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Anatomy of the upper lateral cartilages in the human newborn

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SUMMARY

The morphology of the upper lateral cartilages in the newborn child was studied by dissection of the nose in two stillborns. It was found that the cartilaginous nasal dorsum extends from the tip of the nose for the full length under the nasal bones and in lateral direction on the inner surface of the frontal process of the maxilla. Septum and upper lateral cartilages form a double vaulted structure as in the fetal stages. The marked differences between the neonate and adult anatomy must be respected in rhino- and facial surgery in young children.

INTRODUCTION

The importance of the upper lateral cartilages for the shape of the nose in adult patients is well known. In nasal surgery in children little or no attention is paid to the cartilaginous nasal dorsum as formed by the upper lateral cartilages and supported in the midline by the nasal septum (Huizing, 1979; Gray, 1982; Pirsig, 1986). Moreover detailed description of the upper lateral cartilages in children is lacking in anatomical literature. Only data pertinent to the prenatal period can be found. In the fetal period (Schaeffer, 1910; Wen, 1940; Hamilton et al., 1966; Bosma, 1986) a double-vaulted cartilaginous nasal capsule extends from the tip of the nose in cephalic direction to the point where it merges into the cartilaginous base of the skull. The ventral, foremost part of the nasal capsule is divided by the ingrowth of connective tissue into the alar and upper lateral cartilages from the 28th week onwards. Nasal bones and frontal processes of the maxillary bones develop by desmal ossification superficially to the cartilaginous nasal capsule. In the adult stage the upper lateral cartilages are more or less triangular in shape and are reported to extend over a variable distance (2-10 mm) under the nasal bones (Straatsma et al., 1951; Converse, 1955; Drumheller, 1973; Lessard et al., 1985). In a previous article (van Loosen et al., 1988) the specific morphology of the cartilaginous nasal septum in the neonate was reported. This study will focus on the cartilaginous nasal dorsum.

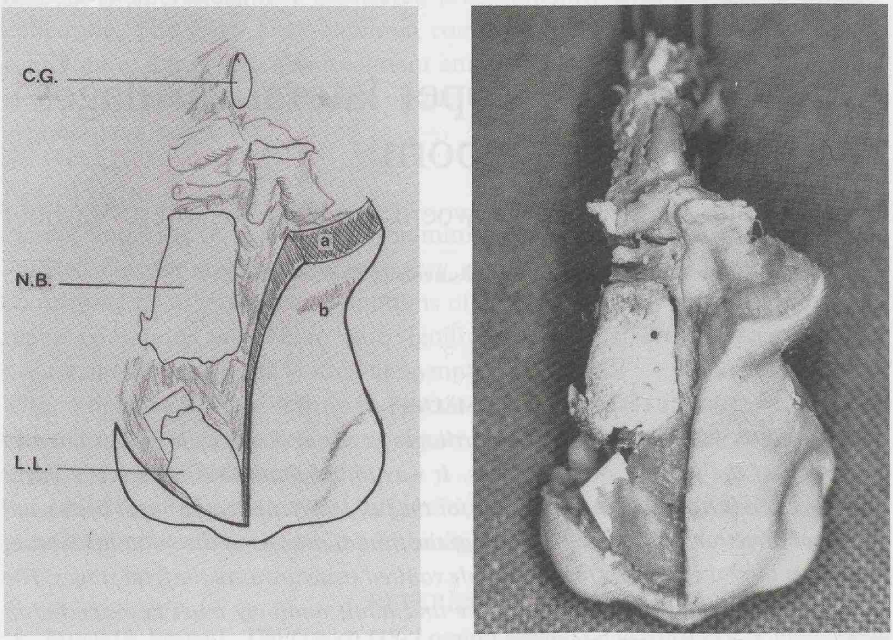

Figure 1. Cranial view of a specimen (human neonate after a pregnancy of 38 weeks) which demonstrates the lower lateral cartilage (L.L.), the nasal bone (N.B.) covered by a thick subcutaneous layer (a) and the crista galli (C.G.). The nasal groove (b) does not correspond with the frontonasal suture.

METHODS

The cartilaginous nasal skeleton was studied by dissecting the nose and surrounding structures from two stillborn human neonates without any apparent developmental anomaly, after a pregnancy of 36 and 38 weeks respectively. The specimens were fixed in a formaldehyde 10% solution within 24 hours of death. Both specimens were dissected following the same procedure. The observations in both cases were very similar. The illustrations of one specimen will be presented here.

OBSERVATIONS

Exposing the nasal skeleton by a midline incision over the nasal dorsum a thick subcutaneous layer of fatty tissue was observed, measuring 10 millimeters over the frontonasal suture and thinning out towards the tip of the nose. Thus, the facial profile in the neonate is to a large extent determined by subcutaneous fat. The nasal groove (nasion) does not correspond with the site of the frontonasal suture (Figure 1). The length of the nasal bone is slightly less than half of the length of the nasal dorsum. The inter-, fronto-, and maxillo-nasal sutures are not

