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RADIOLOGICAL STUDY OF OMC ABNORMALITIES AND ITS ROLE IN PRODUCING SINUS DISEASE

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ABSTRACT

Aim: To study the incidence of OMC abnormalities and its role in producing sinus disease.

Material and methods: The study method is descriptive cross sectional study of 50 CT scans of consecutive cases of chronic sinusitis

Chronic rhinosinusitis is commonest disease encountered. It is multifactorial. The management of chronic rhinosinusitis consists of radiological evaluation of X -Ray and CT scan of paranasal sinuses.

KEYWORDS

Chronic rhinosinusitis, Osteomeatal Complex (OMC) abnormalities, CT scan of paranasal sinuses, Endoscopic sinus surgery

Introduction:

Chronic rhinosinusitis is commonest disease encountered in ENT out-patient department. It is multifactorial. It may be associated with allergic rhinosinusitis, chronic irritation to dust, vehicular pollution or structural abnormalities in the nose and paranasal sinuses like deviated nasal septum(DNS), hypertrophic turbinates and osteomeatal complex (OMC) abnormalities. The management of chronic rhinosinusitis consists of radiological evaluation of X -Ray and CT scan of paranasal sinuses. CT scan is particularly taken to find out the presence or absence of sinus disease and associated causes producing it. The treatment includes medical and surgical management. The surgical management consists of endoscopic clearance of sinus disease, correction of associated abnormalities of OMC and reestablishing the drainage pathway.

Aim:

To study the incidence of OMC abnormalities and its role in producing sinus disease.

Material and methods:

The study method is descriptive cross sectional study of 50 consecutive cases of chronic sinusitis attending the ENT out-patient department and analyzing the results of CT scans.

Results:

Total number of scans examined is 50 i.e., 100 maxillary sinuses with corresponding OMCs. In all the scans, we have studied the anatomical abnormalities of OMC , with or without sinus disease like Concha bullosa (CB), paradoxically bent MT, bifid uncinate process (UP), pneumatized uncinate process (UP), overpneumatized Bulla ethmoidalis (BE) and Haller cells. Among the 50 patients, 27 were male and 23 were female. Presenting age ranged from 6 to 77 years. Mean age of affection is 33.5 years, with a standard deviation of 15.43, with maximum occurrence in third and fourth decades.

Out of 100 OMCs studied, 61 were having sinus disease and 39 were not having any sinus disease. Out of the 61 OMCs with sinus disease, 44 (72%) have at least one anatomical OMC abnormality while 17 have no associated anomalies(28%). Of the remaining 39 OMCs without sinus disease, 31 (79%) were having at least one anatomical variation, but still not producing disease. 8 (21%) OMCs were having no sinus disease and no associated OMC anomalies. Incidence of OMC abnormalities in all the scans studied is 75%. Incidence of OMC abnormalities producing sinus disease is 44%. Incidence of OMC abnormalities without sinus disease is 31%.

Incidence of the anatomical abnormalities of the OMC in all the scans is in the following order – CB (46%), overpneumatized BE(38%), Haller cells(22%), pneumatized UP (14%), Paradoxically curved MT (10%) and bifid UP (5%). Similar order of OMC abnormalities is seen in those cases with sinus disease with occurrence of 44.3%, 39.3%, 14.8%, 13.1%, 11.5% and 4.9% respectively. 75% of the scans showed at least one type of abnormality. We have done a chi square test to know the role of individual abnormality in producing sinus disease. In no case we got a p value less than 0.05. The conclusion can be drawn like this – No independent anatomical anomaly is significantly correlated with sinus disease and chance of any abnormality associated with sinus disease is statistically insignificant. There are multiple factors acting at the same time, like allergic rhinosinusitis, acute or chronic rhinosinusitis, deviated nasal septum, hypertrophic inferior turbinates etc , which contribute to sinus disease.

