ENT updates
www.entupdates.org

Clinical Research

ENT Updates 2016;6(2):70–73
doi:10.2399/jmu.2016002009

Computed tomography analysis of sinonasal anatomical variations and relationship with the maxillary sinus retention cysts

Ahmet Hamdi Kepekçi[1,2], Gökalp Dizdar[2], Ali Bestemi Kepekçi[3,4]

[1]*Audiometry Program, Health Occupation High-School, Istanbul Yeni Yüzyıl University, Istanbul, Turkey*
[2]*Department of Otolaryngology, Meltem Hospital, Istanbul, Turkey*
[3]*Department of Anesthesiology, Meltem Hospital, Istanbul, Turkey*
[4]*Anesthesia Program, Health Occupation High-School, Istanbul Yeni Yüzyıl University, Istanbul, Turkey*

Abstract

Objective: The purpose of the present study was to investigate the relationship of sinonasal anatomic variations (SAVs) with maxillary sinus retention cysts (RCs) on paranasal sinus tomography.

Methods: Our study included 202 patients who applied to the ENT outpatient clinic with fascial pain, nasal obstruction and postnasal drip complaints between September 2014 and February 2016 and underwent CT of paranasal sinus on coronal plane. The patients who had maxillary RCs in their CT scan comprised the study group while the patients who did not have RCs in their CT scan comprised the control group. The CT scans of these two groups were examined and recorded for the SAVs. The statistical analysis of the SAVs for these two groups was conducted using the Mann-Whitney U test.

Results: The presence of septal deviation from SAVs and pneumatized uncinate in patients found to have maxillary sinus retention cyst was considered statistically significant ($p<0.05$). The sex in patients with right maxillary sinus RCs was considered statistically significant ($p<0.05$). The presence of pneumatized uncinate in patients with left maxillary sinus RCs was considered statistically significant ($p<0.05$).

Conclusion: In our study, the statistical relationship between SAV and maxillary sinus retention cysts may show that SAVs may be effective in the etiology of maxillary sinus retention cysts. This result has to be verified by more detailed studies.

Keywords: Sinonasal variation, retention cysts, computed sinus tomography.

Özet: Sinonazal anatomik varyasyonların bilgisayarlı tomografi ile analizi ve maksiller sinüsteki retansiyon kistleriyle ilişkisi

Amaç: Paranazal sinüs tomografisi çekilmiş olan hastalardaki sinonazal anatomik varyasyonlar (SAV) ile maksiller sinüs retansiyon kistleri arasındaki ilişki araştırıldı.

Yöntem: Çalışmaya Eylül 2014 ile Şubat 2016 tarihleri arasında Kulak Burun Boğaz polikliniğine fasiyal ağrı, nazal obstrüksiyon, postnazal akıntı şikayetleri ile başvuran ve koronal planda paranazal sinüs bilgisayarlı tomografi (PSBT) çekilmiş 202 hasta dahil edildi. PSBT'sinde retansiyon kisti saptanan hastalar çalışma grubu olarak, retansiyon kisti saptanmayan hastalar ise kontrol grubu olarak ayrıldı ve iki grubun PSBT'leri incelenerek sinonazal anatomik varyasyonlar saptandı. Çalışma ve kontrol grubu SAV'lar bakımından Mann-Whitney U testi ile analiz edildi.

Bulgular: Maksiller sinüslerinde retansiyon kisti tespit edilen hastaların SAV'lardan olan septum deviasyonu ve pnömatize unsinatın bulunması istatistiki olarak anlamlı olarak bulundu ($p<0.05$). Sağ maksiller sinüslerinde retansiyon kisti bulunan hastalarda cinsiyet ($p<0.05$) istatistiksel olarak anlamlı bulundu. Sol maksiller sinüslerinde retansiyon kisti bulunan hastalarda pnömatize unsinatın bulunması ($p<0.05$) istatistiksel olarak anlamlı bulundu.

Sonuç: Çalışmamızda SAV ile maksiller sinüsteki retansiyon kistleri arasındaki istatistiki ilişki retansiyon kistlerinin etyolojisinde SAV'ların etkili olduğunu gösterebilir. Bu konuda araştırmacılar tarafından detaylı çalışmalar yapılmalıdır.

Anahtar sözcükler: Sinonazal varyasyon, retansiyon kistleri, bilgisayarlı sinüs tomografisi.

Benign mucosal cysts of the maxillary sinus are generated from obstructions in the mucosal gland ducts.[1] Generally, they are asymptomatic, and they are diagnosed incidentally on plain graph or computerized tomography.[2] A radiologic image is generally originated from the maxillary sinus floor and rises up like a rising sun. If it is filled the

Correspondence: Ahmet Hamdi Kepekçi, MD. Department of Otolaryngology, Meltem Hospital, Haznedar Mah., Ergene Sokağı, No: 52, Güngören, Istanbul, Turkey.
e-mail: ahmethamdi.kepekci@yeniyuzyil.edu.tr

Received: June 23, 2016; **Accepted:** July 11, 2016

This paper was presented as oral presentation at 16th Rhinocamp ENT and Family Medicine Congress, 25–28 May 2016, Bodrum, Turkey.

