Trauma and Growth of Midface

Essay Submitted for Fulfillment of Master

Degree in Otorhinolaryngology By

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2013

Abstract

Every surgical procedure of the nose at this young age may cause developmental arrest.In many cases a ‘wait and see’ policy might be preferable and surgery even postponed until after the adolescent growth spurt. Unfortunately evaluation of late effects of surgery on further development requires a (long) follow-up, including the adolescent growth spurt, which seldom appears to be possible The open or external approach has the advantage that the cartilaginous nasal skeleton remains intact.

Keyword

Midrace – Otorhinolaryngology - Naso-Orbito-Ethmoid - Embryology

ACKNOWLEDGEMENTS

Above all, I would like to thank ***Allah*** who made all things possible. ***Allah*** is always there for me throughout my life. Without ***Allah***, I could not have completed this work.

I would like to acknowledge and thank all the following persons who have made the completion of this work possible.

This work would not have been possible without the help, support and patience of my principal supervisor**, *Prof. Nabil Galal***, Professor of Otolaryngology, Faculty of Medicine, Cairo University, for his advice, vital encouragement and support.

The good advice and support of my second supervisor, ***Prof. Khalid Harhash***, Professor of Otolaryngology, Faculty of Medicine, Cairo University, which make my work possible, for which I am extremely grateful.

Many thanks for my third supervisor, ***Dr. Ramez Sabry,*** Assistant Professor of Otolaryngology, Faculty of Medicine, Beni-Suef University, for his understanding, assistance and expert guidance.

Also ***my parents*** that have given me their obvious support and love throughout my life for which my mere expression of thanks does not suffice.

My apologies if I have accidentally omitted anyone to whom acknowledgement is due.

Thank you

CONTENTS

LIST OF FIGURES

LIST OF TABLES

EMBRYOLOGY OF MIDFACE

NASOSEPTAL EMBRYOLOGY

The tissue that gives rise to the face and nasal structures derives from three different embryonic sources: the ectoderm, the neural crest, and the mesoderm. The ectoderm provides an overlying cover and, through its interactions with mesenchymal layers, a pattern for developing structures. Neural crest cells provide the majority of facial mesenchymal tissue (1,2). The paraxial and prechordal mesoderm provides precursors for myoblasts that differentiate into voluntary craniofacial muscles (2). At 4 weeks' gestation, five identifiable primordial structures surround the stomodeum, a depression below the developing brain and the first sign of a future face. These five structures are the frontonasal prominence, the right and left maxillary prominances, and the right and left mandibular prominances. The maxillary and mandibular prominences lie superolaterally and inferolaterally bilaterally respectively. By the end of the fourth week of gestation, paired thickenings of ectoderm appear on the frontonasal prominence superior and lateral to the stomodeum (2). These oval placodes develop into the nose and nasal cavities (Figure .1).

During the fifth week, mesenchymes on the periphery of the nasal placodes proliferate to form horseshoe elevations. The lateral and medial limbs are termed nasolateral and nasomedial processes respectively. Mesenchymal tissue surrounding the nasal placodes continues to proliferate and thicken, resulting in a perceived depression of the

placodes. These depressions are subsequently called the nasal pits and are the primordia of anterior nares and nasal cavities (Figure. 1) (2).

