Developmental Aspects of the Deviated Nose -A Verwoerd Study-

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A 'Deviated Nose' how and why such a deviation can develop and whether abnormal development should be corrected in order to prevent progression?

Postnatal growth of the human nose

From birth to adulthood, the nose, as a part of the viscerocranium, grows, and does so over a longer period than the neurocranium. The neocranium follows the growth of the brain, which reaches 90% of its adult volume at 6 years of age. The growth of the viscerocranium does not cause until 18 to 20 years of age.

Apart from the extra growth of the viscerocranium a change in the polarity of nasal growth around puberty contributes to the development of the adult profile. During infancy and childhood, the nose predominantly grows along the anteroposterior axis after puberty however the increase in height of the nose is more important.

Specific anatomy of the infant nose

In the newborn the cartilagenous nasal skeleton is far more elaborate than in the adult. Except for the bony vomer, the neonatal septum is completely cartilagenous.

The septal cartilage shows specific regional differences in thickness and histologic characteristics.

The upper lateral cartilages in the newborn are not triangular in shape, but look like elongated vaults on both sides of the supraseptal groove. The lower alar cartilages are already found as separate structures. The nasal bones, formed by desmal ossification, cover the cranial half of the cartilagenous nasal roof.

Postnatal changes in anatomy of the human nasal skeleton

At birth the cartilagenous nasal skeleton is a 'T-bar' like structure, extending from the skull base to the

tip of the nose. The later development of this cartilage is characterized by simultaneous processes of growth, ossification, regression and remodelling. The cephalic parts of the dorsolateral cartilages gradually disappear, leaving the comparatively much smaller upper lateral cartilages in the adult stage. The cartilagenous nasal septum shows at the same time growth and ossification. Small centres of ossification, present in the superior part of the septal cartilage at birth, merge and extend in ventrocaudal direction, as the perpendicular plate. Finally, the cartilagenous septum is reduced to the anterior half of the nose.

Mechanisms of nasal growth

Some conclusions on the mechanism of nasal growth derived from experimental studies are:

- (1) Septal and upper lateral cartilages are not separate structures but form one anatomic entity.
- (2) The straight outgrowth of the nose is primarily dependant on the integrity of the upper laterals, the increasing height and length of the nose are determined by the growing cartilagenous septum.
- (3) Maldevelopment of the dorsoseptal cartilage causes maldevelopment of the nasal bones and the vomer.
- (4) The cartilagenous septum is a structure under stress. By virtue of this stress, the growing cartilage can expand the framework of surrounding structures.

Deviations of the septum and nose in children

Maldevelopment of the nose can find its origin in abnormal growth of the dorsoseptal cartilage or abnormal conditions of the framework, or both.

In clinical practice septal deviation in children can be classified in one or more of the following types:

- (i) Septovomer disjunction (ridges, spines), the most frequent malformation in young children.
 - (ii) Bending of the septum, the number of patients with a curved septum, often combined with a septovomer disjunction, increases with age; from 10 to 15% at 5 years to 60% at 20 years.
 - (iii) Angulation, being the result of a fracture of the septum between the most anterior, mobile part and the more posterior part.
 - (iv) Bizarre malformations, probably all due to trauma.
- (1) Postpone septal (rhino) surgery in children if possible until after the adolescent growth part.
 - (2) Respect the connection of the septal cartilage to the perpendicular plate, the anterior nasal spine, and adjacent part of the vomer.
 - (3) Do not separate the upper laterals from the septum, this weakens the T-bar constructing of the dorsoseptal cartilage.
 - (4) Reimplant crushed cartilage to prevent perforations and the formation of nongrowing scar tissue.
 - (5) Angulated caudal parts of the septum can be corrected and put back into the midline, preferably before they induce a malformation of the tip.
 - (6) In treating a fresh trauma try to correct the dorsoseptal cartilage by a less invading technique. Be sure that the fractured bony fragments do not impede the expansion of the elastic dorsoseptal cartilage.
 - (7) Mobilization of the nasal bones by osteotomies, sometimes necessary for surgical treatment of dorsum fistulas, and other conditions, does not disturb further development as long as the underlying dorsosepta. Cartilage remains untouched.

Surgery and growth

some useful information has been gathered from a series of experience :

- (1) Elevation of the mucoperichondrium (on one or two sides) has hardly any consequences for further growth of the cartilaginous septum.
- (2) An incision perpendicular to the axis of predominant growth is invariably followed by an immediate overlap of the cut edges, due to the stress in the cartilage, which later form angulations at the site of connection.
- (3) Resected and immediately reimplanted parts of the septal cartilage continue to grow, which also results in angulations at the connection with the neighbouring parts of the cartilaginous septum.

Septal (Rhino) surgery in children

Considering the various data presented herein, the following points are reviewed :

References

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Conclusion

In childhood functional, infectious, aesthetic and social problems can result from a deviated septum and nose, further research on the anatomic development, the mechanism of growth, and the process of wound healing is needed to develop surgical techniques that not only correct the present problem but also ensure the further normal growth of the septum and nose.