

FORENSIC ODONTOLOGY

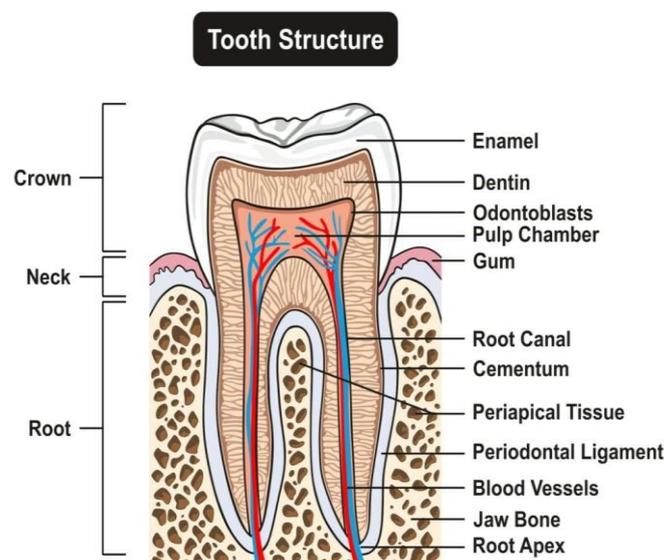
■ Introduction:-

- ✓ Forensic odontology is the study of dental applications in legal proceedings.
- ✓ Forensic odontology is derived from Latin, meaning forum or where legal matters are discussed.
- ✓ The subject covers a wide variety of topics including individual identification, mass identification, and bite mark analysis.
- ✓ The study of odontology in a legal case can be a piece of incriminating evidence or an aspect of wide controversy.
- ✓ Forensic dentistry or forensic odontology is the proper handling, examination and evaluation of dental evidence which will be then presented in the interest of justice.
- ✓ The evidence that may be derived from teeth, is the age (in children) and identification of the person to whom the teeth belong.

■ Application:-

- ✓ Identification of found human remains
- ✓ Identification in mass fatalities
- ✓ Assessment of bite mark injuries
- ✓ Assessment of cases of abuse (child, spousal, elder)
- ✓ Civil cases involving malpractice
- ✓ Age estimation
- ✓ Race and Sex
- ✓ DNA Profiling
- ✓ Habits and features of Special Use

■ Structure of Teeth:-

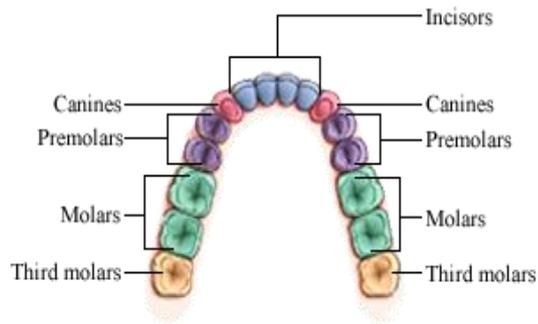


▪ **Types of Teeth:-**

Mainly two types of teeth are found in Human beings. They are temporary teeth and Permanent teeth.

Also teeth can be of following four types

1. Incisors
2. Canines
3. Premolars
4. Molars



✓ **Incisor:-**

Incisors: Incisors tend to be flat, and are often described as being chisel-like.

Their purpose is to cut food.

As they typically have only one root, they are more likely to fall out postmortem than any of the other tooth types.

✓ **Canines:-**

The canine or "eye" teeth have fairly long single roots, and are only somewhat less prone to falling out postmortem than are the incisors.

In our ancestors, the canine teeth were much longer, having been used for grasping the food.

Such is the case with many animals to this day – such as the carnivores.

The major benefit of the evolutionary shortening of the canines is that it allows a side to side motion of jaws, thus allowing food to be ground by the molars.

✓ **Premolars:-**

The premolars are also known as the bicuspid.

As the name implies, they have two cusps, and often have two roots that may appear to be somewhat fused.

✓ **Molars:-**

The molars are the chewing and grinding teeth.

There are usually three per side in both the maxillae and the mandible.

As a rule, the upper molars tend to have three roots, while the lowers generally have two.

The last or third set of molars is often called "wisdom teeth", and erupts in the 17- 22 year window of development.

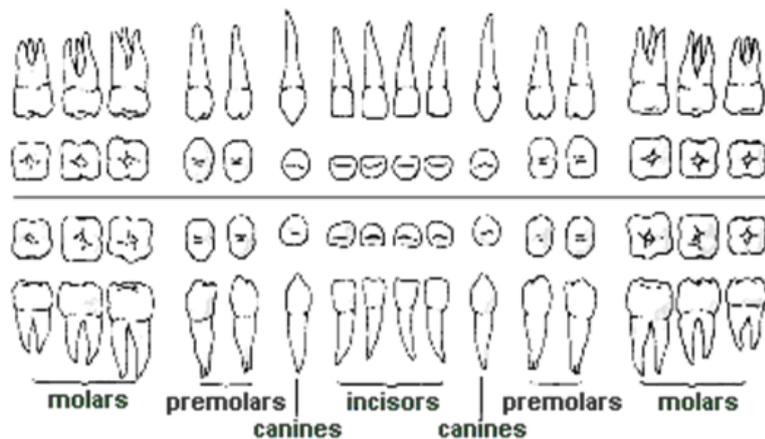
There is tremendous variation as to when, or if, they erupt. As many as 25% of the adult population have at least one 3rd molar that has not erupted.

