

The two holes syndrome

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ABSTRACT

Background: Defects in the fontanel region of the lateral nasal wall have been described in the literature as “accessory” or “secondary” ostia. The authors consider them a sign of chronic maxillary sinusitis. Along with mucus recirculation between the natural ostium and the fontanel defect, we call it the Two Holes Syndrome. The aim of this study was to determine the incidence of fontanel defects in patients with chronic rhinosinusitis (CRS) and in healthy subjects.

Methods: Eighty-eight hundred seventy-nine outpatients with CRS were examined by means of nasal fiberendoscopy. The control group consisted of 1442 healthy volunteers with no previous history of CRS.

Results: Defect in the posterior fontanel was found in 1713/8879 CRS patients (19.3%). It was bilateral in 1165 cases (68.03%). Defect in the anterior fontanel was found in 54 patients (0.61%). The circulating mucus ring was identified in 162 patients with fontanel defects (9.17%). The defect in the posterior fontanel was found in 7/1442 healthy volunteers (0.48%). It was never bilateral, the circulating mucus was not observed and defect in the anterior fontanel was not found.

Conclusion: Posterior fontanel defects were found more frequently in CRS patients than in healthy subjects. These defects have been clinically related to chronic infection of the maxillary sinus and should not be called “accessory” or “secondary” ostia. CRS with defects of the fontanel region and mucus recirculation can promote a number of health disturbances (chronic postnasal drip, headache, and cough). We named this entity the Two Holes Syndrome. (Am J Rhinol Allergy 23, 602–604, 2009; doi: 10.2500/ajra.2009.23.3375)

Key words: Accessory, chronic, fontanels, mucus, ostium, recirculation, sinusitis

Since the beginning of the endoscopic era in the field of rhinosinusology, one term has been frequently emphasized: the “accessory ostium” of the maxillary sinus.^{1,2} This hole in the lateral nasal wall has long been considered as an accidental finding and presumed as a physiological feature.^{3–5} It is generally found in the posterior fontanel; its appearance in the anterior fontanel is much less frequent in our experience. This defect of the posterior fontanel indicates chronic maxillary sinusitis (CMS), just like a defect of the eardrum indicates chronic otitis media.

The lateral nasal wall has two spots of very low resistance: the posterior and anterior fontanels. The posterior fontanel is located behind the uncinate process posterior border whereas the anterior one is located in front of it (Figs. 1, 2, and 3). The low resistance of the fontanels is caused by the lack of bony skeleton in these two spots for there are only maxillary sinus mucosa and mucosa of the nasal cavity sticking together. In the case of maxillary sinus empyema, there is no way out for the overgrowing amount of pus because the natural ostium is blocked (which caused the inflammation and empyema). The only way out for the pus, which is under growing pressure, is through some other hole. Consequently, the brittle fontanel ruptures, just like in the case of purulent otitis media. The consequence is a permanent defect in the posterior fontanel (Fig. 4).

The problem with the hole in the posterior (or anterior) fontanel lies in the physiology and pathophysiology of the maxillary sinus drainage. Once the maxillary sinus has healed, it starts to drain again, and the mucous blanket comes out through its natural ostium, proceeds backward and slightly downward in the direction of the nasopharynx and, finally, is spontaneously swallowed. However, in cases with the fontanel defect, mucus moves over the lateral nasal wall, falls into the hole in the posterior fontanel, and finds itself again in the maxillary sinus. Now, it joins the normal mucous blanket, making it thicker, and continues traveling to the maxillary sinus ostium. Once all of this mucus is out the sinus and enters the nasal cavity, the process is

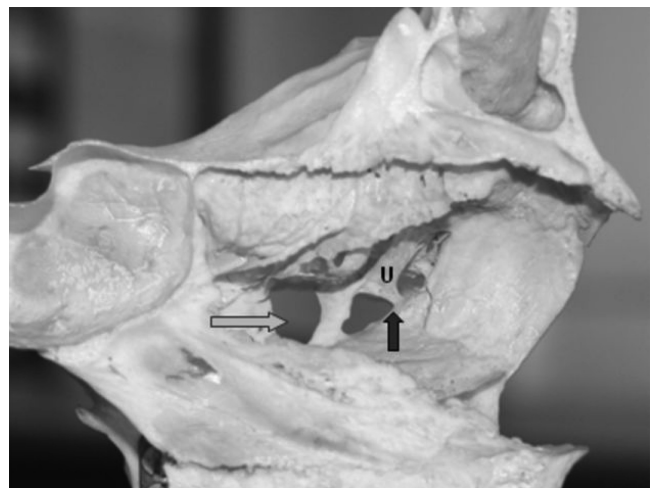


Figure 1. Medial view to the left lateral nasal wall. Black arrow, anterior fontanel divided in two separate parts by a small runner; gray arrow, posterior fontanel; U, uncinate process.

