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Oroantral communication

Epicritical study of 175 patients, with special concern to secondary operative closure

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ABSTRACT – A total of 175 patients with oroantral communications have been investigated in a follow-up study. The results show the importance of a fast and reliable diagnosis, and therapy which can save the patients from more radical treatment. Operation of the maxillary sinus should be avoided if conservative treatment of sinusitis is possible, or at least careful operation techniques should be chosen.

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There have been many studies on oroantral communications (OAC), as diagnosis and therapy require a complex approach (for a historical review see HÖHN[29], NORMAN & CRAIG[46]). The aim of this study was to discuss the various parameters which are of significance in the genesis and treatment of OACs. Great importance has been attached to the prognostic consequences of the treatment.

Material and methods

Within a 3-year period, 262 patients with the diagnosis of OAC were treated; 67 % (= 175 patients) came to follow-up examinations. This rate of response is high in comparison to other investigations[29,33]. Nevertheless, specific causes that hinder patients from attending follow-up examinations should be considered in the findings. The age structure shows Gaussian distribution, with maximum frequency in the fourth and fifth decades[13] ($\bar{x}$ = 41.4 years). Patients were treated in the years 1974–1976, the shortest time interval after the end of therapy and examination being 1 year, the longest 3 years 8 months.

EPIDEMIOLOGY

During 1968–76, OACs have increasingly been recognized and treated in Hessen, FRG (1968: 450, 1976: 1277). We assume that with extra care more OACs could be diagnosed. Nevertheless, an uncertain number of nondiagnosed cases remain which healed spontaneously and are not quantifiable[6,37,58]. Many investigations have described the distribution frequencies of the location of the extracted teeth[6,7,8,23,25,26,28,29,31,32,33,34,46,58,59]. In most cases an OAC arises after extraction of the first molar, followed in frequency by the second molar. An evaluation of all extractions and closures of OACs in the state of Hessen showed that an OAC occurred once after 180 extractions of the first molar, and once after about 280 extractions of the second molar. Exact frequencies are shown in Fig. 1. True frequencies may be higher, because not every contracted OAC may have been diagnosed and treated, but the calculated frequencies can be regarded as realistic.

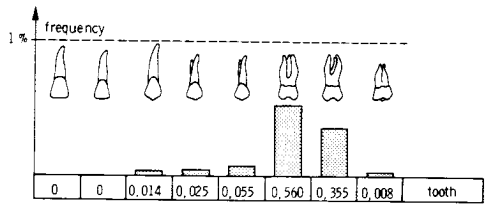

Fig. 1. Frequency of oroantral communications related to their location.

Investigation of the time passing before diagnosis and adequate treatment showed that further emphasis should be given to teaching reliable and early-performed diagnostic and treatment methods. Fig. 2 illustrates that 2 days after formation of an OAC only 50 % of the cases were adequately treated. In 84 % of the cases the practitioner recognized the existence of an OAC and sent the patient to the clinic, but only in 31 % did this happen immediately after determination of an OAC; 6 % of the patients came by themselves, 34 % of the patients were informed by the practitioner about diagnosis and given appropriate instructions.

DIAGNOSIS

The Luc-Caldwell test to prove an OAC by pressing air through the communication gave certainty only in 52 %, whereas the use of a fine probe was positive in 98 % of the patients. Careful application can always avoid a perforation with the probe; 2 % of the patients were missed by both diagnostic methods. Diagnostic steps are shown in Fig. 3. After confirmation of an OAC, it is important to know the condition of the sinus. In 21 % of the cases roots were dislocated into the maxillary sinus.

Radiographs are of high value in finding a dislocated root and in estimating the sinus condition, but are less able to diagnose an OAC[42]. The dental film and the panoramic radiograph both showed a dislocated root in only 78 %, but a combination of the two techniques revealed 98 % of the cases. Foreign bodies such as impression materials were visible only if they had a fairly larger diameter. Certainty can only be obtained by antroscopy.

Radiographs of the maxillary sinus in the occipito-mental (o.-m.) direction are routine when planning the therapy. Even if they are helpful when combined with clinical findings, it has to be remembered that false positive or negative findings are possible[2, 3, 14, 15, 41]. Only 21 % of the patients showed symmetric translucency of the antrum at the beginning of therapy; 43 % had total, 17 % marginal and 15 % basal radioopacity. In the upright position only 3 % showed a horizontal level, whereas in 13 % pus could be aspirated for bacteriologic investigation. With the patient's head recumbent and the diseased side downwards, less secretion volumina can be seen in the zygomatic recess, while in the alveolar recess it is harder to detect. A significant relationship has been found ($0.01 < P < 0.05$, Student's t-test). In the time interval between the origin of an OAC and its clinical diagnosis on the one hand, and the radiographic diagnosis on the other hand, statistically, a time limit could not be discerned after which diagnostic findings change suddenly.