Online available at:
www.entupdates.org
doi:10.2399/jmu.2016002009
QR code:

deomed

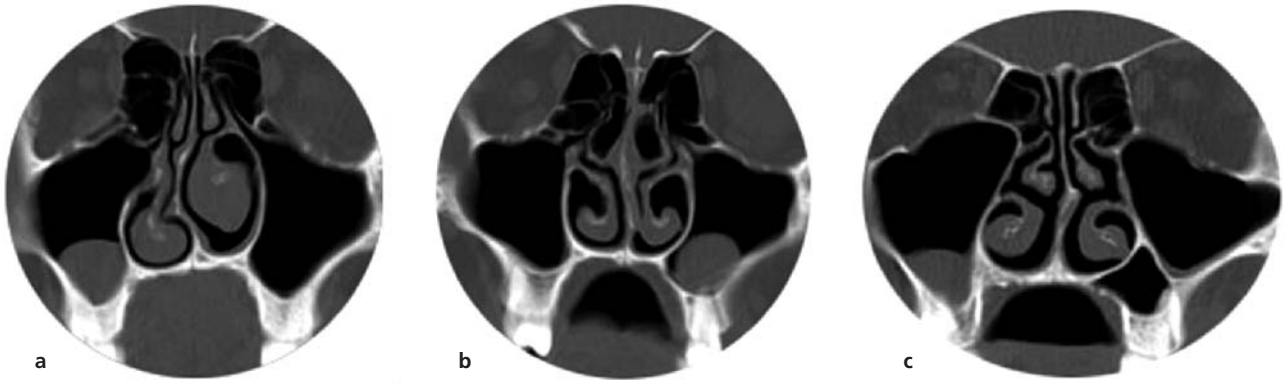

Fig. 1. Paranasal sinus tomography views of a patient's maxillary sinus. (**a**) View showing the nasal septal deviation + retention cyst on the floor of the maxillary sinus. (**b**) View showing the concha bullosa + retention cyst on the floor of the maxillary sinus. (**c**) View showing the reverse concha + retention cyst on the floor of the maxillary sinus.

sinus completely, it can lead to fascial and periorbital pain and the cyst content is a clear yellow liquid.[3] If it obstructs the sinus ostium, it leads to sinus infection.[4]

Some cysts may grow in the maxillary sinus without any complaints. If there is no complication due to the retention cysts (RCs), patient monitoring is appropriate.[5] Sinonasal anatomic variations (SAVs) play the most important role in the pathogenesis of diseases, and paranasal sinuses comprise the area in which SAVs are seen most frequently in humans.[6,7]

Because recurrent sinusitis might represent a putative risk factor associated with the development of maxillary RCs, surgery is aimed at restoring ventilation and drainage of the dependent maxillary sinus.[8] The most common anatomic variations impair ventilation and drainage of the sinuses with narrowing the ostiomeatal complex, nasal septal deviation (NSD), excessive pneumatized agger nasi cells, concha bullosa, paradoxical middle turbinate, uncinate process pneumatization, and Haller cells.[9–11] In our study, we investigated whether there was an effect of SAVs on the increase of maxillary sinus retention.

Materials and Methods

Our study was conducted retrospectively between 01.09. 2014 and 09.02.2016 with patients who sought treatment for facial pain, nasal obstruction, and postnasal drip complaints at our ENT outpatient clinic. All of the 202 patients were examined with coronal paranasal sinus computed tomography (CT). At the same center, we performed tomography scans, which were examined by a radiology expert. Maxillary sinus RCs were found in 39 patients, and these patients were considered as the study group (Fig. 1). The remaining (163) patients (for whom we did not find RCs) were considered as the control group. The paranasal sinus tomographies of the two groups were examined, and the SAVs like NSD, concha bullosa, Haller cells, agger nasi cells, reverse concha and pneumatized uncinate were determined and recorded.

Patients who had chronic nasal and sinus diseases like allergy, sinusitis, and nasal polyp and those who had a previous nose or paranasal surgery were excluded from the study. This study was conducted with the permission of the hospital's ethics committee (10.03.2016/19).

Statistical analysis

Data were analyzed with SPSS for Windows. The qualitative data are given by numbers and percentages; the data of the quantitative variables are expressed as medians. Patients who had RCs on maxillary sinus BT were determined as the study group, while those who did not have RCs were determined as the control group. SAVs were determined by examining the paranasal sinus CT of the two groups. For the study and control groups, the Mann-Whitney U test was used in terms of SAVs. A value of $p<0.05$ was considered significant.

