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A new classification of septal deviations*

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SUMMARY

Statement of problem: *Existing nomenclatures of septal deviation deal with the deformation of the nasal septum exclusively and are rarely used in daily clinical work. The aim of this study was to develop a classification of septal deviations based upon the anatomical structures of the nasal septum and common clinical concepts.*

Methods of study: *We included patients undergoing septoplasty alone or in combination with rhinoplasty or functional endonasal sinus surgery by reason of septal deviation. Immediately after surgery, the surgeon recorded intraoperative findings of the nasal septum and the nasal turbinates in a data sheet and a standardized drawing for every patient.*

Main results: *Data from 1088 patients were analyzed. Six types of septal deviations were identified. This new classification of septal deviations was developed with special regard to clinical anatomical findings. Leading as well as concomitant pathological findings were assigned to the six types of septal deviation. The frequencies of occurrence of hyperplasia of the inferior turbinate and concha bullosa of the middle turbinate were specified.*

Principal conclusion: *The systematic assessment of relevant structures may help to develop improved surgical strategies. Furthermore, the systematic teaching of young surgeons to perform septal surgery may be facilitated.*

Key words: nasal obstruction, septal deviation, hyperplasia of the inferior nasal turbinate, concha bullosa

INTRODUCTION

Nasal obstruction is a common issue in otorhinolaryngological patients. Deviations of the nasal septum and the consequential pathological alterations of the nasal turbinates are frequently identified to cause the nasal handicap of the patients. Septoplasty for the correction of anatomical variations of the septum and reduction of the inferior turbinates by different techniques are among the most frequently used surgical otorhinolaryngological procedures [(1)].

Septoplasty is commonly regarded as an operation for beginners. Nevertheless, this surgical procedure in some cases can be a real challenge even for the experienced surgeon. A systematic classification of septal deviations based on consecutively collected data could be helpful to distinguish potentially intricate from effortless interventions at the time of planning.

In the literature we found only few efforts to classify the deviations of the nasal septum [(2-4)]. Unfortunately, no widely accepted classification had been developed for routine daily use. The intention of our study was to establish a classification of septal deviation that deals with both anatomically and clinically relevant structures of the nasal septum. Additionally, we decided to include pathological alterations of the turbinates in the analysis. Supported by clinically important information, this classification shall be applicable for routine daily use.

PATIENTS AND METHODS

Patients

We analyzed the data of all consecutive adult patients over 18 years of age who underwent septoplasty in the years 2000 – 2003 at an otolaryngological department of a secondary referral center (surgeon: HB).

Surgery and analysis

Septoplasty was usually performed in patients with septal deviation who indicated typical impairments such as nasal obstruction, nasal discharge, or loss of smell. Furthermore, septoplasty was frequently required in patients who underwent functional endonasal sinus surgery (FESS) for chronic rhinosinusitis or rhinoplasty for the correction of nasal deformities.

Immediately after surgery, intraoperative anatomical findings of the nasal septum and the nasal turbinates were documented for every patient in a standardized drawing and a data sheet. Data were recorded for the following characteristics: subluxatio of the nasal septum, inclined septum, nasal crest, vomeral spur, and high deviation. Parameter values for the nasal septum were: “to the right”, “to the left”, “no side deflection”, and “no specification”. Nasal turbinate hypertrophy and concha bullosa were described with respect to occurrence: “none”, “left side”, “right side”, and “both sides”.

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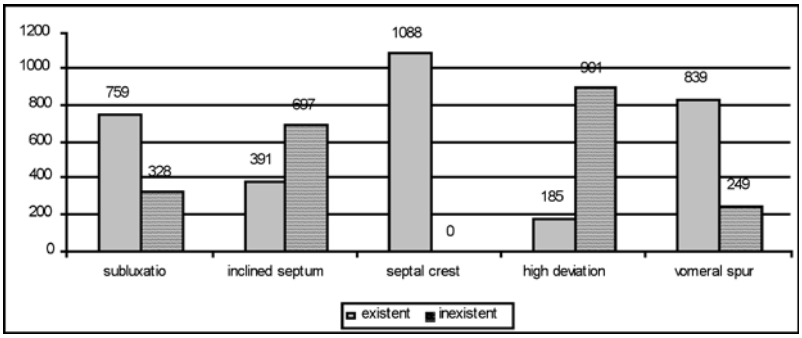

Figure 1. Frequency of different pathological alterations of the nasal septum (n=1088).

