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Oroantral communication - A clinical and radiographic retrospective study of 39 Iraqi patients

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Abstract

Background: oroantral communication (OAC) is abnormal connection between oral cavity and maxillary sinus. OAC is a rare, well known complication, mostly occurs after the extraction of upper posterior teeth, and if not treated lead to formation of oroantral fistula (OAF) and many complications .surgical repair is very necessary to prevent further complications .The aim of this study to evaluate and analyze the clinical, radiographic aspects of 39 Iraqi patients with oroantral fistula.

Materials and methods :the study was carried on 39 patients with oroantral fistula reported to the Department of oral and maxillofacial surgery ,college of dentistry, University of Baghdad ,and private practice from 1983 to 2010 .data regarding the age ,sex , cause ,site ,radiographic features and types of radiographs ,signs and symptoms ,duration ,relation to the adjacent teeth , sinus disease ,methods of treatment .

Results: 39 cases of OACs, 26 male, 13 female, the age range was20-65 with a mean age 44.5 year. Highest incidence was seen in the third and fourth decade of life 61.4%. The highest frequency of OACs was seen in relation to upper first molar 48.7% .the commonest cause was complicated extraction 51.2% .pain and tenderness was the most prominent symptoms 80%, escape of fluid from the nose was the most prominent sign 75.6%.there was a long delay in the diagnosis and treatment .most of the OACs occurs near the edentulous areas, occipitomental radiograph was not reliable in detection of displaced roots. Buccal advancement flap was the main method in treatment 81.2%.

Conclusions: OACs a rare complication, its management need good clinical and radiological experience, and the treatment should be individualized to have good results.

Key Words: oroantral communication, causes, frequency, buccal flap.

Introduction

Oroantral communication (OAC) is abnormal connection between oral cavity and maxillary sinus .(OAC) and subsequent formation of oroantral fistula(OAF)is a rare, well known complication following the extraction of upper posterior teeth in the practice of oral and maxillofacial surgery .The extraction of maxillary posterior teeth is the most common cause of OAC (80%)[1,2], because of the close relationship between the root apices of the premolar and molar teeth and the sinus floor. Maxillary cysts (10-15%) ,benign or malignant tumors(5-10%),trauma(2-5%), orthognathic

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surgeries (lefort osteotomies), osteomyelities ,irradiation, and dental implantology, can be the other causes of O A Fs[1,2,3,4,7].

The incidence of OAFs reported in the literatures varies, according to type of studies and the samples, Rothamel et al[5] found an incidence of (13%) while Bonder et al[6] found an incidence of (5%). Erhl[13] reported that OAF could occur once in 180 extraction of upper first molar, and once in 280 extraction of the upper second molar. 95% of cases of OAF develops as complication due to extraction of maxillary molars[27] , the predisposing factors for the formation of OAF due to dental extraction are enlarged maxillary sinuses resulting in a very thin partition between the antrum and oral cavity and sometimes the roots of posterior teeth are so long that they are very close to or inside the antrum[28]. Injudicious use of dental elevators or traumatic use of instruments close to the floor of the maxillary sinus may result in OACs and subsequent OAFs[8].

Many reports show that OAF commonly occur in third and forth decade of life ,and less frequent in second decade and rarely before the age of 15 years ,and is more frequent in males with a male to female ratio 1.7 :1[8,9].

Signs and symptoms include, pain or discomfort in the cheek or radiated to the orbital area ,reflux of fluids or blood into the nose ,air shooting from the fistula into the mouth on blowing the nose ,salty foul-smelling post nasal discharge indicate maxillary sinusitis ,alteration in voice resonance ,inability to blow out the cheeks ,inability to draw on a cigarette[2,10,11] .

The presences of obvious fistula, unhealed socket, mere slit in the mucous membrane, the appearance at the site of the defect of blood, pus, bubbles, extruded pale blue or reddish, flaccid polyp is not unusual signs of oroantral fistula[10,11] .

