



RESEARCH ARTICLE

INFLUENCE OF SUPERIOR ATTACHMENT OF UNCINATE PROCESS ON PRESENCE OF AGGER NASI

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ABSTRACT

Title: Influence of superior attachment of uncinat process on presence of agger nasi.

Objective: The superior attachment of uncinat process and agger nasi cell are important landmark in frontal sinus surgery, and are in close relation to each other. The aim of the study is to investigate the relationship between the superior attachment of uncinat process and presence of agger nasi cell.

Study Design: A retrospective radiological study.

Method: 50 patients with features of chronic sinusitis were evaluated radiographically i.e, Computed tomography. 100 sides i.e., 50 scans were evaluated for superior attachment of uncinat process and presence of agger nasi. Chi square test was used as statistical tool for eliciting the relationship between the two.

Results: The AN cell was found in 68 (68%) of 100 sides. The prevalence of AN cell according to superior attachment of UP types were 64.1% for lamina papyracea, 79.41% for skull base, 53.84% for middle turbinate. The presence of AN cell according to superior attachment types of UP was not statistically significant ($\chi^2=3.5925$, $p=0.16592$).

Conclusion

The agger nasi cell found in 68 sides (68%), and there was no statistical significance between the superior attachment of uncinat process and presence of agger nasi cell.

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INTRODUCTION

Since the discourses of Messerklinger and Wigand in late 1970s, the sinus surgery have undergone a tremendous expansion with the advanced imaging, increased understanding of anatomy and pathophysiology of chronic sinusitis. With all this endoscopic frontal sinus surgery is still considered difficult with increased risk and high chances of failure rate. The endonasal approach to frontal sinus and frontal recess for frontal sinusitis is challenging and most difficult part.

A thorough knowledge about the regional anatomy is required due the compact nature of this region, high anatomic variability or surrounding structures, and close relation with the vital organs like orbit and anterior skull base.¹ The position of superior attachment of uncinat process and the extensive pneumatization of the surrounding ethmoid air cells including the agger nasi may all limit the shape and width of frontal recess and lead to frontal sinus disease.² Wormald proposed that pneumatization of the agger nasi cell effect the superior attachment of uncinat process. In our study, our aim was to determine a statistical relationship between the agger nasi and superior attachment of uncinat process.

MATERIALS AND METHODS

Patients between aged group 20-80 with chronic sinusitis were evaluated radiologically using coronal CT or paranasal sinuses. A retrospective descriptive radiological study was carried out between September 2012 to September 2014. Patient with history of facial trauma, previous history of surgery, and tumours were excluded. 50 consecutive coronal CT, 100 sides were evaluated for the superior attachment of uncinat process and the presence of agger nasi.

RESULTS

In our study of 50 cases (100 sides), the superior attachment of uncinat process to lamina papyracea was found in 53 sides, to skull base was seen in 34 sides and to middle turbinate was seen in 13 sides (Figure 1-3). Agger nasi was present in 68 sides out of 100, 33 were bilateral and 2 were unilateral (Figure 4). 34 agger nasi was found in association with superior attachment of uncinat to lamina papyracea, 27 with attachment to skull base, and 7 with attachment to middle turbinate. The prevalence of agger nasi according to the superior attachment of uncinat process was 64.1% to lamina papyracea, 79.41% to skull base, and 53.84% to middle turbinate (Table 1). Statistically a chi square value of

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3.5925, with p value of 0.16592 was obtained. Thereby indicating that relationship between superior attachment of uncinata process and agger nasi is not statistically significant.

Table 1 Frequency distribution of agger nasi cell according to the superior attachment of uncinata process

UP superior attachment	Number (%) of sides	Number (%) of Agger Nasi cell
Lamina Papyracea	53 (53)	34 (64.1)
Skull Base	34 (34)	27 (79.41)
Middle turbinate	13 (13)	7 (53.84)

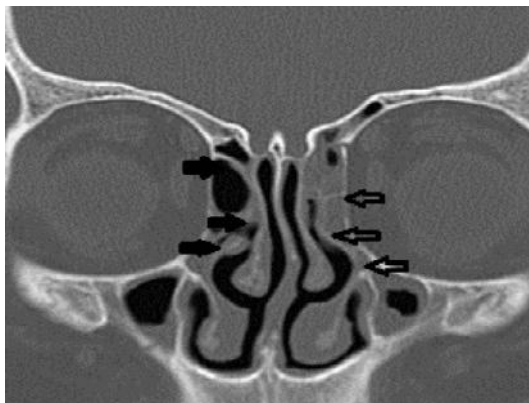


Figure 1 Bilateral superior attachment of uncinata process to lamina papyracea. Solid black arrow on right side; Transparent black arrow left on side

