ORIGINAL ARTICLE

Radiological Aspects of the Ethmoidal Polyps: A Tertiary Care Experience

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ABSTRACT

Objective: To assess the extent of the disease and associated radiological findings preoperatively, by computed tomographic (CT) scan, in patients with extensive ethmoidal polyps.
Study Design: Retrospective descriptive study
Place and Duration of Study: This study was conducted in Department of ENT Unit 1, Mayo Hospital associated with King Edward Medical University, Lahore. It spanned over a period of three years from July 15, 2007 to July 15, 2010.
Material and Method: A total of 110 consecutive patients with ethmoidal polyps were evaluated preoperatively by detailed history, clinical examination and relevant investigations like computed tomographic (CT) scan.
Results: In 68 (61.81 %) of 110 patients bilateral disease was found while unilateral disease was present in 42 (38.18 %) patients. Fungal disease with double density sign was present in 38 (34.54) patients. Intraorbital extension of ethmoidal polyps was found in 29 (26.36 %) and destruction of sinus walls was noticed in 25 (22.72 %) patients. Intracranial extradural extension was found in 21 (19.08 %) patients.
Conclusion: CT scan is an important preoperative tool to reveal extension of the intranasal polyps within and beyond the confines of the paranasal sinuses and to see the residual disease postoperatively. It is also important to seek the need for MRI scan in some cases of intraorbital and intracranial extension of the disease. So every patient presenting with nasal polyps must have imaging by serial CT scans with 3-5 mm thin slices for better management and outcome of the disease.
Key words: Computed Tomographic (CT) Scan, Ethmoidal Polyps, Intracranial Extension

INTRODUCTION

Nasal polyps have been a medically recognized condition since the time of ancient Egyptians, 4000 years ago. They are non-neoplastic grape like masses of edematous and pedunculated sinonasal mucosa[1,2 3].

Exact etiology is unknown and complex however various diseases associated with its formation are Allergy, Asthma, Aspirin intolerance, Cystic fibrosis, Allergic fungal rhino sinusitis, Kartegeners syndrome, Young syndrome, Churg Straus syndrome and nasal mastocytosis[4,5,6,7].

Features associated with nasal polyps depend upon its size. Small polyps may not produce any symptom, while symptomatic polyps can cause nasal obstruction, anterior and posterior nasal discharge, rhinorrhea, dull headache, proptosis, anosmia or snoring. Massive bilateral polyps can cause obstructive sleep apnea syndrome and can alter craniofacial structures leading to diplopia, proptosis, glabellar swelling and hypertelorism [8,9].

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They originate in narrow osteomeatal complex in lateral wall of the nose, by its inflamed mucus membrane. Major part of the polyp is covered by ciliated columnar epithelium with anterior patchy areas, covered by transitional and squamus epithelium induced by the inhaled air current[10,11].

Intracranial spread of the infection occurs due to close proximity of the sinuses with cranial cavity. Orbital involvement occurs by contiguous spread of the disease from paranasal sinuses, by expansion or bone erosion due to pressure effect of the polyps. It is considered to worsen the prognosis of the disease[12,13].

Management includes earlier diagnosis, pre and postoperative steroids, surgical debridement of the sinonasal polyps with adequate drainage and ventilation along with control of the associated underlying disease. Various surgical techniques to deal with sinonasal polyps, according to extent of the disease are intranasal polypectomy or ethmoidectomy, Janson Horgan transantral and Lynch Haworth external ethmoidectomy, functional endoscopic sinus surgery (FESS) or craniofacial resection[14,15].

CT scan is important to see the extent of the disease preoperatively and any residual pathology postoperatively. Patients should not undergo scanning during the active rhinosinusitis because edema and mucosal swelling obliterate the nasal structures, masking any underlying anatomic anomalies. Most protocols for CT scanning of the paranasal sinuses use a coronal position with slices 3-5 mm in thickness. These protocols are readily available as part of most CT software packages. High-resolution CT scanning with thin coronal slices provides the most useful surgical information. Some institutions use thin-section axial CT images that are reformatted in the coronal projection. Reformatted images in the coronal plane have less spatial resolution than direct coronal scans. Axial images do not show certain ostia as the coronal projection do but still they can provide additional information. Generally, CT scanning for ethmoidal polyps is most often performed in the coronal plane. Images in the sagittal plane are useful when surgery of the frontal recess and frontal sinus is going to be performed.[16]

OBJECTIVE

To assess the extent of the disease and associated radiological findings preoperatively, by computed tomographic (CT) scan, in patients with extensive ethmoidal polyps.

