



Educational institution
"Roel Metropolitan University"

Quality Management System
Educational and Methodological Complex of the Discipline "Orthodontics"
Department of Dental Disciplines, Royal Metropolitan University
560004 "Dentistry"

**Ministry of Science, Higher Education, and Innovation of the Kyrgyz
Republic
Educational Institution
"Royal Metropolitan University"
Department of Dental Disciplines**



"APPROVED"

Vice Rector for Academic and
and Administrative Affairs
N.A. Urazalieva

"06" 09 2025



**TEACHING AND METHODOLOGICAL COMPLEX OF THE
DISCIPLINE**

"ORTHODONTICS"

of the main educational program
in the specialty 56004 "Dentistry" (for foreign citizens)

Graduate qualification: Specialist (Doctor)

Bishkek 2025



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**WORKING PROGRAM OF THE DISCIPLINE
"Orthodontics"**


of the main educational program
in the specialty 560004 **"Dentistry" (for international students)**

Graduate Qualification: Specialist (Doctor)

Full-time program	
Course	4
Semester	8
Exam (semester)	8
Credit (semester)	2
Total credits in the curriculum	60
Total hours in the curriculum	

Program developer:
A.A. Makenjanov

Reviewed and approved at a meeting of the
Department of Dental disciplines
Protocol No. 1 dated September 6, 2025
Head of the Department, Ph.D. A.K. Bektasheva

 (signature)

Bishkek 2025



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The work program for the course "Orthodontics" has been developed in accordance with the requirements of the State Educational Standard for Higher Professional Education for the specialty 560004 "Dentistry."

The work program has been approved by the Educational and Methodological Department of the RMU

Head of the Educational and Methodological Department

Reutskhava N.R.

(Full Name)

[Signature]

(Signature)

"06" 09 2025

The work program has been approved by the head of the core educational program for specialty 560004 "Dentistry"

Head of the Main Educational Program

Sapozova A.Z.

[Signature]

(Full Name)

(Signature)

"06" 09 2025

External review provided on

M.D., professor Kurbaev A. Zh.

" " 2025 (review attached)

The work program has been approved by a specialist from the RMU Quality and Monitoring Department

Q&M Department

Mumbesaliev V.

(Full Name)

[Signature]

(Signature)

"06" 09 2025



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1. The working program of the academic discipline

1.1. Explanatory note

The mission of the educational institution "Royal Metropolitan University" is to improve the health and quality of life of the population through high-quality training of medical personnel capable of intercultural interaction, based on the integration of advanced scientific knowledge, innovation and high standards of practice in the context of the unity of education, science and clinical activity.

Abstract of the academic discipline

Orthodontics is a clinical discipline that studies the etiology, pathogenesis, clinical presentation, diagnosis, prevention, and treatment methods of dental and maxillary anomalies (DMA) and deformities in patients of all ages. This course develops students' competencies based on knowledge of the morphology, physiology, and biomechanics of the dental system, the principles of designing and using orthodontic appliances, and pediatric dental prosthetics. It is part of the elective component of the professional training cycle for dentists.

The purpose and objectives of the discipline

The purpose of discipline

The main goal of training in orthodontics and pediatric prosthetics is to develop students' clinical knowledge and skills in:

- morphology and physiology of the dental system in different age periods, including periods of temporary, mixed and permanent dentition;
- the etiology and pathogenesis of dentoalveolar anomalies and deformations, as well as the basics of physical examination of patients with this pathology;
- methods of clinical, anthropometric and radiological (TRG, OPTG) research in orthodontics;
- Planning and interpretation of the results of additional laboratory and instrumental examination methods;
- determination of the main clinical syndromes for the correct orthodontic diagnosis in accordance with the ICD-10 and Angle classifications;
- selection and justification of targeted complex therapy using modern removable and fixed orthodontic devices (brackets, aligners, functional devices) and methods of pediatric prosthetics;
- clinical thinking based on the analysis of diagnostic data and prediction of treatment results;
- the causes and general patterns of occurrence, development and outcomes of bite anomalies, as well as the formation of a methodological and methodological basis for medical tactics;
- current theoretical and practical issues in the field of orthodontics, acquisition of independent work skills in order to ensure the professional and qualified activities of a general dentist and pediatric dentist;



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- development of universal and professional competencies in graduates to provide highly qualified dental care to children and adults in accordance with established requirements and standards in the field of healthcare.