Usual radiologic findings in bone include sinus floor discontinuity, a communication between the oral cavity and the maxillary sinus, opacification of the sinus, focal alveolar atrophy, and associated periodontal disease[10,12] . A tooth remnants pushed in the maxillary sinus may be seen on intraoral or extraoral views. periapical radiograph with their fine definition, show clearly the perimeter of the bony fistula and the relation to the adjacent teeth .small root remnants clearly seen on the intraoral film may be not be readily detected on an occipito-mental views[10] .dental reformatted CT can be useful for evaluating patients suspected of having oroantral fistula[12] .

Several methods of surgical repair of OAF have been described or used, only a few have received wide acceptance[14], Many techniques have been proposed for the closure of OAF, including buccal or palatal alveolar flap and their modifications[15,16] . various alloplastic materials have been used for closure of OAF like gold foil, gold plate,tantalum plate,soft polymethylmethacrylate and lyophilized collagen[17,22,23,24,25] , autogenous cacellous bone or bone grafts also used[16,26] .in the recent years , the use of a pedicled buccal fat pad in closure of large oroantral perforations has become popular[18,19,21] .distant flaps from the extremities or forehead or tongue flaps have been described[2,16] ,but most of them have potential disadvantages which preclude their wide spread use in routine surgical practice[20] .

Successful closure of OAF is dependent on the absence of pathology within the sinus , a proper surgical techniques ,and the size and site of fistula[2,14,19] .Delay in treatment of OAF often results in infection of the antrum which complicates treatment[13,14] .

Materials and Methods

The term oroantral communication in this study comprise two pathological conditions ,one is the acute oroantral communication (OAC) and the other is the chronic oroantral fistula (OAF) , in this study ,the term OAC and OAF are used as being the same ,although they have different features ,many authors found , that 7-8 days to be the average time for an oroantral perforation to epithelialize and become a chronic fistula[1,8,11] .

The records of 39 patients with documented diagnosis of OAFs that were treated from 1983 to 2010 at the department of oral and maxillofacial surgery ,college of dentistry ,university of Baghdad ,and private practice ,were reviewed in this retrospective study .For collection of data a special record forma was used ,for all patients the following information's were collected : sex ,age ,site of OAF ,etiology ,signs and symptoms ,the involved tooth ,the presences of teeth or edentulous area , pneumatization of the maxillary sinus , the radiographic appearance of the maxillary sinus of the involved side , type of extraction (simple extraction or complicated) ,other causes of OAF , time of presentation (duration of OAF) ,the presence of displaced root in the maxillary sinus ,the relation of the OAC to the adjacent teeth , the investigations ,type of radiographs (periapical, occlusal, panoramic , occipitomental views) used for diagnosis and follow up of the treated cases ,surgical methods of treatment ,recurrences or the need for further surgical treatment .

To evaluate the reliability of occipitomental radiographs ,in the detection of displaced root in the maxillary sinus , the presences or absence of any abnormality and maxillary sinus appearance ,the radiographs were examined retrospectively by two independent examiners and the author ,for the presences of root or not (positive or negative) and correlate it with the clinical findings, and to interpretate the periapical radiographs for alveolar bone defect .the obtained data were evaluated and analyzed by using US SPSS.15 under window XP for statistical analysis of numbers and percentage (no %) using Kolmogorov-smirnov test (k-s test)z and chi-square test to see the P value if it is significant or not .

Results

A total of 39 patients with (39) OACs were included in this study ,two patients had a history OAC on the other side ,the ratio of male to female was roughly 2/3 to 1/3 (26 men,13 women).The age range of patients was 20-65 years with a mean age 44.5 years . The highest incidence of OAFs was seen in the third and fourth decades of life 61.4% (24 cases) and to less slightly in the fifth decade 25.6% (10 cases).Table 1.

The highest frequency of OACs was seen in relation to upper first molar 48.7% (19 case) ,the next most common site was the second upper molar 30.6% (12 case), p value was significant ($p < 0.05$)(k-s)z . upper third molar 7.6% (3 cases),upper premolars 7.6% (3 cases),and upper canines 5.1% (2 cases),with slight predominance for the right maxilla 64.1% (25 case)and(14 case) 35.9% on the left side ,the ratio of right to left was 1.8 to 1.six cases (6) were associated with root displaced to the sinus .Table 2.

