

# Relation characteristics of nasal septal deviations and external nasal deformities

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## ABSTRACT

**Objective:** To determine relation characteristics between nasal septal deviations and external nasal deformities.

**Materials and methods:** The study was retrospective and included patients operated at the university hospital during the period of one year. Indication for surgery was the septal deviation that causes symptoms. The external nasal deformity was an additional finding. Septal deviations were classified using Mladina classification into seven types. External nasal deformities were classified into four types: rhinokypnosis, rhinoscoliosis, rhinolordosis and combination of these types.

**Results:** There were 175 patients included in the study, 112 men and 63 women, with a median age of 32. Most frequent type of the septal deviation was type VII (47.43%) and it was followed by type V (23.43%). The most frequent type of external nasal deformity was rhinokypnosis (61.36%) and it was followed by the combination of types (29.55%). Type VII was followed by no external nasal deformity in 62 cases. 15 patients have type VII septal deviation and rhinokypnosis. Type V was followed by no external deformity in 30 cases and rhinokypnosis in 7 cases. Rhinokypnosis was followed by type VII septal deviation in 15 cases, type V in 7 cases and type III in 4 cases. The relation between nasal septal and external nasal deformities was tested using a chi-squared test.

**Conclusion:** Nasal septal deviations can appear as single deformity, but are often followed by external nasal deformities. There is not a specific pattern that assumes which particular type of septal deviation will be followed by a particular type of external nasal deformity.

**Key words:** Nasal septum, Acquired nasal deformities, Nasal obstruction

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## INTRODUCTION

The nasal septum is the major key support to the nasal cavity and the major feature of its shape. It supports the nasal pyramid and represents an inseparable complex with it. Normally, its position allows laminar nasal flow, adequate air warming and humidification and consequently a good gas exchange. So, its deviations have a huge impact on nasal physiology [1,2]. They impact the nasal flow and in long-term narrow sinonasal ostiums. It leads to respiratory infections and sinonasal problems. Those patients are mostly mouth breathers, their nose is full of crusts, they have nasal infections, sinusitis and a higher incidence of epistaxis [3]. External nasal deformities usually do not produce symptoms, and there is not unique consensus when we can say nasal pyramid is deformed. There are angles we can calculate and say that some pyramid does not fit some face, but this combination can be just that one which gives character to that face. So, the isolated septal deviation is usually a functional problem and isolated external deformity is usually an aesthetic problem [4].

Both deformities, external and internal can be congenital or acquired. Acquired are the results of trauma, infection or tumors [5]. Trauma is usually the result of sport or car accidents and it is leading cause of external nasal deformities [6].

The relationship between nasal septum and external nasal deformities is studied and found in previous studies. A long time ago Becchius said: „As goes the septum, so goes the nose“ [7,8]. Today, as external deformities alone are more often than before thanks to increasing number of traumatic events, and as the V and VI types of septal deformity are surely inherited [9, 10, 11] the question is, what kind of relationship exists between these two entities? The aim of this study is to determine what are the relation characteristics of these two deformities.

**MATERIAL AND METHODS**

The study was retrospective and included patients of both sexes operated at the tertiary care university hospital during the period of one year.

Indication for surgery was the septal deviation that causes symptoms such as impaired nasal breathing, nasal discharge or headaches. The external nasal deformity was always an additional finding. Excluded were patients whose septum was operated for other reasons such as pituitary gland resection. Operations were done under general anesthesia.

Septal deviations were classified using Mladina classification. This classification consists of seven types of septal deviations. First six are different, and the seventh one is the combination of the first six. In type I belong patients with the unilateral vertical septal ridge in the valve region that does not reach the valve itself, in type II belong those with the unilateral vertical septal ridge in the valve region touching the nasal valve. Type III implies unilateral vertical ridge located more deeply in the nasal cavity, type IV implies S-shaped nasal septum, type V implies almost horizontal septal spur while type VI implies massive unilateral bone spur. Type VII represents the combination of these types [12,13] (figure 1).

