A to Z ORTHODONTICS

Volume: 02

GROWTH AND DEVELOPMENT

Dr. Mohammad Khursheed Alam
BDS, PGT, PhD (Japan)
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**Growth**

Growth is the increase in size (Todd). It may also be defined as the normal change in the amount of living substance. eg. Growth is the quantitative aspect and measures in units of increase per unit of time.

**Development**

It is the progress towards maturity (Todd). Development may be defined as natural sequential series of events between fertilization of ovum and adult stage.

**Maturation**

It is a period of stabilization brought by growth and development.

**CEPHALOCAUDAL GRADIENT OF GROWTH**

This simply means that there is an axis of increased growth extending from the head towards feet. At about 3rd month of intrauterine life the head takes up about 50% of total body length. At this stage cranium is larger relative to face. In contrast the limbs are underdeveloped.

By the time of birth limbs and trunk have grown faster than head and the entire proportion of the body to the head has increased. These processes of growth continue till adult.
SCAMMON’S CURVE
In normal growth pattern all the tissue system of the body do not grow at the same rate. Scammon’s curve for growth shows 4 major tissue system of the body;

• Neural
• Lymphoid
• General: Bone, viscera, muscle.
• Genital

The graph indicates the growth of the neural tissue is complete by 6-7 year of age. General body tissue show an “S” shaped curve with showing of rate during childhood and acceleration at puberty. Lymphoid tissues proliferate to its maximum in late childhood and undergo involution. At the same time growth of the genital tissue accelerate rapidly.

Scammon’s curve for growth of the four major tissue systems of the body

NEED TO KNOW ABOUT PHYSICAL GROWTH

• To see whether there is any gross abnormality present or not.
• To plan the therapy.
• To determine the efficiency of the treatment.

BONES OF THE SKULL
A) Bones of the cranial base:
A) Fontal (1)
B) Ethmoid (1)
C) Sphenoid (1)
D) Occipital (1)

B) Bones of the cranial vault:
1. Parietal (2)
2. Temporal (2)

C) Bones of the face:
- Maxilla (2)
- Mandible (1)
- Nasal bone (2)
- Lacrimal bone (2)
- Zygomatic bone (2)
- Palatine bone (2)
- Infra nasal concha (2)

**FUSION BETWEEN BONES**

1. Syndesmosis: Membranous or ligamentus eg. Sutural point.
2. Synostosis: Bony union eg. symphysis menti.
GROWTH OF THE SKULL:


B) Face:  1. Upper face 2. Lower face

CRANIAL BASE:

Cranial base grows at different cartilaginous suture. The cranial base may be divided into 3 areas.

1. The posterior part which extends from the occiput to the salatercica. The most important growth site sphenoo-occipital synchondrosis is situated here. It is active throughout the growing period and does not close until early adult life.

2. The middle portion extends from sella to foramen cecum and the sutural growth sphenoo-ethmoidal synchondrosis is situated here. The exact time of closing is not known but probably at the age of 7 years.

3. The anterior part is from foramen cecum and grows by surface deposition of bone in the frontal region and simultaneous development of frontal sinus.

CRANIAL VAULT:

The cranial vault grows as the brain grows. It is accelerated at infant. The growth is complete by 90% by the end of 5th year. At birth the sutures are wide sufficiently and become approximated during the 1st 2 years of life.
The development and extension of frontal sinus takes place particularly at the age of puberty and there is deposition of bone on the surfaces of cranial bone.

**PERIOD OF DEVELOPMENT OF DENTITION**

A) From birth to complete eruption of deciduous teeth. From birth to 2½ year.

B) From complete eruption of deciduous teeth to the eruption of first permanent molar. From 2½ to 6 year.

C) Mixed dentition period. From 6 year to 12 year.

D) Period from the eruption of the 2nd permanent. From 12 year to onward.

**SEQUENCE OF ERUPTION OF DECIDUOUS TEETH**

Upper/Lower A B D C E

**SEQUENCE OF ERUPTION OF PERMANENT TEETH**

Upper: 6 1 2 4 3 5 7 Lower: 6 1 2 3 4 5 7

or 6 1 2 4 5 3 7 or 6 1 2 4 3 5 7
ANTHROPOID SPACE / PRIMATE SPACE / SIMIEN’S SPACE

The space mesial to upper deciduous canine and distal to lower deciduous canine is characteristically found in primates and hence it is called primate space.