MATERIAL AND METHOD

This study was conducted in department of ENT Unit 1, Mayo Hospital associated with King Edward Medical University, Lahore. The study spanned over a period of 3 years from July 15, 2007 July 15 2010. All 110 patients included in the study were admitted through the outpatient department of ENT Unit 1 and were selected from different areas of the country irrespective of age, gender, socioeconomic status and geographical origin.

All patients presented with nasal polyps were evaluated by CT scan after obtaining detailed history and performing clinical examination. Plane and contrast enhanced CT sequences of nose, paranasal sinuses, orbit and brain with 3-5 mm thin slices of axial and coronal views were obtained on soft tissue and bone window settings. CT scans were then evaluated by senior Head and Neck radiologists, to see the involvement of multiple sinuses, orbit and cranium.

Informed consent for the surgery was taken after being briefed about the procedure, its merits and demerits. All patients were operated and surgical technique was tailored according to the extent of the disease including intranasal polypectomy or ethmoidectomy, Janson Horgan transantral ethmoidectomy and Lynch Howarth external frontoethmoidectomy.

Demographic profile and relevant data was recorded in a standard proforma. Data was entered in SPSS version 11, a computer based soft ware programme. Mean and standard deviation were computed for qualitative variables like age. Descriptive statistics like frequency and percentage were computed for categorical variables like gender and radiological extent of the disease to multiple sinuses, orbit or cranium etc. Statistical test of significance was not applicable in this study.

RESULTS:

One hundred & ten patients with ethmoidal polyps were included in the study. The average age of the patients was 29.7 years (SD35.5±26.5). They ranged in age from 9 to 62 years. There were 67 (60.90%) male and 43 (39.10 %) female patients. M: F ratio was 1:0.64. In 68 (61.81%) of 110 patients bilateral disease was found while unilateral disease was present in 42 (38.18%) patients. Widening, ballooning or destruction of the osteomeatal complex was revealed in 40 (36.36%) while evidence of fungal disease with double density sign was present in 38 (34.54) patients. Intraorbital extension of ethmoidal polyps with destruction of lamina papyracia was found in 29 (26.36%) and destruction of sinus walls with asymmetry of two sides was noticed in 25 (22.72%) patients. Intracranial extradural extension was found in 21 (19.08%) patients. Extension of disease to anterior cranial fossa through ethmoidal roof or frontal sinus was found in 16 (14.54%) however to middle cranial fossa through lateral wall and roof of the sphenoid sinus was seen in 5 (4.54%) patients. Similarly medial subperiosteal abscess of the eye and erosion of supraorbital rim was found was found in 7 (6.36 %) and 5 (4.54%) patients respectively. While deflected nasal septum and mucocele, was found in 8 (7.27%) and 3 (2.72%) patients respectively (Table 3).

Table 1: Descriptive statistics of age (n=110)

Mean	29.7
Standard Deviation	35.5±26.5
Range	53
Minimum	9
Maximum	62

Table 2: Frequency Distribution of Gender (n=110)

Sex	Frequency	%age	Cumulative%
Male	67	60.90	60.90
Female	43	39.10	100
Total	110	100	

Table 3: Radiological extent of the ethmoidal polyps (n=110)

Radiological Findings	=n	% age
Bilateral involvement of nose and paranasal sinuses	68	61.81
Unilateral involvement of nose and paranasal sinuses	42	38.18
Widening, ballooning or destruction of osteomeatal complex	40	36.36
Fungus with double density sign	38	34.54
Intraorbital extension with destruction of lamina papyracea leading to proptosis	29	26.36
Destruction of sinus walls with asymmetry of two side	25	22.72
Extension to anterior cranial fossa through ethmidal roof or frontal sinus	16	14.54
DNS	8	7.27
Medial sub-periosteal abscess of the eye	7	6.36
Erosion of supraorbital abscess	5	4.54
Extension to middle cranial fossa through lateral wall or roof of the sphenoid sinus	5	4.54
Mucocele	3	2.72

