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Role of CT in the Evaluation of Sinunasal Masses

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Introduction

Malignancies of paranasal sinuses and Nasal cavity account for less than 30% of all the neoplasms of the upper respiratory tract. (Wolfgang Dahnert; Radiology Review Manual; EdnA; page 329). Most frequently involved is the maxillary sinus (80%) followed by ethmoid (10%), frontal & sphenoid (Rare).

The Sinonasal tract plays host to an enormous variety of neoplasm derived from a multitude of tissue types. Epithelial neoplasia may arise from the mucosa, minor salivary tissue or alfactory mucosa.

Approximately 9% of all woman cancer involves the head & neck region. About 3% of which arises from the paranasal sinus and nasal cavities. In the SEER (Surveillance Epidemiology and End Results) data of the National Institute of health (Survey from 1973 to 1987) only 3.6% of their therapy occurred in the Sinonasal tract.

Causes of sinus malignancy are largely unknown. People working in hardwood furniture industry, nickel refines, leather works and manufacturer of mustard gas have shown higher incidence of Sinonasal cancer.

Cancer of the maxillary sinus is common in Bantus of South Africa who use locally made snuff, which is rich in nickel and chromium. Workers in furniture industry develop adenocarcinoma of ethmoid and upper nasal cavity while those engaged in Nickel refining get Squamous and Anaplastic Carcinoma.

In India, the upper aerodigestive tract cancer that includes the Sinonasal tract, oral cavity, orapharyx, Nasopharynx and Esophagus constitute to 35%.

The complex anatomy of the region often ignores the mass till an advanced stage with a relatively disastrous outlook.

Older imaging like the plane X-ray and tomography has failed to delineate the lesion with precision in these critical areas. The incapability in most instances made the disease to progress to a very advanced stage where the treatment was only confined to debulking. The undiagnosed metastasis only added to a decrease life span.

Modern imaging like CT & MRI played a revolutionary role to diagnose the disease early, plan the treatment and picking up the metastasis. The local extension of the disease to the areas like

the skull base, the orbit and intracranial compartment could be made with absolute precision. The information gained through these modern imaging could permit a realistic treatment planning and subsequent follow up.

CT in the axial and coronal plain best evaluates the sinonasal area. It diagnoses clinically obvious diseases as well as the clinically silent diseases. The high resolution and thin sectioning CT scan depict the bone erosions better. The critical areas like bony orbital walls, cribriform plate, fovea ethmoidalis; posterior wall of the maxillary sinus, Pterygoid plates, Pterygopalatine fossa, sphenoid sinus etc. cab be visualized with high degree of accuracy.

As the MRI is not very good to image the bone and the spatial resolution between bone and soft tissue are not great with MRI. Ct stands marginally better in studying the Sinonasal mass and their extensions.

Aims and Objective

The proposed study is undertaken with the following objectives:

1. To study the incidence of Sinonasal masses and their clinical beheviours.
2. Defining the anatomical location and the extent of sinonasal masses.
3. Differentiating benign and malignant masses on CT.

Materials & Methods

The study was carried out in the Department of Radiodiagnosis, S.C.B Medical College & Hospital, Cuttack. The cases were referred from ENT department of S.C.B Medical College & Hospital. The cases were selected on the basis of C/F suggestive of a Sinonasal mass. The period of study was Jan 2017 to Jan 2018. Fifty cases were studied with through clinical assessment and proper follow-up. A thorough history, clinical history, personal history including tobacco chewing, smoking and occupation were taken. Medical history and treatment history were given due consideration. General and physical examination followed the history.

Patients were subjected to CT scan with proper parameters. Histopathology studies were done in all cases. Biopsy / FNAC were taken in all cases and compared with the imaging findings.

Computed Tomographic Evaluation: CT avaluation was carried out in our departmental SIEMENS SOMATOM EMOTION CT SCANNER (spiral) & PHILIPS, TOMOSCAN, EG 200.

Scanning was done in the axial and coronal sections with 5 mm / 10 mm slice thickness. Intravenous contract medium, either non-ionic; was administered as a single bolus and scanning was commenced in the caudocranial or anteroposterier direction depending on whether axial or coronal study was done.

Age Incidence

Age In Years	No. of Patients	Percentage
1 – 10	1	2
11 – 20	18	36
21 – 30	6	12
31 – 40	2	4
41 – 50	8	16
51 – 60	8	16
>60	7	14

Age incidence with lesions

Age in years	Benign	Malignant
0 – 20	17	2
21 – 40	4	4
41 – 60	7	9
61 - 80	0	7

Sex incidence with lesions

Sex	Benign	Malignant
Male	25	17
Female	4	4

Histological & CT diagnosis of benign sinonasal masses

Diagnosis	CT diagnosis	Histological diagnosis
Papilloma	13	10
Angiofibroma	9	14
Haemangioma	4	2
Fibrous dysplasia	1	3

