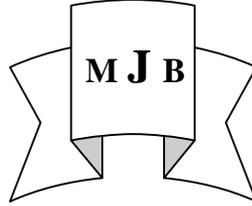


Comparison of Clinical Symptoms, Plain Radiographs, Coronal CT and Antral Lavage in Patients with Chronic Maxillary Sinusitis

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Abstract

Aim of the study : this study was conducted to compare the clinical symptoms of chronic maxillary sinusitis , plain x-ray (Water's view) , CT scan of the maxillary sinuses and the results of antral lavage .

Material and Methods: 150 patients had been examined at the otolaryngology department of Al-Diwaniya teaching hospital and diagnosed as chronic maxillary sinusitis.

Plain x-ray (Water's view) and CT scan done to all of these patients. Radiological features of chronic sinusitis found in 118 patients , 84 bilateral (71%) and 34 unilateral (29%) , the radiological findings classified as well aerated , mucosal thickening , fluid level, haziness and complete opacity .

Antral lavage done to 202 sinus and return classified to be clear, mucoid , mucopurulent and frank purulent .

Results: plain x-ray and CT scan show sinus opacity in 32 patients (16%) , haziness 80 patients (39 %) , fluid level 54 patients (27%) , mucosal thickening 36 patients (18%).

False negative plain x-ray found in 8 patients ,while false positive found in 14 patients . The antral lavage return was 100% purulent in opaque sinus , while hazy sinus shows 50% purulent , 31% clear , 19% mucoid .

Fluid level 80% purulent , 18.5% mucoid , 1.5% clear .

Mucosal thickening 55.5% clear , 44.5% mucoid return .

Conclusions: radiological findings of maxillary sinus opacity is the most reliable evidence of sinus infection followed by fluid level .

Water's view gives good information about sinus pathology but CT scan is the most sensitive radiographic modality for the diagnosis of chronic sinusitis.

دراسة مقارنة بين الاعراض السريرية, اشعة الجيوب الانفية, المفراس والراجع من غسل

الجيوب الأنفية في المرضى المصابين بالتهاب الجيوب الانفية الوجهية المزمن

الخلاصة

هدف البحث تمت هذه الدراسة للمقارنة بين الاعراض السريرية , اشعة الجيوب الانفية, مفراس الجيوب الانفية مع الراجع من عملية

غسل الجيوب الانفية

مادة البحث 150 مريض تم فحصهم في استشارية الاذن والانف والحنجرة في مستشفى الديوانية التعليمي و تم تشخيصهم بالتهاب الجيوب

الانفية الوجهية المزمن . ثم فحص جميع المرضى بواسطة اشعة الجيوب الانفية ومفراس الجيوب الانفية . علامات التهاب الجيوب الانفية

المزمن بواسطة الاشعة والمفراس وجدت في 118 مريض , 84 مريض (71%) في كلا الجانبين 34 مريض (29%) في جهة واحدة .

النتائج الشعاعية قسمت الى جيد التهويه , تضخم الانسجة المخاطية , مستوى السائل في الجيب الانفي ضبابية الجيب الانفي , و عتمته تامه

للجيب الانفي . تم اجراء عملية غسل الجيوب الانفية الوجهية ل 202 جيب انفي والراجع من هذه العملية تم تصنيفه كالاتي : صافي ,

مخاطي , مخاطي قيحي , قيحي .

النتائج عتمة الجيوب الانفية وجدت في 32 مريض (16%) , ضبابية الجيوب الانفية 80 مريض (39%) , مستوى السائل 54 (27%) ,

تضخم الانسجة المخاطية 36 (18%)

النتائج السلبية الكاذبة في الاشعة العادية وجدت في 8 مرضى بينما النتائج الموجبة الكاذبة وجدت في 14 مريض . نتائج غسل الجيوب

الانفية وجدت 100% قبيحيه في العتمة الكاملة للاشعة بينما الضبابية في الاشعة اظهرت 50% قبيحي , 31% سائل صافي , و 19%

مخاطي . مستوى السائل في الجيب الانفي وجد ان 80% قبيحي , و 18.5% مخاطي , و 1.5% صافي , تضخم الانسجة المخاطية

55,5% صافي , 45,5% مخاطي .

الاستنتاجات: ان العتمه الكاملة للجيب الانفي الوجهي هي اكثر النتائج واقعيه التي تدل على التهاب الجيوب الانفية تليها مستوى السائل في الجيب الانفي . ان الاشعه العاديه للجيب الانفي الامامي تعطي معلومات جيدة حول امراض الجيوب الانفية لكن مفراس الجيوب الانفية يحمل دقه اكثر لتشخيص التهاب الجيوب الانفية الوجهيه المزمن شعاعيا .

Introduction

The paranasal sinuses are air filled spaces within the bones of the skull. They are lined with respiratory epithelium , and all communicates with the lateral wall of the nose via openings known as ostia .

