

THE MINISTRY OF HEALTH OF UKRAINE
THE HIGHER STATE EDUCATIONAL INSTITUTION OF UKRAINE
"UKRAINIAN MEDICAL STOMATOLOGICAL ACADEMY"

Approved
at the meeting of orthodontics department
«____»_____20____y.
protocol №____ by _____
Head of department_____ L.V. Smaglyuk

METHODICAL RECOMMENDATION
for independent work of students during the preparation
to practical lessons and on the lessons

Academic discipline	Orthodontics
Module № 1	Orthodontia. Diagnostic of dentognathic anomalies and deformations.
The theme of the lesson № 11	X-ray examination methods (panoramic, dental images, bone age determination, CT, MRI).
Course	III
Faculty	Preparation of foreign students

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1. The relevance of the topic. As additional research methods in orthodontics are widely used X-ray methods to determine the etiological factor (supernumerary teeth, adentia, etc.) to more accurately determine the morphological part of the diagnosis, select the most rational method and make a treatment plan. Therefore, the knowledge of the indications for the appointment of a particular method, rules of reading of X-rays are important in the training of a dentist-orthodontist.

2. Specific objectives:

To know methods of x-ray diagnostics;

To know indications for intra-oral contact radiography;

To know rules of decoding the intra-oral contact radiographs;

To know indications for occlusal radiography;

To know rules of decoding occlusal radiographs;

To know indications for extra-oral radiographs;

To know lateral projection of the body and the ramus;

To know rules of radiographs reading in the lateral projection of the body and the ramus;

To know indications for radiographs of the TMJ;

To know rules of reading of the TMJ radiographs;

To know indications for panoramic radiography;

To know rules of reading panoramic radiographs;

To know indications for radiography of the hand;

To know the rules and determination of bone age by the hand radiograph reading.

To know the technique of reading of different types of radiographs;

To know assign the appropriate x-ray examination for different types of dento-alveolar anomalies and deformations of the bite;

3. Basic knowledge's, abilities, skills necessary for studying the topic (interdisciplinary integration)

Name of previous disciplines	Skills
1. Anatomy	To determine the deviation from the normal structure of the facial bones. To determine the pathological changes of hard tissues of teeth and periodontal tissues.
2. Biophysics, informatics and medical equipment	Practice with negatoscope, magnifiers and other devices.
3. Roentgenology	To determine indications for a certain type of radiograph.

4. Tasks for independent work during preparation to the lesson and on the lesson

4.1. A list of the main terms, parameters, characteristics that need to learn by the student during the preparation to the lesson:

Terms	Definition
1. Ionization	The process of converting electrically neutral atoms (molecules) of a substance in the charged parts – ions.
2. Fluorescence	The glowing of a number of complex salts and crystals
3. Fluoroscopy	Research method, which is based on obtaining x-ray display on a fluorescent screen, the screen of a cathode-optical converter or a television screen.
4. Radiography	X-rays method, which with the help of x-ray radiation-sensitive material (x-ray film) get a fixed image of the object.

4.2. Theoretical questions to the lesson:

1. The types of radiographic studies used in orthodontic practice.
2. The method of the intra-oral contact radiography.
3. Indications for intra-oral contact radiography.
4. The parameters of indication for the method of intra-oral contact radiography.
5. According to a formula, determine the size of the tooth which is not erupted on the intra-oral contact radiograph.
6. The method of occlusal radiography.
7. Indications for occlusal radiography.
8. Indications for occlusal radiography.
9. The method of imaging the lateral projection of the lower jaw body and ramuses.
10. Indications for radiography in lateral projection of the lower jaw body and ramuses.
11. Defined parameters on radiographs in the lateral projection of the lower jaw body and ramuses.
12. Indications for radiography of TMJ methods.
13. Defined parameters on the radiographs of the temporo-mandibular joint.
14. The method of panoramic radiography.
15. Indications for conducting of panoramic radiography.
16. Parameters determined on the panoramic radiographs.
17. X-ray examination of the hand. Determination of the bone age.

