Eruption of the Teeth

Eruption of Teeth is the process of movement of tooth from alveolar bone to oral cavity until it reach the occlusion of antagonist.

The term eruption describes the **movement** which take a tooth from its developmental position to its occlusal contact which opposing tooth.

The formation and eruption are two processes which may be influenced by

1-Genetic factors.
2-Hormonal factors.
3-Environmental factors.

Types of dentition

1-**primary dentition** (deciduous or milky or temporary or predecessor): the primary teeth are 20 teeth.

E D C B A	A B C D E
E D C B A	A B C D E

2-**permanent dentition** (successors): the permanent teeth are 32 teeth.

87654321	12345678
87654321	12345678

All predecessors are deciduous teeth (A, B, C, D, E) and successors are permanent teeth (1,2,3,4,5) that erupt after predecessor.

6	6
6	6

are not successors and have no predecessors.

Tooth numbering system

1. Zsigmondy- palmer system

using a Zsigmondy cross to record quadrants of tooth positions. Adult teeth were numbered 1 to 8, and the primary dentition were depicted with a quadrant grid using Roman numerals I, II, III, IV, V to number the teeth from the midline. Palmer changed this to A, B, C, D, E. This makes it less confusing and less prone to errors in interpretation.

The Palmer notation consists of a symbol (┘ └ ┐ ┌) designating in which quadrant the tooth is found and a number indicating the position from the midline. Adult teeth are numbered 1 to 8, with deciduous (baby) teeth indicated by a letter A to E. Hence the left and right maxillary central incisor would have the same number, "1", but the right one would have the symbol, "┘ ", underneath it, while the left one would have, " └".

87654321 | 12345678	EDCBA | ABCDE
87654321 | 12345678	EDCBA | ABCDE

2. Universal numbering system

it is also called the "American system" as it is commonly used in the United States. The uppercase letters A through T are used for primary teeth and the numbers 1 - 32 are used for permanent teeth. The tooth designated "1" is the maxillary right third molar ("wisdom tooth") and the count continues along the upper teeth to the left side. Then the count begins at the mandibular left third molar, designated number 17, and continues along the bottom teeth to the right side. Each tooth has a unique number or letter, allowing for easier use on keyboards. As specific numbers are employed for each tooth, it reduces the risk of mistake. Data can also be easily entered in the computer.

Permanent Teeth															
Upper Right								Upper Left							
1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
32	31	30	29	28	27	26	25	24	23	22	21	20	19	18	17
Lower Right								Lower Left							

Primary teeth									
Upper Right					Upper Left				
A	B	C	D	E	F	G	H	I	J
T	S	R	Q	P	O	N	M	L	K
Lower Right					Lower Left				

3. International numbering system

The Federation Dentaire International (FDI) system is a two-digit system, the first digit indicates the quadrant (1 through 4 for permanent and 5 through 8 for deciduous teeth) and the second digit indicates the tooth type (1 through 8 or 1 through 5). It is very simple, accurate, it is easy to memories in the visual and cognitive sense, it is user friendly, and prevents errors in differentiating left and right, upper and lower arches, and tooth type. However, in the case of deciduous teeth, there can be confusion and it is difficult to memorize. For specialists other than pedodontists, it can be difficult to understand or to define teeth, as in the case for example of 64, 85.

Permanent Teeth															
Upper Right								Upper Left							
18	17	16	15	14	13	12	11	21	22	23	24	25	26	27	28
48	47	46	45	44	43	42	41	31	32	33	34	35	36	37	38
Lower Right								Lower Left							

Primary teeth									
Upper Right					Upper Left				
55	54	53	52	51	61	62	63	64	65
85	84	83	82	81	71	72	73	74	75
Lower Right					Lower Left				

Development of teeth

Tooth development or odontogenesis is the complex process by which teeth form from embryonic cells, grow, and erupt into the mouth (starts as early as 28 days of IUL and continues to the end of eruption of permanent molars). For human teeth to have a healthy oral environment, all parts of the tooth must develop during appropriate stages of fetal development. Primary (baby) teeth start to form between the sixth and eighth week of prenatal development, and permanent teeth begin to form in the twentieth week. If teeth do not start to develop at or near these times, they will not develop at all, resulting in hypodontia or anodontia.

Development of teeth passes through the following stages:

A. Development in the prenatal period: in this period three overlapping phases occur:

1. Beginning of the deciduous dentition development

The development of teeth starts at 3rd week of IUL, then the odontogenic epithelium proliferates in the 5th week to form the dental lamina which form invaginations that develop into tooth buds.

2. The formation of the successional lamina

It is the lingual extension of the dental lamina develops in the 5th months of IUL (permanent central incisor) to 10th months of age (2nd premolar).

3. Initiation of the permanent dentition

It is initiated in the 4th month of IUL.

B. Status of development at birth: the teeth are in different stages of development at birth.

C. Development in the postnatal period: it shows completion of the crowns of all primary teeth and initiation of root formation. The permanent teeth continue to develop in different stages till their root formation is completed.

So Teeth start to develop during pregnancy:

- At 6 weeks' intrauterine life :1st step of tooth bud formation
- At 6-month intrauterine life :1st step of calcification.
- At 6 month of baby life :1st primary tooth erupts in oral cavity
- At 6 years of child life :1st permanent tooth erupts (6) in the oral cavity.

