COMPARISON BETWEEN IMAGING TECHNOLOGIES (X-RAY WITH COMPUTE TOMOGRAPHY SCAN) OF PARANASAL SINUSES (PNS) IN SINUSITIS PATIENTS

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ABSTRACT

Background: Imaging technologies like x-ray and computed tomography used in study of paranasal sinuses plays an important role in managing multiple pathologies. Modern imaging technologies such as X-ray, CT-scan and MRI play a vital role to diagnose paranasal disorders more accurately than the normal conventional x-rays. This comparative study was conducted at PIMS Hospital Islamabad during from 3rd Jan 2018 to May 15 2018 to examine the diagnostic accuracy of x-ray and CT-Scan of paranasal sinuses.

Objective: The aim of this study is to evaluate the accuracy between modern imaging technologies (X-rays and CT-Scan) of paranasal sinuses in clinically observed sinusitis patients.

Materials and Methods: In this comparative/observational study, 55 patients of both genders who have resulted acute and chronic sinusitis disorder through clinically examination were included according to inclusion criteria and those patients were excluded from this study who had previously getting any nasal passage surgery or having normal and sinus problems and infections. All patients were referred to department of radiology at Pakistan Institute of Medical Science, Islamabad (PIMS) for examine the diagnostic accuracy of paranasal sinuses under x-ray and CT-scan. Radiological results of x-ray were associated with CT-scan in both chronic and acute sinusitis resulted patients.

Results: In this research 55 patients who had ages of 20 to 55 years were included. 33 (60%) patients were male while rest 22 (40%) were female. 12 (21.82%) patients were aged between 20 to 29 years, 13 (23.64%) patients had ages of 30 to 39 years, 18 (32.72%) patients were aged between 40 to 49 years and 12 (21.82%) patients were ages >49 years. From all 55 patients 26 (47.27%) had found acute sinusitis while 29 (52.73%) had found chronic sinusitis by clinically normal x-ray observation, when these patients were diagnosed by CT-Scan, from 26 acute sinusitis patients, 18 (69.23%) patients had found acute sinusitis while 8 (30.77%) had found no positive result. From 29 chronic patients, 22 (75.86%) had found positive results while 7 (24.14%) had not found chronic sinusitis.

Conclusion: It is concluded that, In past researches X-rays plays an important role for diagnosing of paranasal sinuses, but now a days, modern and advanced CT-Scan and MRI provide an accurate findings for diagnosing paranasal sinuses of sinusitis patients.

Key words: X-ray, CT-Scan. Paranasal sinuses, Sinusitis patients

INTRODUCTION

Imaging technologies used in nose study and paranasal sinuses (PNS) plays an important role in managing of multiple pathologies. A modern or advanced Imaging technique such as Computed tomography and MRI plays a vital role to diagnose paranasal sinuses more accurately than the conventional X-rays. Computed tomography of nose and PNS helps surgeon to provide better and accurate treatment of the sinusitis patients. Paranasal sinuses defined as air filled alveolus, which affect very importantly for resonance of voice and other physiological changes of inspired air to compatible of lower airway. Malignant disorders such as chronic and acute sinusitis are mainly examined on patient's history and physical observation but in different complicated incidences radiology of nose and PNS execute an important role in diagnosing of PNS disorders. Inflammatory is most frequent disease that affect nose and paranasal sinus.[1] Computed tomography and MRI is the most important imaging techniques used in nose infections and paranasal sinuses and helps to diagnose the benign and malignant tumor and also helps surgeon to provide better and accurate treatment. Basic or modest radiography is still operating as a diagnostic

technique having a deficient role to mark some areas such as ethmoidal and osteomeatal complex of sinuses in under developing countries. Conventional radiology causes difficulty for diagnosing infection and tumors [2] and polyps in an opaque sinuses.[3] Advance and modern imaging techniques such as CT-Scan provides more accurate and better information about nose infections and paranasal sinuses.[4] Computed tomography execute a very important role to value pathologies in strenuous domains specially in ethmoid and sphenoid sinuses.[5,6] Many researches shows that the radiological results of X-ray of paranasal sinuses having symptoms like mucosal thickness, air fluid in maxillary sinuses ans complete or partially opacification.[7,8] Mucosal thickness is found in mostly sinusitis incidences as 90% cases.[9-11]

Modern imaging technology like CT-Scan provides better result than the plain or basic radiology.[12] Computed tomography scan provides accurate findings for diagnosing inflammatory disorders. In hospital, if CT-Scan technology is available than should have to perform this technique before any perforated sinus sugary.[13,14]

MATERIALS AND METHODS

This observational study was conducted at PIMS Hospital Islamabad during from 3rd Jan 2018 to May 15 2018. In this comparative/observational study, 55 patients of both genders whom had resulted acute and chronic sinusitis disorder by clinically examination were included and those patients were excluded from this study who had previously getting any nasal passage surgery or having normal and sinus problems and infections. All patients were referred to department of radiology of radiology at Pakistan Institute of Medical Science, Islamabad (PIMS) for examine the diagnostic accuracy of paranasal sinuses under x-ray and CT-scan. Radiological results of x-ray were associated with CT-scan in both chronic and acute sinusitis resulted patients. All statistical data was analyzed by SPSS 21. PPV, NPV, sensitivity and specificity and accuracy of X-ray and CT-scan were examined.

