European Journal of Molecular & Clinical Medicine
ISSN 2515-8260 Volume 07, Issue 08, 2020

Growth Mandible Ans Temporomandibular Joint

Dr.P.Sweta,Dr.Thailavathy ,Dr.Kannan

Dr. P.SWETA,
Department Of Orthodontics,
Postgraduate, Sreebalaji Dental College And Hospital
BIHER

Dr.M.S KANNAN, MDS
Head Of The Department Of Orthodontics
Department Of Orthodontic,
Sreebalaji Dental College And Hospital
BHIER

Dr. V.THAILAVATHY, MDS,
Reader,Department Of Orthodontics
Sreebalaji Dental College And Hospital
BIHER

Corresponding author
Dr.P.Sweta
Department of orthodontics,
SreeBalaji Dental College and Hospital
BIHER
Ph no- 8754412217
Email- psweta1695@gmail.com

Abstract
Introduction
Mandible is the only movable bone of the face.It plays important role in mastificationby forming a joint with squamous part on the temporal bone .This joint is called is called temporomandibular joint. The other names ofthis joint are pivot joint,diarthrodialjoint,ginglymoidjoint. The movement produced by this joint are opening, closing, and minimal lateral movements. Abnormalities in growth of mandible can cause skeletal malocclusion and disturbance in the normal function of temporomandibular joint and the essential functions. Therefore it is important to know the normal growth pattern of the mandible and the changes that happen during the course of life. This article review about normal growth pattern of mandible and the changes taking place in mandible Prenatal development Migration of neural crest cells
Neural crest cells migrate from dorsal region of the neural folds between the surface ectoderm and the neural plate. Simultaneously there is epithelial-to-mesenchymal transformation. Neural crest cell begins migrating. After migration of neural crest cells, it is subdivided into cranial, cardiac, vagal, and trunk neural crest cells.

Formation Of Meckel's Cartilage

At the 4 th week of intrauterine life development of branchial arch's takes place. During the fifth week of intra uterine life, there is fusion of brachial arch from both the side towards the midline.

Maxillary and mandibular prominence are formed. Condensation of the cranial neural crest cell derived mesenchyme occurs at the level of the presumptive first molar. These mesenchymal cells organizes themselves to form a rod-like structure which is the Meckel'scartilage.TheMeckel's cartilage first grows ventromedial and dorsolateral on both sides of the mandibular arch and fuses at the most distal tip

Formation Of Mandible

Mandible formation takes place by two types of ossification that is s intramembranous and endochondral.Intramembranous ossification is the process of bone development from fibrous membranes.Endochondral ossification is the process of bone development from hyaline cartilagethis ossification stares on the 6 th weeks of intrauterine life from the lateral side of the Meckel's cartilages where bifurcation of inferior alveolar never takes place. The ossification stops dorsally forming lingual. Endochondral ossification takes place to form the symphysis, condyle and coronoid process of mandible.It is also classified as secondary cartilage on the 10^{th}week of IUL . The body and ramus of mandible till mandibular foramen is formed by intramembranous ossification .In the 8 th week of intrauterine life a Carrot shaped blastema of cartilage extends from ramus. This cartilages extension extends proximal to mandibular foramen and up to squamous portion of developing temporal bone developing into condyle.

Formation Of Temporomandibular Joint

The secondary condylar cartilage stares to articulate with the temporal bone on the 10 th week of IUL. At 12 week of IUL two joint cavities are delineated by intervening fibrous articular disk. The fetal disk is attaches to lateral pterygoid anteriorly. The disk runs through petrotympanic fissure posteriorly and attaches to the malleus of the middle ear. After cavity formation synovial membrane lines the joint cavities, it secretes the synovial fluid.At birth, mandibular fossa is relatively flat, and articular eminence is not developed

Postnatal Changes In Mandible

The postnatal changes in mandible mainly take place by remodeling of bone that occurs through resorption and deposition. Remodeling is followed by drift and displacement

Changes In Ramus

Initially there is resorption on the anterior border of ramus and deposition on the posterior border which also provides room for molars to erupt. Later during uprighting of mandible resorption takes place in the Inferior part, followed by deposition in the Superior part of anterior border, there is deposition in Inferior part and resorption in the Superior part of the Posterior border. Deposition takes place on the buccal surface. The remodeling on the medial surface follows an L pattern where posterior and inferior half is resorptive and anterior surface is depository

Changes in the body or corpus

In the buccal surface, deposition takes place followed by Resorption below the incisor and lingual tuberosity. Deposition of bone takes place just below the teeth followed by resorption in the inferior half of corpus Changes in the antigonial notch

