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Original Article

Mucosal Cysts of the Maxillary Sinus in Solid Organ Transplant Population: Computerised Tomography Follow-Up Results

Erdinç Aydın[1], Hasan Yerli[2], Suna Tanrıkulu[3], Evren Hizal[1]

[1]Department of Otolaryngology, Başkent University Faculty of Medicine, Ankara, Turkey
[2]Department of Radiology, Başkent University Faculty of Medicine, İzmir, Turkey
[3]Clinic of Otolaryngology, Ürgüp State Hospital, Nevşehir, Turkey

ABSTRACT

Background: The clinical significance of maxillary sinus mucosal cysts in liver and kidney transplant recipients remains unclear.

Aim: To investigate the course of maxillary mucosal cysts in liver and kidney transplantation patients.

Study Design: Retrospective clinical study

Methods: Paranasal sinus computed tomography scans of 169 renal and 43 hepatic transplant recipients were reviewed. The incidence, size and growth characteristics of maxillary mucosal cysts in the renal and hepatic transplant population were noted.

Results: Overall incidence of maxillary sinus mucosal cyst in transplantation patients was found to be 24.5%, with a male to female ratio of 2:1 ($p<0.05$). Follow-up views of 26 patients showed that the size of the cysts increased in 19, decreased in 4, and remained the same in 3 patients. Mean growth rate of the cysts was calculated to be 6.30 ± 7.02 mm^2 per month. Most of the cysts were located on the inferior wall of the maxillary sinus.

Conclusion: Incidence of the maxillary mucosal cysts in renal and hepatic transplant recipients does not differ from general population, but these cysts have a greater tendency to grow. Specific measures are not needed for isolated, asymptomatic maxillary mucosal cysts in transplant populations.

Key Words: Maxillary sinus, mucosal cyst, retention cyst, kidney transplantation, liver transplantation

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Introduction

Maxillary sinus mucosal cysts (MSMC) are benign entities that result either from the obstruction of the duct of a seromucinous gland at sinus mucosa, which in turn causes accumulation of mucus and cystic dilatation of the gland, i.e. secretory mucosal cysts or retention cysts, or from the accumulation of fluid between the epithelial layer and underlying mucosal lining of the maxillary sinus, i.e. non-secretory mucosal cysts. In most cases, these cysts are asymptomatic, self-limiting and discovered incidentally on plain or panoramic radiographs, computed tomography scans (CT), or magnetic resonance images (MRI). Depending on the sensitivity of the imaging modality used, the reported incidence of the MSMC in the general population varies from 1.4% to 35.6% (1-5).

Solid organ transplant recipients are a specific group of patients who have to use immunosuppressive therapy and require extraordinary care for possible sinus disease. Infection is one of the most challenging complications in transplant recipients because of the potentially high morbidity and mortality rates (6). Together with improvements in surgical techniques and immunosuppressive and prophylactic antimicrobial agent use, these rates have reduced significantly in recent decades (6). Nevertheless, rhinosinusitis in transplant recipients is not rare. The clinical presentation of rhinosinusitis in this group of patients may be subtle, aggressive, fulminant or even fatal (7, 8). Sinus disease in transplant patients, therefore, should be diagnosed and treated immediately and appropriately.

Clinical significance of MSMC is controversial. Some authors propose that these cysts are associated with chronic rhinosinusitis, nasal symptoms, facial pain, paraesthesias, or headache (3, 9), while others advocate that these are neither pathological nor a manifestation of nasal disease (4). While the clinical behaviour of MSMC in the general population remains unclear, possible complications or the course of these cysts in the immunocompromised patient population is of particular importance. In this study, we aimed to investigate the long-term course of MSMC in renal and hepatic transplant recipients.

Material and Methods

Paranasal sinus CT scans of renal or hepatic transplantation recipients, who were seen due to a suspicion of rhinosinusitis in our otorhinolaryngology clinic between July 1996 and December 2007, were retrospectively reviewed. CT images of the patients who had MSMC were assessed. CT scans of the patients with more than one application to our otorhinolaryngology clinic were compared with earlier ones to determine the course of the MSMC. CT scans of the patients who had a history of nasal or paranasal sinus surgery were

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Address for Correspondence: *Dr. Evren Hizal, Department of Otolaryngology, Başkent University Faculty of Medicine, Ankara, Turkey.*
Phone: +90 312 223 85 34 e-mail: drevren@gmail.com

Table 1. Incidence of maxillary mucosal cysts according to sex

Sex	Presence of cyst	Absence of cyst	Total
Male	39 (31.96%)	83 (68.03%)	122
Female	13 (14.44%)	77 (85.56%)	90
Male+Female	52 (24.53%)	160 (75.47%)	212
p<0.05			

Table 2. Distribution of the localisation of maxillary mucosal cysts

Localisation of the retention cyst	Right maxillary sinus	Left maxillary sinus
Inferior wall	14	14
Superior wall	-	1
Lateral wall	3	-
Inferolateral wall	1	1
Total*	18*	16*

* Maxillary mucosal cysts were placed bilaterally in 8 of the patients

excluded from the study. This study was approved by Baskent University Institutional Review Board (Project no: KA07/204) and supported by Baskent University Research Fund.