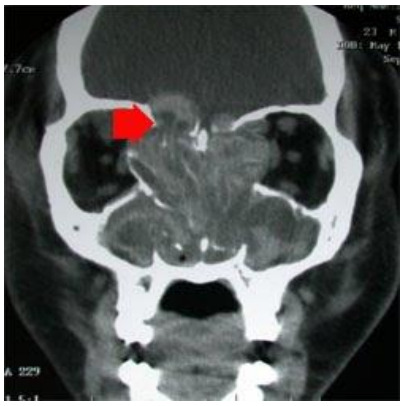

Fig 1: CT scan showing extensive polyps delineated by the red arrow that have eroded normal sinus landmarks and are pressing on the brain

DISCUSSION

Nasal polyps are most common tumors of the nasal cavity and they affect 1-4% of the population. It is a common problem with different etiologies, but the exact cause is unknown. Patients should not undergo scanning during the active rhinosinusitis because edema and mucosal swelling obliterate the nasal structures, masking any underlying anatomic anomaly[17].

CT scan has a role in demonstrating extent of the lesion and bony destruction of the ethmoidal septa, lamina papyracea and medial antral wall. Radiologically patients with nasal polyps frequently have areas of high attenuation surrounded by an area of hypodensity within soft tissue masses of the affected sinuses[18].

MRI scan may be helpful in advanced disease to see the intraorbital and intracranial extension of the disease. It has low T1 weighted and high T2 weighted signal intensities. Due to financial constraints we got MRI scan only in few advanced cases but all revealed extradural intracranial involvement of the disease. It is suggested that CT scan should be used as a first modality of imaging. There was an excellent correlation in CT scan findings and disease extent as evident intraoperatively[19].

In 68(61.68%) of 110 patients, disease was unilateral and it was bilateral in 42 (38.18 %) patients. This result was in accordance with a local and international study in which unilateral and bilateral disease of nose and paranasal sinuses was 60 % and 40 % respectively. Contrary to our results, other studies showed unilateral involvement in 20.60% and 33 % while bilateral involvement in 41.20 %, 66.7 % and 86.0 % of the patients respectively.[18,19,20,21,22].

Widening, ballooning or destruction of the osteomeatal complex was noted in 40 (36.36 %) patients. Bony erosion or destruction of sinus walls with extension to adjacent cavities and asymmetry of two sides were noted in 25 (22.72%) patients contrary to other research where it was in 34.6 %, 30 % and 12 % patients respectively[19, 20, 23].

Fungus with double density sign was noted in 38 (34.54 %) patients. This result was in near accordance with a local study by Thahim K and an international study by Mukherje, where fungus was seen on CT scan in 40 % of the patients[20,21].

Intraorbital extension of the ethmoidal nasal polyps, which usually occurs by contiguous spread by paranasal sinuses, is considered to worsen the prognosis of the disease. So it should be diagnosed early and treated aggressively to decrease the chances of craniofacial deformities and operative morbidities. In our study intraorbital extension of the ethmoidal polyps with destruction of lamina payracea leading to proptosis was found in 29(26.36%) patients. Our findings were close to many local and international studies where it was 33%, 21.10%, 20% and 32.12% respectively[18,19,20,23, 24].

Intracranial extension was found in 21(19.08%) patients. Superior orbital fissure and optic canal directly open into the middle cranial fossa, and are ready pathways for intracranial spread of the infection. Extension of the disease to middle cranial fossa through lateral wall or roof of the sphenoid sinus was present in 5(4.54%) patients in our study. However disease extension to anterior cranial fossa,

through ethmoidal roof or frontal sinus was noted in 16 (14.54%) patients.

Intracranial extension was extradural in all cases and underlying dura was thickened without hyperemia or discoloration. So neurosurgical intervention was not required in any case. In contrast to our result Thahim et al found intracranial extension in 10% and Agarwal S and Kanga A in 7.53% of the patients. Theses variability may be due to late presentation of the patients for surgical intervention[19,20].

CT scan revealed medial subperiosteal abscess of right or left eye in 7(6.36%) patients and erosion of the supraorbital rim in 5(4.54%) patients. Mucocele was found only in 3(2.72%) patients. Nasal polyps associated with DNS were revealed in 8(7.27%) patients contrary to Rehman A where it was present in 16.7% of the patients[18].

CONCLUSION

CT scan is an important preoperative tool to reveal extension of the intranasal polyps within and beyond the confines of the paranasal sinuses and to see the residual disease postoperatively. It is also important to seek the need for MRI scan in some cases of intraorbital and intracranial extension of the disease. So every patient presenting with nasal polyps must have imaging by serial CT scans with 3-5 mm thin slices for better management and outcome of the disease.

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