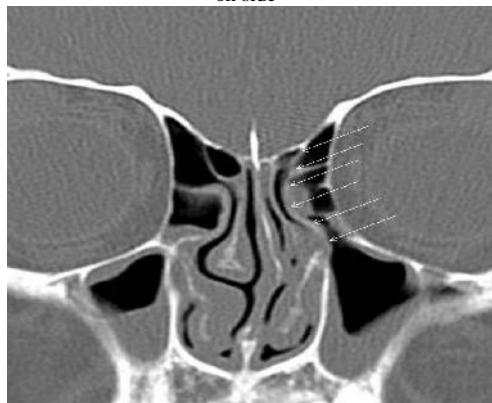


Figure 2 Superior attachment of uncinata process to skull base (white arrows)



Figure 3 Superior attachment of uncinata process to middle turbinate (white arrows)

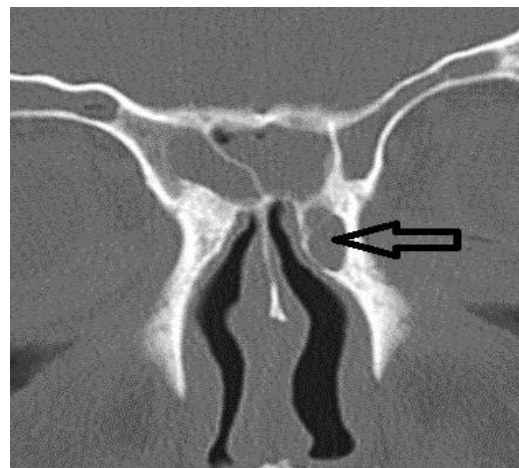


Figure 4 Agger nasi cell on left side (black arrow)

at the frontal ostium. The frontal ostium widens superiorly into the frontal sinus and inferiorly into frontal recess. Although frontal ostium is the narrowest part, it is rarely a direct source of frontal sinus outflow tract obstruction. The inferior third part of frontal sinus pathway formed by the frontal recess is the anatomical location responsible for most cases of frontal sinusitis. The frontal recess is a narrow inverted funnel shaped cleft within the anterior ethmoid complex, that widens in posterior and inferior direction.^{2,3,4}

The superior attachment of uncinata process was first referred by Stammberger and Hawke⁵ in 1991, and described three possible extensions i.e., to the lamina papyracea, skull base and middle turbinate (Figure 1-3). Recently, A more detailed classification was given by Landsberg and Friedman⁶ classifying the variation of superior attachment into 6 types. In our study we considered Stammberger and Hawke's classification for the superior attachment of uncinata process.

The superior attachment of uncinata process is an important anatomical structure for the frontal recess region. Landsberg and Friedman⁶ defined two types of frontal sinus outflow tracts depending on the superior attachment of the uncinata process.⁷ When the uncinata process inserts into the lamina papyracea, the ethmoidal infundibulum is closed superiorly to form a blind pouch called recessus terminalis.⁸ In this case the frontal recess directly communicates with the middle meatus or the suprabullar recess⁹ and this communication was only 1%,¹⁰ thus practically it opens into middle meatus in case of recessus terminalis.

Here it is limited laterally by uncinata process and medially by the laterally side of middle turbinate, or the junction of middle turbinate to the cribriform plate. The frontal recess drains via the ethmoidal infundibulum into the middle meatus when the uncinata process is attached medially to skull base of middle turbinate.⁶ These findings emphasized that uncinata process determines the drainage pattern of frontal sinus.

The agger nasi cell is anterior most ethmoid cell, and is believed to originate from pneumatized superior remanant of first ethmoturbinal. Pneumatization of agger nasi cell is a significant cause of chronic frontal sinusitis as it encroaches on the nasofrontal duct.¹¹

DISCUSSION

Frontal sinus drains into nasal cavity via frontal ostium. Frontal ostium region on saggital section is an hour glassed shaped structure with the narrowest part located

Both, the superior attachment of uncinat process and agger nasi are important anatomical structures in for the frontal recess, and individually are significant factors in causation of chronic frontal sinusitis. These two structures are anatomically related, the uncinat process fuses with the posteromedial wall of the agger nasi cell and the posteromedial wall of the nasolacrimal duct. In our study we assessed the presence of agger nasi cell according to the types of superior attachment of uncinat process.

Liu SC et al¹² studied 132 Taiwanese patients and found no significant relationship between the presence of agger nasi cell and the superior attachment types of uncinat process.

A similar study done by I Ercan et al¹³ including 243 patients, they found in 237 sides the uncinat process was attached to lamina papyracea out of which 180 (80.3%) had agger nasi, 94 cases had attachment to skull base and 75 had agger nasi cells, 30 cases had attachment to middle turbinate and 25 had agger nasi cells. In this study also no significant relationship was found. Similarly in our study of 100 sides, we found no significant statistical relationship between the two structures.

CONCLUSION

Superior attachment of uncinat process to lamina papyracea was most common. Agger nasi was found to be present in 79.41% cases of UP attachment to skull base, a rate that varies from that of literature. However, we found no statistically significant relation between the superior attachment of uncinat process and agger nasi. Further studies are needed to investigate the relationship between the degree of pneumatization of agger nasi and superior attachment of uncinat process, and their influence in causation of frontal sinusitis.

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