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Clinical and Radiological Profile of Chronic Rhinosinusitis

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ABSTRACT

The inherently superior soft-tissue resolution and multiplanar capabilities render MRI examinations superior for assessment of soft-tissue masses and extension of infectious/malignant disease processes beyond the paranasal sinuses. The main source of data for this study were the patients referred from the Departments of ENT, General Medicine, Dental and Ophthalmology with upper respiratory tract symptomatology where imaging revealed paranasal sinus masses. Informed consent was obtained from the subjects before the commencement of the investigations. On plain radiography, the findings were complete sinus opacification (53.49%), partial sinus opacification (23.25%), polypoidal mucosal thickening (34.88%) and nasal haziness (39.53%). On Computed tomography, thickening and sclerosis of sinus walls (100%), polypoidal mucosal thickening (100%) and bone erosion (9.30%) were seen. In present study, CT was able to correctly diagnose chronic rhinosinusitis. On MRI, Sinus polypoidal mucosal thickening (100%), mucosal enhancement (93.02%), nasal mucosal thickening (93.02%) and sinus opacification (32.56%) were seen.

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Key Words
Chronic rhinosinusitis, CT. MRI

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INTRODUCTION

The nasal cavity and the paranasal sinuses are parts of the body's respiratory system. The nasal cavity starts just behind the vestibule of the nose that runs back and then joins the passage from the mouth to throat. The paranasal sinuses are pairs of air-filled spaces that are found around the nose. An abnormality or disease of nose and PNS can be demonstrated by nasal endoscopy in combination with imaging of the sinuses. These are the two most widely used diagnostic tool in the diagnosis of nose and PNS diseases[1]. Nasal endoscopy is a commonly performed procedure and serves as an objective diagnostic tool in the evaluation of sinonasal anatomy and pathology and also helps as a therapeutic tool in some cases[2].

The head and neck radiology, similar to that of other subspecialties in radiology, began with the discovery of the X-ray in 1895 by Wilhelm Konrad Roentgen. Paranasal sinus roentgenography was first described by Schuler in 1905, improved upon by Waters in 1915 and studied extensively by Caldwell in 1918. Caldwell's interest in head and neck radiology is reflected by a view of the paranasal sinuses that still bears his name, "the Caldwell view", which is a depiction of the ethmoid and frontal sinuses that include both orbits. In 1914, Waters and Waldron, two British radiologists, introduced a projection that defined the paranasal sinuses and facial bones to greater advantage. At the present time, the Water's view is still being used to survey sinus disease and facial fractures[3]. An important historic achievement occurred in 1972 with the introduction of computed tomography (CT) by Godfrey Hounsfield of Great Britain.

The inherently superior soft-tissue resolution and multiplanar capabilities render MRI examinations superior for assessment of soft-tissue masses and extension of infectious/malignant disease processes beyond the paranasal sinuses[4]. The wide spectrum of inflammatory to neoplastic conditions affects paranasal sinuses. About 20% of general population is affected by PNS lesions and are common in all age groups. They can be evaluated with X-rays, CT and MRI. But plain radiographs are mostly inadequate and inaccurate in evaluating non-neoplastic and neoplastic conditions of paranasal sinuses because of complex facial skeletal anatomy.

MATERIALS AND METHODS

It was a prospective study to assess paranasal sinus masses by X-Ray, Computed Tomography and Magnetic Resonance Imaging.

Sample Size: One hundred and two (102) subjects.

Source of Data: The main source of data for this study were the patients referred from the Departments of ENT, General Medicine, Dental and Ophthalmology with upper respiratory tract symptomatology where imaging revealed paranasal sinus masses. Informed consent was obtained from the subjects before the commencement of the investigations.

Inclusion Criteria: Patients of all age groups presenting with suspected paranasal sinus masses where imaging reveals paranasal sinus masses will be included in this study.

Exclusion Criteria:

- Previous evidence of sinonasal surgery
- All cases of trauma

Clinical Assessment: In all cases thorough history taking and physical examination were done based on the proforma attached. History was taken from each patient followed by clinical examination. Basic investigations like routine blood examination and routine urine examination were done whenever required. Diagnosis was confirmed by characteristic imaging features of masses or post-operative histopathological reports. Follow up of the patients was done by taking details of treatment and procedures done on the patients.