repeated. The circulating mucus rotates around the small piece of tissue, which anatomically divides the opening of the natural ostium from the hole in the posterior fontanel (the “accessory ostium”), forming a mucous ring (Fig. 5). This is what we call the Two Holes Syndrome (THS). After some time, the mucus ring becomes so thick and heavy that, owing to gravitation, at least one piece of it detaches from the main mass and slides down into the throat. In some patients, this leads to a postnasal drip.

Our department does not consider the hole in the posterior fontanel an accessory ostium but a sign of chronic maxillary sinus disease. If it was just an individual anatomic variety of no clinical importance; we should be able to find it in many subjects with otherwise healthy maxillary sinuses. However, this is not the case in our endoscopic experience. Thus, the aim of our study was to evaluate the incidence of this defect in the posterior fontanels in healthy subjects and in subjects suffering from CMS.

MATERIALS AND METHODS

Fiberendoscopy of the nose has been an obligatory method of nose examination in our department for 10 years; no rhinologic finding can

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Figure 2. Medial view to the left lateral nasal wall. 1, Uncinate process; gray arrow, anterior fontanel; white arrow, posterior fontanel.



Figure 3. Almost anteroposterior view to the left lateral nasal wall. S, sphenoid sinus; white arrow, crista galli; O, left orbit; gray arrow, posterior fontanel; black arrow, anterior fontanel; U, uncinate process.

be undersigned without this endoscopic finding. In the 9-year period from January 1999 to January 2008, we examined 8879 outpatients who presented at the department because of chronic rhinosinusitis (CRS) symptoms. None of them have undergone previous sinus surgery. All of the patients matched the internationally accepted criteria for CRS diagnosis⁶⁻⁸: they had two or more symptoms, one of which was either nasal blockage/obstruction/congestion or nasal discharge (anterior/posterior nasal drip) for a period of time longer

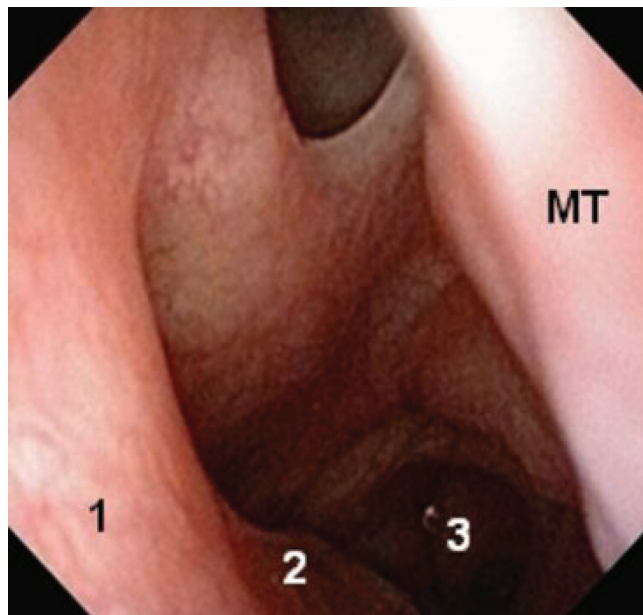


Figure 4. Right-sided defect in the posterior fontanel. 1, the "knee" of the uncinate process; 2, the horizontal part of the uncinate process; 3, nasopharynx; MT, middle turbinate.

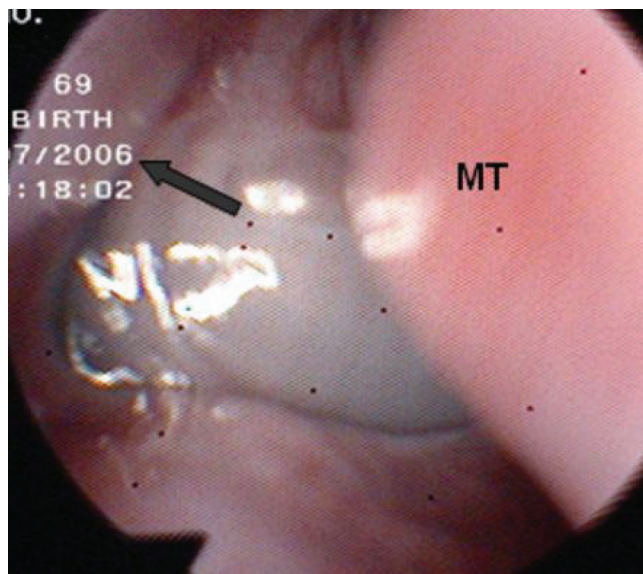


Figure 5. Right nasal cavity. Mucus ring comes out from the infundibulum and goes back to the defect of the posterior fontanel. Black arrow, uncinate process; MT, middle turbinate.

than 12 weeks. Some of them also suffered from facial pain/pressure and/or reduction or loss of smell.