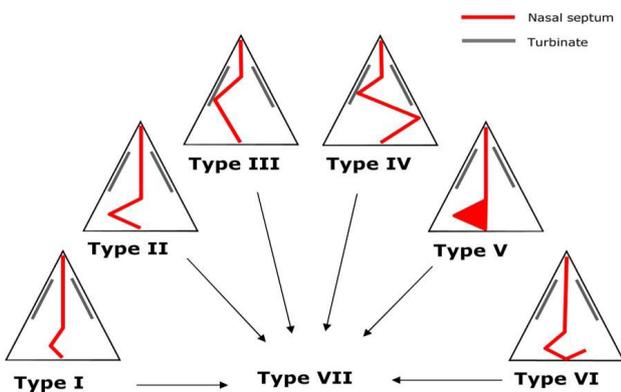


Figure 1. The Mladina classification of nasal septal deviations [13, 14].

External nasal deformities were classified into four different types [15]. Type one were patients with rhinokypnosis, type two were those with rhinoscoliosis, type three were patients with rhinolordosis. Type four were patients who had a combination of those deformities, mostly combination of rhinokypnosis and rhinoscoliosis (rhinokypnoscoliosis). Other deformities were not present during this study. Rhinokypnosis means hump nose, those patients have a hump on their nasal dorsum (figure 2).

Rhinoscoliosis represents crooked nose, the nose which is twisted and asymmetric (figure 3).

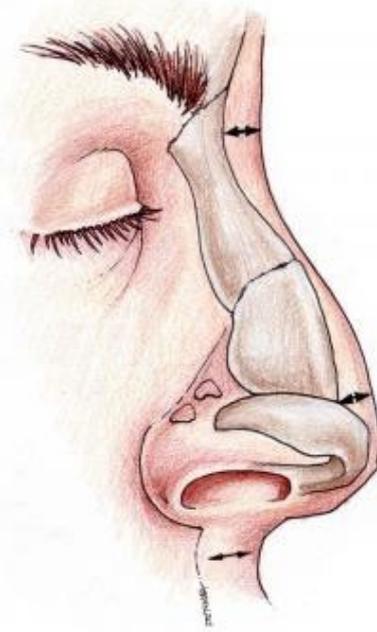


Figure 2. Rhinokypnosis/ Hump Nose [16]

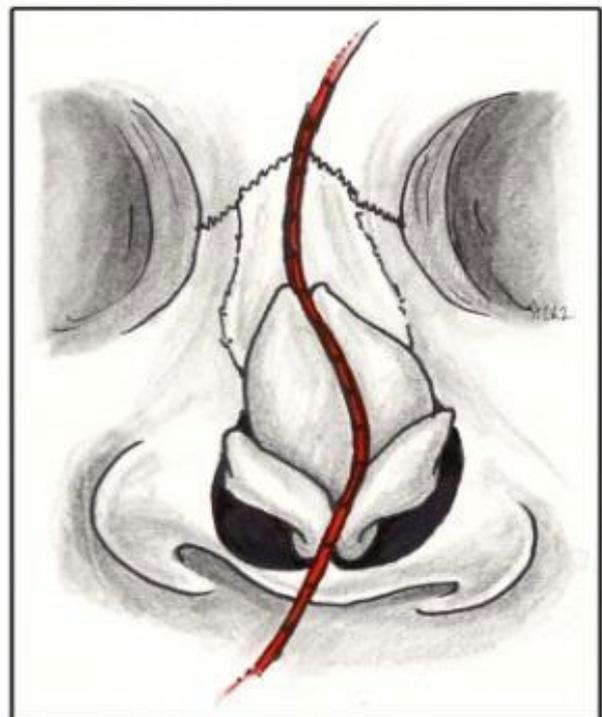


Figure 3: Rhinoscoliosis/Crooked nose [17]

Patient with rhinolordosis have saddle nos, i.e. their nose has a dent on its nasal dorsum (figure 4).