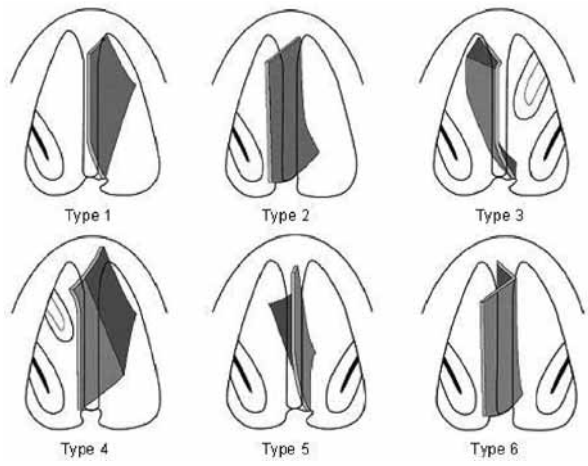

Figure 2. Six types of septal deviation.

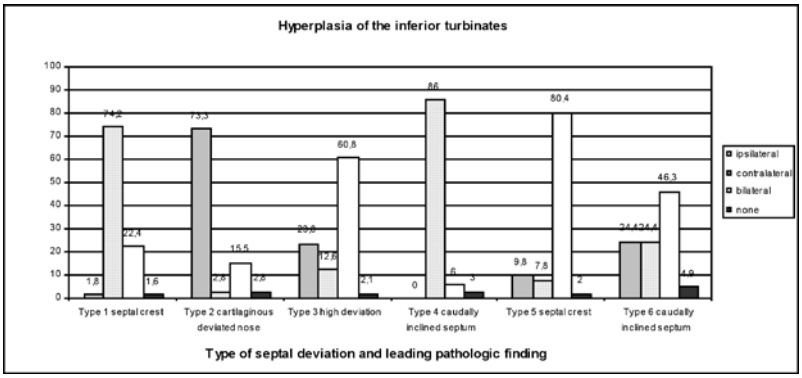

Figure 3. Frequencies of inferior turbinate hyperplasia at different types of septal deviation related to the leading pathology [%].

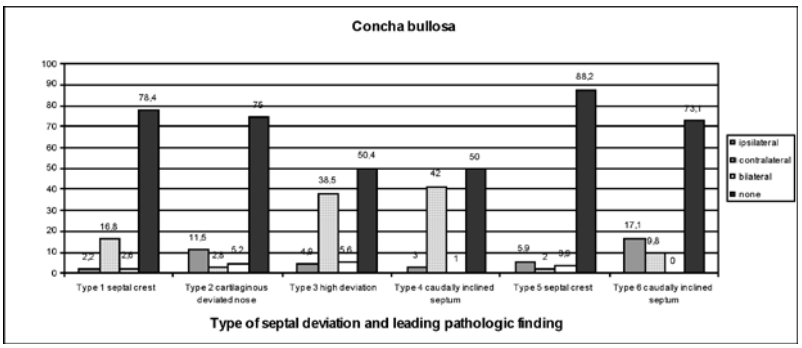

Figure 4. Frequencies of concha bullosa at different types of septal deviation related to the leading pathology [%].

Statistics

For data input we used MS Excel 2002 (Microsoft Corp.). Statistical analysis was performed with JMP 5.1.2 (SAS Institute Inc., New Carey, USA). We used descriptive statistical methods for univariate data analysis.

RESULTS

We analyzed data of 1088 consecutive patients (729 males and 359 females, ratio 2.03:1) with septoplasty. The mean age was 38.9 ± 13.1 years (range 14 – 75 years). Septoplasty was the main procedure in 512 patients (47.1%) while 180 patients (16.5%) underwent additional rhinoplasty and 396 (36.4%) had additional FESS.

A septal crest was found in all the cases. More than half of the cases featured subluxatio and vomeral spur while inclined septum and high septal deviation were seen in less than fifty percent (Figure 1).

We collected data regarding the nasal turbinates from 1067 patients. Unilateral hyperplasia was seen in 739 patients (69.3%) while bilateral hyperplasia was evident in 304 patients (28.5%). No hyperplasia was found in 24 patients (2.2%).

We defined 6 types of septal deviation (Figure 2). Leading pathologies for all the 6 types of septal deviation were identified (Table 1). Typical findings of the inferior and middle turbinates were described with respect to the leading pathologies.

Pathological changes of the inferior turbinates were seen in all 6 types of septal deviation. Ipsilateral hyperplasia with respect to the leading pathology was notably seen in type 2 while contralateral hyperplasia was frequently found in types 1 and 4. Bilateral hyperplasia was more often seen in types 3, 5 and 6 (Figure 3).

