

The nasal septal cartilage in the newborn

J. van Loosen, H. L. Verwoerd-Verhoef and C. D. A. Verwoerd,
Rotterdam, The Netherlands

SUMMARY

The largest part of the nasal septum in young children is cartilaginous. It was established that the cartilaginous septum shows a specific pattern of regional differences in thickness and histologic differentiation. The possible meaning of those phenomenons for growth and support are discussed.

INTRODUCTION

In neonates and young children it is well-known that the nasal septum is mainly cartilaginous (Cleland, 1861; Hillenbrand, 1933; Scott, 1953). However, the morphological and histological characteristics of this septal cartilage at a young age have scarcely been studied.

In rabbits it has been demonstrated that the cartilaginous septum shows a specific pattern of regional differences in thickness and histological differentiation (Meeuwis e.a., 1985).

The present study was designed to investigate whether such a pattern of regional differences also occurs in human neonates.

MATERIAL AND METHODS

The nasal septum of three apparently normal human neonates, stillborn after a pregnancy of 36, 38 and 42 week respectively, were examined.

After a block dissection as described by Melsen (1977) including the nasal septum, part of the hard palate, the cribriform plate and the sphenoid bone, serial sections (5μ) were cut in the transversal plane and stained with haematoxylin and azophloxin. According to a photographic lateral view of the prepared septum (Figure 1), sections (1:200) were used for three dimensional reconstruction (magnification factor $10\times$). The thickness measured in the septal cartilage is represented on a grid-coded diagram of the reconstruction (Figure 2).

RESULTS

The thickness of the cartilage of each septum varies considerably from $\pm 400\mu$ in the anterior area to $\pm 3500\mu$ in the posterior region.

The cartilage increases in thickness from the anterior to the posterior side and towards the free ridge of the columella (Figure 3). In all specimens there is a

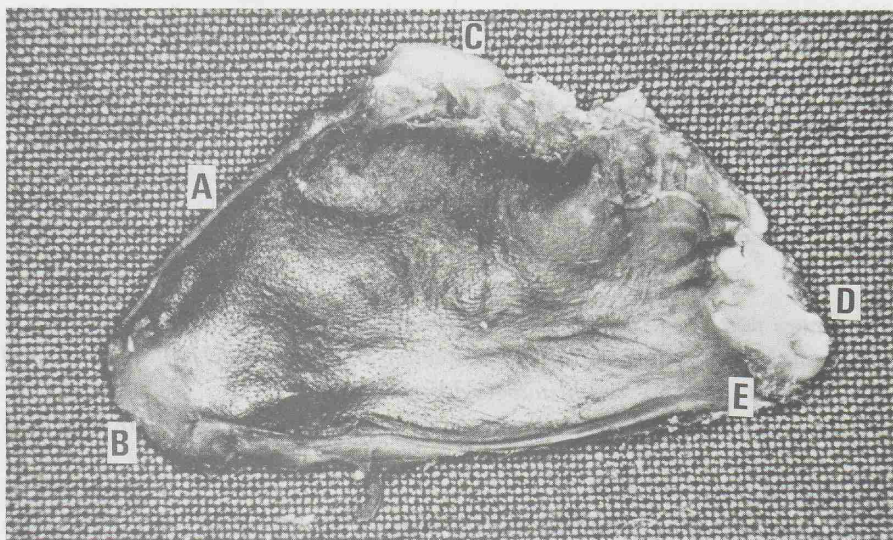


Figure 1 The fully prepared septum of a 42 week old neonate. Nasal dorsum (A), anterior naris (B), crista galli (C), sphenoid (D), choane (E).

significant difference in histology between the thin part anteriorly and the rest of the septal cartilage. The central, thin area consists of small, round chondroblasts with dense prominent nuclei, centrally located in the cells (Figure 4, Figure 5). The presence of "twin-cells" lying in one lacuna indicates a proliferative activity.

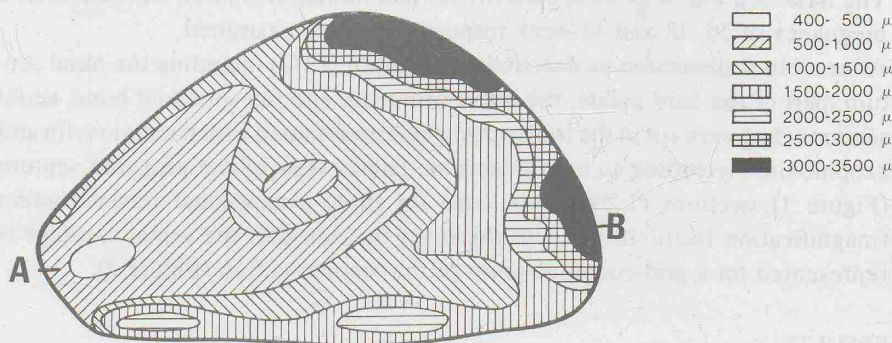


Figure 2 Grid-coded diagram representing the thickness of the nasal septum. The anterior thin area on the left, the lamina cribrosa on top and the sphenoid on the right side. The thickest part being at the lower rear end of the sphenoid and at the lamina cribrosa. (A-B) Level of histologic section illustrated in Figure 3.

