ODESSA NATIONAL MEDICAL UNIVERSITY

Department of Radiation Diagnostics, Therapy, radiation medicine and Oncology

METHODICAL RECOMMENDATIONS FOR STUDYING THE TOPIC:

"Anomalies of development of the teath".

(for the 3th year students of the dentistry faculty)

Approved
at the methodical meeting of the department
"27" August 2021
Protocol №1
Head Department Sokolov V.M.

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"Anomalies in the development of teeth»- 2 hours.

1. **Actuality of theme.**

Numerous etiological factors contribute to the violation of the harmonious development of the maxillofacial area, which leads to the formation of abnormalities of individual teeth, each of which requires appropriate and timely treatment. Radiation diagnostic methods allow you to fully and quickly assess the severity of pathological changes and provide timely assistance to the patient. Knowledge of the features of the radiation image of each type of anomalies of individual teeth makes it possible to choose the right methods for orthodontic correction and achieve optimal functional occlusion.

2. **Objectives of the lesson:**

2.1 General objectives:

1. To study the features of radiation images of anomalies of individual teeth.
2. Determine the most appropriate timing and methods of examination of patients with abnormalities in dental development.

2.2 Educational:

1. Deontological - to provide information for conversations of students (future doctors) with patients about the potential dangers of ionizing radiation.
2. The guidelines of dentists are to optimize the methods of treatment and research of patients, reduce the impact of radiation and responsible allocation of health resources.
3. Responsibility - to report information that implies the responsibility of a physician who uses ionizing radiation for diagnostic or therapeutic purposes.
4. Legal representations - information on this topic allows the doctor to avoid unfounded accusations of complications during the disease after medical or diagnostic procedures.

2.3. Specific goals:

- know:

1. Features of methods of examination of patients in this group.

2. Indications and contraindications for the use of various methods of radiological examination.

2.4. Based on theoretical knowledge on the topic:

- master the techniques / be able /:

1. Be able to determine the need for CPCT in a specific clinical case.

2. Be able to justify the appointment in the patient's medical history and fill out referrals for examination.

3. Interpret (evaluate) the findings of the study.

4. Be able to explain to the patient the need for research and explain the results.

3. **Materials for classroom independent training (interdisciplinary integration).**

Names of previous disciplines	Acquired knowledge and skills
1. Anatomy	1. Be able to describe the structure of the cerebral and facial parts of the skull. 2. Know the structure of the temporomandibular joint. 3. Identify the anatomical features of different groups of temporary and permanent teeth. 4. Draw a diagram of the group affiliation of temporary and permanent teeth.
2. Histology	Ability to draw a diagram of embryonic development of the maxillofacial area and histological structure of teeth.
3. Medical biology	Be able to schematically depict the mechanisms of inheritance of pathology of individual teeth.

4. Content of the topic (text or thesis), graph-logical structure of the lesson.

1. Classification of anomalies in the development of teeth.
2. Contents of terms.
3. Diagnostic criteria.

3.1. The diagnosis of "Anomalies of individual teeth" should be substantiated according to the classification of DA Calvelis.

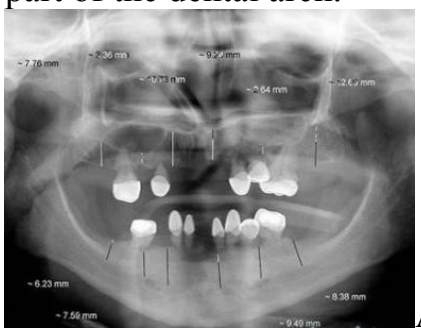
DA Calvelis Classification (1957)

1.	Anomalies in the number of teeth	- adentia - partial or complete (hypodontia); - overcomplete teeth (hyperdontia).
2.	Anomalies in the size and shape of teeth	- giant teeth, - prickly teeth; - distorted forms of teeth; - Hutchinson's teeth, Fournier.
3.	Anomalies in the structure of the hard tissues of the teeth	- hypoplasia of dental crowns; - hyperplasia of dental crowns.
4.	Violation of the process of teething	- premature eruption of teeth; - delayed teething.