Objectives of the discipline

- To develop extensive fundamental knowledge about the patterns of growth and development of the dental system at different age periods.
- To teach methods of clinical, anthropometric, radiological (TRG, OPG, CBCT) and functional examination of an orthodontic patient.
- To study the etiology, pathogenesis and classification of dentoalveolar anomalies (Angle, WHO, Calvelis).
- To teach differential diagnostics of various forms of dental anomalies, dental arches and bite.
- Master the principles of planning and stages of complex orthodontic treatment using modern removable and fixed equipment (brackets, aligners).
- To teach methods of preventing dental caries and the basics of pediatric dental prosthetics to prevent secondary deformations.
- To develop the ability to work in a team with related specialists (surgeon, speech therapist, otolaryngologist).

The Orthodontics block is part of the basic part of the professional cycle for the specialty Dentistry (code 560004).

The place of the discipline in the structure of the OOP (prerequisites, postrequisites)

This discipline is studied by students in the specialty 560004 "Dentistry" (for foreign citizens) and is included in the compulsory volume of studied disciplines of the State Educational Standard of Higher Professional Education (the optional part of the professional cycle).

The course "Orthodontics and Pediatric Prosthetics" builds on the previous courses, including normal and pathological physiology of the maxillofacial region, pharmacology, human anatomy, materials science, and radiation diagnostics. The knowledge gained in "Orthodontics" will subsequently be essential for studying the following disciplines: orthopedic dentistry, oral surgery, and maxillofacial surgery, as well as for clinical practice and final state certification.

The main purpose of the program in orthodontics and pediatric prosthetics is to develop students' clinical thinking, the ability to interpret anamnesis data, clinical picture, additional research methods (analysis of TRG, OPG, CBCT, anthropometry of models) for the correct orthodontic diagnosis and the development of a comprehensive treatment plan.

The total workload of the subject is 60 hours (2 credits).

The course consists of lectures and practical exercises. Assessments, including tests and practical skills assessments using X-rays, are used as ongoing assessment methods to test the required competencies. The final assessment is a credit.



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Course prerequisites: normal and pathological physiology of the maxillofacial region, pharmacology, human anatomy, propaedeutics of ter/ortho/surgical dentistry, impression and prosthetic materials.

Post-requisites: orthopedic dentistry, surgical dentistry and maxillofacial surgery.

Competencies of students formed as a result of mastering the discipline, planned results of mastering the academic discipline.

- Graduate in the specialty Dentistry with the assignment of a specialist qualification "Doctor" in accordance with the goals of the OOP and the objectives of professional activity, must have the following professional competencies:

Code	Contents of competence
GC-1	able and ready to analyze socially significant problems and processes, to use methods of natural sciences, mathematics and humanities in various types of professional and social activities;
IC-1	able and ready to work with computer equipment and software for system and application purposes to solve professional problems
SPC-1	able and willing to implement ethical, deontological and bioethical principles in professional activities
SPC-2	build interpersonal relationships, work in a group, constructively resolve conflict situations, tolerate social, ethnic, religious and cultural differences;
PC-2	able and willing to conduct and interpret interviews, physical examinations, clinical examinations, results of modern laboratory and instrumental studies, morphological analysis of biopsy, surgical and autopsy material of patients, and prepare medical records for outpatient and inpatient patients of children and adults;
PC-3	able and willing to conduct a pathophysiological analysis of clinical syndromes, use sound methods of diagnosis, treatment, rehabilitation and prevention among children, taking into account their age, and the adult population
PC-4	able and willing to apply aseptic and antiseptic methods, use medical instruments, carry out sanitization of treatment and diagnostic rooms, children's healthcare organizations, and possess the skills to care for sick children and adults
PC-6	able and ready to work with medical and technical equipment used in work with patients, computer equipment, receive information from various sources, apply the capabilities of modern information technologies to solve professional problems;



