

# THE VALUE OF PANORAMIC RADIOGRAPHY IN THE DIAGNOSIS OF MAXILLARY SINUS DISEASES

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## Abstract

**Background:** Diseases of the maxillary sinus may create symptoms that the patient might interpret as of dental origin, and conversely, dental diseases may adversely influence the health of the sinus

**Objective:** To interpret the panoramic radiograph of maxillary sinus in a sample from Anbar population,

**Methods:** 120 subject aged from 30 to 70 years, mean age 58 years, who underwent orthopantomographic examination for different medical & dental treatment purposes including males (56%) and females (44%). Panoramic radiographs were taken in College of Dentistry, Anbar University, Ramady City, Anbar. With Cranex – Soredex panoramic x-ray machine (Helsinki, Finland).

**Results:** Normal maxillary sinus were found in (58%) while radiographical changes (maxillary sinus findings) were found in (42%) including mucosal thickening were (32%) and (4%) of the findings were classified as mucous retention cysts.

**Conclusion:** The maxillary sinus findings were more common in fifth decade of life and slightly higher percentage in male group and the majority of findings were found in dentate subjects.

**Key words:** maxillary sinus, OPG, Mucosal thickening.

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## INTRODUCTION

Diseases of the maxillary sinus may create symptoms that the patient might interpret as of dental origin, and conversely, dental diseases may adversely influence the health of the sinus<sup>1</sup>. The response of the sinus mucosa to the odontogenic inflammation has been called periapical mucositis<sup>2</sup>. This is usually defined as localized thickening of the

sinus mucosa, which reach sometimes 10 – 15 mm as a result of irritating stimuli<sup>3</sup>. This is considered the most common antral lesion and requires differentiation from a mucous retention cyst<sup>4, 5, 6</sup>. Mucous inflammatory lesion is believed to be caused by products of pulpal or periodontal diseases that penetrate the antral floor and reach the mucosa causing it to thicken locally<sup>7</sup>. Clinical and radiographic studies have shown that mucous thickening in the maxillary sinus is common in individuals with apical infections at the upper molars and premolars than in individual with healthy periodontal tissues<sup>8, 9</sup>. The close contact between the roots of the upper molars and premolars and the maxillary sinus, and the numerous anastomoses in the apical region of these teeth and corresponding vessels in sinus mucosa

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have been found to permit the spread of odontogenic pathological processes from the periodontium and pulpal spaces both directly and via vessels to the maxillary sinus<sup>10, 11</sup>. In radiographical studies of both dentate and edentulous subjects. Prevalence figures ranging from 2% to 13% have been reported<sup>3, 12, 13</sup>. The diffuse mucosal thickening is more common with frequencies up to 50% of the radiographic incidental findings<sup>14</sup>. Mucous cysts which are included in the paranasal sinuses are more common in the maxillary sinus<sup>15</sup>. Bjorn et al.<sup>16</sup> and Lindhall et al.<sup>17</sup> found radiographic signs of long standing mucosal changes in the maxillary sinus in 10.6% of statistical sample of a Swedish population. Prevalence figures for sinusitis due to dental causes vary between 4.6 and 47%. However it has been suggested that, mucous retention cysts are insignificant clinically and only of radiograph interest<sup>18</sup>. Further more mucous cysts and mucosal thickening usually cause no symptoms, but occasionally they have been related to a variety of symptoms, mainly, facial pain, headache and toothache<sup>3, 19</sup>. Mucosal thickening resolve when their caused is removed. In symptomatic cases, however surgical removal of the cyst may be indicated<sup>(20,21,22)</sup>. Myall et al in 1974<sup>6</sup> stated that benign mucosal cyst is the most maxillary molars. Its incidence varies by Halstead in 1973<sup>20</sup> To 9.6% in one retention cysts are round, ovoid or domeshape shadow of uniform density within the maxillary sinus whose base is continuous with the floor or the wall of the maxillary sinus and the free surface of the lesion should be smooth and sharply defined and adjacent to an air shadow. Also, there should be no osseous cortex<sup>6</sup>. Layon<sup>24</sup> has discussed the reliability of panoramic radiography in the diagnosis of maxillary antral pathosis. The main disadvantage of panoramic radiography arises from their dynamic projection technique, distortion levels may reach 30% in the third molar region<sup>25, 26</sup>. The maxillary sinus is clearly imaged in panoramic radiography, but small changes outside the 2 –3 mm thick sharply depicted layer are not visualized in the normal panoramic projection, the roof of