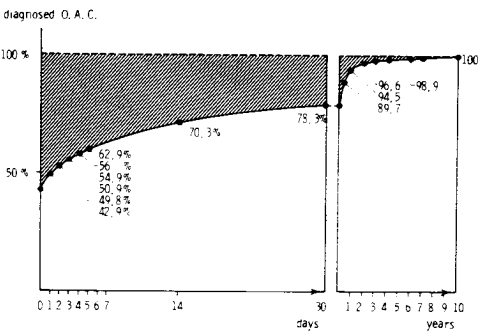

Fig. 2. Time interval between occurrence and diagnosis of an oroantral communication (OAC).

THERAPY

In 92 % of the cases the perforation was closed by a buccal flap. In most cases the Rehrmann-Wassmund technique was used[48, 58]. This means extending a buccal broad helved trapezoid mucoperiosteal flap by splitting the periosteum at the flap's base, fixing the disepithelialized end of the flap without tension below the palatal mucosa with U-sutures, and closing the remaining wound with a usual suture. We took care to keep a thin mucosal bridge around the neighboring teeth. This method was chosen because it is known to have a high rate of success ($\bar{x} = 93$ %)[19, 30, 32, 37, 52]. In the event of large communications (> 1 cm in diameter) it is more secure to use a double flap technique or a palatal island flap[4, 9, 11, 12, 18, 25, 29, 36, 43, 54, 57, 60]. In the edentulous jaw it is preferable to move a bridge flap from the anterior region of the communication[52]. Many more techniques

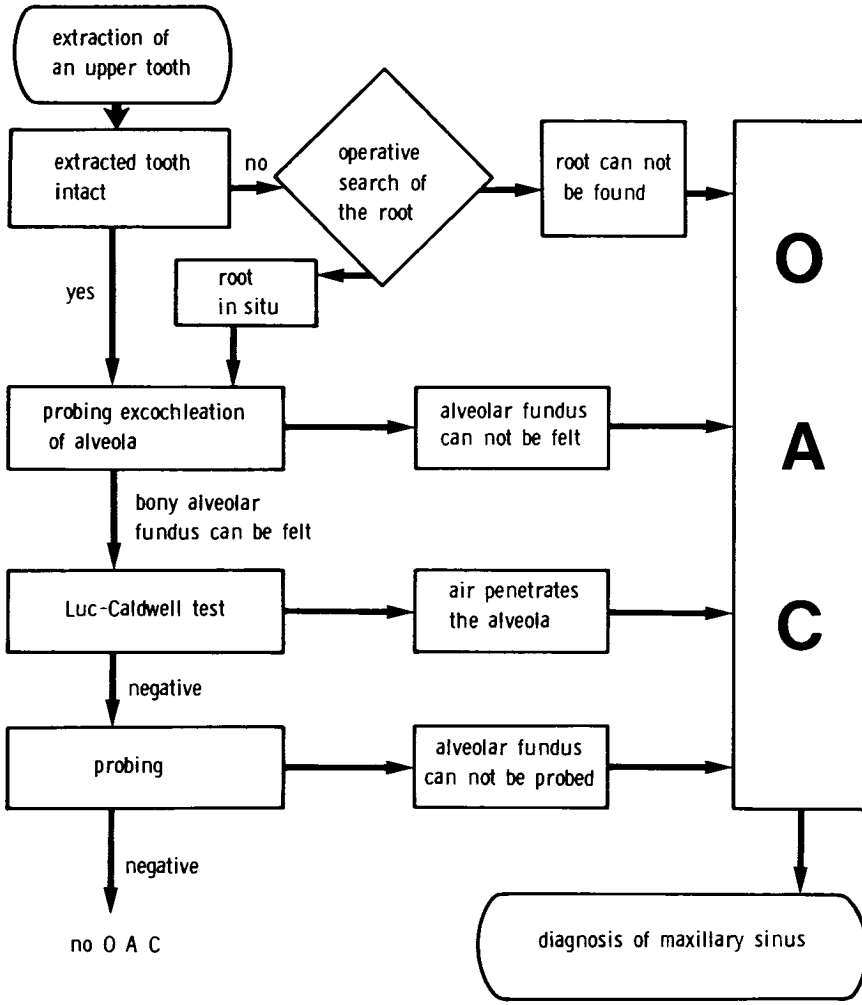

Fig. 3. Diagnostic steps for suspected oroantral communication (OAC).