Among the anomalies in the structure of the hard tissues of the tooth distinguish hyperplasia and hypoplasia. Anomalies in the size and shape of teeth - increase or decrease the average size of the tooth or change its anatomical shape. Clinical form - microdentia, macrodentia.

Anomalies in the number of teeth:

 Supradontia - an unprofitable number of teeth in any part of the dental arch.

 Adentia - the absence of tooth (s) in any part of the dental arch. It can be congenital or secondary.

 Adentia and supercomplete tooth.

Adentia permanent first permanent lower incisors. Intralpulpar granuloma of 11 teeth.

Location anomalies: dystopia is tooth anomaly in which the tooth is incorrectly located in the dental arch and beyond, which interferes with the normal eruption of other teeth. There are several types of dystopia:

1. vestibular and mesial - displacement of the bone structure forward;
2. oral and distal - the tooth bends inside the oral cavity;
3. supraposition and infraposition - very low or high position of the organ relative to the occlusal plane;

4. tortoposition - rotation around its own axis;



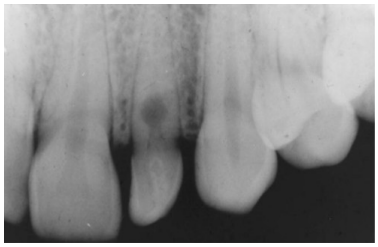
Cake position 21 cutters 900

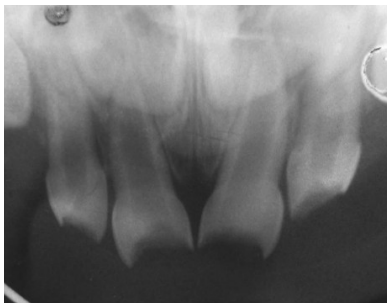
5. transposition - change the order of teeth in a row.


Transposition of 13 teeth

Anomalies in the size and shape of teeth

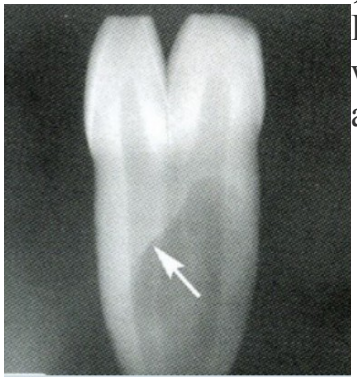

Macrodontia Microdentia


Spiky shape of the tooth. Intralpulpar granuloma.



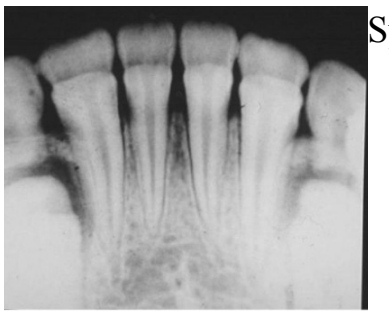
Hutchinson's teeth. Caries of the cutting edge of the teeth due to impaired mineralization.

Hutchinson's teeth are a special form of systemic dentin hypoplasia, which affects the change of tooth crowns (Pfluger's teeth also belong to this pathology).
The upper central incisors become barrel-shaped or screw-shaped: the size in the neck becomes larger than in the area of the cutting edge).
Unlike Fournier's teeth, Hutchinson's teeth have a flaming notch, which is mostly covered with enamel, but sometimes the enamel covers only the corners of the tooth, and in the middle part of the dentin is exposed and not covered with enamel.
Parenchymal keratitis, congenital deafness and Hutchinson's teeth form a triad of congenital syphilis. Recent studies have shown that Hutchinson's teeth can be observed in other cases, for example, with leprosy.