Results

There were 14 women (35.9%) and 25 men (64.1%) in the study group, and 89 women (54.6%) and 74 men (45.4%) in the control group. The age of the patients ranged between 11 and 85 years. The mean age was 34.02±13.073 years. There were 39 patients with RCs on one or both maxillary sinuses. The number of right maxillary sinus RCs was 18, and the number of left maxillary sinus RCs was 25.

Table 1. Sex and SAVs distribution of the study group and control group and their statistical analysis.

	Study group	Control group	p value*
Nasal septal deviation	22	113	**0.012**
Concha bullosa	15	57	**0.683**
Haller cell	3	12	**0.944**
Agger nasi cell	6	26	**0.931**
Reverse concha	4	10	**0.364**
Pneumatized uncinate	4	3	**0.010**

*One way ANOVA

Table 2. The pneumatized uncinate was significantly higher in the left maxillary sinus retention cyst (+) group (p<0.001).

	Study group	Control group	p value*
Nasal septal deviation	5	52	0.331
Concha bullosa	6	50	0.658
Haller cell	1	9	0.815
Agger nasi cell	3	25	0.774
Reverse concha	2	7	0.360
Pneumatized uncinate	3	2	0.001

*One way ANOVA

The number of both maxillary sinus RCs was 4. Statistical analysis was conducted and it was observed that maxillary sinus RCs were found significantly more often in men (p<0.036). On the side in which NSD and pneumatized uncinate were seen, the number of RCs was more likely to be higher (p<0.05), (p<0.05) (Table 1). Right maxillary sinuses were statistically analyzed in the study group and control group, and RCs were more common in men (p<0.05) (Fig. 2). Left maxillary sinuses were compared between the study and control group, and pneumatized uncinate was seen significantly more frequently in the study group (p<0.001) (Table 2).

Discussion

When we looked at other variables like NSD, concha bullosa, Haller cells, agger nasi cells and reverse concha pneumatized uncinate values, significant differences were not observed (p>0.05). Patients with left sinus RCs were significantly different from the control group in terms of pneumatized uncinate (p<0.001). When we looked at other variables like NSD, concha bullosa, Haller cells, agger nasi cells and reverse concha, no significant differences were seen (p>0.05).

Although maxillary sinus cysts have benign clinical course, sometimes they give rise to clinical problems. In the literature, maxillary sinus RC-related publications are limited. The etiology of the maxillary sinus cyst has not been understood well yet. In our study, the rate of male patients in the maxillary sinus cyst-positive group was significantly higher compared with that of the control group (p<0.05). In the study by Omezli et al.,[10] the same result was obtained in terms of sex. In patients with RCs on the maxillary sinuses, the NSD and pneumatized uncinate seemed to be more, which shows that SAVs can be one of

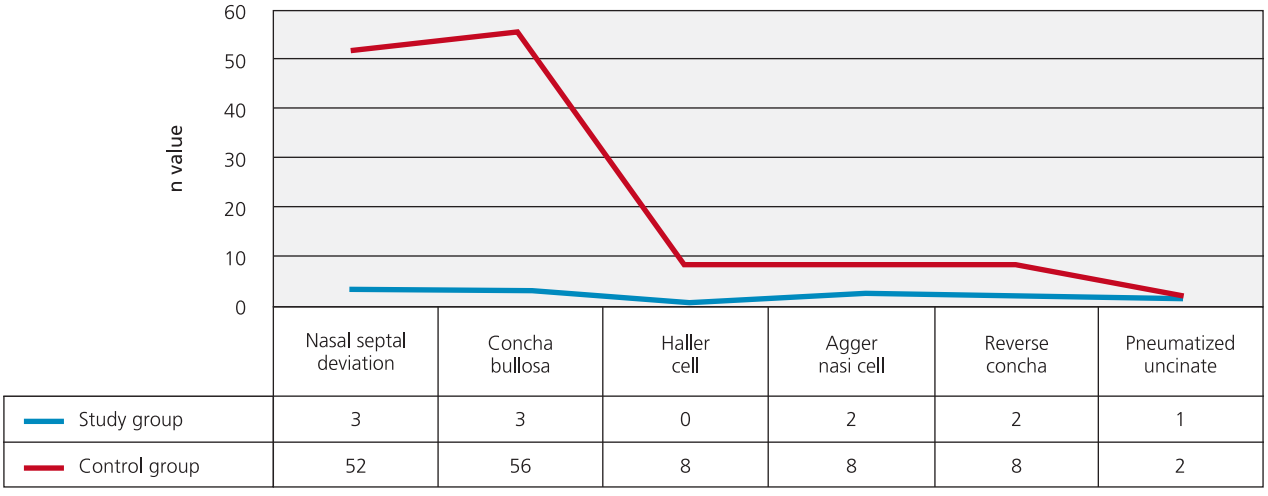

Fig. 2. There was a significant difference in terms of sex in the right maxillary sinus retention cyst (+) group.

