

The role of maxillar morphology in the development of pathological septal deformities

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SUMMARY

As a rule some kinds of nasal septum deformities are more frequently found in subjects whose maxilla has more or less stressed morphological irregularities than in those with a normally shaped maxilla. The subjects with asymmetry between the nasal floor levels (the right and left side) show heavier septal damages than others. It means that a regularly shaped maxilla as well as a symmetric nasal floor serve like a fuse against the more severe deformations after nasal trauma. In this paper we have made a classification of the septal pathological deformities.

INTRODUCTION

The influence of the maxillar morphology on development of septal deformities is undoubtedly very strongly connected with various growth irregularities (Goldstein, 1936; Scott, 1967; Ballard, 1975; Gray, 1977).

The maxillar palatal processes which, in fact, are the support for the nasal floor, grow in combination of two parallel events: the apposition of a new bone tissue all over the oral surface and its resorption on the nasal side. The final result is the palatal descending.

If descent of the nasal floor is backward on either the left or the right side during the development of the nose, it enlarges the possibilities of various changes in the intermaxillar bone posture.

Furthermore, those changes are the elementar precondition for luxation of the septal palatal edge towards the lower side of the nose cavity floor (Gray, 1977). Since those subjects who have had more or less stressed morphological irregularities of the maxilla more frequently showed some kind of septal deformity than those with the normally developed maxilla, we examined this phenomenon in more detail. Firstly, a classification of the most frequent pathological septal deformities has been made.

CLASSIFICATION OF THE PATHOLOGICAL SEPTAL DEFORMITIES

This division includes seven types. The first three are related to unilateral "vertical" deformities, the fourth is bilateral (to both sides), the fifth and the sixth are

concerned with the "horizontal" deformities and the seventh one deals with so-called "atypical" deformities. This classification includes the most common and most characteristic pathological types (Figure 1).

Type 1: A vertical ridge in the valve area which never reaches nasal dorsum, and so does not disturb the valve function.

Type 2: A more definite vertical ridge is found in the valve area. It always reaches the dorsum and in that way disturbs normal valve function.

Type 3: Again only one vertical ridge, but now in deeper areas, i.e. area 3 and 4 after Cottle. It reaches the nasal dorsum.

Type 4: There are two vertical ridges reaching the dorsum, one in the valve area and the other 2-3 cm backwards and to the opposite side from the first one.

Type 5: We named this deformity the "sabre septum". Beginning from the distal part of the intermaxillar bone wings a horizontal ridge (crista basalis) rises towards the lateral nasal wall and backwards, becoming larger and larger as it gets in deeper, but permanently retaining its characteristically sharp edge (resembling the ancient Turkish sabre) and never being followed by any corresponding gutter on the opposite side of septum.

Type 6: This type consists of two horizontal ridges (cristae basales), one medial and the other lateral. The lateral one rises from the proximal part of the intermaxillar bone wings and reaches its most expressive shape in the third Cottle's area, but never sticking out so much, slightly diminishing in deeper areas. This

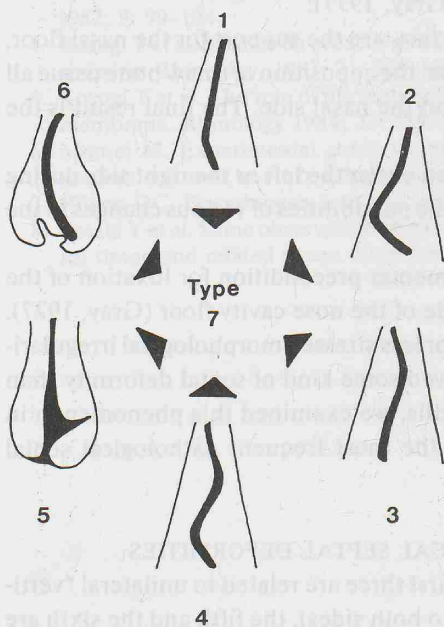


Figure 1. Simplified classification of the pathological septal deformities. The first four types are presented from the cranio-caudal view. Types 5 and 6 are presented from the antero-posterior view. Type 7 presents a combination of previous six types.

crista is always followed by the corresponding deep gutter on the opposite side of the septum.