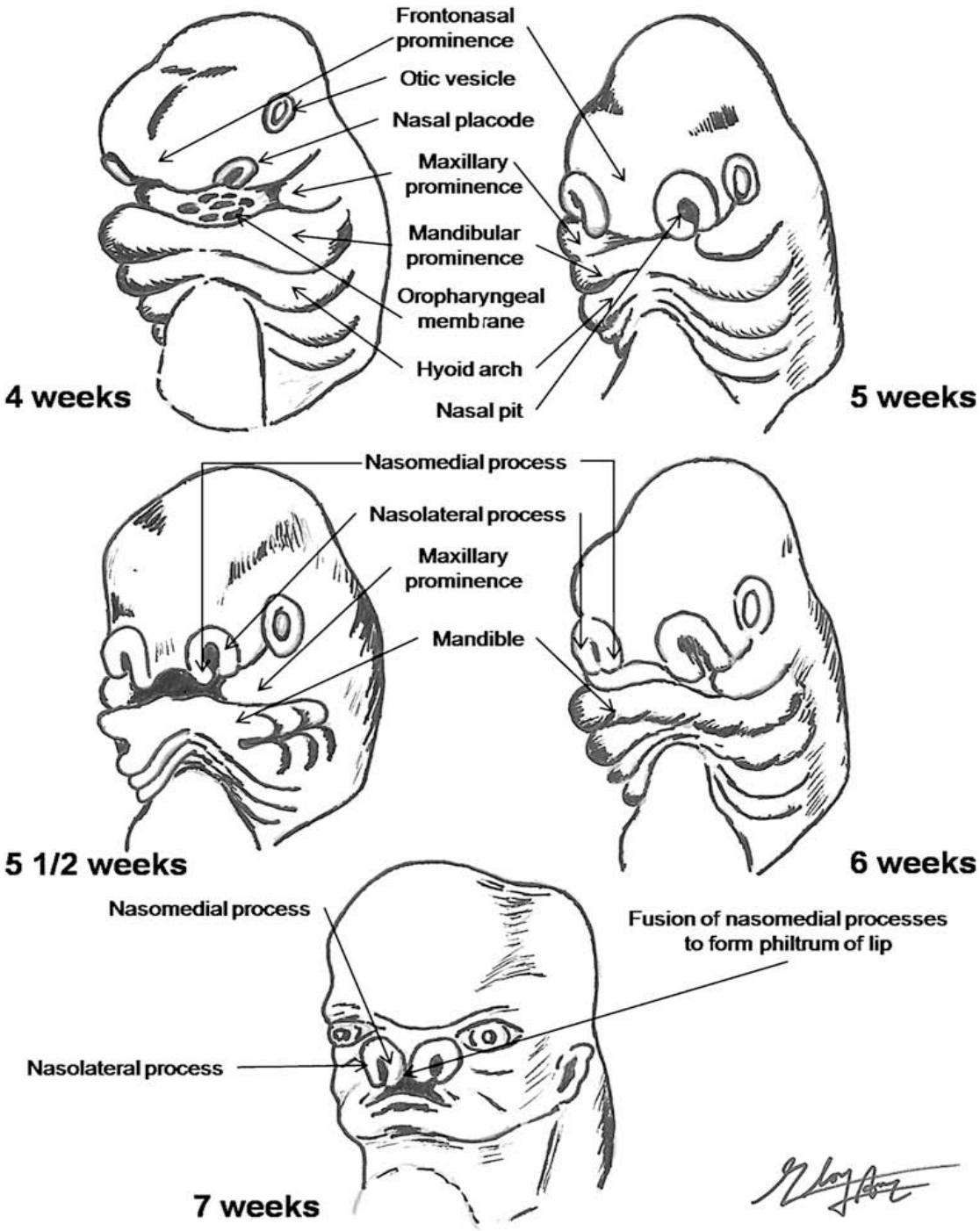

Figure .1 . Embryogenesis of the face.

From 5 weeks' gestation, the nasal pits continue to deepen toward the oral cavity. By 6 and one-half weeks, only a thin oronasal membrane separates the oral cavity from the nasal cavaties (1). This oronasal membrane subsequently disintegrates, leading to a communication to the nasal cavities posterior to the primary palate. These regions of continuity are the primordial choanae. As the palatal shelves fuse and the secondary palate develops, the nasal cavity lengthens, resulting in the junction of the nasal cavity and the pharynx (1,2). Beginning from the fourth to sixth week of gestation, the paired maxillary processes grow medially toward each other and toward the paired nasomedial processes (1). By the end of the sixth week, the nasolateral processes begin to fuse with the maxillary processes to form the ala nasi and the lateral border of the nostril bilaterally (Figure. 1). Along the junctions of the nasolateral and maxillary processes lie the nasolacrimal grooves. Ectoderm within these grooves thickens to form epithelial cords, which then detach and canalize to form nasolacrimal ducts and lacrimal sacs. By late fetal period, nasolacrimal ducts extend the medial corners of the eyes to the inferior meatuses in the lateral wall of the nasal cavity (2).

The nasomedial prominences continue to expand but remain unfused until the seventh or eighth week of gestation, when they merge with superficial components of the maxillary processes. The fusion lines between these processes are the nasal fins. As mesenchymes penetrate this articulation, a continuous union is formed, completing most of the upper lip and upper jaw bilaterally (Figure. 1). The nasomedial processes then merge with each other, forming the intermaxillary segment and subsequently displacing the frontonasal prominence posteriorly. The intermaxillary segment formed from the nasomedial processes is the

precursor to several structures, including the primary palate, the tip and crest of nose, and a portion of the nasal septum (1).