4.3. Practical works (task) which are executed at the lesson:

1. To decoding contact intraoral radiographs;
2. To decoding intraoral occlusal radiographs;
3. To decoding extra-oral x-ray lateral projection of the lower jaw body and ramuses;
4. To decoding extra-oral radiographs of the TMJ;
5. To decoding panoramic x-rays;
6. To determine bone age radiograph of the hand;

7. To define the indications for carrying out a particular type of x-ray examination;
8. To filling-direction on x-ray examination;
9. To read intra-oral contact of the image;
10. To read occlusal radiographs;
11. To reading extra-oral photo of the lower jaw body and ramuses in the lateral projection;
12. To reading radiographs of the TMJ;
13. To reading panoramic radiographs;
14. To determination of bone age radiograph of the hand.

The content of the topic:

X-rays were discovered on 8 of November 1895 by Professor of the Würzburg University Conrad Roentgen.

X-ray radiation is an electromagnetic radiation. In a wide range of electromagnetic waves X-rays occupy the spectral region between ultraviolet and gamma rays. X-rays can be spread in different environments: air, solids, vacuum. Passing through various objects, the rays are partially absorbed, reflected, changing direction. The penetrating ability of x-ray radiation is higher, how much shorter wavelength. Conventionally, there are long-wave and short-wave x-ray radiation. The latter with a smaller wavelength has greater penetrating power.

X-rays are also ionizing, fluorescence, photochemical and biological action.

Ionization is the process of converting electrically neutral atoms (molecules) of a substance in the charged parts – ions.

X-rays can cause fluorescence, which is illumination of a number of complex salts and crystals. This property is one of the main methods of radiological examination – x-rays.

X-ray is an examination method that is based on obtaining of x-ray display on a fluorescent screen, the screen of a cathode-optical converter or a television screen.

The ability of x-rays to penetrate through transparent objects and to act on the photosensitive layer of photographic film (photochemical action) ensures the possibility of performing radiography.

X-ray – method of x-rays, which with the help of x-ray radiation-sensitive material (x-ray film) get a fixed image of the object.

Radiological research method has found wide application in dentistry and particularly orthodontics. It is used for both diagnosis and to determine the effectiveness of interventions. The use of repeated radiographs in the dynamics of treatment allows us to trace the course of the pathological process, to timely identify and prevent possible complications, make a plan and prognosis of orthodontic treatment.

Intraoral contact radiography shown in the presence of diastemas, anomalies of position of individual or groups of teeth, presence of supernumerary or impacted teeth, to determine the degree of root resorption, time and the stage of formation of permanent teeth roots.

Intraoral contact radiography allows to determine the following:

1. The belonging of teeth to temporary or permanent occlusion.
2. The degree of resorption of temporary teeth roots.
3. The presence, location, extent of formation of the permanent tooth follicle.
4. The ratio of permanent and temporary tooth follicles.
5. The stage of permanent teeth roots formation.
6. The condition of the palatal suture.
7. The status of periapical tissues supporting the teeth.
8. The size of the tooth which is not erupted.
9. The presence of supernumerary and impacted teeth.
10. The presence of fracture tooth or tooth root.

The size of the tooth which is not erupted, determined by the formula:

$$X = (x \times y) : Y$$

Where X is the size of the tooth which is not erupted; x – size of the tooth which is not erupted, on the radiograph;

Y – the size of the eponymous tooth of the opposite side that was cut;

y – the size on the radiograph.

A common way intraoral survey is occlusal x-rays, which can be used to:

1. The plot of greater length.
2. The presence and location of impacted teeth.
3. The condition of the palatal suture.
4. The presence of stones submandibular and sublingual salivary glands.
5. The presence of the fracture line after trauma.
6. The presence of the crown or root fracture after the tooth trauma.