Type 7: We called it "crumpled septum". This type consists of a number of planes lying in various angles with each other, several curves, ridges, etc. Usually it is a combination of some previously described types of septum deformities.

PATIENTS AND METHODS

The relationship between maxillar deformities and appearance of certain types of septal deformities was observed in 260 adult patients who visited our hospital in the period from January 1982 till September 1985 because of nose breathing difficulties. There were 177 (68%) men and 83 (32%) women. All of them were between 18 and 56 years old.

We made a plaster model of maxillar imprint for each patient observed. The imprints were made by a maxillofacial surgeon, signed with an Arabic numeral and sent away to an orthodont to be analysed. The orthodont was not informed about the type of the septal deformity. In this analysis all maxillas were divided into either normally or irregularly developed ones. The notion of an irregularly developed maxilla was given in case of various morphological irregularities such as deformation of the palatal vault (narrowness of the frontal maxillar segment, bimaxillar narrowness, crossbite, gothic palate), as well as retrusion, protrusion and deformities of alveolar arches. Two examples are presented in Figure 2. Symmetry of nasal floor levels (the right and left nasal cavity) was examined by a rhinologist using the two speculums technique (one speculum for each nose side at the same time).

Septal deformities were followed and according to the classification previously presented, signed with Arabic numerals corresponding to plaster maxillar imprints.

RESULTS

Our first results are about the relationship between the frequency in which septal deformity types occur in subjects who, according to their anamnestical data, have suffered from at least one nasal trauma. In general we found the following results: Types 1 and 2 (resp. 20% and 25%) were most commonly found. Slightly less frequent was the occurrence of type 6 (17.3%), type 5 (14.2%) and even less frequent type 7 (12.6%). Type 3 (3.4%) and type 4 (6.9%) were rarely found. In the group with positive data about nasal trauma types 1 and 2 were also frequently found (resp. 22.5% and 30.2%) and somewhat less frequent types 5 (17.6%) and 7 (16.8%). Types 4, 6 and 3 (resp. 5.7%, 4.3% and 2.6%) were seldom found. Contrary to this we found in the group with negative data about nasal trauma that type 6 occurred excessively frequent (58.7% of all cases). Significantly less frequent