The nasal septum grows inferiorly from the nasofrontal prominence to the level of the palatal shelves following fusion to form the secondary palate (Figure. 2). Anteriorly, the septum is contiguous with the primary palate originating from the nasomedial processes. The initial site of palatal fusion occurs posterior to the incisive foramen and extends both anteriorly and posteriorly. The fusion point between the primary and secondary palate is the incisive foramen (Figure. 2) (3).

At the end of its development, the nasal septum divides the nasal cavity into two separate chambers. The nasal septum's components are the quadrangular cartilage, the perpendicular plate of the ethmoid, the vomer, the maxillary crest, the palatal crest, and the membranous septum (Figure. 3).

The tubular vomeronasal organ first appears as bilateral epithelial thickening on the nasal septum. By the fortieth day of gestation, this primordial structure has invaginated along the septum. The structure thus end in a blind pouch and subsequently separates from the septal epithelium. In other species, the vomeronasal organ is lined with chemoreceptors similar to those in the olfactory epithelium. This epithelium projects into the accessory olfactory bulb, which connects to the amygdala and other limbic centers (4).

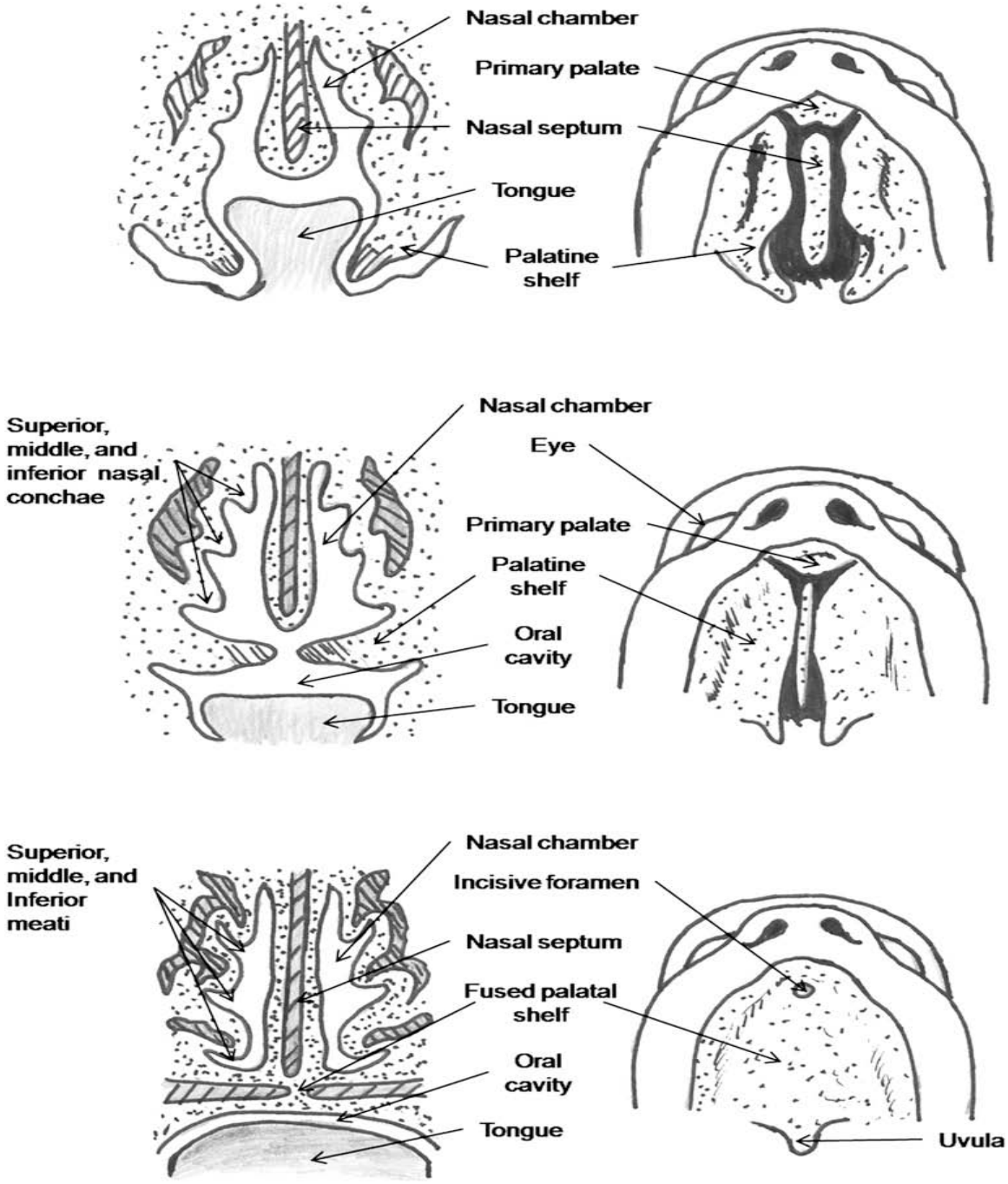

Figure. 2 . Embryogenesis of the nasal cavity and palate.