Taking of occlusal x-rays doing for the examination of children and adolescents with impaired opening of the mouth and in case of hypersensitivity of the mucous membrane of the mouth, which leads to increased gag reflex.

Radiograph of the palatal suture. In those cases, when diagnosed with narrowing of the upper jaw or her dental arch and planning of the expansion, and for the treatment of diastemas, shown radiography of palatal suture.

More pronounced palatal suture is determined at the diastemas. Width and density often correspond to the size of the diastema. When small size of diastemas the palatal suture of medium width and density, and the diastema size 4-5 mm broad and thick.

For the rapid expansion of the maxilla with fixed orthodontic appliances sometimes the disclosure occurs (rupture) of palatal suture. In such cases the radiograph in the area of palatal suture see a dark stripe of moderate expansion gap is not observed. Sometimes there is only a small bone thinning and expansion of the gap between the roots of the central incisors is closer to the top of the alveolar process.

In some cases it is necessary to estimate the parts of the upper and lower jaws, TMJ, facial bones, which are not necessarily obtained on snooty images or they are only partially visible. On extra-oral shots, the image of the teeth and surrounding tissues obtained less than structural. Therefore, such images are used

only in cases where to obtain intraoral radiographs impossible (increased gag reflex, lockjaw, etc.).

X-ray of lateral projection of the lower jaw body and the branches. On extra-oral radiographs of the body and the branches of the lower jaw have the opportunity of studying the ratio of their sizes, the measurement of the angle of the mandible and the nature of teething "wisdom".

Radiography of the temporomandibular joints. Indications for application of this method is the presence in patients of complaints or symptoms related to TMJ or the presence of dental anomalies associated with displacement of the lower jaw (distal, mesial, cross bite). Plain radiography of the TMJ is carried out by the method of Schuller, Parma etc.

Method Parma – contact close-up shots, which can be done by a dental x-ray machine after removal of the tube. According to the method of Parma, you can obtain functional radiographs of the temporomandibular joint. This is made by two images at the open and closed mouth (closed the teeth in the position of central occlusion).

On these radiographs is determined by:

1. The position of articular heads in particular fossae.
2. The ratio of the articular heads, and other elements of the joint.
3. The width of the joint space.

Schuller Method. To obtain images of joints by the method of Schuller photography is carried out with a special tube with a length of 50 cm. At the angle of inclination of 30°, central ray directed to the area of the skull of a healthy side (for the palm width is above the external auditory canal), while it goes through the ear hole of the investigated parties, that is nearly axially through the articular head.

On the radiographs obtained by this method, we can identify:

1. The contours of the joint elements.
2. The relationship between elements of the joint.
3. Gross pathological changes.

However, this conclusion is unsuitable to study the function of the TMJ. In addition there are various distortions, especially the width of the joint space. Also difficult to see small changes in the joint in the picture.

Tomography – layer-by-layer image of the object on the x-ray film – an additional method, allowing imaging the individual layers. Imaging is mainly used To clarify the pathology of the upper jaw and TMJ studies.

Stratified study with a small angle (8-10°), or sonography, is a combination of x-ray picture and CT scan. The image of the object is more clear and contrasting.

Panoramic radiography is a type of layer-by-layer image.

The practical application of panoramic radiography in dentistry began in 1949 p. Panoramic radiograph occurs simultaneously image the entire dentition as a functional complex with virtually no angular distortion. However, the image on film is slightly increased, and uneven in the central and lateral parts of the jaws. Also noteworthy is the blurred image of the anterior jaws and the projection on them of the cervical spine.

Panoramic radiography gives a reflection on the upper jaw dental, alveolar and basal arcs; nasal cavity; maxillary sinus; and the zygomatic bones. In the lower jaw – dental, alveolar and basal arcs; the edge of the lower jaw; the branches and angles.