The same radiologist reviewed all of the CT scans. During the CT examinations, coronal images were obtained from the posterior wall of the sphenoidal sinus to the anterior wall of the frontal sinus through the paranasal sinuses. Examinations were done using settings of 3-5 mm slice thickness with 1.5-3 mm intervals, 120-140 kV, and 94 to 111 mA. CT examinations were performed using single detector or multi-slice computerized tomography units (Somatom Plus 4; Somatom Plus Volume zoom; Sensation 16; Siemens, Erlangen, Germany). For each retention cyst, all slices were evaluated and then the mean attenuation of the lesion was calculated in Hounsfield units (HU). Pear-shaped, homogeneous and low-density lesions (20 HU or less) with smooth, well-circumscribed margins were diagnosed as MSMC. The dimensions and areas of the mucosal cysts were determined using maximal perpendicular dimensions with a cursor on computed tomography images.

SPSS software (Statistical Package for the Social Sciences, version 15.0, SPSS Inc., Chicago, IL, USA) was used for statistical analysis. Chi-square tests were used for comparisons and a p value less than 0.05 was accepted as statistically significant.

Results

Paranasal sinus CT scans of 169 renal and 43 hepatic transplant recipients were reviewed (age, 23-70 years; 122 male, 90 female). 45 renal and 7 hepatic transplant recipients were found to have MSMC (39 male, 13 female). Of those, 22 renal, and 4 hepatic transplantation recipients (21 male, 5 female) were found to have subsequent paranasal sinus CT scans. The mean time period between the date of transplantation and the first CT scan was 7.4±0.7 years. The mean time period between the successive CT scans was 32.0±5.3 months.

Table 3. Growth characteristics of the maxillary mucosal cysts within time (Mean follow-up period is 32.0±5.3 months). Values represent the number (and %) of the patients

Type of transplantation	No change	Decrease	Increase	Total
Hepatic	0	3 (75%)	1 (25%)	4 (100%)
Renal	3 (13.6%)	1 (4.5%)	18 (81.9%)	22 (100%)
Hepatic + Renal	3 (11.5%)	4 (15.4%)	19 (73.1%)	26 (100%)
p=0.002				

The overall incidence of MSMC in transplantation recipients was found to be 24.5%. The incidence of MSMC in hepatic (16%) and renal (26%) transplantation patients was statistically not different from each other (p>0.05). The incidence of MSMC was significantly greater in males than females (p<0.05) (Table 1).

Eight of the patients had left-sided (Figures 1a and 1b) and 10 of the patients had right-sided MSMC (Figures 2a and 2b). In 8 of the patients, MSMC was found to be bilateral. The localisations of the cysts in the maxillary sinuses are given in Table 2. The dimensions of cysts ranged from 5 to 32 mm in the horizontal axis and 5 to 32 mm in the vertical axis. The maximum cross sectional area of the MSMC ranged from 22 mm^2 to 853 mm^2.

Evaluation of the follow-up views of 26 patients showed that the size of the cysts increased in 19, decreased in 4, and did not change in 3 patients. Mean growth rate of the cysts were calculated as 6.30±7.02 mm^2 per month (range, 0.31- 23 mm^2/month). The increase in cyst size was significant in renal patients when compared to hepatic transplantation patients (p=0.002) (Table 3).

The effect of the type of immunosuppressant used and co-morbid diseases such as hypertension and diabetes on the course of maxillary mucosal cysts was assessed. There was no correlation between the change in the size of MSMC, and accompanying diabetes or hypertension. When compared, there was no relationship between the type of drug, i.e. sirolimus, mycophenolate mofetile, azathioprine, cyclosporine, prednisolone and tacrolimus, and the change in the size of MSMC (p>0.05).