The epithelium secretes mucus which transported by cilia through the ostia. The mucus thus drains into the nose and is eventually swallowed [1]. The sinuses are usually considered as four paired structures , the frontal , ethmoids , maxillary and sphenoid sinuses [2].

The paranasal sinuses are closely related to the nasal cavities embryo logically , structurally and functionally. As the lining of the nose and paranasal sinuses is continuous , inflammatory process tend to involve both areas to greater or lesser extent [3].

Symptoms of sinusitis include mucopurulent nasal discharge , nasal congestion , facial pain , pressure or fullness and decrease perception of taste or smell. These symptoms result in substantial adverse effects on mood , physical functioning , energy level and social functioning .

Sinusitis is classified by the duration of the symptoms into :

- acute less than 4 weeks
- subacute 4-12 weeks
- chronic 12 weeks or more
- recurrent acute 4 episodes or more per year of acute bacterial sinusitis, signs and symptoms of sinusitis between episodes[4]

Most of the clinical features of chronic sinusitis overlap considerably and the type and extent of disease may need to be classified by doing some investigations.

Plain radiography of the paranasal sinuses remains the commonest investigation done , the others being endoscopy, immunology and bacteriology .

The computerized tomography (CT) of the paranasal sinuses exhibits good sensitivity for the diagnosis of chronic sinusitis and it is the ultimate imaging modality of choice [5] .

Radiology of sinuses :

Pathological process affecting the sinuses encroach on the air in the sinuses , and are seen on x-rays as alteration in their translucency[2]. Unfortunately the clinician can often be misled by both normal sinus

x-rays [6,7] , as there are both false positives and false negatives . Indeed in one study [8] plain sinus x-rays had a false positive rate of 4% (i.e 4% of x-rays showed pathology when endoscopy of the sinuses were normal) , and more worryingly , plain x-rays had a false negative rate of 31% (i.e 31% of x-rays incorrectly suggested normality when compared with sinus endoscopy).

Computed tomography (CT) provides a much better anatomical display of soft tissue densities , and it is capable of accurately demonstrating pathology both within and beyond the sinuses.

Magnetic resonance imaging (MRI) is of limited value as the bony margins of the sinuses are not visible by this technique .

Materials and Methods

This is a prospective, randomized, clinical study conducted at the department of otolaryngology in Al-diwanbia teaching hospital from November 2008 to October 2010.

There are 150 patients of various age groups. The age, sex and number distribution are given in table I .

These patients were examined clinically and diagnosed to have chronic maxillary sinusitis.

The diagnostic criteria used for chronic rhinosinusitis were at least two of the symptoms of :

1. Mucopurulent discharge (anterior , posterior or both) .

2. Nasal obstruction (congestion) .
 3. Facial pain , pressure or fullness .
 4. Decrease sense of smell and/or perception of taste . For at least 12 weeks duration

Table I distribution of patients according to age and sex

Age (in years)	Female	Male	Total
10-19	9	10	19
20-29	24	32	56
30-39	26	12	38
40-49	9	18	27
50-60	4	6	10
	72	78	150

All of these patients had occipito-mental view with open mouth (Water's view) and in the same day CT scan of the paranasal sinuses , done by CT machine at radiology department in Al-diwanzia teaching hospital Somatom Emotion from siemens soft ware version A40A , 3-5 mm slice thickness , coronal sections are used ideally for full evaluation of nose and P.N.S, CT allows post processing reformats for further views in different planes if required .

The radiological findings of the maxillary antrum in Water's view and CT scan were classified as :

- _ well aerated antrum
- + mucosal thickening with or without polyp formation
- ++ fluid level
- +++ haziness i.e loss of translucency of most of the maxillary antrum
- ++++ completely opaque antrum

All the patients with positive sinus findings on x-ray and CT scan were subjected to antral washout under local anesthesia and some of them under general anesthesia .

The returns on antral lavage were classified as :

- _ clear fluid
- + mucoid discharge in the irrigation fluid

++ mucopurulent or straw colored secretions in the irrigation fluid

+++ frank purulent secretions with bad odor mixed with irrigation fluid .

Excluded from this study patients with previous sinonasal surgery, evidence of nasal mass or epistaxis within six months prior to presentation .

Results

Data from one hundred and fifty (150) patients that were analyzed consisted of 72 females and 78 males , the age distribution between 10-60 years.

The duration of symptoms ranged from 3 months (13 weeks) to 2 years. The plain x-ray of maxillary sinuses were normal in 18 patients , CT scan were normal in 32 patients (including those with normal plain x-ray) .

Interpretations of radiological findings on plain x-ray and CT scan yields normal CT scans for 14 (28%)patients of those who had findings of sinusitis on plain x-ray films (false positive) .

Maxillary sinusitis were discovered in 8 (16%)patients by CT scan for whom the plain radiograph indicates no sinus disease (false negative) .

Antral washout done in the remaining 118 patients and the result recorded :

84 patients had bilateral maxillary sinusitis and 34 patients unilateral .

