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Original Research Article

Clinical study on the correlation between radiological and intra operative findings in cases of sino nasal polyposis

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ABSTRACT

Background: Sino nasal polyposis is a common condition often encountered by the otolaryngologists. Though plain radiographs are valuable in the pre-operative evaluation, the CT scan plays a major role in identifying the extent of disease and the anatomic variations accurately for the surgeon. This study evaluates the value of pre-operative CT scans by correlating the scan findings with intra-operative surgical findings.
Methods: Total 50 adult patients who attended the ENT department from November 2018 to October 2020 with Sino nasal polyposis were selected for the study. All were subjected to CT scan and underwent Functional Endoscopic Sinus Surgery. The intra-operative findings were compared with the CT scan findings.
Results: In our study, the pre-operative CT scan showed single sinus involvement in 20% and multiple sinus involvement in 80% of cases. Mucosal abnormality was reported in 86% and normal in 14% of cases. Osteomeatal obstruction was reported in 44% and normal in 56% of cases. Various anatomical abnormalities were noted in 100% of cases. There was a perfect positive co relation between CT scan findings and intra operative findings with regards to Osteomeatal occlusion and anatomical or mucosal abnormalities.
Conclusions: The study done to assess the correlation between pre-operative CT scan findings and intra-operative findings of Sino nasal polyposis cases has shown a perfect positive correlation between the findings. Pre-operative CT scan is an invaluable tool for the surgeon for accurate diagnosis and treatment planning.

Keywords: Sino nasal polyps, CT scan, Intra operative correlation

INTRODUCTION

Sino nasal polyps (SNP) are swellings of the nasal and or paranasal sinus mucosa. They are mostly associated with chronic Rhino sinusitis. SNP is considered to be due to unknown etiology. Bacterial or fungal infections and allergy have also been identified as causative agents. SNP are frequently associated with various systemic diseases. One third of SNP patients show association with asthma, but polyps are seen only in 7% of asthmatic patients.[1] SNP affects the quality of life by causing symptoms of nasal obstruction, altered sense of smell, nasal discharge, headaches or facial pain. SNPs predominantly affect adults older than 20 and are uncommon in children less than 10 years of age. There is at least a twice male preponderance.

The prevalence of SNP in general population is around 4 %. In cadaveric studies, this prevalence has increased to 32 %.[1-3] Despite a high prevalence, the treatment of SNP is challenging as the SNP could a simple mucosal polyp or turn out to be a pathological entity like a infective Granuloma, a benign tumor like papilloma, a vascular mass or a congenital lesion, such as meningocele, Encephalocele or a neoplasm. Though a provisional diagnosis of SNP can be made with conventional

examination methods, a detailed evaluation is essential for accurate management.

Plain radiographs of the paranasal sinuses are regularly used for evaluation, but they have a limited role in the treatment planning. Computed tomography (CT) is a newer and fast radiological investigation readily available in most places. The role of a pre-operative CT scan is not limited to diagnosing SNP, but also helpful in assessing the extent of the disease and identifying the various anatomical variations which are crucial when surgical treatment is planned. CT imaging has become an important diagnostic tool.[4] Often there is a difference between the clinical symptoms and CT findings. The prevalence of the mucosal changes in an asymptomatic population is quite high.[5]

Studies on the efficacy of pre-operative radiological evaluation of Sino nasal polyposis cases have reported different results. Studies done by Casiano and Rosbe and Jones have shown a strong positive correlation between the preoperative CT and intra operative findings.[6,7] But the study by Stankiewicz et al has reported a poor correlation.[8]

The objective of the present study was to evaluate the usefulness of pre-operative CT scans in evaluating the anatomical abnormalities and sinus mucosal changes in SNP cases by correlating the CT scan findings with intra-operative surgical findings in the selected patients.

METHODS

The cross-sectional study was conducted at the Department of Otorhinolaryngology and Head and Neck surgery of the Aarupadai Veedu Medical College & Hospital, Puduchery, South India from November 2018 to October 2020.

Convenient sampling method was used for sample size calculation. During the study period, whichever patient reported to the ENT OPD with a SNP and fulfilled the inclusion criteria were included and 50 adult patients were selected for this study.