The common causes of OACs in this study was complicated extraction 51.2% (20 case), then simple extraction of teeth 41.0% (16 case), cystectomy 5.1% (2 case), squamous

cell carcinoma 2.5% (1 case).Table 3 .

The all 39 patients were presented with one or more complaints (signs and symptoms), but pain and tenderness over the maxillary region (30 patients) 80% , escape of fluid from the nose(28 patients) 75.6% , p value was significant($p< 0.05$), passage of air into mouth (22 patients) 59.4% ,unhealed socket (8patients) 21.6% , foul taste and bad odor (7 patients) 18.9% , lump on gingiva or polyp (6patients) 16.2% ,are the most prominent clinical features of oroantral communication or OAFs , in addition to other features as shown in table4.

As shown in table 5, (12 case) 30.7% of the fistulae has been presented or detected in the first five days, and (27 case) 69.2 % detected after that one to five months, and 10.2% detected after one to two years after the occurrence of the OACs.

The radiographic appearance of the maxillary sinus on the affected side, as shown in table (6), from the available occipito-mental (Waters view) radiographs (23 radiographs), 14 cases 60.8%shows complete cloudy antrum and 8 cases 34.7% shows partially cloudy and 1 case 4.3% shows clear antrum. for the (6 cases) of OAFs with displaced roots in the maxillary sinus, occipitomental radiographs were negative appearance in (5) cases 83.3% and positive in one case 16.6%, while the periapical radiographs were positive in (4) cases 66.6 % .

Examination of the available periapical radiographs (34 periapical x-ray) shows that (16) cases 47% of OACs ,there were adjacent teeth on both sides of the communication site,(12) cases 35.2% , there were no teeth adjacent to the sinus exposure, while(6)cases 17.6% patients had neighboring tooth on one side only .also periapical radiographs shows that in 17 cases 50% of OAFs there were a marked pneumatization of the maxillary sinus at the affected side of the patients as shown in table 7.

Also examination of the preoperative periapical radiographs shows that 76.4% (26) radiographs disclose bone defect in the alveolar process clearly while 23.6% (8) radiographs of them the bone defect was not clear.

The results of surgical treatment and techniques used in this study shown in table 8. in this study 26 cases (81.2%) were treated by buccal advancement flap technique, 3 cases (9.3%) were treated by palatal flap technique, in additions 3 cases (9.3%) were treated by Caldwell-luc operation in addition to the buccal advancement flap for the removal of displaced root in the sinus and the removal of cystic lesion in the maxillary sinus. recurrence of fistula occurred in 7 cases (21.8%).biopsy was used in(6 cases) to know the nature of the pathological tissue present or prolapsed in the unhealed socket ,and the result was ,3 cases antral polyp,2 cases cystic lesion ,and one case squamous cell carcinoma .

Discussion

In retrospective clinical studies a loss of patients is unavoidable, and the data regarding the cases of these studies not always available completely, in addition to that the medical or dental records did not takes that importance in its preparation and preservation, so we use the available data of the 39 cases included in this study.

Our findings in this study demonstrates that higher incidence of OAFs 61.4% occurs in the third and fourth decade of life, followed by the fifth decade , and this is in agreement with other studies[1,9,27,29,30] .The maxillary sinus reaches its greatest size

during the third decade of life, so the incidence of OACs expected to be higher after that [9,19,30] .also it is demonstrated by many reports that teeth extraction and loss of teeth occurs mostly with advancing ages and subsequently OACs expected to be more at these age groups[9,29,31,32,35].the risk of occurrence of OACs in children and adolescent is reduced because of the relatively small size of the sinus at that age group[9,10], none of the patients in this study was younger than 20 years old .in this study we found that two patients have a history of OAF on the other side. Pedlar et al[34] stated that if the dental history reveals the creation of OAF during previous extraction there is an increased risk of this complication occurring during the subsequent extraction of adjacent or contra lateral teeth .

This study shows that OAF IS common in males 2/3 than females 1/3 .many reports also shows similar findings regarding the sex distribution[11,13,29,33] this result may be related to more frequencies of extractions and more difficulties in extraction of teeth in males.