The radiological findings in plain x-ray and CT scan compared with antral puncture and irrigation findings (table II)

It was seen that when the radiological findings of the maxillary sinus were :

- Completely opaque 100% purulent return on antral irrigation

- Hazy 50% purulent return
31% clear 19% mucoid
- Fluid level 80% purulent
18.5 mucoid 1.5% clear
- mucosal thickening 55.5 % clear
44.5 % mucoid

Table II : comparison of the radiological and CT scan findings and antral puncture and

Radiological findings	No. of sinuses	Results of irrigation				Total no. of sinuses
		+++	++	+	—	
++++	32	32	—	—	—	32
+++	80	26	14	15	25	80
++	54	30	13	10	1	54
+	36	—	—	20	16	36
Total	202	80	27	45	42	202

irrigation findings

Anatomical abnormalities found in the nose and have radiological appearance include : deviated nasal septum ,engorged turbinates , this is found in 98 (65%) patients, 63 (42 %)of them bilateral .

Discussion

Chronic rhinosinusitis is a familiar disease of otorhinolaryngology practice , and it occurs worldwide.

The age distribution and an average age of 37 years found in this study gives credence that it is more common in the young adults [5].

There is no pathological process known to predispose one gender over the other , and

no sex preponderance was found in this study .

Previous studies also not show a consistent sex predisposition [5]. The most common modality used for substantiation of sinus disease is plain radiography and the best view to delineate the maxillary sinus is the occipito-mental view with open mouth (Water's view) .

Air-fluid levels and opacification are considered to be reliable pathologic findings on plain x-ray films [9-11], some authors also consider mucosal thickening of 4mm or more pathologic[9].

CT scans of the sinuses have advanced the fields of diagnostic radiology. Coronal CT of the sinuses with 4mm cuts at 3mm intervals and appropriate bone window is

proving to be the best radiological tool [9]. CT scans can demonstrate disease that is not shown on routine x-ray films , it can also delineate pathologic variation and demonstrate inaccessible anatomic structures, such as the osteomeatal complex[9].

In our study when total or intense opacity were seen in the plain x-ray and CT scan , the antral puncture returns either frank purulent or mucopurulent in all cases i.e 100% reliability for sinus infection , this finding was in agreement with the work of various authors .

Vourinen et al [12] in their study of 272 maxillary sinus showed 86% agreement of a positive antral lavage when x-ray showed total opacity .

Mc Neil [13] in his study of 242 sinuses , 150 patients compared opacity with sinus lavage and found an agreement of 81% .

Sammy Elwamy et al [14] in the comparison of x-rays with operative findings showed total opacity with intrasinus pathology in 75% of cases.

In the maxillary sinus mucosa disease leading to inflammation initially appear as haziness on x-ray , progression and recurrence of inflammation showed as mucosal thickening of 4mm , exudated fluid gravitate and appear as fluid level in the antral cavity , and further progression can lead to complete opacity of the sinus cavity .

The common antral changes in this study were haziness (80 patients) , 50% of these patients had purulent return on antral lavage and this has low specificity[15] .

In cases where the x-rays and CT scan showed fluid level , 80% of cases were purulent returns on antral lavage, Sammy Elwamy shows 100% purulent return on antral lavage while Vourinen et al shows correct prediction in 73.6%.

Mucosal thickening of the maxillary sinus on plain x-ray and CT scan where found in 36 patients, 44.5 % of the returns were mucoid and 55.5 % were clear , thus 100% were negative for sinus infection , Mc Neil in their study showed that only 37% of

cases were positive on antral lavage when x-ray showed mucosal thickening .

The drainage opening of the maxillary antrum is located high on the sinus cavity and it is antigravity, this relatively unfavorable anatomy makes the maxillary sinus to be prone to fluid retention and infections more than any of other sinuses , anatomical abnormalities found in 98 (65 %) patients and these are deviated or angulated nasal septum and engorged turbinates , this is similar to previous studies [16-18] .

False positive findings of plain x-ray found in 14 (28 % .) while false negative found in 8(16%) patients .

Croft et al found that false positive 4% while false negative 31% .

Many factors can cause the erroneous interpretation of plain radiographs in sinuses and these are :

1. variation in radiographic techniques.
2. sloping of lateral and superior maxillary sinus walls .
3. double contours in maxillary sinus imaging .
4. anatomic variation in children including hypoplastic maxillary sinus or small or aplastic sinus .
5. slight rotation .
6. sinonasal secretion .
7. thick sinonasal mucosa .

Conclusions

From this study it is evident that a radiological finding of maxillary sinus opacity is the most reliable evidence of sinus infection followed by fluid level .

A mucosal thickening as shown by plain x-ray and CT scan is not an indication of sinus infection .

Thus we can conclude that Water's view undoubtedly yields valuable information regarding sinus pathology , it should not be accepted as a diagnosis in itself but considered in the light of patient's history and clinical findings .

Our results indicate that high resolution CT of the maxillary sinuses is the most sensitive and specific radiographic

modality currently available for diagnosis of chronic sinusitis .

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