ORIGINAL ARTICLE

Diagnostic Accuracy of X-ray in Clinically Suspected Acute Sinusitis taking Computed Tomography Scan as Gold Standard

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ABSTRACT

Aim: To determine the diagnostic accuracy of X-Ray in clinically suspected acute sinusitis taking CT Scan as gold standard

Study Design: Cross-sectional

Place and duration of study: Department of Radiology, Sahiwal Medical College Sahiwal from 1st March 2019 to 31st August 2019.

Methods: Forty patients of both genders with ages between 18 and 70 years clinically diagnosed to have acute sinusitis were enrolled in this study. Patients' detailed demographics including age, sex and symptoms were recorded after taking informed written consent. All the patients underwent X rays and CT scans.

Results: Twenty three (57.5%) patients were female while 17 (42.5%) patients were male. 18 (45%) patient were of ages <30 years followed by 15 (37.5%) patients with ages between 30 to 40 years. Nasal obstruction was the most common symptom found in 25 (62.5%) patients followed by nasal discharge in 20 (50%) patients. 32 (80%) patients showed positive and 8 (20%) showed negative findings for acute sinusitis by X-ray. Sensitivity, specificity, positive predictive value and negative predictive value of X-ray were 90.63%, 75%, 93.55% and 66.67% respectively.

Conclusion: X ray provided accurate enough diagnosis of acute sinusitis as compared to CT scan

Keywords: X-rays, Computed tomography scan, Acute sinusitis, Paranasal sinuses

INTRODUCTION

The para-nasal sinuses are hollow, airfilled spaces located within the bones of the face and base of the skull surrounding the nasal cavity. There are four pairs of sinuses, each connected to the nasal cavity by small canal. They include the frontal, ethmoidal, maxillary and sphenoid sinuses[1]. The paranasal sinuses are formed by three essential components; mucus lining, normally functioning hair-like cilia that move the mucus out of the sinuses and sinus drainage openings (called sinus ostium). Any condition (Inflammation, neoplasm, foreign body) that interferes with drainage of a sinus renders it liable to infection[2]. Lesions of para nasal sinuses are common and affect a wide range of population with a variety of etiologies. They include a wide spectrum ranging from inflammation to neoplasms. It is recently evident that sinusitis is primarily a clinical diagnosis. When the clinical history suggests sinusitis, a focused physical examination can help to differentiate sinusitis from simple upper respiratory tract infection.[3] The aim of history taking is to evaluate the presence, severity and duration of symptoms in order to obtain an accurate diagnosis. Physical examination aims to find any abnormality or disease that can explain the symptoms. Inspection, palpation and anterior rhinoscopy are easy and rapid ways to examine any nasal problem.[4] The emphasis on obtaining a patient history and performing a limited physical examination is based on the fact that most patients can be effectively treated (medically and cost-wise) without the necessity of

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nasal endoscopy, radiographic studies or bacterial cultures.[5] Imaging of the sinuses is usually reserved to give information that supports the clinical findings, to confirm the diagnosis if history and physical examinations are equivocal, or if conventional treatment has failed. Modalities mainly include plain radiographs and CT scan[6]. Computed tomography (CT) is the imaging modality of choice for the diagnosis and follow-up of patients with sinus pathology. But CT scanning is not without risks to the patient. The radiation dose and cost associated with CT scan make its use as primary diagnostic tool for rhinosinusitis inappropriate. Whereas, provisional diagnosis could be on the basis of clinical history and physical examination, radiology and sinus endoscopy are necessary in making definitive diagnosis and management protocol. Plain radiography is the mainstay of radiological diagnosis in most developing countries because it is cheap, simple and widely available[7,8]. The present study was conducted aimed to determine the diagnostic accuracy of X-ray for acute sinusitis in clinically diagnosed patients and comparing the findings with CT scan.

MATERIALS AND METHODS

This cross-sectional study was conducted at Department of Radiology, DHQ Teaching hospital, Sahiwal Medical College Sahiwal from 1st March 2019 to 31st August 2019. A total 40 male/female patients clinically diagnosed to have acute sinusitis underwent X-rays of para-nasal sinuses. Patients enrolled in this study had ages between 18 and 70 years. Patients' detailed demographics including age, sex and symptoms were recorded after taking informed written

consent. Patients with previous nasal surgery or infections other than sinusitis were excluded. Computed tomography scan examination was done to all the patients afterwards and reported by single experienced radiologist. Diagnostic accuracy of X-ray was determined in comparison to CT scan. Data was analyzed by SPSS 24 and Sensitivity, specificity, positive predictive value and negative predictive value were calculated.