Changes in ramus corpus angle produced mainly by ramus remodelling,Antigonial notch size is determined by this relationship. Closed gonial angle individuals have less prominent antigonial notch. Open gonial angle individuals have prominent antigonial notch

Changes around lingual tuberosity

Resorption takes place posterior and inferior to tuberosity to for the lingual fossa, deposition takes place on the medial surface

Changes in the coronoid process

Deposition on the medial surface, resorption on the buccal surface takes place

Changes in condyle

One Year After Birth

- reduction of condylar cartilage to 0.5 mm
- Reduction of a zone of cellular hypertrophy , zone of matrix formation

- In the latter, the cells become less numerous and the intercellular matrix more prominent. The cells of the hypertrophic zone appear smaller and less vacuolated
- a reduction in the size and number of vascular columns
- A clearer distinction can be made between newly formed primary trabeculae and the older, larger, less numerous secondary trabeculae of the neck region which are characterized by remodeling activity
- semilunar profile

Seven years after birth

- cartilage has thinned to about 0.3 mm
- fibrous articular layer appears thicker and less sharply demarcated from the proliferative zone
- the condylar cartilage gradually becomes oriented more anteriorly and is semilunar in shape
- This anteriorly directed cartilaginous growth in combination with bone resorption on the anterior border of the neck of the condyle results in an anteroposterior projection of the condyle.
- With the resorbing anterior cortex, the neck becomes more definite, particularly on the anteromedial aspect where the fovea for insertion of the lateral pterygoid muscle is being formed.
- The condyle continues to grow laterally as indicated by periosteal deposition on its lateral cortex and endosteal deposition on its medial cortex

Permanent dentition-

- becomes wedge-shaped
- Cortical bone becomes more compact while growth cartilage remains thin and becomes noticeably less cellular

20 to 30 year- cartilage is completely replaced by endochondral ossification

Changes in temporomandibular joint

6- 8 months after birth

- Enlargement of articular tubercle
- Resorption takes place in the Articular slope followed by deposition in the Posterior fossa
- Enlargement of glenoid fossa by growth of zygomatic process laterally and downwards
- Height of articular tubercle- 2mm
- Depth of slope – 2mm

One to two years

- Cortical bone is laid down in articular tubercle
- Resorption takes place in upper part of the articular slope on the tubercle and the glenoid fossa
- Deposition in the endosteal
- Definite s shaped
- Height of articular tubercle – 4 to 5 mm
- Depth of slope – 4 to 5mm

Six to seven years

- glenoid fossa continues to resorb
- Later resorption becomes limited mainly to the lateral wall of the fossa
- zygomatic process also continues to grow laterally and the fossa thus becomes a more circumscribed concavity
- Height of articular tubercle – 5 to 6mm
- the slope of the tubercle becomes steeper

Articular disc-The disk is initially flat and highly vascular .Gradually it becomes biconcave with decreases in vascularity .In adolescence there is increase in thickness of the disk

CONCLUSION

This article concludes that it is important to know the growth changes that occurs in different stages for better understanding of growth anomalies in different stages and providing better care

REFERENCE

1. Essentials of facial growth by Donald H. Enlow
2. Baggiolini A, Varum S, Mateos JM, Bettosini D, John N, Bonalli M, et al. Premiratory and migratory neural crest cells are multipotent in vivo. Cell Stem Cell. 2015;16:314–322
3. Mandible and Tongue Development, Carolina Parada and Yang Cha,12/9/2020, HHS public view
4. Richany SF, Bast TH, Anson BJ. The development of the first branchial arch in man and the fate of Meckel's cartilage. Quarterly Bulletin of Northwestern University Medical School. 1956;30:331–355
5. Donald M Wright, Benjamin C Moffeitt, The postnatal development of the human temporomandibular joint , Am J. Anat, 141: 235- 250
6. Craniofacial Development by Geoffrey H. Sperber
7. Contemporary orthodontics by William R Proffit
8. Trainor PA, Krumlauf R. Hox genes, neural crest cells and branchial arch patterning. Current Opinion in Cell Biology. 2001;13:698–705
9. Trainor PA, Sobieszczuk D, Wilkinson D, Krumlauf R. Signalling between the hindbrain and paraxial tissues dictates neural crest migration pathways. Development. 2002;129:433–442
10. Amano O, Doi T, Yamada T, Sasaki A, Sakiyama K, Kanegae H, et al. Meckel’s cartilage: Discovery, embryology and evolution—Overview of the specificity of Meckel’s cartilage. Journal of Oral Biosciences. 2010;52:125–135