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The study of gross and CT scan anatomy of lateral nasal wall, infundibulum and sinus drainage pathways and their clinical implications in Government Medical College and Super Facility Hospital, Azamgarh, UP

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Abstract

Anatomy of lateral nasal wall and infundibulum with special reference to uncinate process is very intricate and variable. The aim of this study was to evaluate the anatomical changes infundibulum, frontal recess and uncinate process and its clinical implications. Changes in anatomy of uncinate process alter the sinus drainage. An endoscopic gross and ct scan study of infundibulum and frontal recess was done on the 50 patients of inflamed sinuses. The results were analysed statistically. Uncinate process attachment to lamina paparacea was found most commonly.

Keywords: Lateral nasal wall, Infundibulum, Inflamed sinuses, Drainage pathways.

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Introduction

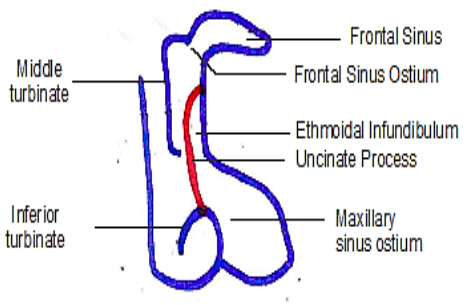
The anatomy of infundibulum and frontal recess alter significantly with changes in anatomy of uncinate process which forms the medial boundary of frontal recess.(1) Uncinate process is a boomrang shaped bone attaching anteriorly to lacrimal bone. It medially covers the maxillary and frontal sinus ostium. Uncinate process bone is covered medially and laterally on both surfaces by mucosa. Removal of uncinate process is the first step in endoscopic sinus surgery. A comprehensive knowledge of anatomy of uncinate process and their anomalies is a must prior to surgery to avoid orbital complications.(2) A parsons window is created in lower segment of uncinate process to open the infundibulum. Then with the help of debrider upper and lower portion is removed.(3,4) Superior attachment of uncinate process is found to differ in different patients.

The anatomical alterations of uncinate process were defined as following by Stammberger and Bolger.(5)

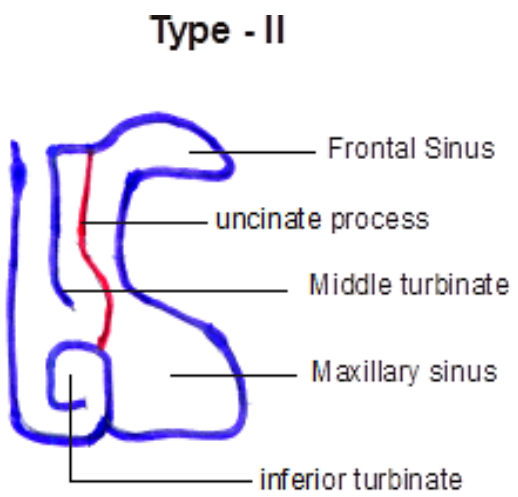
1. Superior attachment of uncinate process are of three types.

A-type I uncinate: Superior attachment to lamina paparacea. Frontal sinus drains in middle meatus.

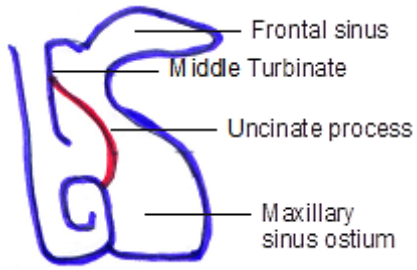
Type-I



B–type II uncinate: Superior attachment to skull base. Frontal sinus drains in infundibulum.



C-Type III uncinate process- Superior attachment to middle turbinate. Frontal sinus drains in ethmoidal infundibulum.



Sometimes the superior end of the uncinate process may be branched.

2. Medially bent uncinate process.
3. Laterally bent uncinate process
4. Hypertrophied uncinate process

In a study conducted on 800 cases, Earwaker[6,7] provide a detailed description of the variants of superior insertion of uncinate process, by classifying them in association with other variants of osteomeatal complex (ethmoid bulla, middle turbinate, septal deviation, degree of angulation of uncinate process). When the uncinate process is inserted into pappyracea lamina, maxillary sinus drainage may be affected.