Strait panoramic radiography allows to study:

1. The relationship of the dentition in occlusion, in the mesio-distal direction.
2. The relationship of the dentition in the malocclusion in the vertical direction.
3. The belonging of teeth to temporary or permanent occlusion.
4. The stage of permanent teeth roots formation.
5. The degree of temporary teeth roots resorption.
6. The presence, the stage of formation and position of permanent teeth germs.
7. The ratio of permanent teeth germs and the roots of the temporary teeth.
8. The inclination of the teeth, erupted and impacted teeth relative to adjacent teeth and the mid-sagittal plane.
9. Dent-alveolar relative height in the front and lateral areas of the jaws.
10. The depth of incisal overlap.
11. The body size of the jaws, branches and angles of the mandible.
12. The asymmetry of the right and left halves of the middle and lower parts of the facial skeleton.
13. The presence and degree of curvature of the nasal septum.
14. The size of the nasal cavity.
15. The magnitude of the nasal cavity.
16. The amount and condition of the paranasal cavities.
17. Shape and location of the congenital clefts of the alveolar process and body of the maxilla.
18. The location of the articular heads temporo-mandibular joint into the joint folds;
19. The location of the hyoid bone.

Research devoted to the bone age study first appeared in pediatrics. One of the first orthodontists, who by attention to the relationship beginning of mineralization sasamoid bone that is in the region of the interphalangeal joint of the finger 1 with the period of intensive growth of the skeleton, was T. W. Todd (1937).

The x-ray hand to determine bone age.

Stage 1 – the epiphysis and diaphysis of the proximal phalanx of the 2nd finger foods-scientific dimensions. Chronological age girls and boys – 9 years.

Stage 2 – the epiphysis and diaphysis of the medial phalanx of the 3rd finger however new size. The apogee of the growth will come in 2 years, but the growth of the upper jaw ends, and the bottom continues. The chronological age of the girls is 9 years, 7 months, boys 11 years and 2 months.

Stage 3 – pisiform bone mineralization starts a mineralization of hamate bones. Chronological age of girls is 10 years, 5 months, boys 11 years 9 months.

Stage 4 – there is sesamoid bone ends hamate bone mineralization. Chronological age of girls is 11 years 3 months, boys 12 years 5 months. By Kaminek, for the treatment of malocclusion urgent need to move the lower jaw, because you can skip a good moment, especially for II class on Angle.

Stage 5 – is the peak of pubertal growth, which coincides with the beginning of the menstrual cycle in girls. In the medial phalanx of the 3rd finger the epiphysis is wider than the diaphysis. Chronological age of girls is 12 years, 4 months, boys – 14 years.

Stage 6 – puberty the recession comes growth. The distal phalanx of the 3rd finger is formed: no band gap between the epiphysis and diaphysis. Chronological age of girls was 13 years, 1 month, boys 15 years 4 months.

Stage 7 – there is a connection of epiphysis and diaphysis of the proximal phalanx of the 3rd finger. The peak of growth has passed. Chronological age of girls 14 years 1 month., boys – 16 years.

Stage 8 – there is a connection of epiphysis and diaphysis of the medial phalanx of the 3rd finger. Chronological age of girls 14 years, 3 months, boys – 16 years. At this stage the child is still growing, but growth is slowing, and this should be considered. Kaminek recommends only the inclination or the movement of the teeth, movements of the mandible impossible.

9 stage connection of epiphysis and diaphysis of the radius. This stage indicates the end of the formation of the skeleton. Chronological age of girls is 16 years, 5 months, boys 17 years 3 months. At this stage Kaminek recommends planning complex maxillofacial surgery to be carried out after the formation of the skeleton.

Thus, the carried out radiographic studies help to clarify the diagnosis, to choose a method and make a treatment plan depending on the age of the patient.

Rentgenology the maxillofacial region in children.

In the development of occlusion distinguish three periods: a temporary, mixed and permanent. Spongy substance of jaw bones at birth has a gentle nature; in each jaw 18 follicles (10 temporary and 8 permanent teeth). Because of this the alveolar processes of the upper and lower jaws are the most developed departments.