the maxillary sinus is not imaged because of superimposition of bones<sup>27</sup>. However mucous cysts and other mucosal thickening are usually well demonstrated as they almost always arises from the antral floor not from roof<sup>30, 29, 28, 23</sup>.

**Statistical analysis:** includes percentages, mean, standard deviation and student "t" test. The finding was considered as statistically significant if the p value <0.005, Karl –person coefficient of correlation (r) was used to find inter observer reliability (-1<r<+1).

### **MATERIALS AND METHODS:**

120 subject aged from 30 to 70 years, mean age 58±8 years, who underwent orthopantomographic examination for different medical & dental treatment purposes including 66 males (56%) and 54 females (44%). Panoramic radiographs were taken in college of Dentistry, Anbar University, Ramady City, Anbar. With Cranex – Soredex panoramic x-ray machine (Helsinki, Finland), All patient were referred to college of dentistry requesting OPG examinations, panoramic films were processed by Kodak RP X-omat automatic processor. The radiographs then were studied under standardized condition by two independent examiners (double blind technique) with the use of magnifying lens of radiographic viewer. Panoramic radiographs were interpreted for these findings using a standardized radiographic criterion of mucosal thickening and mucous retention cyst of the maxillary sinus (24,91,6). The mucous retention cyst is a well defined dome-shaped opacity with convex outline arising from the floor of the maxillary sinus, while the mucosal thickening is represented by the more diffuse opacities along the margins of the sinus without well-defined rounded outline, as mentioned both are usually well demonstrated as they almost always arises from the antral floor not from roof.<sup>(30,29,28,23)</sup>

**Result**

The study sample was including 66 (56%) males and 54 (44%) females with age ranged from 30-70 years of mean age 58±8 year. The distribution of the number of patients and age groups are summarized in (Table 1). Normal radiographical (maxillary sinus findings) were 70 subjects (58%) while maxillary sinus findings were found in 50 subjects (42%). Including mucosal thickening in 38 patients (32%) and 4 patients (4%) have mucous retention cysts (Table 2). The highest percentage of mucosal thickening was found that in the age group (40-49) years represent (14%) within the age group. Regarding the mucous retention cyst the highest percentage was found also among the age group years

representing (2%) (Table 3). Regarding the sex (Table 4), the maxillary findings were slightly higher in the males rather than the females, where the mucosal thickening was found in (18%) within gender. While the mucous retention cysts were found in (3%) within the gender. Table 5 showed that the prevalence of mucosal thickening in dentate and edentulous patients representing (20%) and (12%). Other maxillary sinus findings were also recorded in this study. There were (4%) of patients showed impaction & displacement of a tooth inside the maxillary sinus. The impacted maxillary teeth or tooth were either canine or second molar, also severe pneumatization of the maxillary sinus floor down to the alveolar crest was seen in (2%).

**TABLE 1: The distribution of age group in relation to sex**

AGE GROUP	MALE	FEMALE
30-39	0%	3%
40-49	24%	28%
50-59	18%	9%
60-69	9%	4%
TOTAL 120(100%)	66(56%)	54(44%)

**TABLE 2: The distribution of radiographical maxillary sinus findings\***

MAXILLARY SINUS FINDINGS		PERCENT
Normal		70(58%)
Mucosal thickenings		38(32%)
Mucous retention cyst		4(4%)
Others	Root inside antrum	4(4%)
	Pneumatization (sinus floor to alveolar ridge)	3(2%)
TOTAL		120 (100)%