have been described, but these have no advantage over the mentioned techniques or have a very small indication[4, 20, 22, 24, 27, 35, 45, 55]. Methods to close the bony defect use as material bone chips[1, 16, 29, 47, 50], the fat tissue of Bichat[54], gold and tantal foil[21, 39, 40, 44, 49, 53], lyophilized fascia lata and dura mater[54, 55, 57]. These methods come into question only for complicated cases. Postoperative wound dressing was done in 48 % with a deep-drawn plastic plate, and in 8 % with an acrylic-stabilized gauze, fixed on the neighboring teeth[17]. If it was not possible to fix the gauze firmly it was dispensed with, because a pressure effect hinders healing.

When inflammation of the sinus was diagnosed at the beginning of treatment, conservative treatment was performed to prepare good healing circumstances for the operative closure. This procedure is known as secondary plastic closure[51]. Conservative treatment consisted in antibiotics (Doxicyclin, Pivampicillin), nasal decongestant (Xylometazolin) and irrigation (0.9 % NaCl, Ethacridin). Thus, 25 % of the patients could be treated by secondary plastic closure, who would otherwise have been

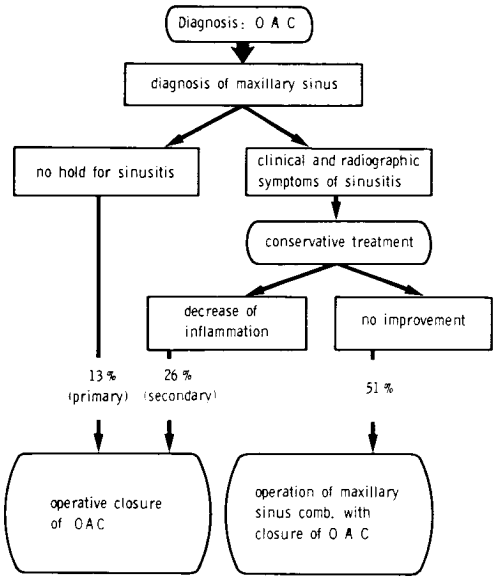

Fig. 4. Oroantral communication (OAC): Therapy conspectus.

treated by operation of the maxillary sinus. In 51 % conservative treatment had no success (Fig. 4).

Radical operation of the maxillary sinus after Caldwell-Luc[10] was found necessary in three-fourths of all antrum operations (75.2 %). One quarter were operated on only by removing altered parts of the sinus mucosa. This careful proceeding allows a better prognosis for postoperative complaints (see below).

The necessity of a radical operation of the maxillary sinus was formerly often decided from the o.-m. radiograph. Even with a reserved attitude towards operative measures, a correlation between radiographic evidence and the later therapy exists ($\chi^2 = 39.301 > 18.47 = \chi^2_4$ 0.001). However, if the data are viewed by a clinician who wants to spare his patients too extensive operative measures, they show for instance that 23.1 % of the patients with pathologic changes of the antrum needed no operation of the maxillary sinus (Fig. 5). This underlines that the radiograph of the maxillary sinus is not a sufficient guide to adequate therapy.

The mean duration of treatment was 5 weeks (median, n = 175). The mean duration when an operation of the maxillary sinus was done was 9 weeks (median, n = 89), and when an operative closure alone was done 3 weeks (n = 84). The average time (median) of temporaray disablement was 14 days for all patients (n = 175), 20 days for radically operated patients (n = 67), and 6 days for patients who had only an operative closure (n = 85); 44 % of the patients (n = 175) were treated in hospital, with a mean duration of stay of 6.5 days.

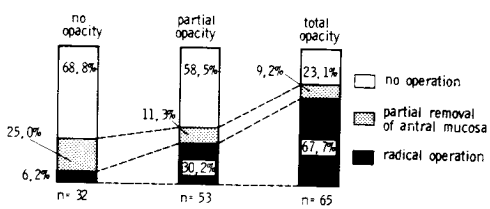

Fig. 5. Radiographic symptoms of the maxillary sinus at the beginning of treatment of an oroantral communication in relation to the later-performed therapy.