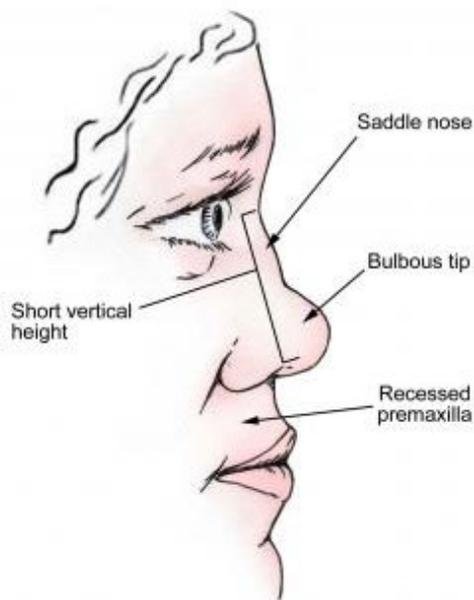


Figure 4: Rhinolordosis/ Saddle nose [18]

The all above-mentioned data about particular types of nasal septal deviations and external nasal deformities were collected, regardless of the operation procedure.

Demographic data were also collected. Compared were the frequency of the particular type of septal deviation alone and a particular type of external nasal deformity alone. Also, these two entities were also compared one with each other.

A relationship between the presence of septal deviation and external nasal deformity regardless of their particular type was sought. Also, the relationship between particular types of septal deviations and external nasal deformity was also looked for.

**Statistical analysis**

Data were analyzed using Medcalc Statistical Software version 15.8 (MedCalc Software bvba, Ostend, Belgium). The relationship between septal deviations and external nasal deformities were calculated using X

square test. A p-value less than 0.05 was considered statistically significant.

**RESULTS**

There were 175 patients included in the study, 112 (64%) of them were men, and 63 (36%) were women. The range of the years was 18 to 71 with a median of 32. Dominant symptoms in 110 patients (62.86%) were impaired nasal breathing while 65 patients (37.14%) had also symptoms of paranasal sinuses involvement such as a headache and postnasal discharge. Hypertrophic inferior turbinate was found in 62 (64.57%). 68 (38.86%) patients had a right-sided deviation, 56 (32%) had left sided deviation and 51(29.14%) patients had both sided deviation. Results are shown in tables 1-4.

Table 1: Number of the patients with a particular type of the septal deviation

Type of septal deviation	Number of the patients	Percentage (%)
I	0	0
II	5	3
III	38	22
IV	0	0
V	41	23
VI	8	5
VII	83	47

Table 2: Number of the patients with a particular type of the external nasal deformity

Type of external nasal deformity	Number of the patients	Percentage (%)
Rhinokyphosis	27	61
Rhinolordosis	3	7
Rhinoscoliosis	1	2
Combination of these types	13	30
Total	44	100

Table 3: Relation characteristics of septal deviation and external nasal deformities

Number of patients with particular type of external nasal deformity	Number of patients with particular type of nasal septal deviation according to Mladina classification							Total	P value (Chi-square and Fisher exact test)
	I	II	III	IV	V	VI	VII		
No deformity	0	5	31	0	30	3	62	131	0.01
Rhinokyphosis	0	0	4	0	7	1	15	27	
Rhinokyphoscoliosis/Combination	0	0	3	0	2	4	4	13	
Rhinoscoliosis	0	0	1	0	0	0	0	1	
Rhinolordosis	0	0	0	0	1	0	2	3	
Total	0	5	39	0	40	8	83	175	

Table 4: Relation characteristics of type VII nasal septal deviation and rhinokyphosis

Type of deformity	Patients with nasal septal deviation type VII	Patients without nasal septal deviation type VII	Total	P value*
Patients with rhinokyphosis	15 (12.81%)	12 (14.19%)	27	0.3577
Patients without rhinokyphosis	68 (70.19%)	80 (77.81 %)	148	
Total	83	92	175	

## DISCUSSION

The incidence of the deformations of the nasal septum and pyramid is on a steady rise. This is primarily due to the increase in the number of traumatic events such as car accidents and injuries in sports activities. The main actors of these activities are usually men, which explain the men predominance found in this study. Similar results are found in other studies, 1.7:1 in the study of Sam A. et al. [8], 1.8:1 in the study of Jin HR. et al. [15], and 2.2:1 in the study of Janardhan RJ. et al. [19]. Also, these patients are pretty young because younger people have more often traumas and more often decide to be operated, which was also found in other studies: 34.7 [10], 31.5 [20] and 33.5 years [21].