If a non-erupted molar begins causing problems with the other teeth, it is said to be **impacted**.

✓ **Wisdom teeth:-**

Wisdom teeth are the last molars (one at every side of every jaw) and not a different type of teeth.

The wisdom teeth erupt between the ages of 17 and 21.



Human Dental Formula:-

2 / 1 / - / 2

2 / 1 / 2 / 3

i / c / p / m **deciduous**

I / C / P / M **permanent**

2 / 1 / - / 2

2 / 1 / 2 / 3

i/I = incisor, c/C = canine, p/P = premolar, m/M = molar

▪ **Development of Tooth and Eruption:-**

- ✓ The Alveolar cavities which contain teeth are formed around the third and fourth month of intrauterine life.
- ✓ Development of teeth begins with formation of cellular teeth germ within the bone in the shape of the crown.
- ✓ At birth rudiments of all temporary teeth may be found in the jaws.
- ✓ Root formation begins after the completion of crown and as the root becomes longer, the crown erupt through the bones and finally emerge into the buccal cavity.
- ✓ During eruption of permanent teeth, the overlaying of its deciduous teeth simultaneously undergoes resorption until only crown remains.
- ✓ The Unsupported crown then falls.

▪ **Determination of Age by Teeth:-**

- ✓ Teeth are useful for age determination from birth to 14 years of age.
- ✓ The degree of formation of root, crown and number of temporary and permanent teeth are useful for age determination.
- ✓ The age estimation of adults depends upon physiological changes in each dental tissues.
- ✓ The calcification of all deciduous teeth begins around 3-4 months of intrauterine life.

Eruption of Temporary teeth			
Sr. No.	Teeth	Eruption	Resorption of roots
1.	Central Incisors	6-12 months	4 th year
2.	Lateral Incisors	7-12 months	5 th year
3.	1 st Molar	1-2 ^{1/2}	6 th year
4.	Canines	1 ^{1/2} -3 years	8 th year
5.	2 nd Molar	2-3 years	7 th year

Calcification and Eruption of Teeth			
Sr. No.	Teeth	Eruption	Calcification
1.	1 st Molar	6-7 years	9-10 years
2.	Central Incisors	6-8 years	10 years
3.	Lateral Incisors	7-9 years	11 years
4.	1 st Premolar	9-10 years	12-13 years
5.	2 nd Premolar	10-12 years	12-14 years
6.	Canines	11-12 years	12-16 years
7.	2 nd Molar	12-14 years	14-16 years
8.	3 rd Molar	17-25 years	18-25 years

▪ **Physiological Age changes in Dental tissue:-**

- ✓ **Attrition:-**
It is wearing down of incisor surface of teeth due to mastication.
- ✓ **Paradentosis:-**
Regression of gums and periodontal tissue surrounding the teeth in advance age.
- ✓ **Secondary Dentine:-**
The deposition of secondary dentine takes place within the pulp cavity and diminish the size of pulp cavity.

✓ **Cementum Deposition :-**

The cementum increases in thickness partially due to changes in teeth position, specially near the end of the root.

✓ **Root Resorption:-**

It involves root Cementum and dentine which shows sharp grooves. Resorption of roots start first with apex of the root and extend downwards.

✓ **Transparency of the roots:-**

The cavity in the dentine are gradually filled by minerals with advancing age so that they become invisible and dentine become transparent.

This occurs only after 30 years of age.

▪ **Gustafson formula for Age determination:-**

✓ Gustafson (1950) used a point system running from 0 to 3 to assess the regressive changes in teeth. Attrition was one of the important criterion in the study.

✓ Score = A+P+S+C+R+T

✓ Age in years = $4.56 \times \text{total score} + 11.43 (+-3.63 \text{ years})$

▪ **Role of odontology in personal identification:-**

The teeth also provide evidence as to the age of the individual, his general facial characteristics, economic status from the condition of his teeth and type of dental repair and sometimes his occupation.

Some of the common identifying features of teeth pertain to:-

Faulty development

Faulty Alignment

Presence of Stains

Localized wear on certain teeth

Missing teeth

▪ **Role of odontology in Mass Disaster:-**

Importance of Forensic Dental Identification in Mass Disasters is as follows:-

✓ Benefits family and friends.

✓ Important for legal purpose of insurance payments, probate court, wills and estates and other governmental formalities.

✓ Important for spiritual and religious reasons for identification prior to burial, etc.

✓ Dental ID is often possible when DNA samples or DNA analysis methods are not available – may be less expensive.