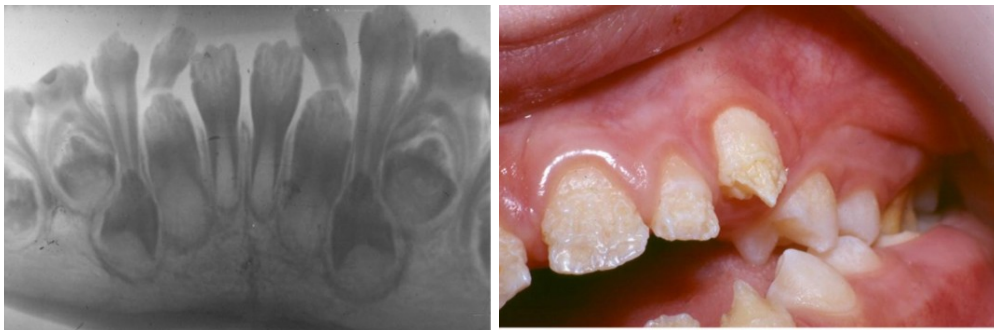
Fournier's teeth- similar to Hutchinson's teeth, but without a moon-shaped notch on the cutting edge, they are also characteristic of congenital syphilis.

Enamel hypoplasia of temporary teeth



Systemic hypoplasia of the enamel

Systemic hypoplasia of the enamel



Imperfect amelogenesis

Imperfect odontogenesis. Stanton-Caldepon dysplasia.

Stanton-Capdepon syndrome occurs due to a mutation in the dentin-sialo-phosphoprotein gene, located on chromosome 4 and responsible for the formation of a specific matrix protein.
Histologically, in Stanton-Capdepon syndrome in the enamel near the unstructured areas are areas with a wide distance between the enamel prisms. The enamel layer is reduced in thickness.
The connection of enamel with dentin has the form of a straight line, which causes the lack of a strong connection between the hard tissues of the tooth. The predentine layer is usually absent. The number of dentinal tubules is sharply reduced. As a consequence of active production of replacement dentin in Stanton-Capdepon syndrome, there is obliteration of the pulp chamber and calcification of root canals. The structure of odontoblasts is broken. In cement near local areas hypercementosis areas of resorption are also observed.
The sizes of crowns are normal. Enamel is thin and fragile, quickly peels off after eruption, opening a layer of dentin. Due to the increased abrasion there are sharp edges, injuring the mucous membrane of the oral cavity, the pulp chambers are translucent.
On the radiograph Stanton-Capdepon syndrome is characterized by a decrease in root height, narrowing of the tooth cavity, obliteration of root canals, often identified periapical foci of bone destruction.
The presence of cystic formations is associated with a violation of the processes of bone formation, and not with the penetration of infection transdentally in inflammation and necrosis of the pulp.

Differentiate Stanton-Capdepon syndrome with other genetic diseases caused by malformations of the hard tissues of the teeth:
- imperfect amelogenesis,
-1 and 3 types of imperfect dentogenesis
- dentin dysplasia.
The examination is performed by a tomato therapist. To identify hereditary factors of the disease, a geneticist's consultation is indicated.

Violation of the process of teething.
Persistent tooth - a deciduous tooth that has not fallen out according to age standards, or until the child has formed a variable permanent tooth for 2/3 of the length of this root.
Retinal tooth completely formed in the jaw, but not erupted (or partially erupted) outward tooth.

 Persistent 13 tooth.

 Retained tooth.

 Retained tooth in the right maxillary sinus

3.2. Contents of terms.

The list of the basic terms, parameters, characteristics which the student should master at preparation for employment:

Term	Definition
Mesiodistal tooth size.	Measurements of mesiodistal tooth sizes are performed in the widest part of the tooth (upper incisors - in the equatorial zone, lower - in the area of the cutting edge).
Absolute macrodentia of the upper incisors.	Diagnosed if the sum of the mesiodistal dimensions of the four upper incisors is> 35 mm.
Macrodentia (giant teeth)	The result of merging of follicles of two teeth or a follicle of a complete and supercomplete tooth.
Absolute macrodentia of the lower incisors.	Diagnosed if the sum of the mesiodistal dimensions of the four upper incisors is> 27 mm.
Absolute microdentia of maxillary incisors.	Diagnosed if the sum of the mesiodistal dimensions of the four upper incisors is less than 28 mm
Absolute microdentia of mandibular incisors.	Diagnosed if the sum of the mesiodistal dimensions of the four upper incisors is less than 20 mm
Hypoplasia	Symmetrical arrangement of defects of dental tissue not only on teeth of the same name (incisors and the first molars), but also on identical sites of a surface of crowns.

a. Diagnostic criteria.