Diagnosis of nasal septal deviation is based on collecting information from patients history and physical examination of the nose which ascertains also anterior and posterior rhinoscopy, nasal endoscopy and imaging [2]. Treatment modalities include septoplasty alone with or without rhinoplasty, rhinoplasty alone is rare operation. Along with septoplasty, often is turbinectomy- a reduction of inferior turbinate with or without the CO<sub>2</sub> laser. Namely, inferior turbinate tends to hypertrophy to fill all of the empty space caused by septal deviation.

In this study, Mladina classification system (figure 1) for nasal septal deviations is used. He divided deviations into two main groups: so-called "vertical" deformities (types 1, 2, 3 and 4), and "horizontal" ones (types 5 and 6). The seventh one is the combination of these six. Besides Mladina, Rao et al. used also a similar classification system that included seven septal deviations types [21,12]. Most of the authors classified nasal septal deviations based on common deviation patterns such as S-shaped deviations, C-shaped deviations and septal tilt [22]. Lawson suggested classification twisted nose into two types: C-shaped and S-shaped twist [23]. Lee and Baker explained S- and C- shaped deviations in two plains: horizontal and vertical [24]. Guyuron divided septal deviations into six categories and included C- and S-shaped deviations in two directions (cephalocaudal and anteroposterior) as well as a localized deviation with septal tilt and nasal spur [20].

Most frequent type of the septal deviation found in this study was the type VII which was also found in the study of Sam A. et al. (29%) [8], while Janardhan et al. [19] found type V as the most frequent type (45 % of cases).

External nasal deformities were also classified by many authors [22, 20]. In this study, we used very common and simple classification system which is very describing and easy to remember. It divides external nasal deformities into four basic types and also mentions other types, which are rare and were not presented in this study. Three basic types are rhinokyphosis, rhinoscoliosis, rhinolordosis and fourth is a combination of these types. Other, rare deformities are different abnormalities of the nasal tip and they were not found in this study [13]. Other often classification is from Jang et al. They classified external nasal deformities into five types based on the orientation of bony pyramid and cartilaginous vault to each other. First type: a straight tilted bony pyramid with a tilted cartilaginous vault in the opposite direction ; second type: a straight tilted bony pyramid with concavely or convexly bent cartilaginous vault; third type: a straight bony pyramid with a tilted cartilaginous vault; fourth type: a straight bony pyramid with a bent cartilaginous vault; fifth type: straight tilted bony pyramid and tilted cartilaginous dorsum in the same direction [25].

The most frequent type of external nasal deformity was rhinokyphosis and was mostly followed by type VII nasal septal deformation. Using the Chi-square test to test this relationship, we found it not significant (Chi-square 0.8457; p=0.3577; not significant at p<0.05). That means that these deformations do not certainly need to present together. The general relationship between the nasal septal deviations and external nasal deformities was tested using chi-squared and Fisher exact test, and it was found statistically significant (chi-square=29.733, p<0.05). That means that presence of septal deviations is larger in a group of the patients with external nasal deformities than in the group of the patients without these deformities. So, these deformities do track each other, but there is not a specific pattern of deformity combinations.

The main disadvantage of the study is its retrospective nature. Some data are missing. The prospective study would allow measuring the life quality with different questionnaires, which would give better insight into the real local and psychophysical status of these patients. This could help us to plan the treatment in the way to help these patients in general, improving, besides their health, their life quality.

These results are important because they point those nasal septal deviations are often accompanied by external nasal deformities. We need to consider these deformities together, we need to think about one deformation when there is another one presented. There is not a specific pattern of the combination of the nasal septal and external nasal deformities.

Future perspective should take into consideration the patients who have been operated for example ten years ago. They should be inspected and their internal and external nasal status should be compared with their status before the operation and with operation done. That would facilitate to answer the eternal question, do we really need to operate nasal pyramid in every single case although, in a lot of them, it is a just aesthetic problem? Or, for the nasal function, operating the nasal septum and pyramid together is crucial?

## CONCLUSION

Nasal septal deviations can appear as single deformity but can be also followed by external nasal deformities. Different types of nasal septal deviations are followed by different types of external nasal deformities. Treating these two conditions together may improve the surgical outcome and the patient's life quality.

## DECLARATION OF INTEREST

The authors declare no conflicts of interest.

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