RESULTS

In this research 55 patients who had ages of 20 to 55 years were included. 33 (60%) patients were male while rest 22 (40%) were female. 12 (21.82%) patients were aged between 20 to 29 years, 13 (23.64%) patients had ages of 30 to 39 years, 18 (32.72%) patients were aged between 40 to 49 years and 12 (21.82%) patients were ages >49 years (Table 1). From all 55 patients 26 (47.27%) had found acute sinusitis with symptoms observed in patients of normal, mucosal thickness, haziness and complete and partial opacity as 8, 7, 5, 6 respectively, while 29 (52.73%) had found chronic sinusitis by clinically normal x-ray observation with symptoms observed in patients of normal, mucosal thickness, haziness and complete and partial opacity as 10, 7, 6, 6 respectively (Table 2).

When these patients were diagnosed by CT-Scan, from 26 acute sinusitis patients, 18 (69.23%) patients had found acute sinusitis while 8 (30.77%) had found no positive result. From 29 chronic patients, 22 (75.86%) had found positive results while 7 (24.14%) had not found chronic sinusitis (Table 3). In acute sinusitis findings, we observed sensitivity, specificity, positive predictive value and negative predictive value as 80%, 66.67%, 70.59% and 66.67% respectively and in chronic sinusitis patients, we observed 80.95%, 55.56%, 85% and 55.56% as sensitivity, specificity, PPV and NPV respectively (Table 4).

Table 1: Gender & age wise distribution of patients

Characteristics	No.	%
Gender		
Males	33	60
Females	22	40
Age		
20 to 29 years	12	21.82
30 to 39 years	13	23.64
40 to 49 years	18	32.72
>49 years	12	21.82

Table 2: Clinically X-rays findings and symptoms observed

X-ray findings PNS	Acute Sinus	Chronic sinus
Normal	8	10
Muco thickness	7	7
Hazines	5	6
Complete/partial opacity	6	6
Total	26	29

Table 3: Imaging results of CT-Scan followed by X-rays findings of acute sinusitis n=26

Characteristics	No.	%
Positive	18	69.23
Negative	8	30.77
True +ve	12	46.15
True -ve	6	23.08
False +ve	5	19.23
False -ve	3	11.54

Sensitivity: = 80% Specificity = 66.67%
Positive predictive value = 70.59%
Negative predictive value = 66.67%

Table 4: Imaging results of CT-Scan followed by X-rays findings of chronic sinusitis n=29

Characteristics	Frequency	% age
Positive	22	75.86
Negative	7	24.14
True +ve	17	46.15
True -ve	5	23.08
False +ve	3	19.23
False -ve	4	11.54

Sensitivity: = 80.95% Specificity = 55.56%
Positive predictive value = 85%
Negative predictive value = 55.56%

DISCUSSION

Several anatomical disorders of nose happens which may be diagnosed not accurately but can diagnosed accurately by using advance radiology like CT-Scan. These disorders findings may deficient some domains of nasal alveolus which damage nasal air flow and drainage of PNS cause sinusitis. Sinusitis can be divided into acute and sub-acute and chronic sinusitis resulted on duration of mucos membrane inflammation. Acute sinusitis can be defined as having disorder from < 1 month and sub-acute from <3 months and chronic from > 3 months.[15]

In this study, 55 patients who had ages of 20 to 55 years were included. 33 (60%) patients were male while rest 22 (40%) were female. 12 (21.82%) patients were aged between 20 to 29 years, 13 (23.64%) patients had ages of 30 to 39 years, 18 (32.72%) patients were aged between 40 to 49 years and 12 (21.82%) patients were ages >49 years, these results were different to other study done in South Africa in which females ratio was high than the males but in our study males ratio was higher than females it was may be due to the excess use of smoking in males.[16] In this research we observed 26 (47.27%) had found acute sinusitis with symptoms observed in patients of normal, mucosal thickness, haziness and complete and partial opacity as 8, 7, 5, 6 respectively, these results were differ from some other studies in which mucosal thickness found in maximum patients as 90% of cases and haziness in and total opacificity in 60% incidences.[9,10] We observed 29 (52.73%) had found chronic sinusitis by clinically normal x-ray observation with symptoms observed in patients of normal, mucosal thickness, haziness and complete and partial opacity as 10, 7, 6, 6 respectively. These results are also different from other study conducted by Varonen et al.[17] In our study, we observe Modern imaging technology like CT-Scan provides better result than the plain or basic radiology and these results were same to the some other studies.[12] Computed tomography scan provides accurate findings for diagnosing inflammatory disorders. In hospital, if CT-Scan technology is available than should have to perform this technique before any perforated sinus surgery.[13,14]

In current study we observed in acute sinusitis findings, we observed sensitivity, specificity, positive predictive value and negative predictive value as 80%, 66.67%, 70.59% and 66.67% respectively and in chronic sinusitis patients, we observed 80.95%, 55.56%, 85% and 55.56% as sensitivity, specificity, PPV and NPV respectively. These results were same to the some other studies.[17-21]

CONCLUSION

It is concluded that, In past researches X-rays plays an important role for diagnosing of paranasal sinuses, but now a days, modern and advanced CT-Scan and MRI provide an accurate findings for diagnosing paranasal sinuses of sinusitis patients.

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