RESULTS AND DISCUSSIONS

In the present study of 102 paranasal sinus masses, chronic rhinosinusitis was the most common cause contributing 42.16% (43/102) of the total cases. The incidence of chronic rhinosinusitis was common in 12-21 years age group with 37.21% (16/43) of the total cases falling in this age group. Chronic rhinosinusitis was much more common in males (67.44%) than females (32.56%). This study shows that majority (37.21%) of the cases of chronic rhinosinusitis is seen in males of 12-21 years age group and women of 12-21 years age group (16.3%). The most common clinical presentation in chronic rhinosinusitis was nasal obstruction and nasal mass (100%) followed by nasal discharge (72.10%), headache (55.81%), decreased hearing (18.60%), epistaxis (18.60%) and pain in cheek (4.65%). In this study, maxillary sinus was more commonly involved constituting 90.70% followed by ethmoid (44.19%), frontal (32.56%) and sphenoid sinus (25.58%).On plain radiography, the findings were complete sinus opacification (53.49%), partial sinus opacification (23.25%), polypoidal mucosal thickening (34.88%) and nasal haziness (39.53%). On Computed tomography, thickening and sclerosis of sinus walls

Table 1: Age distribution of chronic rhinosinusitis

Age group (years)	No of cases	Percentage
2-11	5	11.63
12-21	16	37.21
22-31	6	13.95
32-41	7	16.28
42-51	6	13.95
52-61	3	6.98
Grand Total	43	100

Table 2: Gender distribution of chronic rhinosinusitis

Sex	No of cases	Percentage
Females	14	32.56
Males	29	67.44
Grand Total	43	100

Table 3: Age wise gender distribution of chronic rhinosinusitis

	No of cases		
Age group	Females	Males	Grand total
2-11	2	3	5
12-21	7	9	16
22-31	2	4	6
32-41	2	5	7
42-51	1	5	6
52-61	0	3	3
Grand Total	14	29	43

Table 4: Clinical presentation in chronic rhinosinusitis

Clinical presentation	No of cases	Percentage of total
Nasal obstruction	43	100
Swelling in nasal cavity	43	100
Nasal discharge	31	72.10
Headache	24	55.81
Pain cheek	2	4.65
Decreased hearing	8	18.60

Table 5: Distribution of Chronic rhinosinusitis

Sinuses	No of sinuses	Percentage of total
Maxillary	38	90.70
Ethmoid	19	44.19
Frontal	14	32.56
Sphenoid	11	25.58

Table 6: Plain radiography findings in chronic rhinosinusitis

Plain radiography features	No of cases	Percentage of total
Complete sinus opacification	23	53.49
Partial sinus opacification	10	23.25
Sinus polypoidal mucosal thickening	15	34.88
Nasal haziness	17	39.53

Table 7: CT findings in chronic rhinosinusitis

CT findings	No of cases	Percentage
Polypoidal mucosal thickening	43	100
Bone sclerosis	43	100
Thickening of bone	43	100
Bone erosion	4	9.30

Table 8: MRI findings in chronic rhinosinusitis

MRI findings	No of cases	Percentage
Sinus polypoidal mucosal thickening	43	100
Mucosal enhancement	40	93.02
Nasal mucosal thickening	40	93.02
Sinus opacification	14	32.56

(100%), polypoidal mucosal thickening (100%) and bone erosion (9.30%) were seen. In present study, CT was able to correctly diagnose chronic rhinosinusitis. On MRI, Sinus polypoidal mucosal thickening (100%), mucosal enhancement (93.02%), nasal mucosal thickening (93.02%) and sinus opacification (32.56%) were seen. In the present study, the age range of patients was between 2-61 years with a mean age of 26.60 years. Maximum number of patients (16 out of 43) were in the age group of 12–21 years. In the study by Pleis IR and Coles R[5], maximum number of patients were in age group of 18-44 years. In the study by Gupta MK *et al*[6]. age range of patients was between 14-72 years. In the study by Tiwari R and Goyal R[7], maximum number of patients were found in age group 10-30 years. All these studies correlate well with the present study with respect to age distribution. In the present study, there were 29 males and 14 females out of 43 patients. In the study by Shi JB *et al*[8]. there were 451 males and 400 females out of 851 patients. In the study by Tiwari R and Goyal R[7], there were 58 males and 27 females out of 85 patients. In the study by Manning SC *et al*[9]. there were 42 males and 18 females out of 60 patients. All the above mentioned studies showed male preponderance which correlates with the present study.