\* r=0.9

**TABLE 3: The distribution of maxillary sinus finding in relation to patients age group**

AGE GROUP	NORMAL	MUCOSAL THICKENING	MUCOUS RETENTION CYST	OTHERS
30-39	4%	2%	0%	1%
40-49	26%	14%	2%	2%
50-59	17%	10%	1%	2%
60-69	11%	6%	1%	1%
TOTAL 120(100%)	70(58%)	38(32%)	4(4%)	7(6%)

**TABLE 4: The distribution of radiographical maxillary sinus findings in relation to sex**

SEX	NORMAL	MUCOSAL THICKENING	MUCOUS RETENTION CYST	OTHERS
MALE	32%	18%	3%	4%
FEMALE	26%	14%	1%	2%
TOTAL 120(100%)	70(58%)	38(32%)	4(4%)	7(6%)

**TABLE 5: The distribution of radiographical maxillary sinus finding in relation to maxillary arch**

MAXILLARY ARCH	NORMAL	MUCOSAL THICKENING	MUCOUS RETENTION CYST	OTHERS
DENTATE	34%	20%	2%	3%
EDENTULOUS	24%	12%	2%	3%
TOTAL 120(100%)	70(58%)	38(32%)	4(4%)	7(6%)

**DISCUSSION**

The prevalence of mucous and diffuse mucosal thickening in all the paranasal sinuses has occasionally been as high as 50% in facial radiographs taken for indications other than suspected sinus disease<sup>32</sup>. In magnetic resonance imaging study of incidental findings in the paranasal sinuses of 438 subjects, the prevalence of incidental findings in all sinuses was 37.5% and they were most common in the maxillary sinus<sup>32</sup>. The prevalence

of the maxillary sinus findings among elderly edentulous in previous studies of variable ranges, however figures ranging from 2.6% to 20% have been reported<sup>10,12</sup>. In a study of Soikkonen and Ainomo in 1994<sup>14</sup>, The prevalence of mucous cysts and diffuse mucosal thickening in the maxillary sinuses of elderly edentulous subject was 7% studies of rounded shadows (mucous cysts) in maxillary sinus found in both dentate and edentulous subject with figures ranging from 2% to 13%<sup>12, 3, 13</sup>.

Our figures of 4% for the prevalence of mucous retention within that range. According to Mattila,<sup>29</sup> the prevalence of mucous cysts is not age-dependant. This was in accordance with our results, where no statically significant difference was found between age groups ( $p < 0.005$ ). In studies including younger age groups, maxillary sinus findings have been most prevalent in the third decade and they have also been found to be more prevalent in men<sup>12, 3, 27</sup>. This result is on the contrary with ours, where the findings were more common in the fifth decade of life and comes in accordance with ours regarding the slightly higher percentage in the male group. In the rather wide age-range of the present study old subjects, the number of maxillary sinus findings showed no age-dependent tendencies. The diffuse mucosal thickening, however, were more prevalent in the younger age group, the majority of the diffuse mucosal thickening were found in dentate subject of younger age group. More important (than dental origin) is that allergic sinusitis especially due to dust inhalation especially in this region of Iraq due to sentimental characteristic of the region and it can be suspected that odontogenic causes may not be a major contributing factor in their formation. This result comes in accordance with previous who stated that, the prevalence maxillary sinus findings in sites of periapical or periodontal pathosis and in sites without pathologic findings have also been similar<sup>33</sup>. Neither that findings nor ours support the findings of Halstead in 1973<sup>20</sup>, Who reported that a possible odontogenic cause could be indicated in 90% of subjects with maxillary sinus findings. Regarding The diffuse mucosal thickenings, it was reported that those findings always indicate the presence of irritating stimuli, after an infection of dental origin<sup>8,14</sup>. Although our results

showed no statistical significant difference ( $p < 0.005$ ) between dentate and edentulous patients in relation to the mucosal thickening found in the floor of the sinus. It has been stated that, the chronic apical periodontitis, deep infra-bony pockets are usually unaccompanied by any major subjective symptoms. Their accurate diagnosis may sometimes be vital to the patient, for if the host resistance for same reason, it will give this infection the opportunity to become exacerbated and cause acute sinusitis, whereas the possibility also exists of further spread systemic manifestation<sup>34, 28</sup>.

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