Histological diagnosis of malignant sinonasal masses

Diagnosis	CT diagnosis	Histological diagnosis
Squamous cell ca	7	16
Lymphoma	5	1
Adenocarcinoma	5	2
Chondrosarcoma	3	1
Rhabdomyosarcoma	0	1

Density of the benign sinonasal masses

Density	No.	Percentage
Soft tissue	23	79
Calcification	3	11
Bone	2	7
Mixed	6	21

Densities of malignant sinonasal masses

Density	No.	Percentage
Soft tissue	18	85
Calcification	2	10
Bone	1	5
Mixed	7	33

Post contrast enhancement of benign sinonasal masses

Post contrast enhancement	No.	Percentage
No enhancement	3	10
Minimal enhancement	5	17
Moderate enhancement	6	21
Significant enhancement	15	52

Post contrast enhancement of malignant sinonasal masses

Post contrast enhancement	No.	Percentage
Homogenous enhancement	5	24
Heterogeneous enhancement	16	76

Bone changes associated with Sinonasal masses

Bone change	Benign	Malignant
Erosion	12	7
Sclerosis	3	0
Destruction	2	12
Deformity	9	3
Expansion	5	5

Discussion

This study was conducted in the Department of Radiology, S.C.B. Medical College & Hospital. We evaluated 50 cases of Sinonasal mass, the characteristics of which are discussed below.

Age Incidence: The benign lesions most frequently in the second decade of life numbering 18. Our study correlates well with the study by Barnes L 1985 who found that maximum number of benign cases presented in the second decades of life.

The age distribution of the malignant lesions in our series correlates well with the previous reports by Sakai, 1975 and Batsakis J, 1979.

Sex Incidence: In our study, we saw a male predominance. Barnes I, 1985 in his study of the masses of the nose and paranasal sinuses found a predominant male involvement.

Location: in our series, we found that 8 benign lesions to have originated from the lateral nasal wall and 7 from the pterygopalatine fossa. This correlates well with the study by GAS Lloyd and P 0 Phelps 1988, in which they stated that angiofibromas originate in the pterygopalatine fossa with secondary extension into the nasal cavity.

Histology: in our study 16 cases of squamous cell carcinoma were detected followed by 2 cases of adenocarcinoma, and 1 case each of chondrosa-rcoma, lymphoma & Rhabdomyosarcoma.

Spectrum of CT findings

Density and Enhancement: The Hounsfield Units of the benign lesions varied from 26-60 on NECT scans. Nasopharyngeal angiofibroma and haemangioma showed intense homogenous post-contrast enhancement consistent with the reports by G.A.S Lloyd in their study of 30 cases of Nasopharyngeal angiofibroma by CT in 1991.

Papillomas revealed mild to moderate enhancement with 1 (10%) lesion showing calcific density within the lesion. This correlates with the study by V.J. Lund, who studied 60 patients of papilloma of nose and paranasal sinuses. He found classification in 6 patients (10%) but further went on to state that these apparent classifications could be foci of residual bone. As reported by Som P, Shugar J 1983 ossifying fibroma reveals large non-ossified areas of soft tissue density. The case in our series reveals similar features. In our study we found the density consistent with their finding.

In case of malignant lesions, opacification of sinuses were frequently observed.

The HU varied from 26-60. Variable enhancement of mild to moderate degree was noted in other cases, with a few showing ill-defined areas of low density within the lesions. Forbes et al (1978) had reported HU values of 30-90 HU in cases of Sinonasal malignancies. They also commented that this included the mean density of benign mucosal swelling and fluid.

Hasso (1984) reported that the degree of enhancement was related to the amount of contrast medium injected and that area of necrosis show up as areas of low density after contrast administration.

Calcifications within the masses were noted in both cases of chondrosarcoma I our series. So, our study stands with the studies of GAS Lloyd et al (1992) and Saito K et al (1995) who individually stated that calcification is present in 90% of cases of Sinonasalchondrosarcoma.

CT Accuracy: all the 50 Sinonasal masses in our study had either been biopsy proved or had been followed up after operation.

Conclusion

Sinonasal masses are very common entity encountered these days. The delay in diagnosis of the lesions were overcome by modern imaging like CT and MRI. As we saw in our study CT is accurate in diagnosing the location & extent of sononasal masses with precision. CT is very good modality to observe the bony changes whereas MRI is complimentary in diagnosing and charactering the lesions.

From this study of 50 sinonasal masses, the following conclusions can be drawn:

- Anatomical location of the Sinonasal masses and their extensions can be defined accurately by using computed tomography.
- Computed tomography permits a more detailed evaluation of bony structures and soft tissue contents including those of sinuses and nose not outlined by air.
- CT allows easy appreciation of bony abnormalities and detection of calcification making it the first mode of investigation in Sinonasal mass lesions.
- Computed tomography is helpful in planning treatment procedures and follow up studies.
- CT has poor diagnostic accuracy in determining the cell type of tumor.

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