Radiological picture during the period of temporary occlusion is diverse, polymorphic and changes with age. Radiographs of the tooth follicle are determined in the form of rounded pockets of rarefaction of bone tissue with clear contours, surrounded by the periphery of the cortical bone. Cortical bone of the bone that surrounds the germ of the future tooth, prior to the mineralization of the crowns has the form of a continuous narrow strip. The contours of the future of the tooth become visible only after the start of the crown mineralization.

Mineralization of the crowns of lateral teeth starts from the tops of casps, and of the cutters with the cutting edge, and on radiographs they look like point pockets of calcification. The number of point pockets of calcification are different. Thus, the cutters usually mentions the existence of 3 centers of calcification in canines – 4 molars and premolars as many of them as tubercles on the chewing surface. Gradually merging into posterior teeth, is determined by the ring phase,

then the stage of "cap" or "crock"; on cutters define the contours of the crowns of various sizes.

A baby on radiographs of the jaws is determined by the mineralization of 1/6 of the central incisors crowns, approximately 2/3 of the crowns of the lateral incisors and sometimes calcification in the apex of the canine, the visible calcification of the tubercles of the temporary molars. Sometimes in visible areas of calcification in the area of the first permanent molar and incisor. Noted that the girls teething occurs somewhat earlier than in boys. However, there are individual deviations from the average standards of the eruption. Even fluctuations within 6 months as the norm.

Rickets, chronic dyspepsia, acute infection, endocrine disease, malnutrition, hypovitaminosis, various may affect the timing of mineralization and eruption of teeth. In such cases, x-ray examination to determine the presence or absence of germs, to assess the nature of their formation, taking into account age.

APPLICATIONS OF CONE BEAM COMPUTED TOMOGRAPHY (CBCT) IN ORTHODONTICS

In orthodontics, CBCT might be used for a variety of reasons. Since the previous edition of these guidelines in 2008, the literature has grown considerably. Establishing the diagnostic efficacy of an imaging technique ideally requires evidence at all levels, starting with technical efficacy (e.g., measurement accuracy, reproduction of detail), diagnostic accuracy (e.g., sensitivity, specificity), impact on treatment planning decisions or patient outcomes and, at the highest level, the cost-effectiveness at the societal level.

It is important to be aware that most knowledge on CBCT relates to the lower levels of diagnostic efficacy. In the absence of comprehensive evidence, this technique should be used cautiously and in carefully selected situations. Cephalometric and panoramic radiographs appear to be sufficient in most circumstances and should not be replaced with CBCT imaging.

USES OF SMALL FIELD OF VIEW (FOV) CBCT

Unerrupted maxillary canines. The majority of CBCT examinations of young people are undertaken for localized examination of the anterior maxillary region to assess the position of unerupted canine teeth and suspected root resorption of incisors. There are now a number of retrospective studies comparing orthodontists' decisions made on such clinical cases, with and without the availability of CBCT imaging, which suggest that treatment plans are changed in a minority of cases. The evidence suggests that clinicians' confidence and consistency in treatment planning decisions is improved.

There is improved accuracy of localization of unerupted maxillary canine teeth and identification of root resorption in incisor teeth using a three-dimensional imaging technique. In most cases, however, there is agreement between localization and presence of root resorption made using conventional radiographs and CBCT imaging.

Previous UK and European guidelines have suggested that CBCT may be appropriate for the examination of unerupted maxillary canines in selected cases where conventional radiographs fail to provide adequate information. Such an

approach seems sensible. For example, conventional radiographs may show root resorption of an incisor tooth with sufficient detail to allow a treatment plan to be devised. CBCT could then be reserved for equivocal cases or those with potential complications.

