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Variations Of Uncinate Process - A C T Scan Study

KEYWORDS: UNCINATE PROCESS (UP), COMPUTED TOMOGRAPHY (CT SCAN), PARANASAL AIR SINUSES (PNS)

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ABSTRACT *Accurate information of the anatomical variants of the Uncinate process is critical for clinicians, especially with the advent of functional endoscopic sinus surgery. This study aimed to determine the incidence and morphology of these variations using computed tomography (CT).*

The anatomical variations of the Uncinate process were studied in 50 Hyderabad patients with clinical suspicion of sinusitis, using CT scan. They were explored in the radiology departments of Government ENT, Koti, Hyderabad and Gandhi Hospital, Musheerabad, Secunderabad .

In the present study among the six variants of Uncinate process the Horizontal type – II was encountered to be the most common variant which constitutes 34% and the least common variant to be found was Vertical type – III (7%).

Determination of these variations is essential for surgeons before any management or surgical interference.

Introduction: The superior aspect of the uncinate tip may deviate laterally, medially or anteriorly out of the meatus, appearing as a second middle concha . When deviated medially, it comes into contact with and compromises the middle meatus (Stammberger, H. et al). When deviated laterally, it may encroach on the hiatus semilunaris and infundibulum, impeding drainage and ventilation of the anterior ethmoidal, frontal and maxillary sinuses. Anatomic variations of attachment of uncinate process include attachment to lamina papyracea, the lateral surface of the middle turbinate or the cranial bone.

Types of Uncinate process
Uncinate process is classified into 2 major types which are vertical and horizontal. Each of these 2 types has been further classified into 3 more categories which include Type I, Type II and Type III.

Type - I: the uncinate process bends laterally in its upper most portion to be inserted into the lamina papyracea.
Type – II: the uncinate process extends superiorly to the roof of the ethmoid, that is into the skull base.
Type –III: the superior end of uncinate process turns medially and is attached into the middle turbinate.

Hence uncinate process has been classified into 6 subtypes. In the present study distribution of uncinate process into the above mentioned 6 sub-types is listed *Table and Chart no. 01*

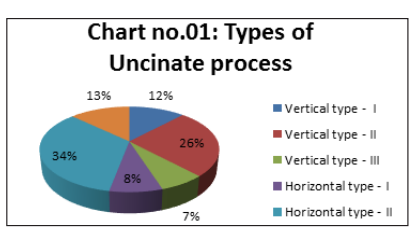
Aim: To determine the frequency of anatomic variations on computed tomography scan of Ucinate process.

Materials & methods: The present study was done on imaging of lateral nasal wall and paranasal air sinuses (computed tomography) on patients referred to ENT department with symptoms of nasal obstruction, nasal discharge, post nasal discharge and headache and on patients who have been diagnosed clinically with chronic rhinosinusitis referred to radiology departments of Government ENT, Koti, Hyderabad and Gandhi Hospital, Musheerabad, Secunderabad during the period of 6 months from May 1st 2014 – September 30th 2014.

Observations: In the present study among the six variants of Uncinate process the Horizontal type – II was encountered to be the most common variant which constitutes 34% and the least common variant to be found was Vertical type – III (7%).

Table no.01: Types of Uncinate process

Type of Uncinate process	No. of cases (n=50)			Percentage
	Left sided	Right sided	bilateral	
Vertical type - I	0	0	6	12%
Vertical type - II	1	1	12	26%
Vertical type - III	0	1	3	07%
Horizontal type - I	0	0	4	08%
Horizontal type - II	1	1	16	34%
Horizontal type - III	1	0	6	13%



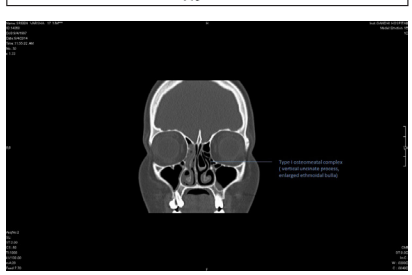


Fig no. 01. CT scan of Paranasal sinuses showing type I osteomeatal complex with Vertical type I Uncinate process

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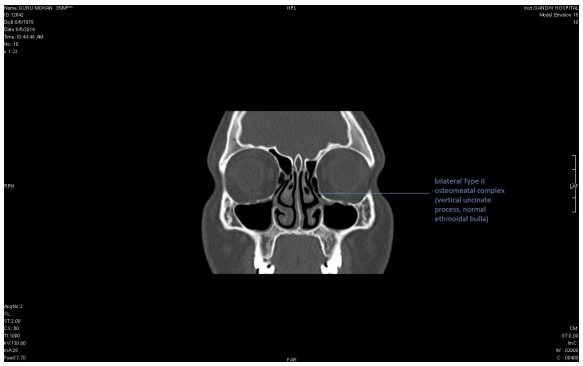