RESULTS

23 (57.5%) patients were female while 17 (42.5%) patients were male. Majority of patients 18 (45%) had age <30 years, 15 (37.5%) patients had ages between 30 and 40 years and 7 (17.5%) patients had ages above 40 years. Nasal obstruction was the most common symptom found in 25 (62.5%) patients followed by nasal discharge in 20 (50%) patients, headache in 16 (40%) patients, fever in 8 (20%) patients and facial swelling in 5 (12.5%) patients (Table 1). Thirty two (80%) patients showed positive and 8 (20%) showed negative findings for acute sinusitis by X ray examination. 29 (72.5%) patients were true positive, 2 (5%) were false positive, 3 (7.5%) were false negative and 6 (15%) patients were true negative (Table 3). Sensitivity, specificity, PPV and NPV of X-ray were 90.63%, 75%, 93.55% and 66.67% respectively (Table 3).

Table 1: Demographical details of all the patients

Variable	No.	%
Gender		
Female	23	57.5
Male	17	42.5
Age (years)		
<30	18	45.0
30 – 40	15	37.5
>40	7	17.5
Symptoms		
Nasal Obstruction	25	62.5
Nasal Discharge	20	50.0
Headache	16	40.0
Fever	8	20.0
Facial Swelling	5	12.5

Table 2: Findings on X-rays examination

Variables	No.	%age
Normal	14	35
Mucosal Thickening	17	42.5
Sinus Haziness	5	12.5
Opaque sinus	4	10

Table 3: Findings X-ray versus CT

X-ray	CT		Total
	Positive	**Negative**	
Positive	29	3	32
Negative	2	6	8
Total	31	9	40

Sensitivity 90.63%, Specificity 75%, PPV 93.55%, NPV 66.67%

DISCUSSION

Paranasal sinusitis is the most common painful disorder with high rate of morbidity all over the world. Management of paranasal sinuses pathology depends on accurate diagnosis. X-rays and CT-scan both play an important role for diagnosing paranasal sinuses pathology but CT scan is considered as gold standard because of good resolution images and high accuracy rate[9,10]. Present study was conducted to examine the diagnostic accuracy of X-ray compared to CT scan for diagnosing acute sinusitis in clinically suspected patients. In our study female patients were higher in number 57.5% as compared to males 42.5%. 45% patients were of ages less than 30years. These results showed similarity to the study conducted by Hussein et al[11] in which female patient population was high 54% as compared to males and majority of patients were in the age group of 19 to 29 years. Some other studies[12-14] demonstrated that male patients were high in numbers as reported by Ahmad et al[12] in which 60% patients were males.

In present study nasal obstruction was the most common symptom found in 25 (62.5%) patients followed by nasal discharge in 20 (50%) patients, headache in 16 (40%) patients, fever in 8 (20%) patients and facial swelling in 5 (12.5%) patients. These results were comparable to several previous studies in which nasal discharge, nasal obstruction and headache were the common symptoms among sinusitis patients[11,15].

In our study we found that 14(35%) patients had normal X-rays, 17 (42.5%) patients had mucosal thickening, 5 (12.5%) patients had hazy sinuses and 4(10%) patients had finding of complete / partial opacity in sinuses (Table 2). These results were similar to the study by Ahmad et al[12].

In present study we found that 32(80%) patients showed positive and 8(20%) showed negative findings for acute sinusitis by X-ray examination. 29(72.5%) patients were true positive, 2(5%) were false positive, 3(7.5%) were false negative and 6 (15%) patients were true negative. Sensitivity, specificity, PPV and NPV of X-ray were 90.63%, 75%, 93.55% and 66.67% respectively. A study by Kanwar et al[16] reported that CT-scan resulted high accuracy than the X-ray examination for diagnosing acute sinusitis, they reported sensitivity 97.7% and specificity 97.8% for diagnosing sinusitis. Several studies demonstrated that CT-scan for diagnosing paranasal sinuses showed high accuracy rate and considered as gold standard[17,18].

CONCLUSION

Computed tomography scan is better modality to diagnose acute sinusitis. Moreover, X-ray examination is accurate enough option where CT-scan is not available.

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