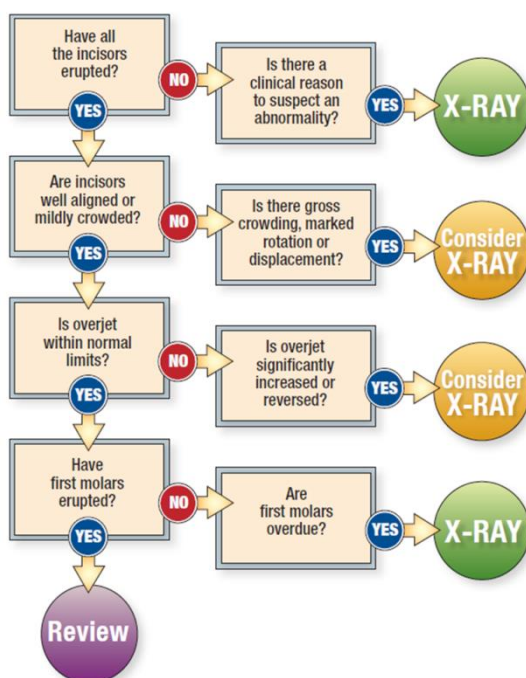
Other uses of small FOV CBCT

Other localized uses of small FOV CBCT can be considered, such as assessment of unerupted dilacerated incisor teeth, as this view can provide an accurate measurement of the angulation of the dilacerated which might assist in treatment planning.

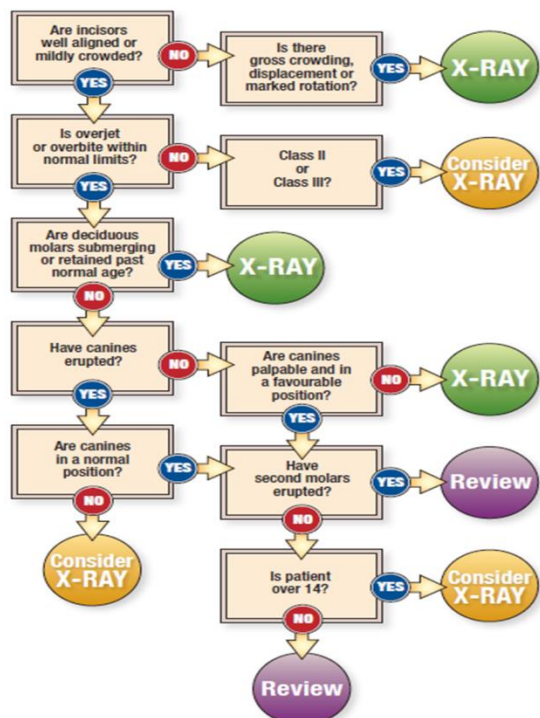
Surgical planning may also benefit from three-dimensional information. An example is where unerupted teeth or supernumerary teeth are to be surgically removed, but when: they are located in the region of important anatomical structures. If the neurovascular structures cannot be shown to be at a safe distance from the area of surgery on conventional radiographs, then localized small FOV CBCT would be justified.

The use of CBCT for the assessment of cleft palate can be justified where CT scans have been used in the past, as small/medium FOV CBCT is likely to have a lower radiation dose. As described in a recent review, CBCT can allow quantification of the bone defect volume in the context of grafting, as well as localization of ectopic teeth which may be associated with clefts.

X INDICATIONS FOR RADIOGRAPHS –
CHILD PATIENT LESS THAN 10 YEARS OF AGE



X INDICATIONS FOR RADIOGRAPHS –
PATIENT OVER 10 YEARS OF AGE



Materials for self-control:

A. Tasks for self-control (tables, diagrams, drawings, graphs):

1. To make the graph for panoramic radiographs decoding.
2. To make the table of permanent teeth mineralization stages.
3. To draw the types of physiological temporary roots resorption.