However, in the study by Blackwell DL *et al*[10]. there were 18,202 females and 10,302 males out of 28,504 patients which does not correlate with the present study as their study included a large population and many other parameters were included. In the present study, maxillary sinus was most common sinus to be involved corresponding to 90.7% of involved sinuses (38 out of 43 cases) followed by ethmoid sinus corresponding to 44.19% of involved sinuses (19 out of 43 cases), frontal sinus corresponding to 32.56% of involved sinuses (14 out of 43 cases) and sphenoid sinus corresponding to 25.58% of involved sinuses (11 out of 43 cases). In the study by Gupta MK *et al*[6]. maxillary sinus was most common sinus to be involved corresponding to 83.4% of involved sinuses (291 out of 349 patients) followed by ethmoid sinus corresponding to 73.6% of involved sinuses (257 out of 349 patients), frontal sinus corresponding to 48.4% of involved sinuses (169 out of 349 patients) and sphenoid sinus corresponding to 33% of involved sinuses (115 out of 349 patients). In the study by Amondu EJ *et al*[11]. maxillary sinus was most common sinus to be involved corresponding to 81.7% of involved sinuses (49 out of 60 patients) followed by ethmoid sinus corresponding to 68.3% of involved sinuses (41 out of 60 patients), frontal sinus corresponding to 40% of involved sinuses (24 out of 60 patients) and sphenoid sinus corresponding to 20% of involved sinuses (12 out of 60 patients).

Thus distribution of chronic rhinosinusitis with respect to sinuses involved in all the above mentioned studies are correlating with the present study. Plain radiograph findings in present study were complete sinus opacification corresponding to 53.49% of cases (23 out of 43 cases), partial sinus opacification corresponding to 23.25% of cases (10 out of 43 cases), nasal haziness corresponding to 39.53% of cases (17 out of 43 cases) and sinus mucosal thickening corresponding to 34.88% of cases (15 out of 43 cases).

In the study done by Verma J *et al*[12]. sinus haziness was found in 76% of cases (38 out of 50 patients), nasal haziness in 64% of cases (32 out of 50 patients) and mucosal thickening in 32% of cases (16 out of 50 patients). In the study by Kolo ES[13], mucosal thickening was seen in 38.2% of cases on plain radiography (55 out of 144 patients). Study by Skoulas IG *et al*[14]. showed mucosal thickening in 27.27% of cases on plain radiography (9 out of 33 patients).

All the above mentioned studies are correlating with the present study with respect to plain radiographic findings. CT findings in the present study were thickening of bone (100%), sclerosis of bone (100%), mucosal thickening (100%) and bone erosion corresponding to 9.30% of cases (4 out of 43 cases). In the study done by Skoulas IG *et al*[14]. thickening and sclerosis of bone was seen in 100% of cases on CT (112 cases). In the study by Manning SC *et al*[19]. sinus mucosal thickening was seen in 75% of cases on CT examination (45 out of 60 cases). The above mentioned studies is correlating with the present study with respect to CT findings.

MRI findings in the present study were sinus mucosal thickening (100%), mucosal enhancement corresponding to 93.02% of cases (40 out of 43 cases) and sinus opacification corresponding to 32.56% of cases (14 out of 43 cases). In the study by Gupta MK *et al*[6]. mucosal thickening was seen in 89.7% of cases (313 out of 349 patients) and sinus opacification in 32.7% of cases (114 out of 349 patients) on MRI. In the study by Manning SC *et al*[9]. sinus mucosal thickening was seen in 75% of cases on MRI examination (45 out of 60 cases). Thus MRI features in the above mentioned studies are correlating with the present study.

CONCLUSION

Thus CT had higher sensitivity to detect thickening and sclerosis of bone and bone erosions. MRI had higher sensitivity to detect the type of secretions based on signal characteristics. X-Rays were less sensitive (75%) than CT or MRI as they lacked sufficient diagnostic sensitivity for many of the inflammatory changes present in chronic rhinosinusitis.

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