54 OMCs showed obstruction with discharge, mucosal thickening or polypoidal tissue, of which 46 were having sinus disease. 8 OMCs, in spite of obstruction were not having any sinus disease. 46 OMCs were patent. Out of 46 patent OMCs, 15 showed signs of disease in spite of patent OMC

Disease was present in total of 61 sinuses while 39 were disease free. Overall occurrence of OMC obstruction in cases with no sinus disease is 20.5% (8/39). Overall occurrence of sinus disease in cases with no OMC obstruction is 24.59% (15/61). Odds of sinus obstruction when OMC block is present, is 5.75(46/8). Odds of sinus disease even with no OMC obstruction 0.48 (15/31). Odds ratio of sinus disease with and without OMC obstruction is 12 (5.75/0.48), i.e there is 12 times more risk of developing sinus disease with OMC obstruction compared to patent OMC.

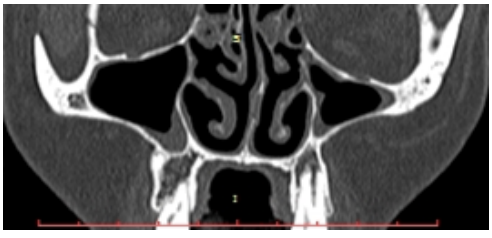

Fig 1: Sinus disease even in the absence of OMC abnormality

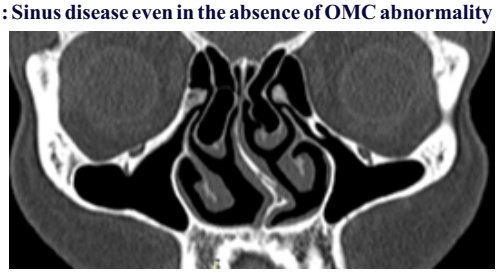

Fig 2: No sinus disease in spite of huge Concha bullosa

Table 1: OMC abnormality and its status and associated sinus disease

	Sinus disease present (61)		Sinus disease Absent (39)	
Associated anatomical abnormalities of OMC (+/-)	44 +	17 -	31 +	8 -
OMC status – block/open	46 block	15 open	8 block	31 open

Table 2: Incidence of OMC abnormality and associated sinus disease

OMC abnormality	All scans (100)		In scans with sinus disease (61)		In scans without sinus disease (39)	
	No.	%	No.	%	No.	%
Concha bullosa	46	46	27	44.3	19	48.7
Overpneumatized BE	38	38	24	39.3	14	35.8
Haller cells	22	22	9	14.8	13	33.3
Pneumatized UP	14	14	8	13.1	6	15.3
Paradoxically curved MT	10	10	7	11.5	3	7.6
Bifid UP	5	5	3	4.9	2	5.1

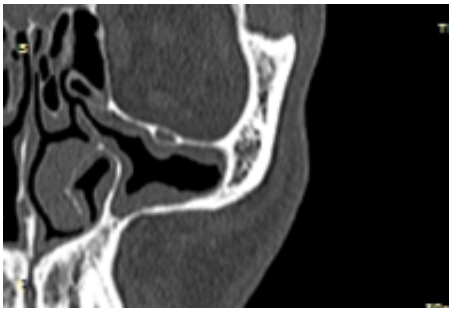

Fig 3: Sinus disease despite patent OMC

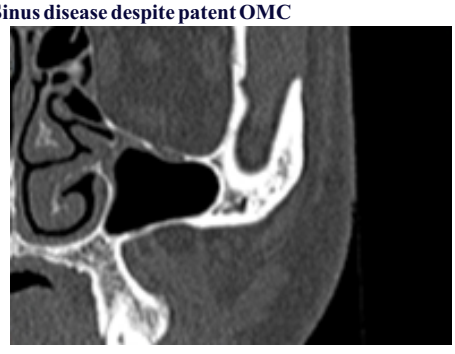

Fig 4: Healthy sinus despite OMC obstruction

Discussion:

Otolaryngologist consultation is often sort after by the patients of chronic rhinosinusitis[1]. Prior to the publication of Messerklinger, chronic rhinosinusitis was managed by traditional method of antral lavage, intranasal antrostomy and Caldwell-Luc operation. Messerklinger published the technique of endoscopy and the endoscopic management of sinus disease[2]. Osteomeatal complex is a tiny compartment, cramped between septum and lateral nasal wall in the middle meatus with funnel shaped infundibulum of maxillary sinus and frontonasal duct of frontal sinus opening into it, which is sandwiched by number of ethmoidal air cells[3,4]. Obstruction of the osteomeatal complex leads to a vicious cycle of sinus infection which leads to mucosal congestion and edema that further leads to OMC block[5]. The surgical clearance of chronic rhinosinusitis is clearing the obstruction and re-establishing the sinus drainage[6]. For a long time now CT scan of the paranasal sinuses and diagnostic nasal endoscopy are routinely used diagnostic tools. The purpose of the CT scans is to determine the mucosal abnormalities, presence or absence of sinus disease and associated OMC abnormalities, which are only detectable by CT scans[7]. The detection of OMC abnormalities gained lot of importance with the presumption that these abnormalities predispose to chronic rhinosinusitis. Minimally invasive endoscopic sinus surgery opens the obstructed ostium with widening of the ostium and excising or correcting the OMC abnormality with preservation of mucosa[8,9]. Extremely good results are reported in the literature with this technique[10,11].

In our study CT scans of 50 patients presenting with symptoms suggestive of chronic rhinosinusitis were studied for the presence or absence of sinus disease, osteomeatal complex abnormalities, OMC abnormalities producing sinus disease and OMC blocks. The mean age of affection is 33.5 years, with maximum occurence in third and fourth decades. In our study, out of the 61 OMCs with sinus disease, 44 (72%) have at least one anatomical OMC abnormality while 17(28%) have no associated anomalies. In comparison with Liu X et al., who reported anatomical variation of around 81% in chronic rhinosinusitis[12]. Severino Aires de Araujo Neto et al. study shows the prevalence of OMC abnormalities in sinus disease is 65%[13]. In the 39 OMCs without sinus disease, incidence of at least one anatomical variation, but still not producing disease is 79% (31 cases). 8 (21%) OMCs were having no sinus disease and no associated OMC anomalies. The comparative incidence of OMC abnormalities producing disease is 72%, not producing disease is 79% which is higher.

Incidence of the anatomical abnormalities of the OMC in all the scans is in the following order – CB (46%), overpneumatized BE(38%), Haller cells(22%), pneumatized UP (14%), paradoxically curved MT (10%) and bifid UP (5%). Similar order of OMC abnormalities is seen in those cases with sinus disease with occurrence of 44.3%, 39.3%, 14.8%, 13.1%, 11.5% and 4.9% respectively. 75% of the scans showed at least one type of abnormality. On applying a chi square test to know the role of individual abnormality in producing sinus disease, in no case we got a p value less than 0.05. It can be concluded that no independent anatomical anomaly is significantly correlated with sinus disease and chance of any of the OMC abnormality associated with sinus disease is statistically insignificant. In a study conducted by Lloyd et al., the anatomical variants of middle meatus were not associated with increased incidence of sinus disease, and there is no evidence that these OMC abnormalities have any effect on the sinus disease by producing OMC block, further radiological assessment of chronic rhinosinusitis should include X-ray paranasal sinuses as a first line investigation, CT scan is not necessary as a routine examination for confirming chronic rhinosinusitis or associated OMC abnormalities and it is reserved for preoperative assessment of patients before undergoing endoscopic sinus surgery to know important anatomical landmarks[14].

Conclusion:

OMC abnormalities are not significant factors in producing sinus disease as the disease is multifactorial. The radiological assessment of chronic rhinosinusitis should include X-ray paranasal sinuses as a first line investigation. CT scan is not necessary as a routine examination for confirming chronic rhinosinusitis or associated OMC abnormalities. It should be reserved for preoperative assessment of patients before undergoing endoscopic sinus surgery to know important anatomical landmarks. Correction of OMC abnormality should be undertaken only when it is contributing to the sinus disease.

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