Inclusion criteria

Inclusion criteria were 1) males and females subjects above 18 years of age with SNP 2) SNP not responding to a full course of medical treatment with systemic and topical corticosteroids 3) cases of allergic fungal sinusitis

Exclusion criteria

Exclusion criteria were 1) patients below 18 years of age 2) pregnancy 3) cases of simple chronic sinusitis without nasal polyposis 4) patients who had previous functional endoscopic sinus surgery 5) patients with complicated sinusitis 6) antrochonal polyp

After an informed consent, detailed history was taken and a complete clinical examination was carried out. Relevant pre-operative laboratory tests were done. All the patients were subjected to CT scan with 3 mm cuts in standard coronal, axial and sagittal sections and the findings were documented. All the subjects underwent Functional endoscopic sinus surgery and intra-operative findings were documented. The data was collected, coded, entered into Microsoft Excel work sheet and exported to SPSS. Data was analyzed using SPSS version 21. Data is presented as percentage in categories and then presented as tables and diagrams. Chi-square test and Pearson correlation was used for test of significance.

RESULTS

In this study 22 patients (44%) were in the age group of 31- 40 years. Around 20 patients [40%] were in the age group of 21–30 years and 7 (14%) were in the age group of 41–50 years. Only 1 patient (2%) was in the age group of 61–70 years. The mean age of study population was 34.76±8.5 years. In this study 64% of patients were males and 36% were females. The age wise distribution of patients is shown in (Figure 1).

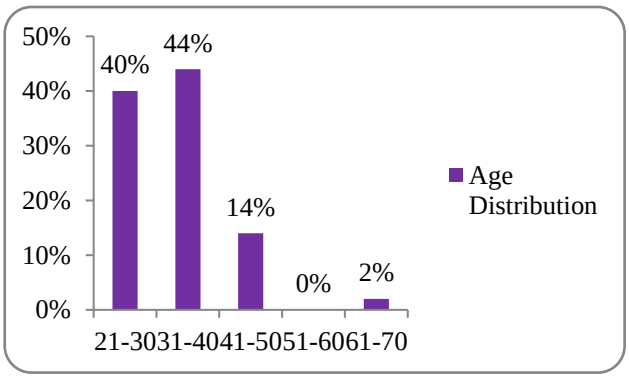

Figure 1: Age distribution.

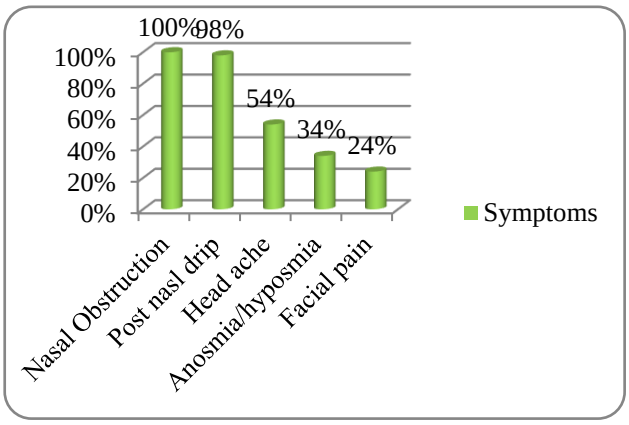

Figure 2: Symptom distribution (many had multiple symptoms).

Many subjects had multiple complaints and the most common presenting symptom was nasal obstruction

(100%) followed by post nasal drip (98%). Headache (54%) was the next common complaints. Anosmia/hyposmia (34%) and facial pain (24%) were also present. The symptom wise distribution is shown in (Figure 2).

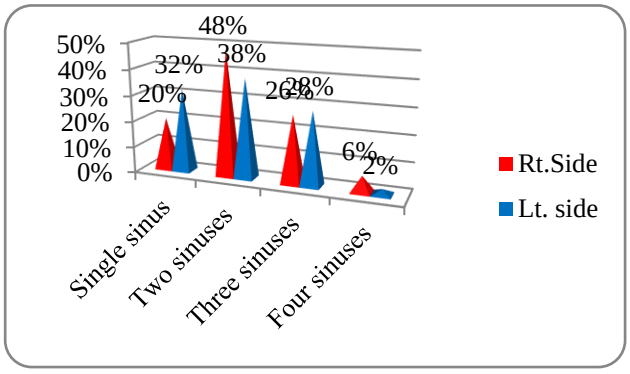

Figure 3: the number of sinus involvement on each side as seen by CT study.

CT study results: The number of sinuses involved on the Right and Left side was assessed. Majority of the CT studies showed involvement of two sinuses, more on the Rt. Side 48% than on the Lt. side 38%. Three sinus involvements were equally seen on the Rt. 26% and Lt. side 28%. Single sinus involvement was seen less on the Rt. Side 20% and more on the Lt. side 32%. Four sinus involvements were seen more on the Rt. side [6%] than on the Lt. side 2%. The number of sinuses involved in each side is shown in (Figure 3).