Materials and Method

This study was carried out in department of otorhinolaryngology and anatomy of GMC Azamgarh, UP from November 2013 to November 2015. A prospective CT scan study was done on 50 patients of chronic rhinosinusitis. CT scan of sinuses were done in coronal and axial view.

Patients with symptoms of nasal congestion, nasaldischarge, headache, facial pain and hyposmia, who were not responding to 3 weeks of medical treatment were evaluated with CT scan paranasal sinuses in coronal view and axial view.

Patients with history of previous sinus surgery were excluded from this study. The data are entry in Cs-Pro software and after that its transfer in SPSS data. Statistical analysis was done using CHI square statistical test with statistical programme for social science version 16.0. A P value <0.05 was considered statistically significant.

Observation

The present study was carried out in department of otorhinolaryngology, Government Medical College, Azamgarh, on 50 patients (100 sides) of chronic sinusitis were included.

Table 1: Sex Distribution

Sex	Percentage %
Male	48
Female	52

Table 2: Age Distribution

Age Group	Percentage %
0-20	18
20-30	24
31-40	44
>40	14

Table 3: Distribution of patient on the basis of different type of bent

Variation	Percentage
Medial Bent	20
Lateral Bent	04
Hypertrophied	08
Pneumatised	08

Table 4: Distribution on the basis of superior attachment

Type of superior attachment	Percentage
Type 1 attached to lamina papracea	40
Type 2 attached to Skull base	32
Type 3 attached to middle turbinate	18
Type 4 uncinate lying free	10

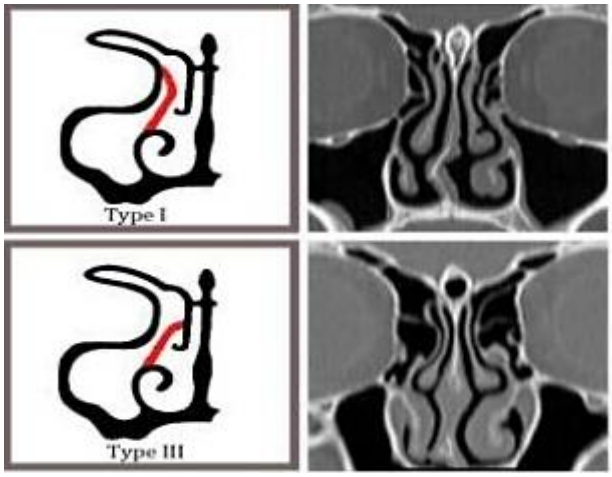


Fig. 1: Type 1 uncinate process attached to lamina paparacea. Type 3 unciate Process attached to middle turbinate

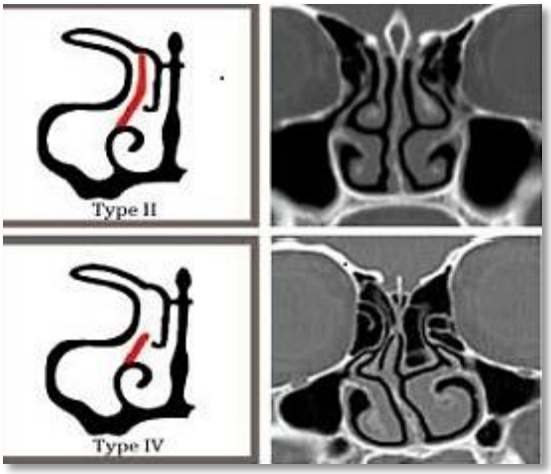


Fig. 2: Type 2 uncinateprocess attached to skull base. Type 4 uncinate process lying free