Fig no. 02. CT scan of Paranasal sinuses showing bilateral type II osteomeatal complex (Vertical type II uncinate process)

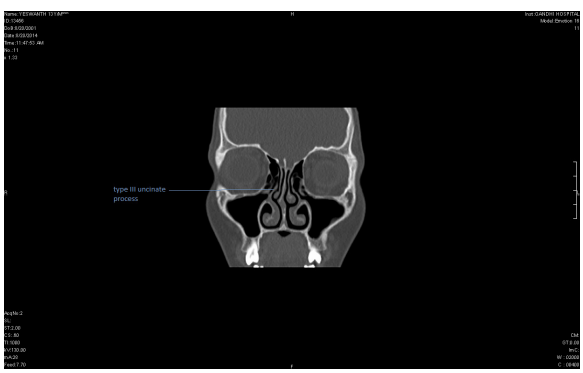

Fig no. 03. CT scan of Paranasal sinuses showing vertical type III uncinate process

Discussion:

It is necessary for the surgeon to be cognisant of any of these variations in the patient undergoing FESS especially when an uncinatectomy is contemplated. If a variation of uncinate process attachment is present, then special care should be taken in order to avoid aggressive traction and torque on the upper tip of the structure during uncinatectomy, which may inadvertently damage the ethmoid roof ***(Annilco M. et Al, 2010)***.

Table No. 02: *Percentage of Types of uncinate process in various studies in frontal sinusitis patients.*

S.no	Author	Type – I uncinate process	Type – II uncinate process	Type – III uncinate process
01.	Suat Turgut et al (2005)	72%	22%	6%
02.	Isha preet Tuli et al (2007)	79.8%	16.67%,	3.57%
03.	Sagar et al (2013)	82%	14%	4%
04.	Gnanavelraja C et al (2014)	72%	22%	6%
05.	Present study	20%	60%	20%

A large agger nasi cell may push the upward continuation of the uncinate medially so that it attaches to the middle turbinate. This configuration alters the drainage of the frontal sinuses as the agger nasi cell pushes the frontal drainage pathway posteriorly. Therefore, the surgeon can no longer access the frontal recess medial to the uncinate. Access is obtained by passing the uncinate along the frontal sinus drainage pathway behind the posterior wall and roof of the agger nasi cell forward to fully expose the frontal obstruction ***(Wormald P.J, 2013)***.

Lessa M.M. et. Al (2007) inferred that the uncinate process is the main anatomical structure which causes the difficulty in identification of frontal sinus ostium.

Miranda C.M.N.R. et al (2011) opined that the uncinate process is a superior extension of the lateral nasal wall that is anatomically relevant for draining the frontal recess.

In Type I, the uncinate process attaches superiorly with lamina papyracea and forms a blind pouch called Terminal recess (recessus terminalis). Into this, frontal recess opens in to middle meatus (medial to the superior attachment of uncinate process). In Type II and III, frontal recess drains in to the middle meatus via the ethmoid infundibulum (lateral to the superior attachment of uncinate process). These findings show that the superior attachment of uncinate process changes the pattern of drainage of frontal sinus in to middle meatus which may be the factor determining the development of frontal sinusitis ***(Kennedy D.W. et al, 1997; McLaughlin RB et al, 2001)***

Gnanavelraja C et al observed that Type I uncinate process was found in 39 sides (72%), Type II Uncinate process was found in 12 sides (22%) Type III uncinate process was found in 3 sides (6%) of the total 54 sides with frontal sinusitis. In this study it was seen that the association between these three types of uncinate process and frontal sinusitis, Type I had a statistically significant association, but they could not find a statistically significant association in Type II and Type III.

In the present study, among the six variants of Uncinate process the Horizontal type – II was encountered to be the most common variant (which constitutes 34%) and the least common variant to be found was Vertical type – III (7%). In the previous studies also type III process was encountered to be the least common.

But type II uncinate process was found to be most prevalent in the present study because this study was not performed specifically in patients suffering from frontal sinusitis.

Conclusion:

The uncinate process is a key bony structure of the lateral wall of the nasal cavity. Together with the ethmoidal bulla, it limits the semilunar hiatus and the ethmoidal infundibulum.

Determination of these variations is essential for surgeons before any management or surgical interference. Furthermore, special attention must be paid for the existence of nasal septal deviation and pneumatized middle concha because of their high prevalence and frequent accompaniment with osteomeatal reduction.

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