AND. Clinical:

- one or all teeth are reduced in size, but the correct anatomical shape;
- one or all teeth are enlarged, but the correct anatomical shape;
- one or all teeth of awl-shaped or conical shape;
- barrel-shaped teeth (Fournier, taurodontism);
- teeth with a crescent cut on the cutting edge (Hutchinson);
- drain (double, giant) teeth, the presence of a dividing groove on the vestibular surface or uzura on the cutting edge;
- teeth of distorted shape (tooth in tooth, premolar-like);
- the presence of abnormal shape and size of teeth in parents and close relatives;
- venereal diseases of parents;
- systemic and somatic diseases;
- radiation exposure;
- infectious diseases of the child or mother during pregnancy.

B. Radiation:

According to radiological studies:

- the number of abnormal teeth in the jaws;
- the state of the root system in abnormal teeth (formation, resorption, root shape);

- size and shape of pulp chambers (single or separated) in drain teeth;
- the presence of pathological changes in periodontal tissues.

Anomaly in the development of individual teeth is a very common pathology that causes a number of problems. According to the literature, this pathology occurs in 12-22% of cases among all dental anomalies and deformities. Anomalies in the structure and development of teeth can be classified according to TF Vinogradova (1987).

1. Anomalies caused by external factors:
a) systemic hypoplasia of the enamel;
b) aplasia of the enamel of deciduous teeth of premature infants;
c) local hypoplasia of the enamel as a result of injury;
d) fluorosis;
e) "tetracycline teeth".
2. Anomalies that are inherited and due to imperfections in the structure of the hard tissues of the tooth:
a) imperfect amelogenesis;
b) imperfect dentinogenesis;
c) Stainton-Capdepon syndrome.
3. Anomalies in the number, size and shape of teeth, genetically determined: Type - autosomal dominant.
4. Anomalies of structure and malformations of tooth tissues that occur as a result of systemic pathology in the child's body:
a) Hutchinson's teeth in hereditary syphilis;
b) "amber" teeth with imperfect osteogenesis;
c) gray-blue and brown teeth with hemolytic syndrome.

Tooth tissues have different origins: ectodermal (enamel) and mesodermal (dentin, pulp, cement). The process of tooth development consists of the following stages: tooth bookmark; formation of the crown of the tooth; loss of mineral components of enamel; formation and loss of mineral components of dentin root; tooth eruption; formation of dentin and root cementum; root resorption (for temporary teeth) final formation of enamel under the action of saliva.

5. Materials of methodical providing of employment.

5.1. Tasks for self-examination of the ascending level of knowledge and skills.

1. Methods of radiological diagnosis in the examination of patients with impaired dentition.
2. Merged teeth.
3. Anomalies in the shape of the teeth. Microdentia, macrodentia. Differential diagnosis of them with anatomical variants of the norm.
4. Spiked teeth as harbingers of adentia.
5. The influence of fused teeth on the process of formation of dental arches and occlusion.