Normal eruption process

Eruption of teeth includes two processes intrabony phase and intra oral phase. They take 5 years to be completed. The tooth emerges when 3\4 % its root formation has occurred. The tooth usually reaches the occlusal plane before its root development is completed, the teeth of girls erupt earlier than that of boys. When the tooth is not fully formed its root shape is funnel shaped.

There are certain developmental process and factors related to eruption process

1- Elongation of root
2- Force exerted by vascular tissues around and beneath the root
3- Growth of alveolar bone
4- Growth of dentin
5- Pulpal constriction

6- Growth and pull pf PD membrane
7- Pressure from muscular action
8- Resorption of alveolar bone crest

The most important factor that cause movement of tooth occlusally is elongation of the pulp that result from pulpal growth in proliferating ring at its basal end, proliferating zone is separated from periapical tissue by enfolding of Hertwig epithelial root sheath.

Importance of time eruption

1-To the dentist.
2-To the dentist epidemiologist.
3-For physician.
4-For orthodontist.
5-For psychologist.
6-For forensic odonatologist.
7-For anthropologist.

sequences of eruption

For primary teeth:

	ABDCE
	ABDCE

For permanent teeth:

	61245378
	61234578

Variation in sequences of eruption

The mandibular first permanent molars are often the first permanent teeth to erupt. The mandibular central incisors quickly follow them. Then lateral incisor, canine, first premolar, second premolar, and second molar (the most common sequence of eruption of mandibular permanent teeth), while the most common sequence for the

eruption of the maxillary permanent teeth is first molar, central incisor, lateral incisor, first premolar, second premolar, canine, and second molar.

The mandibular canine erupt before the first and second premolars. This sequence will aid in:

1. Maintaining adequate arch length

2. Preventing lingual tipping of the incisors, which not only causes a loss of arch length but also allows an increased overbite to develop.

An abnormal lip musculature or an oral habit that causes a greater force on the mandibular incisors than can be compensated for by the tongue allows the anterior segment to collapse.

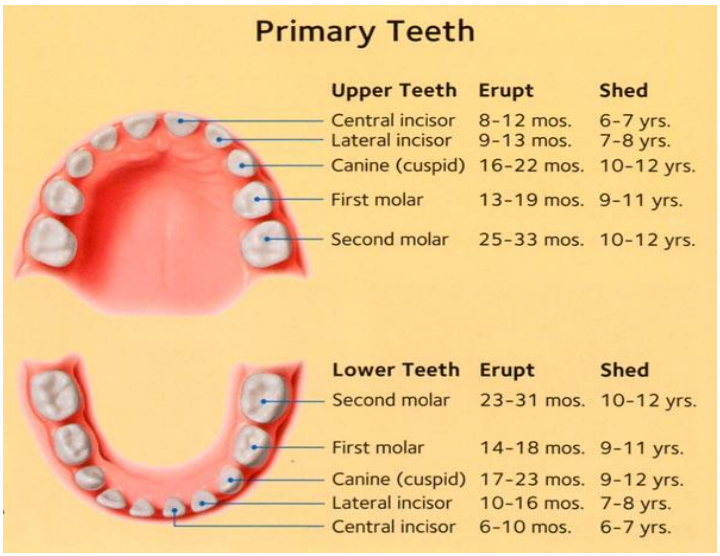
- So a passive lingual arch appliance is often indicated when the primary canines have been lost prematurely or when the sequence of eruption is undesirable.
- The untimely loss of primary molars in the maxillary arch, which allows the first permanent molar to drift and tip mesially, results in the permanent canine is being blocked out of the arch, usually to the labial side.
- The position of the developing second permanent molar in the maxillary arch and its relationship to the first permanent molar should be given special attention. Its eruption before the premolars and canine can cause a loss of arch length, just as in the mandibular arch. The eruption of the maxillary canine is often delayed because of an abnormal position or deviations in the eruption path.

Eruption time and sequence

Eruption sequence

Primary dentition

- **Mandibular central:** 6 mos
- **Mandibular lateral:** 7 mos
- **Maxillary central:** 7 ½ mos
- **Maxillary lateral:** 9 mos
- **Mandibular 1st molar:** 12 mos
- **Maxillary 1st molar** 14 mos
- **Mandibular cuspid:** 16 mos
- **Maxillary cuspid:** 18 mos
- **Mandibular 2nd molar:** 20 mos
- **Maxillary 2nd molar:** 24 mos



Permanent dentition sequence

- **Mand 1st molar:** 6/7 yrs
- **-Max 1st molar:** 6/7 yrs
- **-Mand central:** 6/7 yrs
- **-Mand lateral:** 7/8 yrs
- **-Max central:** 7/8 yrs
- **-Max lateral:** 8/9 yrs
- **-Mand cuspid:** 9/10 yrs
- **-Mand 1st bicuspid:** 10/11 yrs
- **-Max 1st bicuspid:** 10/11 yrs
- **-Max 2nd bicuspid:** 10/12 yrs
- **-Mand 2nd bicuspid:** 11/12 yrs
- **-Max cuspid:** 11/12 yrs
- **-Mand 2nd molar:** 11/13 yrs
- **-Max 2nd molar:** 12/13 yrs