B. Tasks for self-control:

1. To study the teeth hard tissues state using:
intraoral contact X-ray
occlusal X-ray
cephalometry
contrast X-ray
X-ray of the hand
2. X-ray of the bite is also called:
occlusal
contact
sonografia
contrast
standard
3. With increased gag reflex or lockjaw is using:
zonagrafia
contact x-ray
occlusal x-ray
tomography
panoramic x-ray
4. X-ray of palatal suture is prescribed for the following orthodontic pathology:
the diastema
anomalies of individual teeth position
malocclusion in the sagittal plane
malocclusion in the vertical plane
malocclusion in the transversal plane
5. On extraorally lateral X-ray of the back projection of the body and ramus it is possible to determine:
relation of their size and the magnitude of the mandible angle
relation of teeth in the transversal plane
relation of the teeth in the sagittal plane
relation of teeth in the vertical plane
status of mental holes
6. X-ray of the temporomandibular joint' method by Parma to find out:
the position of the joint heads into the joint fossas
location of the teeth
the position of the mandible in the transversal plane
proportionality of the body and the branch development
presence of impacted teeth.

7. Bone age is determined by:

X-ray of a the hand
contact intraoral X-ray
panoramic X-ray
cephalometry of the skull
CT

8. Panoramic X-ray allows to describe the relation of occlusion in these planes:

sagittal and vertical
sagittal and transversal
sagittal and horizontal
sagittal and occlusal
sagittal and tuberales

9. On the panoramic X-ray may show:

dental arches, nasal cavity, maxillary sinuses, TMJ heads
cervical spine
bone age
frontal sinuses
anterior cranial fossa

10. Zonagrafia is:

layer-by-layer study of the TMJ
X-ray of the TMJ
occlusal X-ray
contact X-ray
TRG of the skull from the front

11. At what stage in the x-ray hand appears sesamoid bone?

the fourth
the second
the third
the first
the fifth

12. How many stages of bone tissue mineralization by x-ray Kaminek allocated?

9
6
7
5
11

13. What processes on X-ray of the hand correspond to the stage IV of mineralization?

ends of the pisiform bone mineralization, starts mineralization of hamate bone

appears sesamoid bone, ends mineralization of hamate bone

epiphysis and diaphysis of the proximal phalanx of the 2nd finger of the same dimensions

connection of epiphysis and diaphysis of the medial phalanx of the 3rd finger

connection of epiphysis and diaphysis of the radius

14. What processes on X-ray of the hand correspond to the stage III of mineralization?

ends of the pisiform bone mineralization, starts of hamate bone mineralization

appears of sesamoid bone, ends of hamate bone mineralization

epiphysis and diaphysis of the proximal phalanx of the 2nd finger of the same dimensions

connection of epiphysis and diaphysis of the medial phalanx of the 3rd finger

connection of epiphysis and diaphysis of the radius

15. What processes on X-ray of the hand correspond to stage I of mineralization?

ends of the pisiform bone mineralization, starts of hamate bone mineralization

appears of sesamoid bone, ends of hamate bone mineralization

epiphysis and diaphysis of the proximal phalanx of the 2nd finger of the same dimensions

connection of epiphysis and diaphysis of the medial phalanx of the 3rd finger

connection of epiphysis and diaphysis of the radius

16. What processes on X-ray of the hand correspond to the IX stage of mineralization?

ends of the pisiform bone mineralization, starts of hamate bone mineralization

appears of sesamoid bone, ends of hamate bone mineralization

epiphysis and diaphysis of the proximal phalanx of the 2nd finger of the same dimensions

connection of epiphysis and diaphysis of the medial phalanx of the 3rd finger

connection of epiphysis and diaphysis of the radius

17. To determine the TMJ condition using:

rentgenography method by Parm
sighting rentgenography
panoramic X-ray
TRG
axial rentgenography

18. OPG in orthodontics are used to determine:
presence of permanent teeth follicles
length of mandible
length of the upper jaw
structure of the nose
structure of the middle third of the skull