Discussion

MSMC are not rare in the general population; the reported incidence of MSMC varies widely from 1.4% to 35.6% (1-4, 10). The discrepancy amongst reported incidence values seems to be mostly due to the sensitivity of the imaging modality used. An MSMC is usually diagnosed as a rounded, dome-shaped, soft tissue mass in plain radiography and CT images (1, 11, 12); the mass has a homogeneous and relatively radiodense appearance (2). However, mucosal cysts may be easily misdiagnosed as rhinosinusitis with plain radiographic images. Mucosal cysts have lower attenuation values than mucosal thickenings in

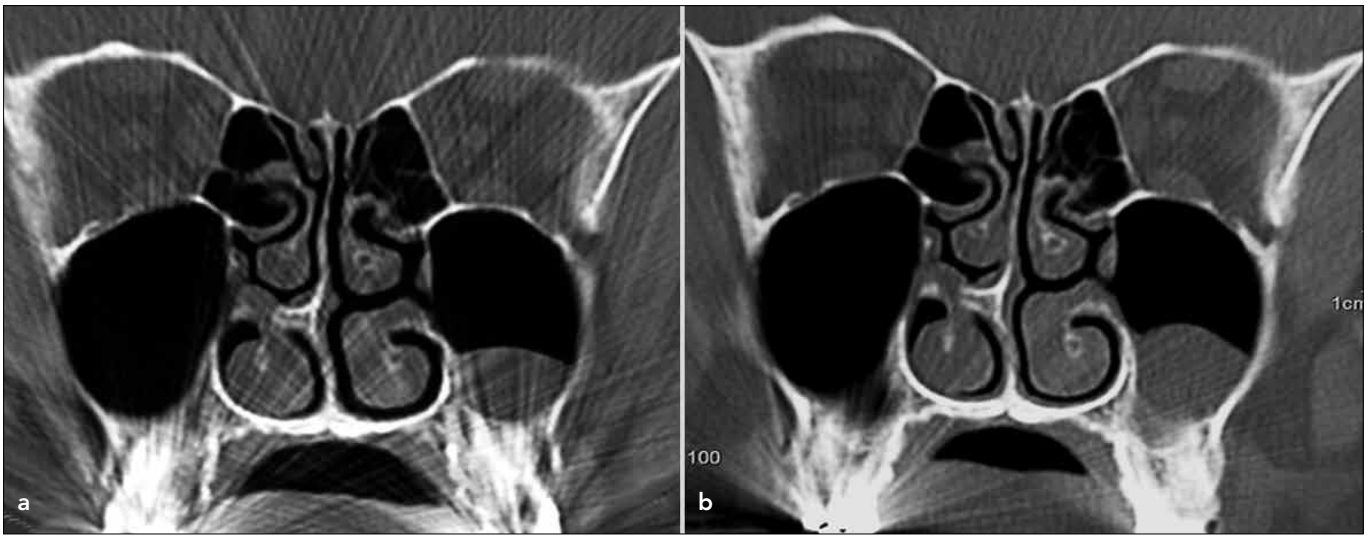

Figure 1. a, b. Coronal CT image (at the bone-window level) shows a homogeneous, dome-shaped cystic lesion with well-defined margin and low density consistent with retention cyst at the left maxillary sinus floor (a). One year later, follow-up CT image shows that the retention cyst increased in size (b).