Results

All patients were asked to report their complaints at the earliest 1 year after treatment; 74 % of the patients had none, 21 % slight and 5 % strong complaints. The classification of slight (weather sensitivity, pressure sensation in the infraorbital region, intraoral paresthesia, secretion, vibration, change of taste) and strong complaints (neuralgia, headache) was made subjectively. Fig. 6 shows that complaints, and especially the strong ones, occurred mainly after radical operation of the maxillary sinus. For

kind of treatment / complaints	operative closure	with partial removal of antral mucosa	with radical operation of antrum	Σ
no complaints	48	17	45	110
weather sensitivity	10	2	17	29
pressure sensitivity	5	3	10	18
intraoral paraesthesia	1	1	1	3
vibration	-	-	1	1
tasting	1	-	-	1
secretion	1	-	3	4
headache	1	1	4	6
neuralgia	-	-	3	3
Σ	67	24	84	175

Fig. 6. Complaints after treatment of oroantral communications (n = 175).

this reason, all therapeutic measures should be tried to avoid the necessity of a radical operation; 24 % of the operated patients and 9 % of the patients with no operation of the maxillary sinus (n = 85) had a postoperative change in the sensitivity of the infraorbital region, such as paresthesia, hypesthesia or anesthesia; 30 % for the former and 13 % of the latter group had a pressure sensation of the infraorbital foramen.

Postoperative radiographic control showed a statistical improvement of the radiologically healthy cases, but no significant relation between postoperative radiologic diagnosis and the type of complaints could be demonstrated. Special consideration was made for those patients who had a totally opaque sinus in the radiograph at the beginning of the treatment and who were treated by secondary closure of the OAC. Even though the number of these patients is small (n = 15), the postoperative findings allow the statement that there are less postherapeutic complaints than after radical surgery. One of these patients later had to undergo a Caldwell-Luc operation. In 11 % of the cases therapy failure was encountered, while 2 % of the patients treated in the clinic had to be reoperated.

Discussion

With each tooth extraction in the premolar and molar region of the upper jaw, one has to reckon with an OAC and the patients have to be informed of the risk. Earlier investigations gave information only about the possible localizations of the OAC. Now it can be said that after an extraction of, for example, the upper first molar, an OAC will arise in one of 180 cases. This allows not only the dentist but also the patient to assess the risk. Statistical evaluation of the data verified the clinical experience[37] that a growing time interval between occurrence and diagnosis yields more pathologic symptoms of the maxillary sinus. It was also found that the main cause of protracted healing and postoperative complaints was in most cases a late diagnosis and subsequent therapy. A certain time point, such as the 48-h limit[58], after which a sudden aggravation has to be expected, could not be found. Further, on immediate diagnosis of an OAC, two-thirds of the patients had pathologic radiographic symptoms, which shows that sinusitis already existed before tooth extraction. The indication is that adequate therapy of an OAC cannot begin soon enough. Unfortunately, only 43 % of the OACs were diagnosed immediately and after 48 h this number was still only 51 %. The only sufficient diagnostic measure for an OAC has been found to be careful probing. The Luc-Caldwell test gives a false negative result because the antral mucosa closes the perforation. This result demands that each extraction of an upper premolar or molar be followed by careful probing to test existence of an OAC. Only in this way can the high number of persisting OACs and subsequent complications be reduced. The sooner the diagnosis is made, the easier and more comfortable to the patient is the therapy. Operative closure of an OAC can be done only when the maxillary sinus shows no symptoms of inflammation. However, if sinusitis has been found, this means first treating the sinusitis and then closing the communication after the sinus is free of inflammation. This secondary plastic closure spares the patients from radical sinus operation[5, 32, 51]. Thus only 38.2 % of the patients were operated after Caldwell-Luc. The cautious indication of a radical operation becomes justified, as the expenditure of treatment (number of visits, time of treatment, unpleasantness of treatment) is less, and there is no risk of complaints found after radical operation. Nevertheless, there remains the risk of a recurrence if the perforation is closed over an inflamed

antrum which has not been detected as such. The indication for the operation must be based on clinical *and* radiographic symptoms and the course of treatment. Nevertheless, there is still a correlation between the time interval between OAC occurrence and diagnosis, and the radicality of treatment. This study does not concern itself with nasal antrostomy (after Eckert-Möbius), but this technique should be considered more often. Postoperative complaints caused by an OAC arise through recurrence of sinusitis, and above all through operation-caused irritation of the infraorbital nerve: strong complaints such as persisting headache and neuralgia are reported more often after radical operation. Even if the proportion of unfortunate patients (15 %) seems low in comparison with the findings of some authors[15], it is still too high, and demands first a search for better and more cautious techniques of operative treatment of the maxillary sinus[38], and second the use of all possibilities of avoiding radical treatment.

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