19. For measurement of the joint space size it is advisable to do:
X-ray by Parm
sonography
sighting X-ray
panoramic X-ray
TRG

20. The patient 11 years to select the design of the appliance assigned to conduct the determination of bone age, which is determined on:
X-ray of the hand
contact internally oral X-ray
panoramic radiograph
computed tomography
dental picture

21. Patient G., 19 years assigned to the X-ray of the temporomandibular joint in Parm. Indications for this study are:
anomalies of TMJ hard tissues structure
anomalies of position of individual teeth
pathology of periodontal tissues
malocclusion is associated with displacement of the mandible to the side;
the form of the dentition anomaly

22. The patient S., 10 years assigned to the X-ray palatal suture. The orthodontic pathology shows using of this method:
anomalies of the upper lip frenulum attachment
anomalies of the shape of dentition
malocclusion in the sagittal plane
malocclusion in the vertical plane
malocclusion in transversal plane

23. Patient G. 12 years, was appointed research method which allows to determine bone age. On what basis the child on the radiograph is determined by the peak growth:

- there sesamoid bone

- connection of epiphysis and diaphysis of the radius

- epiphysis and diaphysis of the proximal phalanx of the 2nd finger of the same dimensions

- connection of epiphysis and diaphysis of the medial phalanx of the 3rd finger

- size of the epiphysis and diaphysis of the proximal phalanx of the 2nd finger are the same

24. Patient L., 18 years old diagnosed with retention of 13 and 23 teeth. What research method to use in this situation to determine surgical intervention at the opening of crowns of teeth

- dental X-ray

- MRI diagnostic

- computer diagnosis

- orthopantomography

- radiograph by Parm

25. Patient K. 19 years old, complains of crunching in the temporo-mandibular joint. What method of research be conducted to diagnose disorders?

- X-ray by Parm

- TRG

- OPG

- dental X-ray

- sonography

26. Patient S. complains of limited mouth opening. The dentist puts a preliminary diagnosis of anterior dislocation of the TMJ disc. What method of research conducted to diagnose disorders?

- radiograph by Parm

- TRG

- MRI

- dental X-ray

- OPG

27. Patient N. 18 years of complaints about the gap between the upper central incisors. Orthodontic dentist diagnosed a low attachment of the frenulum of the upper lip, with the transition to the incisal papilla. What method of research conducted to clarify the surgical intervention?

- x-ray at bite

- TRG

- radiograph at Parm

dental X-ray
OPG

28. Patient K., 8 years old complains of presence on the upper jaw tooth is an unusual shape in the frontal portion. What method of research is logical to use in this situation for further violations?

OPG
radiograph of prices
TRG
radiograph at Parm
CT

29. Patient M., 18 years old complains of discomfort in the region of the angle of the mandible on the left that connects with the eruption of the third permanent molar. What method of research is logical to use in this situation for further violations?

OPG
radiograph of prices
TRG
radiograph at Parm
the x-ray of hand

30. The patient F. 15 years old complains of lack of tooth of the second premolar in the upper jaw on the left. What method of research is logical to use in this situation for further violations?

OPG
radiograph at bite
TRG
radiograph at Parm
the x-ray hand

31. The patient 18 years old of the preliminary diagnosis: retention of third permanent molars. What method of research is logical to use in this situation for further violations?

OPG
radiograph of prices
TRG
radiograph at Parm
the x-ray hand

32. Patient set a bone age of 10 years. What research method for this age using?

X-ray of hand
radiograph of prices
TRG

radiograph at Parm
OPG

33. Patient F. 7 years on the upper jaw cut through a tooth is atypical in form. What method of research is logical to use in this situation for further violations?

OPG

CT

TRG

radiograph by Parm

x-ray hand

34. Patient G. 12 years diagnosed with distal occlusion. To solve the tactics of treatment the orthodontist recommended to determine the bone age of the patient?

X-ray of hand

CT

TRG

radiograph by Parm

OPG

Literature

Main:

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