In this study 52% patients were female and 48% patients were male. Majority of patients, 44% were in age group of 31-40 years. 14% patients belonged to the age above 40 years. 18% belonged to age less than 20 years. 24% patients were in age group of 20 to 30 years. Present study shows that medially bent uncinate was most common(20%). In 4% cases uncinate was found laterally bent. In 8% cases hypertrophied uncinate was found. Pneumatised uncinate was found in 8% cases in this study. Out of 100 uncinate process, type 1 superior attachment was found in 40% patients, type 2 in 32% patients, type 3 in 18% patients and type 4 in 10% patients. Type 1 superior attachment was most common. Few studies had described deviation of uncinate process either medially or laterally leading to narrowing of the infundibulum, frontal and anterior ethmoidal recess producing impaired sinus ventilation in maxillary, frontal and ethmoidal sinuses,[9,10,11,12] contradicting claims by some studies that deviations of uncinate process prevents contaminated air entering the sinuses.[13,14.15]

Discussion

Stammberger and Wolf (1988) 16 has documented the preeminent role of osteomeatal complex in causation of chronic rhinosinusitis. Computerised tomographic imaging of oseomeatal complex is of paramount importance in surgery of sinuses. Variations in anatomy of oseteomeatal complex are numerous and there detection before surgery is very much significant to avoid complications. Endoscopic examination of nose in conjunction with CT scan paranasal sinuses is the gold standard for the treatment of chronic rhinosinusitis now-a-days. CT scan of paranasal sinuses accurately detects the bony and soft tissue anatomy of sinuses and there variations. This study was conducted on 50 patients of chronic rhinosinunusitis, in which 52% patients were female and 48% male. Majority of patients were in age group of 31 to 40 years (44%).

Uncinate process variations: Uncinate process shows an arc shaped course, therefore in anterior coronal sections the uncinate is wide. In middle third, uncinate lies adjacent to nasolacrimal duct, posteriorly, it is narrow. Free edge of uncinate process may deviate medially. Laterally or anteriorly.[16] Medially bent uncinate process is the most frequent pathological finding in chronic rhinosinusitispatients (Stamberger and wolf16). Medially bent uncinate comes in contact with middle turbinate, leading to impaired drainage of paranasalsinuses.In our study, we observed medially bentuncinate process in 20% cases. Laterally bent uncinate process was seen in 4% cases. Hypertrophieduncinate process was seen in 8% cases and pneumatiseduncinate in 8% cases. Zinreich[17] noted pneumatisation of uncinate process in one patient (0.4%) among 230 patients of chronic rhinosinusitis. Pneumatised uncinate can also be referred to as uncinate bulla. Pneumatisation can also impair the sinus drainage. A comparative chart of our findings and findings of other authors is given below. Type three attachment was least common finding. Type one was most common finding.[18,19,20] Type two finding was in between.

Study	Our study (%)	Tuli et al. (%)	Krzeski et al (%)	Min et al. (%)	Landsberg and Friedman
Type I	40%	79.8	17.83	54	52%
Type II	32%	14	33.12	24.5	-
Type III	18%	3	14.33	21.5	-

A study of Landsberg and Freidman[23] had classified the superior attachment of uncinate process as follows:
Type 1: Insertion of lamina pappyracea (LP)
Type 2: Insertion into posterior wall of Agger nassi cell(ANP)
Type 3: Insertion into lamina pappyracea and junction of middle turbinate with cribriform plate(MTCP)
Type 4: Insertion into junction of middle turbinate with the cribriform plate
Type 5: Insertion into the ethmoid skull base (ESB)
Type 6: insertion into middle turbinate.

Conclusion

Almost all chronic sinusitis are associated with anatomical variations that alter ventilation. So the preoperative evaluation of variation of uncinate process and its pneumatization helps to avoid intraoperative damage to surrounding structures that alter normal ventilation. From this study we concluded that chronic rhinosinusitisis associated with variations in uncinate process. In our study it was found that superior attachment of uncinate process to lamina paparacea Type 1was most common finding that alters the drainage resulting in frontal sinusitis. Medially bent uncinate process variation was also most common finding. CT scan study is essential before undergoing for functional endscopic sinus surgery. It provides a precious information regarding variations in uncinate process anatomy, which is helpful in removal of complete disease as well as preventing complications during surgery.

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Conflict of interest

Author A and B declared that they have no conflict of interest.

Ethical approval

Article does not contain any study with human or animal participants.

Informed consent

Informed consent was obtained from all the individuals who participated in this study.

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