In this study frequencies of OAF in relation to site seems in accordance with other reports described by other authors[11,31,32].in this study , the highest incidence of OAF was found after extraction of a upper first molar followed by the upper second molar [36,37] and this can be explained on the higher frequency of extraction of these teeth and the divergence of their roots in addition to the difficulties in extraction of these teeth , with similar incidence between upper third molar and upper premolars. Also this study shows that the most frequent cause of OAFs was tooth extraction 92.2 % and 7.6 %due to pathological conditions ,cystic lesion and squamous cell carcinoma ,and this result similar to those previous studies and reports[9,11,31,36].also we notes that the percentage due to complicated and simple extraction is nearly equal and this could be explained at that OACs could be occurs due to many reasons like anatomical or pathological conditions and not only due to traumatic or un correct use of extraction instrument . one case of malignant tumor associated with chronic OAF was detected, although it is a small percentage but exclusion of malignancy in all prolapsed polyps and granulation tissue cases is necessary .Yilmaz et al [31] stated that neoplastic process should be excluded in all patients with chronic unhealed OAFs,also Bell g[38] stated that malignancy should be excluded when there is unhealed socket associated with OAF and associated with prolapsed polyp or granulation tissue .so we can conclude that biopsy and histopathological examination is mandatory .and in this study 21.6% (8 cases)presented with chronic unhealed socket and biopsy was used six times .

Our study revealed that (75-80%) of patients with OAFs presented with pain and tenderness in the area or referred to the adjacent regions , and escape of fluid to the nose. 59.4%with passages of air to the mouth from the nose ,and other signs and symptoms with less extent. And this result with accordance with other reports[11,37] but killey et al[11] stated that the next most common complaint was a foul or salty taste and 18% of cases were asymptomatic .so in clinical examination of OAFs patients this point should be considered .

The incidence of maxillary sinusitis related to the OAFs in this study seems to be high ,and this could be reflected to the high percentage of patients presented with pain and tenderness 81% and other signs and symptoms of infection like pus discharge ,foul bad taste, presences of polyps, in addition

to that the radiographic features of the sinus on the involved side revealed that(95.5%) of cases associated with partial or complete obliteration of the involved sinus .this result can be explained on the bases of that(69.2%) of the OAFs cases presented or detected in this study, after (10) days to (12) months and this regarded as a cases of long duration(long intervals) which is enough for the development of such complication. Killey et al[11] in their study mentioned that suppuration of maxillary sinus may occurs within one day. Ericson et al[39]stated that, the treatment success rate was 90% for those cases of OACs treated within 48 hours. Also Ehler[11]in his study explains that a growing time interval between occurrences and diagnosis yields more pathologic symptoms of the maxillary sinus and it was the main cause of protracted healing and postoperative complaints.

This study also shows that 52.8% of OAFs cases, there was no adjacent teeth on one or both sides of the communication site. And this is similar to the findings of Haanaes et al[16] 77.3%. also Jones E & Steel J[40] found that 65.7% of the displaced roots into the maxillary sinus in sites were those of teeth adjoining an edentulous space .clinical experience tends to the belief that antral involvement is more frequent in the extraction of isolated teeth or those teeth approximating an edentulous space, this can be explained by , that loss of upper maxillary posterior teeth may followed by variable degree of maxillary sinus pneumatiaztion and resorption of alveolar bone process leaving a weak area which may assist in the creation of such complication. And our study shows that 17 case (50%) occurs in areas of pneumatiaztion of the maxillary sinus ,and this result confirming and supporting the previous clinical experience .

This study shows that periapical radiograph is a reliable radiographic tool in the detection of bone defect in the sites of OACs. in 76.4% (26)case, the alveolar bone defect was highly positive when compared with available occipito mental view radiographs ,and this can be explained on fact that periapical radiograph still provide the finest details of bony radiographic changes because of its inherent technique quality . although the sample is small ,this study shows that the reliability of periapical radiographs in detection of displaced roots in the maxillary sinus(66.6%) is superior to occipitomental (Water's view) radiographs 16.6%.this can be explained on base that most of the displaced roots may be present on the floor of the involved sinus in upright position and the less superimposition of anatomical structures on the periapical radiographs while in waters views ,the inadequacy may be due that ,the root is small, or it may be lies on the floor of the sinus and may be obscured by opacity of the inferior border of the sinus on such view ,and the presence of inflammatory thickening or cloudiness of the involved sinus. Logan et al[41]stated in their radiographic study found that over one third of cases there is superimposition of the petrous temporal bone obscures the lower half of the maxillary sinus ,and with respect to suspected oroantral fistula and or displaced roots stated that occipitomental view is not indicated routinely but useful if supplemented with other radiographs in detection of many pathological conditions of maxillary sinus .also Lee FM[42]conclude that waters view is of little or no value, in the detection of small root fragment lying usually on the floor of the sinus and the presences of bony ridges ,together with extravasations of blood into antrum