Mucosal abnormality was seen on the Rt. side in 22 patients 44% and on the Lt. side in 21 patients 42% and 7 patients 14% showed no mucosal abnormality. Osteomeatal complex [OMC] occlusion was reported on the Rt. side in 11 (22%) cases and Lt. OMC occlusion was reported in 11 (22%) of cases and bilateral OMC occlusion was reported in 28 (56%) of cases. Olfactory fossa depth was assessed using Keros classification. Keros type II was seen in 37 (74%) cases and type III was seen in 9 (18%) of cases and type I was seen in 4 (8%) cases.

Based on the symptoms and involvement of sinuses as reported in the CT study, Lund -Mackay Score was used for grading. The mean LM score on the Rt. side was 6.4±1.8 and on the Lt. side was 6.1±1.7. The median LM score value of right and left side was 6 (Table 1).

Table 1: Distribution of Lund Mackay (LM) Score in the study population as per CT scan findings.

Side	Mean LM score	Median (range) LM score
Right	6.4±1.8	6 (3 – 12)
Left	6.1±1.7	6 (4 – 12)

Many cases had multiple anatomical abnormalities as reported in the CT study. The various abnormalities reported were as follows. Deviated nasal septum (82%), hypertrophied uncinate process (32%), Concha bullosa (10%), and paradoxical middle turbinate, Onodi and Haller cells [each 2%] and pneumatized Crista Galli (1%) (Figure 4).

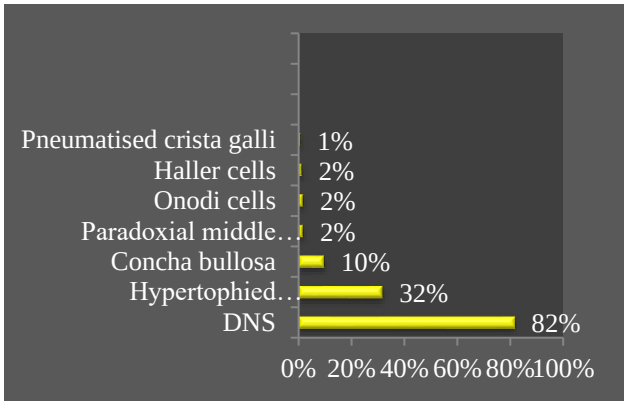

Figure 4: The different anatomical variations observed by CT study.

Table 2: Comparison of CT scan findings and intraoperative findings of mucosal abnormality.

Mucosal abnormality	Intraoperative present (%)	Intraoperative absent (%)	Total (%)	Kappa value
CT scan present	22 (100)	0 (0)	22 (100)	0.6 Moderate agreement
CT scan absent	10 (35.7)	18 (64.3)	28 (100)	
Total	32 (64)	18 (36)	50 (100)	

P value is <0.01

Table 3: Comparison of CT scan findings and Intra operative findings of hypertrophied uncinate process.

Hypertrophied Uncinate process	Intra operative present (%)	Intra operative absent (%)	Total (%)	Kappa value
CT scan present	14 (87.5)	2 (12.5)	16 (100)	0.4–Fair agreement
CT scan absent	11 (32.3)	23 (67.7)	34 (100)	
Total	25 (50)	25 (50)	50 (100)	

P value <0.01

Intra operative assessment results

The number of sinus involvement on the Rt. and Lt. side were similar to the CT findings. The CT scan and intra operative finding with respect to mucosal abnormality was compared. It was observed that CT scan was able to correctly identify presence of mucosal abnormality in 68.8% of patients. Non parametric test of significance – chi square test was applied. Since one of the cells has a value of <5, Yates correction was applied and it was found that the p value is <0.01 (Table 2). This suggests that there is a statistically highly significant co relation between CT scan findings and intra operative findings for mucosal abnormality identification.

Similar statistically highly significant co relation (p value <0.01) was observed when the pre-operative CT study and intra operative assessment findings with reference to Osteomeatal complex occlusion and various anatomical variations such as DNS, Concha Bullosa, paradoxical middle turbinate or hypertrophied Uncinate process (Table 3) were compared.

DISCUSSION

Polypoidal mass in the nasal cavity is a condition commonly encountered by the Otorhinolaryngologists. A detailed evaluation is imperative to study the extent of the disease for proper management. Several studies have been done to assess the correlation between the CT findings and intraoperative findings.

In our study the maximum numbers of patients were in the age group of 31-40 years (44%). The mean age of study population was 34.76±8.5 years. In present study the most common presentation among the study participants was nasal obstruction (100%) followed by post nasal drip (98%). Headache was complained by 54% and Anosmia/hyposmia was present in 34% of study subjects and 24% of them had facial pain.