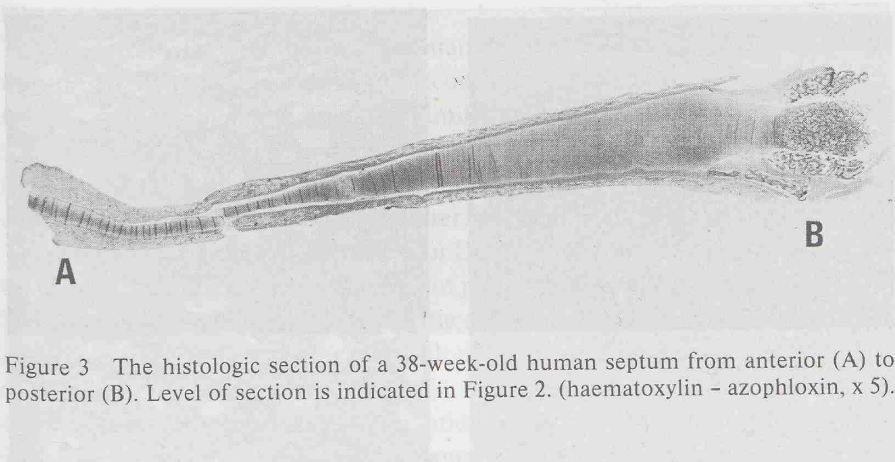


Figure 3 The histologic section of a 38-week-old human septum from anterior (A) to posterior (B). Level of section is indicated in Figure 2. (haematoxylin - azophloxin, x 5).

The cellularity in the remainder of the nasal septum is characterized by hypertrophic chondrocytes with eccentric nuclei (Figure 6, Figure 7) In the most dorsal region the process of ossification is demonstrated by lacunae varying in size and invaded by connective tissue full of bloodvessels and by deposition of bone (Figure 8).

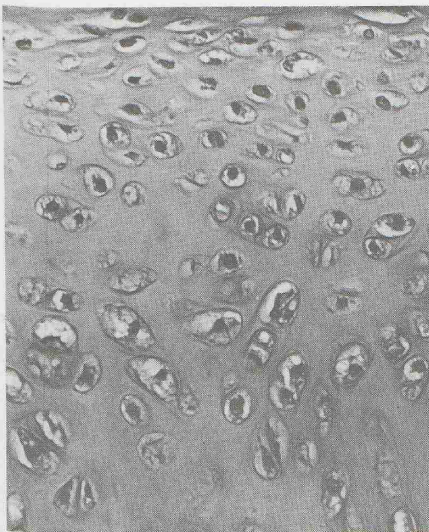


Figure 4 The anterior thin part of the cartilaginous septum covered by a thin layer of perichondrium (A), under which a peripheral zone with small, round chondroblasts (B) (haematoxylin - azophloxin, x 80).

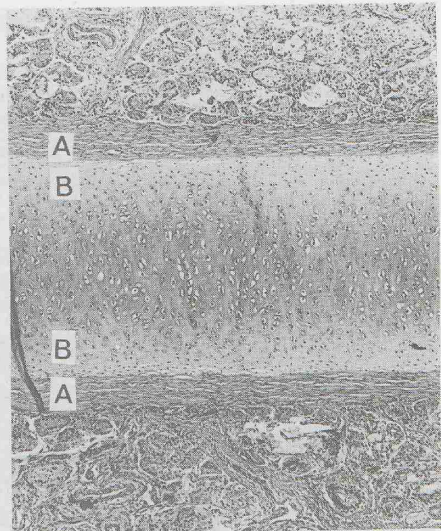


Figure 5 Anterior thin part in higher magnification. Round chondroblasts with dense prominent nuclei, centrally located in the cells. The presence of "twin-cells" demonstrates proliferative activity. (haematoxylin - azophloxin, x 380)