Septorhinoplasty was performed in patients with all types of septal deviation but predominantly in patients with septal deviation types 2 (60 out of 251 patients; 24%) and 4 (23 out of 101 patients; 23%). Most of these patients had a history of nasal trauma. Furthermore, septal deviation type 2 was frequently combined with a crooked nose deformity.

Concha bullosa was detected in 290 out of 1068 patients (27.2%) with bilateral occurrence in 37 patients (3.5%). In types 3 and 4 concha bullosa was seen in almost half of the cases (Figure 4).

DISCUSSION

Several efforts had been undertaken to classify septal deviations. Mladina [2,3] defined seven types of septal deviation in a cohort of 260 adults. He identified three types with vertical crests, one type with a bilateral deformity, two types with horizontal deformities

Table 1. Types of septal deviation (SD), leading and concomitant pathologies.

Type of SD	Frequency		Septal pathology		Turbinal pathology
	n	%	Leading pathology	Concomitant pathologies	
1	501	46	Septal crest	ipsilateral vomeral spur	contralateral turbinal hyperplasia
2	251	23,1	Cartlilaginous deviated nose	ipsilateral subluxatio contralateral vertical septal deviation	ipsilateral turbinal hyperplasia
3	143	13,1	High septal deviation	contralateral septal crest	bilateral turbinal hyperplasia contralateral Concha bullosa
4	101	9,3	Caudally inclined septum	contralateral subluxatio, ipsilateral vertical septal deviation, ipsilateral septal crest ipsilateral vomeral spur	contralateral turbinal hyperplasia contralateral Concha bullosa
5	51	4,7	Septal crest	contralateral vomeral spur	bilateral turbinal hyperplasia
6	41	3,8	Caudally inclined septum	contralateral subluxatio, ipsilateral vertical septal deviation, contralateral septal crest, contralateral vomeral spur	bilateral turbinal hyperplasia

and another type with atypical deformities.

Another study involving 9284 patients in South Korea did identify septal deviations in 22.4% of the patients and demonstrated a significant correlation with nasal trauma [5]. Guyuron et al. defined six types of septal deviation in a cohort of 93 patients [4]. The most frequent type was characterized by an inclined septum while further four types were described as anteroposterior or cephalocaudal C- or S-shaped deviations. A sixth type was defined as a localized deviation or large spur.

Another study investigated the localizations and the value of septal deviations in coronal computed tomography. The authors divided the nasal septum into ten segments that were assessed with respect to the direction of septal deviation. A deviation was found in one region in at least 76.2% of the 143 persons [6].

Mladina's and Guyuron's classifications solely describe the shape of the nasal septum [2-4]. In contrast, our classification was developed with regard to the anatomical structures of the nasal septum and under consideration of conventional surgical and clinical terms. Additionally, our classification regards for the first time pathological and anatomical variations of the inferior and middle turbinates.

Considering the new classification of septal deviations we found that type 1 has some aspects in common with type 5. We also found that type 4 has some characteristics in common with type 6. The vomeral spur in the types 5 and 6 was identified on the contralateral side relating to the leading pathology while it was found ipsilaterally in types 1 and 4. The bilateral but less distinctive septal deviation in types 5 and 6 resulted in bilateral hyperplasia of the inferior turbinates while the pronounced unilateral septal deviation in types 1 and 4 lead to a unilateral contralateral hyperplasia of the inferior turbinate (Table 1). Therefore, types 5 and 6 might be regarded as alternative occurring of types 1 and 4. Especially in types 4 and 6 with a caudally inclined septum as leading pathology (frequency ratio 2.5:1) trauma as the cause might be conceivable.

Septal surgery should follow the principles described in the literature [7]. Preoperative analysis of the type of septal deviation can be helpful in planning the surgical procedure. For example, cases with septal deviation type 3 should be evaluated for the potential need for an extracorporeal septoplasty. Furthermore, the surgical planning process may benefit from this classification as the pathological alterations of the inferior and middle turbinated might be considered. One important example for the latter is the high incidence of a concha bullosa in types 3 and 4.

We all learned from clinical experience, that septoplasty might be a very complicated surgery and a great challenge. Therefore, sequential training in septal surgery appears to be desirable. From our point of view types 1, 2 and 5 could be appropriate to learn surgical technique under guidance of an experienced surgeon while types 3, 4 and 6 should be reserved to experienced surgeons.

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