from perforation, but it may provide indirect confirmatory evidence of an antral perforation and reveal the presence of sinus diseases .

In this study, the buccal advancement flap was the treatment of choice in most cases .the success rate was 81.2% which is similar to many studies in the past.[11,27,31,32,37,43] Killey and Kay[11] in his comprehensive study stated that buccal advancement flap can be considered a straightforward and reliable method for repair of OACs which is applicable in practice in most of the situations with some considerations. Visscher, HS et al[43] stated that there is no such thing as a"best" treatment method for OACs because as other researchers have stated, multiple aspect have to be taken into account in each case when deciding which method is to be used. Abuabara et al[27] pointed that when one determine how to treat a communication ,the surgeon must take into account its size, the site, the presences of infection, time of the diagnosis. Recurrence rate was21.8% in this study which is relatively high, this can be postulated to the high percentage of sinus infection and the delay in the management in our sample of patients. Wovern[44] found that wound breakdown occurred in 21% of patients in the absence of preoperative control of the existing infection, compared to breakdown rate of 2% when infection controlled.

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Table 1.age distribution of patients .

Age in years	No of patients	%
10-20	1	2.5
21-30	12	30.7
31-40	12	30.7
41-50	10	25.6
51-60	2	5.1
61-70	2	5.1
Total	39	100

Table 2.site of OACs distribution No % .

	No	%
Upper canine	2	5.1
Upper premolars	3	7.6
Upper first molar	19	48.7
Upper second molar	12	30.6
Third molar	3	7.6
Total	39	100

Table 3.causes of OACs

	No	%
Simple extraction	16	41.o
Complicated extraction	20	51.2
cystectomy	2	5.1
Squamous cell carcinoma	1	2.5
Total	39	100

Table 4.clinical features of OACs.

Clinical features presented	No of patients	%
Pain and tenderness	30	81%
Escape of fluid into nose	28	75.6%
Passage of air into mouth	22	59.4%
Unhealed socket	8	21.6%
Lump on gingiva or polyp	6	16.2%
Foul taste and salty taste	7	18.9%
Discharge of pus	5	16.6%
Unilateral epistaxis	5	16.6%
Alteration in voice resonance	2	5.4%
Inability to blow out cheeks	2	5.4%
In ability to draw on cigarette	2	5.4%
Small tiny opening	2	5.4%
Presences of sequestrum	2	5.4%

Table 5. time interval between establishment of OACs and discovery of the complication.

duration	(0-5) days	(6-10) days	10-((above) days	0-5 month	6-10 month	11-12 month	1-2 year	Above year	**total**
No of cases	12 30.7%	6 15.3%	4 10.2%	10 25.6%	2 5.1%	1 2.5%	2 5.1%	2 5.1%	39 (100%)

Table 6 . radiological appearance of maxillary sinus on first examination .

sinus appearance	No of patients	%
clear	1	4.3
Cloudy (partial)	8	34.7
Cloudy (complete)	14	60.8
Total	23	100

Table 7.the relation of OAFs to the adjacent teeth .

Cases of OAFs	No of cases	%
The presences of teeth on both sides	16	47
The presences of teeth on one side	6	17.6
There is no teeth on both sides	12	35.2
Pneumatiaztion of maxillary sinus	17	50

Table 8 .results of surgical treatment .

Method of surgical treatment	No of cases & %
Buccal flap	26 (81.2%)
Palatal flap	3 (9.3%)
Caldwell-luc operation	3 (9.3%)
Total	32 (100%)