the reasons for RCs. Right and left maxillary sinus cysts were considered separately, and significant differences were observed in terms of sex. Significant differences were found on the left side only in terms of pneumatized uncinate. When maxillary sinuses were examined, and each one was analyzed as a single party, the reason why only the number of left pneumatized uncinate was higher may be due to the number of cases. In this regard, there is a need for more studies. In the study by Yousem,[6] the severity and degree of SAVs directly increased the severity of inflammation rather than the presence of SAVs. In the study of Huizing, they emphasized that if the SAVs increase, the mucosal contact area to the level of mucociliary movement decreases or immobilizes ciliary activity and leads to paranasal sinus pathology.[7]

In the study of Harar et al. conducted on paranasal sinus CT of 500 possible chronic sinusitis patients, the incidence of maxillary sinus cyst was 22%.[9] In the sinus cyst-positive group, the incidence of sinus inflammatory disease was 52.7% while the inflammatory sinus disease ratio was 41.3% in the sinus cyst-negative group. The difference between the 2 groups was significant ($p<0.05$). As a result, they emphasized that chronic rhinosinus plays a critical role in the formation of mucosal cysts.[11] Omezli et al.[10] conducted their study in Ordu and Erzurum, two centers with different climatic conditions; 17,659 panoramic graphics were analyzed in that study and the ratio of maxillary sinus RC prevalence in the Black sea region was 1.6% while it was 0.4% in Eastern Anatolia. The mild climate and low altitude significantly increased the probability of developing mucosal cysts in the maxillary sinus ($p<0.05$).

When SAVs were compared between the study and control groups, significant differences were observed in terms of pneumatized uncinate, NSD, and patient's sex ($p<0.05$). No significant differences between the two groups were observed in terms of concha bullosa, Haller cells, agger nasi cells and reverse concha ($p>0.05$). In patients with right sinus RCs there were significant differences in terms of sex ($p<0.05$).

Conclusion

Although maxillary sinus RCs are seen frequently in ENT and dental practice, their etiology is still not understood well. In previous studies, sinus inflammation, sex, climate, humidity and altitude were pointed out as etiologic factors. In our study, we tried to look at this clinical situation from the point of SAVs and we found that SAVs such as NSD and pneumatized uncinate were seen significantly more in the sinus cyst (+) group. Our cases are quantitatively limited and these results need to be confirmed with larger series.

Conflict of Interest: No conflicts declared.

References

1. Ruprecht A, Batniji S, el-Neweihi E. Mucous retention cyst of the maxillary sinus. Oral Surg Oral Med Oral Pathol 1986;62:728–31.
2. Casamassimo PS, Lilly GE. Mucosal cysts of the maxillary sinus: a clinical and radiographic study. Oral Surg Oral Med Oral Pathol 1980;50:282–6.
3. Manson-Hung L. Mucosal cysts of the maxillary sinus: a clinical and radiological study. Oral Surg 1980;50:282–6.
4. Gothberg KA, Little JW, King DR, Bean LR. A clinical study of cysts arising from mucosa of the maxillary sinus. Oral Surg Oral Med Oral Pathol 1976;41:52–8.
5. Wang JH, Jang YJ, Lee BJ. Natural course of retention cysts of the maxillary sinus: long-term follow-up results. Laryngoscope 2007;117:341–4.
6. Yousem DM. Imaging of sinonasal inflammatory disease. Radiology 1993;188:303–14.
7. Zinreich SJ, Abidin M, Kennedy DW. Cross-sectional imaging of the nasal cavity and paranasal sinuses. Operative Techniques in Otolaryngology-Head and Neck Surgery 1990;1:94–8.
8. Albu S. Symptomatic maxillary sinus retention cysts: should they be removed? Laryngoscope 2010;120:1904–9.
9. Harar R, Chadha N, Rogers G. Are maxillary mucosal cysts a manifestation of inflammatory sinus disease? J Laryngol Otol 2007;121:751–4.
10. Omezli MM, Torul D, Polat ME, Ayrancı F, Dayı E. Does climate affect the presence of retention cysts in the maxillary sinus? ODU Journal of Medicine 2016;3:1–7.
11. Bolger WE, Butzin CA, Parsons DS. Paranasal sinus bony anatomic variations and mucosal abnormalities: CT analysis for endoscopic sinus surgery. Laryngoscope 1991;101:56–64.

Please cite this article as: Kepekçi AH, Dizdar G, Kepekçi AB. Computed tomography analysis of sinonasal anatomical variations and relationship with the maxillary sinus retention cysts. ENT Updates 2016;6(2):70–73.