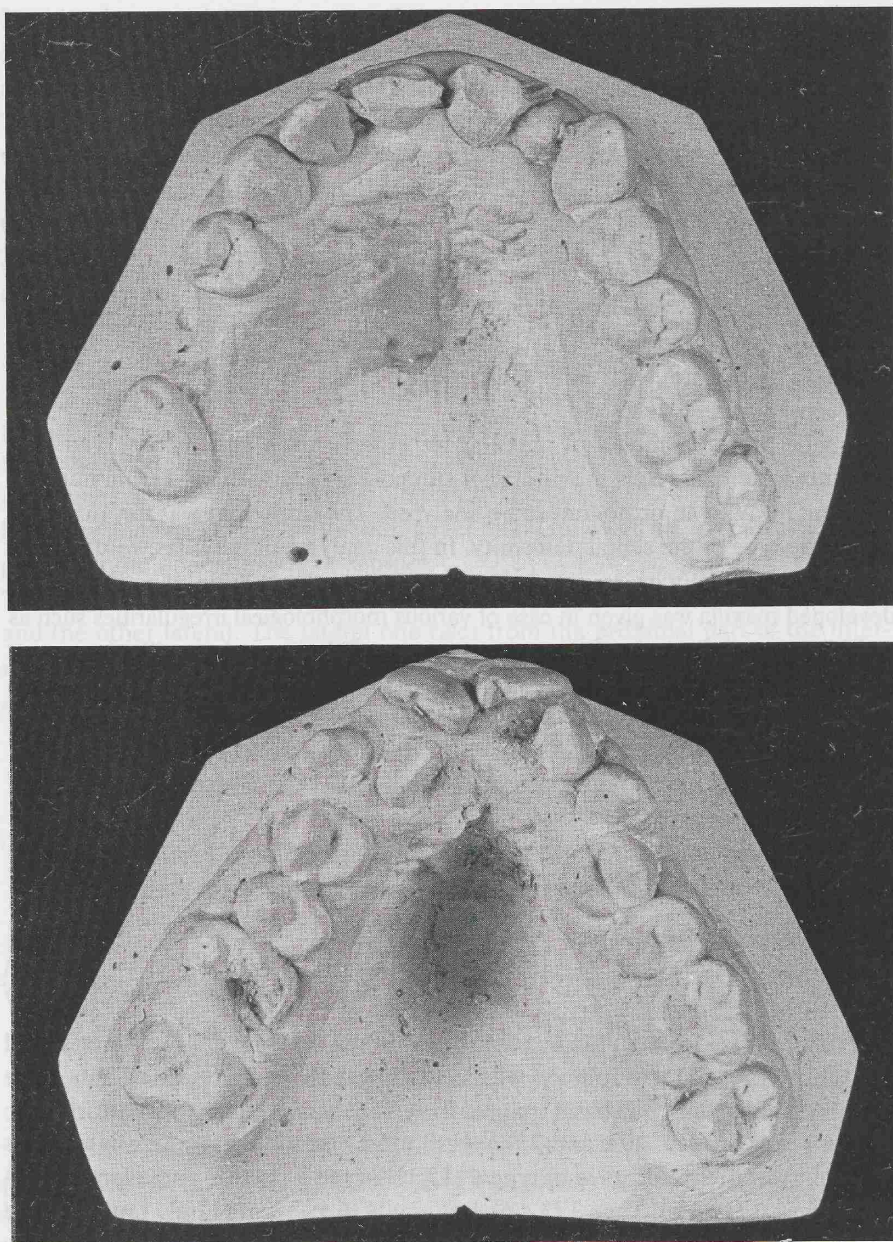


Figure 2.

- A) Deformed maxilla. Note the slope of the left palatal arch, left side maxillar narrowness and depth of entire palate.
- B) Deformed maxilla. Note the excessive depth of the entire palate, "V" shaped alveolar crist (characteristic for rickets) and slightly steeper right palatal arch.

were types 1, 2 and 4 (10.7%, 9.3% and 10.7%) (Figure 3). The distribution of all these frequencies was statistically proved ($p < 0.05$).

The maxilla was normally developed in 152 (58.4%) and deformed in 108 (41.6%) patients. The frequency in which the septal deformity types occur differs considerably between these two groups of patients. In cases of normally developed maxilla the most common types were 1, 2 and 7 again (the same relation we found in case of positive data about nasal trauma) and in cases of a deformed maxilla the most common types were 5 and 6 (Figure 4).

In addition, a group of 136 subjects with more or less stressed asymmetric levels was excluded from a total of 260 patients. In 91 subjects (66.9%) the nasal floor was higher in the right cavum and in 45 (33.1%) the left side was higher. The narrowness of the nasal cavity caused by the septal deformity was more frequent on the side opposite the side of the higher nose floor. In patients who showed equal highness of the nasal floor levels on both sides, the frequency of narrowness was almost the same in the right and left side (Table 1).

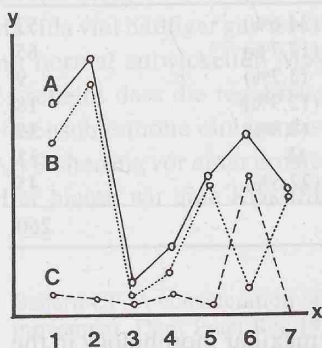


Figure 3.

X = Type of deformity.

Y = Total of subject ($n = 260$).

A = The general distribution of the septal deformity types frequencies.

B = The distribution of the septal deformity types frequencies as related to positive data about nasal trauma. Note the similarity between curve A and this one. The only difference is the existence of the gap over type 6 in curve B.

C = The distribution of the septal deformity types frequencies as related to the negative data about the trauma. Note the difference between the curves A, B and this one. The most frequent was type 6 (almost the same frequency as in the general distribution).