INCISOR LIABILITY

When the permanent central incisor erupt, these teeth use up specially all the spaces found in the normal dentition. With the eruption of permanent lateral incisor the space situation becomes tight. In the maxillary arch it is just enough to accommodate but in mandibular arch there is an average 1.6 mm less space available. This difference between the space present and space required is known as incisor liability.

These conditions overcome by;

1. This is a transient condition and extra space comes from slight increase in arch width.

2. Slight labial positioning of central and lateral incisor.

3. Distal shift of permanent canine.

LEE WAY SPACE (OF NANCE)

Definition:
The combined mesiodistal width of the permanent canines and premolars is usually less than the deciduous canines and molars. This space is called leeway space of Nance.

**Measurement of leeway space:**

Is greater in the mandibular arch than in the maxillary arch.

It is about 1.8mm [0.9mm on each side of the arch] in the maxillary arch.

And about 3.4mm [1.7 mm on side of the arch] in the mandibular arch.

**Importance:**

This leeway space allows the mesial movement of lower molar thereby correcting flush terminal plane.

* LWS can be measured with the help of cephalometry.

**FLUSH TERMINAL PLANE (TERMINAL PLANE RELATIONSHIP)**

Mandibular 2nd deciduous molar is usually wider mesio-distally than the maxillary 2nd deciduous molar. This leads to the development of flush terminal plane which falls along the distal surface of upper and lower 2nd deciduous molar. This develops into class I molar relationship.

Distal step relationship leads to class 2 relationship.

Mesial step relationship mostly leads to class 3 relationship.
FEATURE OF IDEAL OCCLUSION IN PRIMARY DENTITION

1. Spacing of anterior teeth.
2. Primate space is present.
3. Flush terminal plane is found.
5. Overbite and overjet varies.

UGLY DUCKLING STAGE

Definition:
Stage of a transient or self correcting malocclusion is seen sometimes is called ugly duckling stage.

Occurring site: Maxillary incisor region

Occurring age: 8-9 years of age.

Occurring due to: This situation is seen during the eruption of the permanent canines. As the developing p.c. they displace the roots of lateral incisor mesially this results is transmitting of the force on to the roots of the central incisors which also gets displaced mesially. A resultant distal divergence of the crowns of the two central incisors causes midline spacing.

This portion of teeth at this stage is compared to that of ugly walk of the duckling and hence it is called Ugly Duckling Stage.
Described by Broad bent. In this stage children tend to look ugly. Parents are often apprehensive during this stage and consult the dentist.

**Correction:** Corrects by itself, when canines erupt and the pressure is transferred from the roots to the coronal area of the incisor.

**IMPORTANCE OF 1ST MOLAR**

1. It is the key tooth to occlusion.

2. Angle’s classification is based on this tooth.

3. It is the tooth of choice for anchorage.


5. Loss of this tooth leads to migration of other tooth.

6. Helps in opening the bite.
Bibilography:

4. Iida J. Lecture/class notes. Professor and chairman, Dept. of Orthodontics, School of dental science, Hokkaido University, Japan.
5. Lamiya C. Lecture/class notes. Ex Associate Professor and chairman, Dept. of Orthodontics, Sapporo Dental College.
17. Yoshiaki S. Lecture/class notes. Associate Professor and chairman, Dept. of Orthodontics, School of dental science, Hokkaido University, Japan.
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My Mom, Zubaida Shaheen
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Dr. Mohammad Khursheed Alam has obtained his PhD degree in Orthodontics from Japan in 2008. He worked as Asst. Professor and Head, Orthodontics department, Bangladesh Dental College for 3 years. At the same time he worked as consultant Orthodontist in the Dental office named “Sapporo Dental square”. Since then he has worked in several international projects in the field of Orthodontics. He is the author of more than 50 articles published in reputed journals. He is now working as Senior lecturer in Orthodontic unit, School of Dental Science, Universiti Sains Malaysia.

Volume of this Book has been reviewed by:

Dr. Kathiravan Purmal
BDS (Malaya), DGDP (UK), MFDSRCS (London), MOrth (Malaya), MOrth RCS( Edin), FRACPS.
School of Dental Science, Universiti Sains Malaysia.

Dr Kathiravan Purmal graduated from University Malaya 1993. He has been in private practice for almost 20 years. He is the first locally trained orthodontist in Malaysia with international qualification. He has undergone extensive training in the field of oral and maxillofacial surgery and general dentistry.