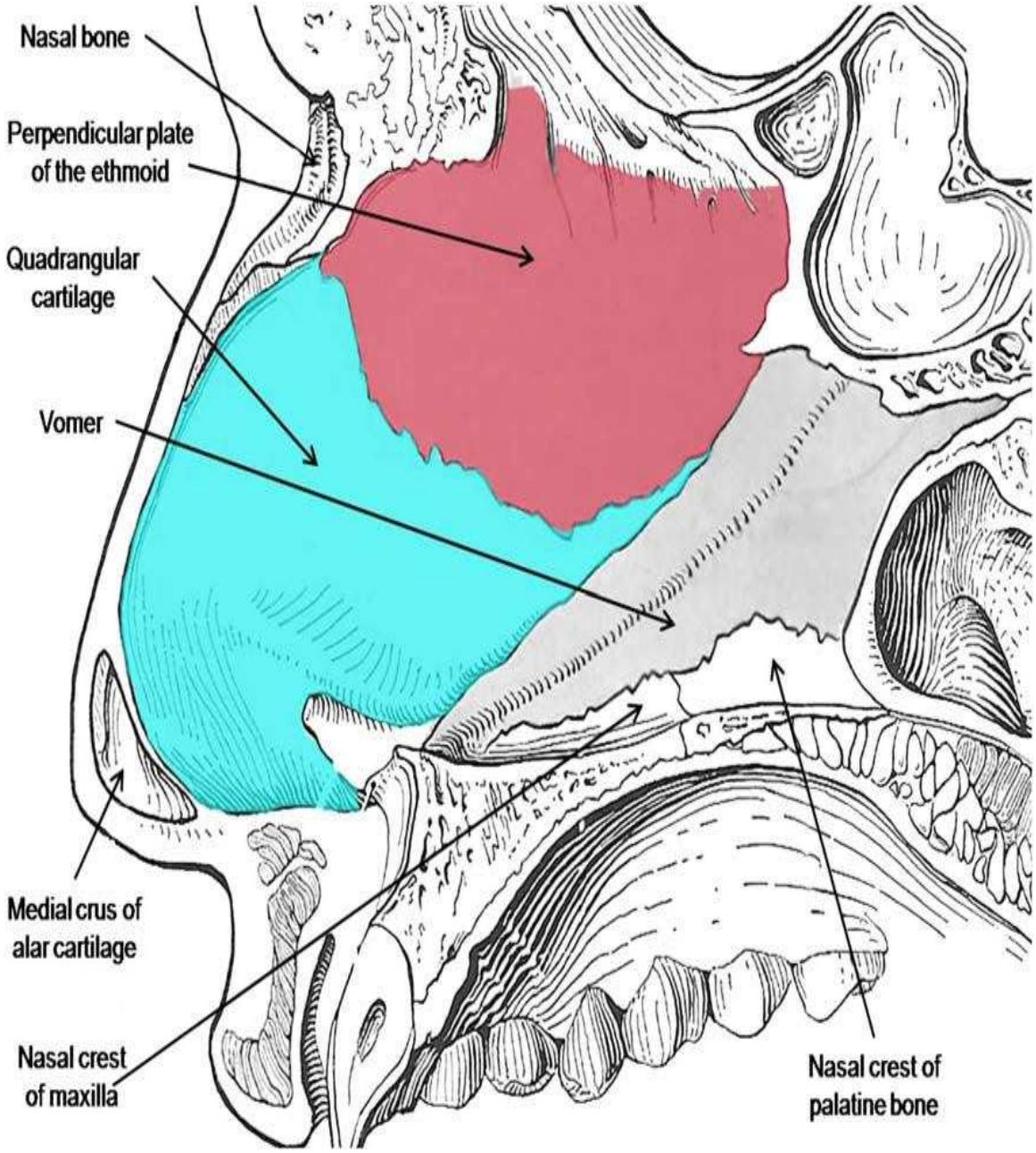

Figure. 3 . Schematic depiction of a sagittal view of the nasal septum and surrounding structures.