Table 1. The correlation between the side of the nose cavity narrowness and the side of higher nasal floor. The narrowness caused by septal deformity was more frequent on the side opposite the side of higher nose floor.

		narrowness	
		right	left
right nasal floor higher	91	21	70
left nasal floor higher	45	33	12
equal highness	124	53	71
total	260	107	153

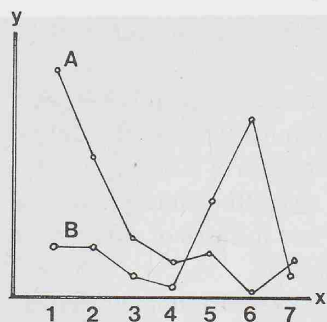


Figure 4.

X = Type of deformity.

Y = Total of subjects (n = 260).

A = The distribution of the septal deformity types frequency as related to the normally developed maxilla. Types 1 and 2 were the most common. Contrary to this, type 6 was not seen at all.

B = The distribution of the septal deformity types frequencies as related to the deformed maxilla. Most frequent was type 6, similar to the subjects with negative data about nasal trauma.

In cases of symmetric levels types 1, 2 and 7 (24.6%, 17.7% and 22.5%), and in cases of unequal levels (asymmetry) types 6, 2 and 5 (33%, 31.6% and 19.1%) were most common (Table 2).

Table 2. The distribution of the various septal deformities as related to symmetric and asymmetric nasal floor levels.

type of deformity	asymmetry	symmetry	total
1	10 (7.3%)	43 (34.6%)	53
2	43 (31.6%)	22 (17.7%)	65
3	5 (3.6%)	4 (3.2%)	9
4	2 (1.4%)	16 (12.9%)	18
5	26 (19.1%)	11 (8.8%)	37
6	45 (33%)	Ø Ø	33
7	5 (3.6%)	28 (22.5%)	45
total	136	124	260

DISCUSSION

The results of the investigations on the influence of maxillary morphology in the development of septal deformities showed that this influence really exists. This is in accordance with Quante's results (Quante, 1976).

The most prominent confirmation is type 6, in which we found a very great number of maxillary irregularities including the asymmetry of the nasal floor levels. The asymmetry of the nasal floor levels is almost always followed by some irregularities of maxillary shape. This is most frequently the case in type 6. Compared to type 6 this occurrence is two times less frequent in type 5. This difference is just as striking between type 2 and type 1 (type 2 two times more frequent). However, in cases of subjects with asymmetric levels type 6 was not found at all and type 1 was slightly more frequent than type 2.

As a rule the nasal floor is lower in the same side in which deformity (ridge, crista or their combination) exists (more than 73%).

This correspondence in findings of various nasal floor levels and parallel irregularities in the maxillar shape such as pointed out in type 6 becomes clearer if we correlate the distribution of the septal deformity types with deformed maxilla with those who showed asymmetry of nasal floor levels. It appears that the irregularities in highness of the nasal floor level correspond almost only in type 6. This fact leads directly to the presumption that the asymmetry of the nasal floor levels plays the role of a very peculiar "locus minoris resistentiae". Probably in case of the same violence intensity and direction towards the nose subjects with a symmetrical relation between two nose sides will have a milder degree of damage (causing deformity) than subjects with asymmetry.

It simply means that in the case of asymmetry a certain space surplus exists. There is a plenty of room which allows more dislocation of the palatal septal edge (type 2, for instance). Regularly developed maxilla as well as the symmetry of the nasal floor levels are some kind of protection against deformities by violence. They are a protection against severe damages of the septal skeleton.

ZUSAMMENFASSUNG

Etliche klinische Beobachtungen haben herausgebracht, dass bei den Subjekten mit mehr oder weniger betonten morphologischen Unregelmässigkeiten der Maxilla viel häufiger gewisse Arten von Missbildungen auftauchen als bei denen mit normal entwickelten Maxilla.

Es scheint dass die regelmässig entwickelte Maxilla, sowie die Symmetrie der Nasensohlenhöhe einigermaßen Protektion bieten gegen Gewaltwirkung, eine Art Sicherung vor einer ernsten Septumverletzung, sowie deren Nachwirkungen. Hier bieten wir eine Klassifikation pathologischer Septummissbildungen dar.

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