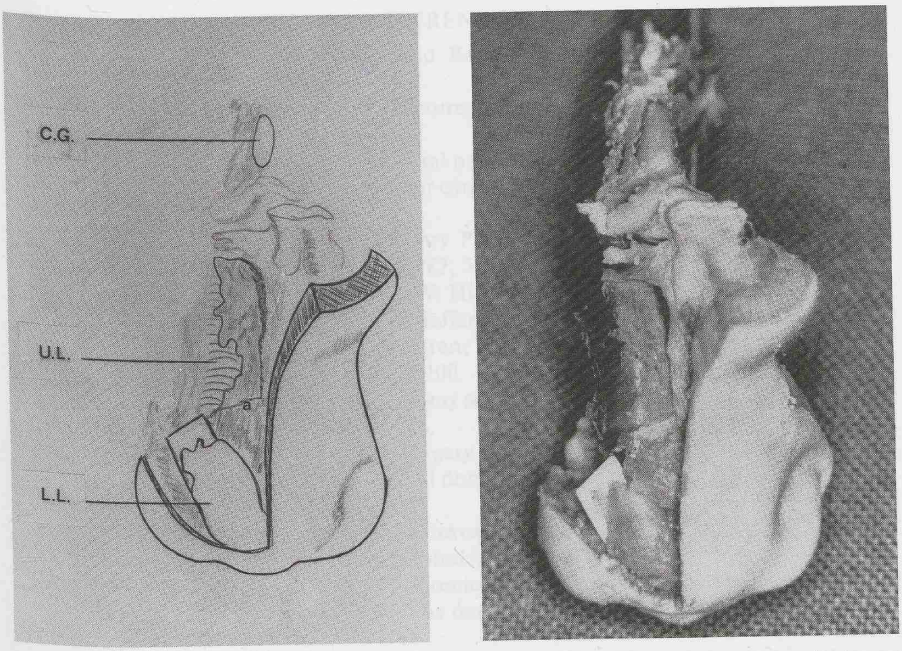

Figure 2. Cranial view of the same specimen (Figure 1) which demonstrates the lower lateral cartilage (L.L.), the upper lateral cartilage (U.L.) and the crista galli (C.G.) after removal of the right nasal bone. The perichondrium/periosteum (a) partially covers the upper lateral cartilage.

yet ossified. The edges of the piriform aperture, formed by the frontal process of the maxillary bone and the nasal bone are rather irregular.

The alar cartilage partly encompass the nasal vestibule laterally (Figure 2). The upper lateral cartilages, forming the cartilaginous nasal dorsum, appear to continue under the full length of the nasal bones and merge into the cartilaginous anterior skull base.

The upper lateral cartilages are vaulted, fusing in the midline with the cartilaginous septum and thus creating the supraseptal groove (Figure 3). In cephalic direction the convex shape of the vault is more pronounced as the supraseptal groove widens and deepens, ending in a concavity in which the nasal bones were anchored by a thickening of the posterior end on the inner surface. In lateral direction these cartilaginous vaults extend to the piriform aperture (Figure 3), even extending on the inner surface of the frontal process of the maxillary bone, forming the cartilaginous portion of the lateral wall of the nasal cavity.

The cartilaginous nasal septum extends superiorly into the cranial fossa as the crista galli (Figure 3). The crista galli is adjacent to the mainly cartilaginous and only partially ossified cribriform plate.

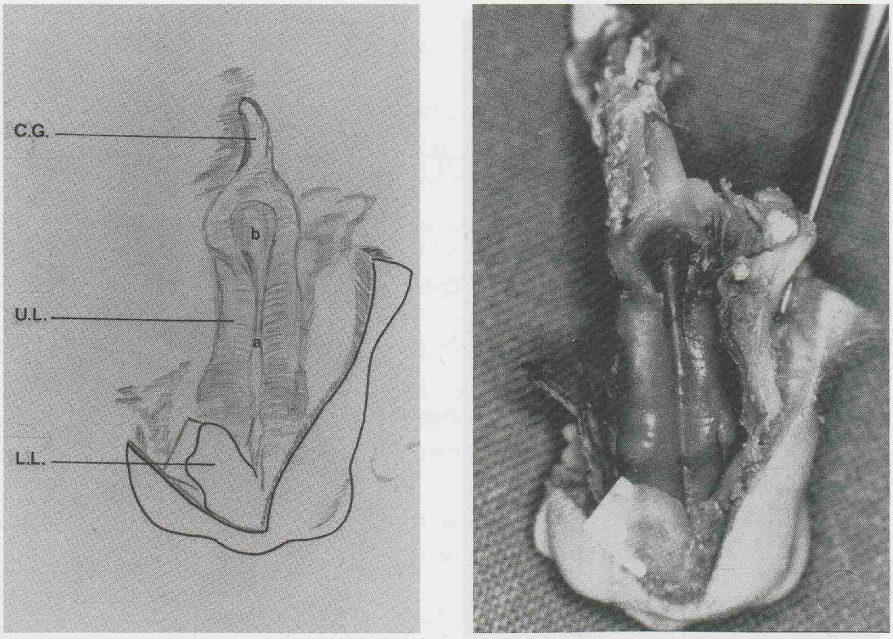

Figure 3. Cranial view of the same specimen (Figure 1) which demonstrates the lower lateral cartilage (L.L.), the upper lateral cartilages (U.L.) and the crista galli C.G.). The supraseptal groove (a) can be distinguished in the median line between both upper laterals. This groove widens cranially forming a marked convexity (b) in which the nasal bones are anchored. The upper laterals are one structure with the still cartilaginous skull base and crista galli.

DISCUSSION

From this study it can be concluded that the morphology of the upper lateral cartilages in the human newborn is highly different from that in the adult. The neonatal cartilaginous nasal dorsum extends much further in lateral and cephalic direction and merges even with the cartilaginous anterior skull base, as in the fetal stages. Consequently regression of the lateral and cephalic parts and simultaneous growth of the remaining parts must be features of the development of the upper lateral cartilages during childhood. The reported variation in the extension of the upper lateral cartilages under the nasal bones in adults (Straatsma et al., 1951) may be regarded as due to varying degrees of regression. In nasal surgery in children lateral and transverse osteotomies may involve the underlying cartilaginous structure. This could affect the further growth of the nose in view of the abnormal nasal growth produced after lesions of the upper lateral cartilages in growing animals (Poublon, 1987).

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