Incidence of Concha Bullosa and Its Relationship to Nasal Septal Deviation and Paranasal Sinus Disease: A Study of Eleven Hundred Consecutive CT Scans of the Paranasal Sinuses

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Purpose
The incidence of middle turbinate pneumatization, or concha bullosa, has been described well in the literature. However, no study to date has evaluated the presence of concha bullosa and its relationship to nasal septal deviation. This study analyzes the incidence of concha bullosa and any correlation with nasal septal deviation and paranasal sinus disease.

Materials & Methods
Eleven hundred consecutive paranasal sinus CT studies obtained between 2001 and 2002 were reviewed retrospectively by three neuroradiologists. All examinations were performed for evaluation of a symptom referable to the sinonasal region. Coronal and axial images were examined in a bone window algorithm. Patients with prior surgery (98 patients) were excluded from the study. The presence of paranasal sinus inflammatory disease was identified and graded as mild, moderate, or severe. The sphenoid, ethmoid, maxillary, and frontal sinuses each were graded separately on both sides. If a concha bullosa was present, it was graded in size as small, moderate, or large. If bilateral concha were present, their sizes were compared and if one was larger it was identified as dominant. If nasal septal deviation was present, it was graded as mild, moderate, or severe. The direction of nasal septal deviation was identified as the face of the convex surface. Chi-square statistical analysis was applied to the data set.

Results
Of the 1002 patients included in the study, 581 (58%) were male and 421 (42%) were female. The median age was 47 years with an age range of 95 years. Four hundred thirty-one (43%) of patients had at least one concha bullosa. Two hundred thirty-one (49%) of these patients had unilateral concha and 220 (51%) had bilateral concha. Two hundred eleven (49%) of these patients had small concha, 181 (42%) had moderately sized concha, and 39 (9%) had large concha. Six hundred forty-one (64%) of all patients had
nasal septal deviation. Three hundred twenty-seven (51%) of these patients had deviation to the right and 301 (47%) had deviation to the left. Thirteen (2%) had a biconvex septal deviation. Seven hundred sixty-two (76%) of patients had some sinus disease present. There was a clear correlation between the presence of a unilateral concha, or a dominant concha (in the case of bilateral concha) and the presence of nasal septal deviation (p < 0.0001). Moreover, there was a significant correlation between the presence of concha bullosa and deviation of the nasal septal to the contralateral side (P < 0.0001). This inverse correlation was present regardless of the size of the concha bullosa, or degree of septal deviation. In all cases there was some preservation of the air channels between the dominant concha and the nasal septum. There was no relationship between the incidence of paranasal sinus inflammatory disease and the presence of concha bullosa (p = 0.4612).

**Conclusion**

Concha bullosa is a common anatomical variant. There is a strong correlation between the presence of a concha bullosa and contralateral deviation of the nasal septum. The fact that there is nasal septal deviation away from the dominant concha but the adjacent air channels are preserved suggests that the deviation is not a direct result of mass effect from the concha. There is no increased incidence of paranasal sinus disease in patients with concha bullosa.