preferred in large and recurrent fistulas. Furthermore, narrowing of gingivobuccal sulcus may occur, interfering with prosthodontic rehabilitation<sup>1,13</sup>.

In one case, it had been planned to transplant the inferior right third molar to the left maxillary first molar. By coincidence, during the extraction of the maxillary molar, an OAC was found, and transplantation was the treatment of choice at that time. YOSHIMASA et al.<sup>24</sup> reported two cases of using third molar transplantation with closed apices for the closure of an OAC after tooth extraction. They presented satisfactory results of closing the communication and restoring masticatory function, and no problems were noted during the first year of clinical follow-up.

The use of the BFP as a pedicle graft for closure of oral defects has been reported with good results<sup>13,17-20</sup>. All cases treated in this study using the BFP were successful. Healing usually occurred within two to three weeks, leaving a good mucosal surface. Patients were not asked about their tolerance of the procedure or satisfaction with the surgery, but the experience in this study agrees with RAPIDIS et al.<sup>15</sup>, who believed that use of the BFP is easy, well tolerated and is an uncomplicated technique. TIDEMAN et al.<sup>20</sup> reported that, as with all grafts, postoperative complications are usually related to graft failure resulting from necrosis or infection. The BFP blood supply comes from three sources: the maxillary artery (buccal and deep temporal branches), the superficial temporal artery (transverse facial branch), and the facial artery (small branches). This rich vascularity may explain the high success rate with this flap<sup>5</sup>. To minimize the incidence of postoperative complications, it is suggested that the fat pad graft should adequately cover the surgical defect and that it must not be sutured under tension. A soft diet is also advisable until tissue healing has taken place<sup>15</sup>. As with the buccal flap, excessive traction of BFP towards the medium usually causes a vestibular sulcus loss, which may require a secondary surgical procedure before prosthetic rehabilitation.

Suture, when the communication is small (3–5 mm), and use of the BFP, for a larger communication (>5 mm), seem to be the two best choices for treatment of OAC. ONC is a rarer and more challen-

ging condition. The 100% success rate using the BFP in the present study is outstanding. In some patients, multiple surgical interventions may be necessary for successful closure.

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