5.2. The information necessary for the formation of knowledge and skills can be found in textbooks:

-main (basic):

1. Radiology (radiation diagnostics and radiation therapy). Kyiv, Book Plus, 2018. -721 p.
2. Radiology (radiation diagnostics and radiation therapy). Test tasks. Part 1. Kyiv, Book Plus. 2015. -104 p.
3. Radiology (radiation diagnostics and radiation therapy). Test tasks. Part 2. Kyiv, Book Plus. 2015. -168 p.
4. Radiology (radiation diagnostics and radiation therapy). Test tasks. Part 3. Kyiv, Book Plus. 2015. -248 p.
5. Smaglyuk LV Basic course in orthodontics / LV Smaglyuk, AE Karasyunok, AM Belous. - Poltava: Blitz Style, 2019. - P.151-152.
6. Tkachenko PI Clinical and morphological aspects of anomalies in the development of teeth / PITkachenko, II Starchenko, SO Bilokon, OV Gurzhiy. - Poltava: ASMI LLC, 2014.– 79 p. (Monograph).

-Auxiliary:

1. Abdelkarim A. Three-dimensional imaging for indirect-direct bonding could expose patients to unnecessary radiation. Am J Orthod Dentofacial Orthop. 2017Jan; 151 (1): 6. doi: 10.1016 / j.ajodo.2016.10.006. PubMed PMID: 28024783. Никберг И.И. Ionizing radiation and human health. K. Health, 1989, p. 6-13.
2. Educational edition Center for testing the professional competence of specialists with higher education in the fields of "Medicine" and "Pharmacy". Collection of test tasks for passing the license exam: Step 3. Dentistry. Kyiv. Center for testing the professional competence of specialists with higher education in the fields of "Medicine" and "Pharmacy" (in Ukrainian) 2018. - 24 p.
3. Possibilities of modern x-ray examination methods for diagnostics of hidden dental caries of approximal localization / I. I. Sokolova, S. I. German, TV Tomilina et all // Wiadomości Lekarskie. - Vol. LXXII, N 7. - 2019. - P. 1258–1265. (Scopus).
4. Radiographic studies in dentistry: recommendations for the selection of patients and limiting radiation exposure. Educational and methodical manual for interns in the specialty "Dentistry" and dentists / Sokolova II, Udovychenko NM, Herman SI and others. // Kharkiv KhNMU, 2020, p.4-37.
5. http://www.dentalexpert.com.ua/index.php/stomatology/article/view/200.
6. https://stom.tilimen.org/izmeneniya-kolichestva-i-formi-zubov.html

5.3.Orienting map for independent work with literature on the topic «Anomalies in the development of teeth».

№	Task	Instructions for the task	Independent records of

			students
1.	Examine the anomalies of individual teeth.	Draw in a workbook a diagram of the anomalies of individual teeth.	

6. Materials for self-control over the quality of training.

Questions for self-control.

1. Radiation signs of eruption of teeth.
2. Options for the structure of the jaw (uniform density, multi-mineralized, heterogeneous density).
3. Exostoses and endostoses.
4. Disorders of teething (persistent and retained teeth).
5. Violation of the number of teeth (supradentia, adentia).
6. Anomaly of size and shape (macro- and micro-dentia).
7. Anomaly of tooth location: vestibular and mesial dystopia, oral and distal dystopia, supraposition and infraposition, cake position, transposition.

7. Practical work (tasks) performed in class:

1. Draw a diagram in a workbookdentition.
2. Draw in a workbookjaw structure options (uniform density, multi-mineralized, heterogeneous density).Give an explanation.
3. Draw tables in the workbook with the basic units of radioactivity. Give an explanation.
4. Draw a schematicexostosis and endostosis of the mandible.
5. Schematically depict persistent and retained teeth. Give an explanation.
6. Draw schematic principles of anti-inflammatory action of ionizing radiation. Give an explanation.

8. Topic of the next lesson: "Radiation semiotics of diseases of the teeth and jaws."

9. Tasks for UDRS and NDRS on the topic of the next lesson:

Eclipse and enlightenment. Local change in tooth density and structure. Caries. Periodontitis (classification by radiological manifestations). Radiation signs of chronic fibrous periodontitis. Chronic granulating periodontitis of different localizations. Radiation signs of periodontitis (images of mild, moderate and severe stages). Generalized periodontitis. Periodontitis. Staging by radiological signs.

Methodical recommendations were _____ as. Kaouk AS