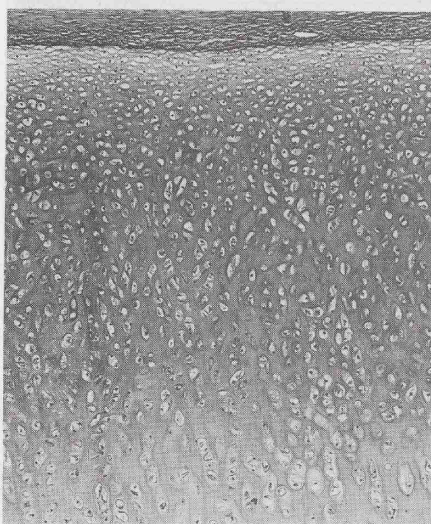


Figure 6 Mid-septal zone with hyperthrophic chondrocytes with eccentric nuclei.
(haematoxylin - azophloxin, x 80)

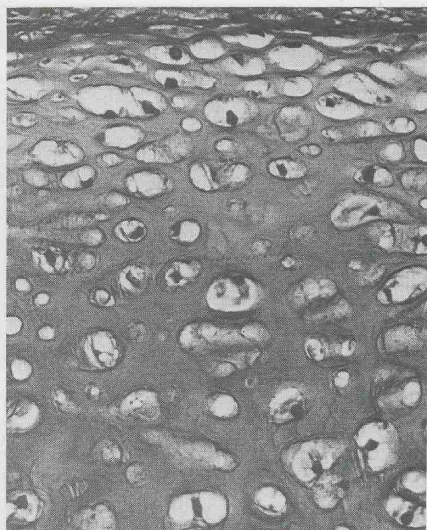


Figure 7 Same mid-septal zone in higher magnification.
(haematoxylin - azophloxin, x 380)

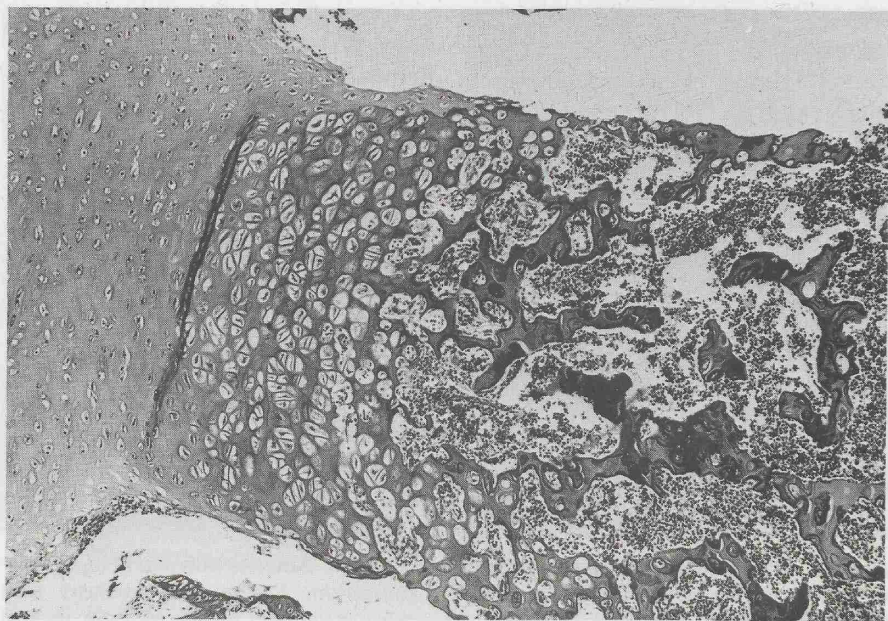


Figure 8 Most posterior region with the process of ossification. Lacunae varying in size, invaded by connective tissue full of blood elements and deposition of bone.
(haematoxylin - azophloxin, x 150)

DISCUSSION

This study demonstrates that in the human neonate as well as in the young rabbit, the cartilaginous nasal septum varies considerably in thickness according to a specific pattern which is more or less similar in both species. This observation of similarity can be a significant factor in the assessment of experimental results on the growing nasal septum in animals and suggests more than only very restricted conclusions as was mentioned by Vetter, Pirsig et al. (1984).

These findings in neonates do not favour Delaire and Precious' (1987) conception that the nasal septal cartilage is a mass of pasta in a plastic bag, flattened by a roller to give it a uniform thickness. On the contrary, the characteristic differences in thickness seem to be connected with different biodynamic conditions in the various regions of the septum.

Comparison of the histological observations made on the young child and young rabbit suggest that in both species the anterior central, thin area shows the greatest proliferative activity. The dissimilarity in between the various regions can be based on a real difference in cell-type or on a process of "ripening". The last means that at the specific sites the septal cartilage is found in variable stages of differentiation each with a special task for growth and/or support.

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J. van Loosen, M.D.
Dept. of O.R.L.
University Hospital Rotterdam
Dijkzigt
Dr. Molewaterplein 40
3015 GD Rotterdam
The Netherlands