Our findings were akin to an Indian study by Cassandra et al in which nasal obstruction and rhinorrhea were the most common presenting complaints and altered sense of smell and facial pain were also found in majority of cases.[9] Another Indian study by Kumari et al also showed similar findings with common presenting symptoms of nasal obstruction (70%), headache (66.6%), nasal discharge (65%), epistaxis (30%) and post nasal drip in (20%) of cases.[10]

CT study findings in our study showed that the various sinus involvement pattern observed by us was almost similar to the study by Sunil B et al in which majority of patients had involvement of maxillary and anterior ethmoidal sinus. In some subject's frontal and sphenoidal sinuses were also involved.[11] The CT findings of mucosal abnormalities, OMC occlusion and olfactory fossa depth assessment observed in our study was similar to the Indian study by Dua et al and International study by Kaplanoglu et al.[12,13]

The Keros classification pattern of olfactory fossa depth in our study was slightly different from the study conducted by Ashok Murthy et al.[14] The incidence of Keros type II was similar in both studies. But incidence of type I & III were different. In our study the mean Lund-Mackay (LM) score value of right and left side was 6. But Cassandra et al in their study has quoted the mean LM score as 1.6.

In our study the incidence of anatomical variations observed by CT scan was comparable to a study by Cashman et al in which the incidence of abnormalities of middle turbinate, Haller cells, deviated nasal septum, and hypertrophy of uncinate process were similar.[15] However studies done in India by Dua et al and Maru et al and international studies done by Bolger et al and Lloyd et al have quoted a different pattern of anatomical variations, which could be due to genetic or racial differences.[16-19]

Intraoperative findings in our study showed that involvement of numbers of sinuses were akin to the CT scan findings. The international study done in Iran by Ramin et al has quoted a different pattern of sinus involvement.[20] In their study, the single sinus involvement was reported as 39% where as in our study it was only 32%. Two sinus involvement reported by the Iranian study was only 25% and, in our study, it was 48%. The difference could be due to the delay in patient presentation and accessibility to specialized medical facilities in this part of the World.

The incidence of sinus mucosal abnormality and Osteomeatal occlusion observed in our study was almost similar to the studies conducted by Cassandra et al and Dua et al in which the anterior ethmoids and Osteomeatal unit were the most commonly involved in patients with nasal polyps.

The incidence of anatomical variations in our study was different from the study done by Varshney et al, which has reported the incidence of various anatomical abnormalities such as hypertrophied uncinate process as 30.30%, septal deviation 21.21%, Concha bullosa 9.09%, Haller's cell 6.06 %, Paradoxical middle turbinate, Onodi cell and pneumatized crista galli each 3.03 %.[21] The study was conducted in a smaller number of patients.

Comparison of CT scan findings and intra operative findings in our study with relation to number of sinuses showed a perfect positive correlation with a correlation value (r) of +1. Such positive correlation was also observed in an International study done in Egypt by Zeid et al.[22]

In our study the comparison of sinus mucosal abnormality findings was found to be statistically highly significant and similar significance was also observed by Cassandra et al in their study for identification of sinus mucosal abnormalities among patients with nasal polyps. Jones et al in their study have quoted a good sensitivity and significant association of CT scan and intraoperative findings of osteomeatal occlusion.[23] In our study, the

sensitivity of CT scan in identifying osteomeatal occlusion was low.

In our study anatomical variations seen in the pre-operative CT scan were compared with intra operative findings. It was observed that there is a statistically highly significant co relation between the findings for all anatomical variations. Studies by Lazar et al and Bolger et al have observed the CT scan to be sensitive and specific in identifying bony lesions and anatomical variations in patients with chronic rhino sinusitis.[24,25]

Limitations

Limitations were small sample size, there could be an element of information bias in this study and limited availability of similar studies conducted previously.

CONCLUSION

SNP are chronic inflammations of unknown etiology. The role of preoperative CT scan which is available in most of the centers is vital and unquestionable. This study was done to assess the correlation between pre-operative radiological evaluation and intra-operative findings and compare it with other published studies.

All the variables when compared showed a high statistical significance. The results showed a perfect positive correlation between pre-operative radiological and intra-operative findings, similar to several published studies. Mini CT studies which are often performed offer limited information, which leaves the physician with a dilemma regarding the extent of the disease and treatment planning. CT scan with multi slice 3 mm cuts in coronal, axial and sagittal planes are the norm of the day and are very helpful to the physician for accurate diagnosis and treatment plan.

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