According to the CT findings, 8879 patients exhibited isolated opacities and other pathological changes of the maxillary sinuses solely (CMS). There were 6823 female and 2056 male (75.7 and 24.3%, respectively) patients, aged 12–81 years (an average of 37.6 years).

The group of healthy persons consisted of volunteers from the medical students at our department during the last 9 years. The inclusive criteria for them were as follows: none of the symptoms mentioned in the international criteria for CRS diagnosis and no history of recent respiratory infection accompanied by high fever.

Fourteen hundred forty-two students were involved in the study. There were 1027 female and 415 male (71.3 and 28.7%, respectively) patients. The age was practically the same because all our students were in their last year of medical study, *i.e.*, 24–25 years of age. They practiced nasal fiberendoscopy among themselves during the clinical exercises under the supervision of a teacher. The teacher was responsible for identifying the presence of a posterior or anterior fontanel defect in the subjects.

RESULTS

CMS Patients

The defect in the posterior fontanel was found in 1713 of the 8879 patients suffering from CRS (19.3%). It was bilateral in 1165 cases (68.03%). The defect in the anterior fontanel was found in 54 patients (0.61%). The circulating mucus ring was clearly identified in 162 patients with either posterior or anterior fontanel defect (9.17%).

Volunteers

The defect in the posterior fontanel was found in 7 of the 1442 students (0.48%). It was never bilateral. The circulating mucus ring was not observed. The defect in the anterior fontanel was not found.

DISCUSSION

The defects in the region of the posterior (exclusively anterior) fontanel of the lateral nasal wall, or accessory ostia, have been described in the literature by numerous authors, especially since the beginning of the endoscopic era. These defects have been categorized as iatrogenic (surgically created) or accessory ostia (presumed to be physiological). However, they have been clinically related to chronic infection of the maxillary sinus by very few authors.^{9–11}

In our opinion, the fontanel defect is not a physiological accessory ostium because if one were needed for human maxillary sinuses, it would be naturally created in all of us through evolution. However, this defect is very rare in healthy persons, and more frequent in those suffering from CMS, which theoretically implicates disturbances in the mucociliary clearance of the related maxillary sinus. Fontanel defects could serve as maintainers of a chronic inflammation. Chronic inflammation of the maxillary sinus can, of course, act as a promoter of a bouquet of various disturbances that can bother the patient substantially, such as postnasal drip, headache, and prolonged cough. Therefore, we name this clinical situation THS. This name warns every doctor that the hole in the posterior fontanel is not just an anatomic rarity but a clinical sign that requires meticulous additional work on the patient.

The fontanel defect could be clinically important because its presence theoretically implicates disturbances in the mucociliary clearance of the related maxillary sinus and it could serve as a maintainer of the chronic inflammation. We found this anatomic entity in 19.3% of our CMS patients, and an obvious mucus recirculation was seen in 9.17%. These results are not quite in accordance with the literature that says that “accessory ostia of the maxillary sinus, located on the

lateral wall of the middle nasal meatus, are present in ~30% of the general population.”⁵ We find this number to be too high. Our results are not approximate but provide exact numbers resulting from meticulous fiberendoscopic examinations of patients’ noses over a 9-year period.

CONCLUSIONS

The defects in the region of the posterior (and only exceptionally anterior) fontanel of the lateral nasal wall have been wrongly called “accessory ostia” for years. It is about time to change the understanding and estimation of this clinical finding, because these defects have been clinically related to the chronic infection of the maxillary sinus and, therefore, should be considered as an analog of the perforations at the eardrum in cases of chronic otitis media.

The posterior fontanel defect was found much more frequently in patients suffering from CMS than in the group of healthy subjects (19.3 and 0.48%, respectively). Among the CMS patients, an obvious mucus recirculation was seen in 9.17%, which is a significantly lower figure than that reported in the literature.

The hole in the fontanel means chronic inflammation of the related maxillary sinus, which, as a focus, can promote various health disturbances that can bother the patient substantially (chronic postnasal drip, headache, and chronic cough). We named this clinical entity the THS.

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