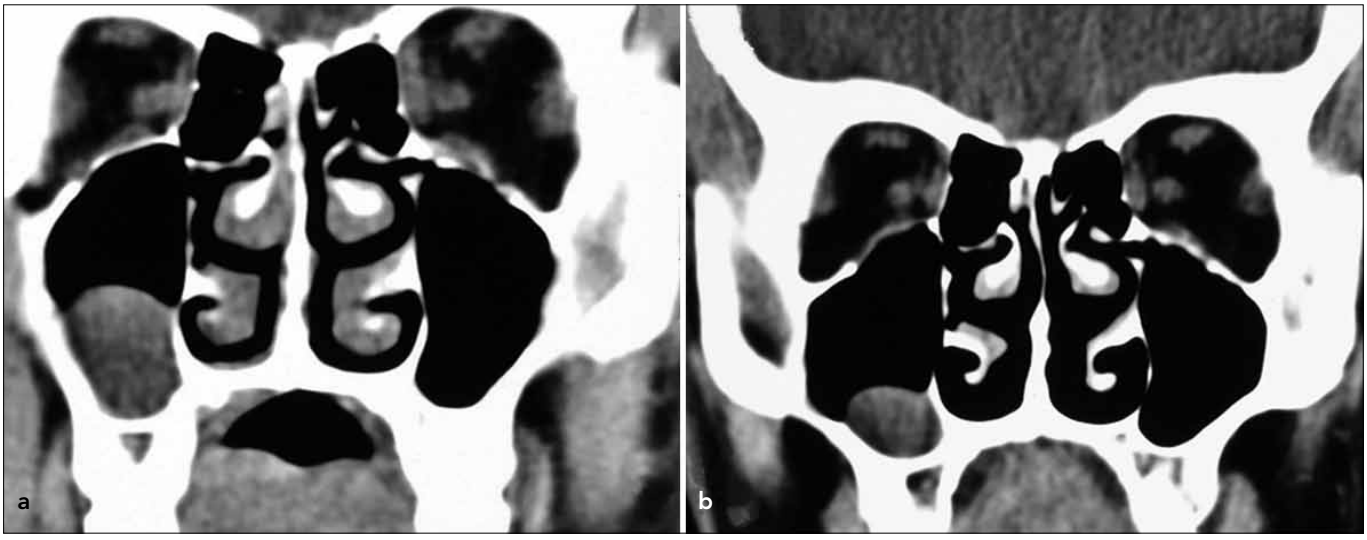

Figure 2. a, b. Coronal CT image (at the soft tissue window) shows a pear-shaped lesion with smooth, well-circumscribed margins, consistent with retention cyst at the right maxillary sinus floor (a). Three years later, follow-up CT image shows that the retention cyst has decreased in size (b).

CT images; therefore, it is possible to differentiate mucosal cysts from mucosal thickenings with CT. Due to the widespread use of more sensitive imaging modalities such as CT and MRI in recent decades, recent studies report higher incidence values.

There has been no study about the incidence and course of MSMC in transplant patients. Although our patient group consisted of a selected group, i.e. patients that had been referred to the otolaryngology clinic, we found the incidence of MSMC to be 24.5%. This ratio is not higher than those reported for the general population. In the general population, 60% of retention cysts have been reported to remain the same size and 15% of the cysts were reported to grow within time, while the spontaneous regression and disappearance rates were reported to be 17.6% to 38%, respectively (13, 14). In our study, 12% of the cysts that were followed-up remained the same size, whereas 15% of the cysts decreased and 73% of the cysts increased in size. Our results showed that maxillary mucosal cysts in solid organ transplant recipients have a greater tendency to grow when compared with the general population. This may be due to continuous immunosuppressive drug use and more frequent upper respiratory tract infections in this group of patients. Our clinic is a tertiary referral centre and most of the patients come from distant parts of the country. Since this was a retrospective study, we do not know whether the patients had rhinosinusitis or an upper respiratory tract infection attack between the CTs. In other words, the change in the size of the MSMC might be affected by previous rhinosinusitis or upper respiratory infection attacks. When compared with hepatic transplants, the tendency to grow was significant in renal transplant recipients. However, the number of hepatic transplant recipients who had a follow-up CT was limited and

a larger series of this group of patients is needed to assess the course of MSMC in the hepatic transplant population alone.

Previously, some studies have shown no predilection of MSMC for sex (3). Wang et al. (15) reported a male to female ratio of 3:2, whereas Ruprecht et al. (2) found the male predominance to be 2:1. In our study, we observed a male to female ratio of 2:1 (31.96% vs. 14.44%). Our results suggest that the male preponderance for MSMC in the general population is also the same in the transplant population.

MSMC are often asymptomatic and require no definitive treatment except for symptom-relieving measures. However, headache, nasal obstruction, facial pain in the sinus areas, post nasal drip, nasal discharge and paraesthesias may be associated with MSMC (3, 9). The cysts may resolve or rupture spontaneously with no residual effects on the antral mucosa (3). Symptomatic retention cysts may be treated by puncture and aspiration through the inferior meatus or natural sinus ostium, or removed via the Caldwell-Luc approach (16, 17). None of our transplant recipients required surgical intervention due to MSMC.

Permanent immunosuppressive therapy is needed in transplant recipients in order to prevent graft loss. This group of patients is susceptible to infections, which remain a cause of significant morbidity and mortality. The incidence of respiratory virus infections among solid organ transplant recipients is similar to that of the general population, but complications are higher (18) and the clinical presentation of rhinosinusitis may be subtle, fulminant or even fatal. Thus, it is essential to establish a proper diagnosis within a limited time and transplant recipients with any kind of symptom suggesting rhinosinusitis should be carefully evaluated.

Chronic renal or hepatic disease processes before the transplantation may affect the constitution of MSMC and their course. As reported before (19), routine paranasal sinus CT scans are not feasible in patients scheduled for organ transplant according to the high rate of false positive results; therefore, we do not perform radiological imaging methods in every transplant candidate. This means that our patients might already have maxillary mucosal cysts before transplantation. However, the incidence and characteristics of maxillary mucosal cysts in our transplant recipients do not differ with those that were reported for the general population, and we assume that neither chronic renal or hepatic disease nor the transplantation procedure has a significant effect on the formation or course of maxillary mucosal cysts.

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