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PC-15	able and willing to collect and record a complete patient medical history, including oral health data
PC-16	able and ready to make a diagnosis based on the results of clinical laboratory studies of biological materials and taking into account the laws of the course of pathology in organs, systems and the body as a whole
PC-19	able and ready to diagnose typical dental diseases of the hard and soft tissues of the oral cavity, dentofacial anomalies in patients of all ages
PC-20	able and willing to analyze and interpret the results of modern diagnostic technologies in children, adolescents and adults for successful treatment and preventive activities
PC-22	able and willing to perform basic treatment procedures for the most common dental diseases and conditions in adults and children
APC-1	the ability to use modern digital technologies in the diagnosis and treatment of dental diseases
APC-2	willingness to use innovative aesthetic materials and restoration methods to restore the dentition

1.3 Planned results of mastering the academic discipline/practice

LO1: Analyze socially significant and professional problems in orthodontics using scientific methods.

LO2: Use computer technology and software to solve professional problems.

LO3: Apply the principles of bioethics, deontology and medical ethics in professional activities.

LO4: Communicate professionally, work in a team and resolve conflict situations constructively.

LO5: Conduct clinical examination of patients, collect anamnesis and prepare medical documentation.

LO6: Perform pathophysiological analysis of clinical syndromes and interpret the results of diagnostic studies.

LO7: Conduct diagnostics of dentoalveolar anomalies and dental diseases in patients of all ages.

LO8: Develop and implement a sound orthodontic treatment plan using modern methods and equipment.

LO9: Apply aseptic and antiseptic methods and ensure sanitary safety when working with patients.

LO10: Use modern digital technologies for diagnosis, planning and implementation of orthodontic treatment.

After mastering this discipline, the student:

Will know terms used in the discipline of orthodontics and the main methods of orthodontic treatment; concepts of etiology, pathogenesis, morphogenesis of



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dentoalveolar anomalies, nosology, principles of classification of orthodontic anomalies;

Will understand the essence and basic patterns of general pathological processes; their influence on the maxillofacial system, characteristic changes in the tissues of the maxillofacial region in orthodontic anomalies;

Will be able to use Rules for constructing an orthodontic dental diagnosis, principles of tooth movement and orthodontic dental diagnoses.

Will be able to determine functional disorders of the maxillofacial region in orthodontic anomalies.

Will be able to carry out Clinical and anatomical analysis; differential diagnosis of pathological processes; diagnosis of orthodontic anomalies.

Will be able to analyze characterization of pathological processes in the tissues of the maxillofacial region (MFR) organs and tissues in order to establish a preliminary diagnosis; clinical, laboratory, and other data, and formulate a conclusion on the most likely causes and mechanisms of development of orthodontic anomalies based on them.


Will be able to synthesize results of clinical and radiological analysis;

Will be able to evaluate and develop principles of etiotropic and pathogenetic therapy.

1.2. Recommended educational technologies

The following educational technologies are used to help students master the discipline "Orthodontics," gain knowledge, and develop professional competencies:

- lecture with elements of discussion and problem solving;
- lectures - electronic presentations;
- analysis of specific situations;
- role-playing game "doctor - patient";
- lecture-visualization;
- debate;
- brainstorming;
- small group method;
- analysis of clinical cases;
- situational tasks;
- preparation and defense of medical history;
- student's research work;
- holding subject Olympiads;
- preparation and defense of abstracts;
- excursions, visits to the dentist's office

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1.3. Scope of the discipline and types of academic work


The section data is presented in tabular form in accordance with the curriculum. It also specifies the volume of classroom instruction (lectures, seminars, practical classes, and labs) and independent student work (overall and by semester in which the course is studied), as well as the types of final assessments.

Form of study – full-time

According to the 2025 curriculum	8 sem.	Total	
		in hours	in loans
Total labor intensity	60	60	2
Classroom work	36	24	
Lectures	18	18	
Practical classes	18	18	
Independent work	12	12	
SRSP	12	12	
Type of final control	Credit		

1.4. Structure of the discipline

1.4.1. Thematic plan for studying the discipline –Reflects the course structure, reveals the sequence of study of sections and topics of the program; is presented in the form of a table and provides information on the distribution of the number of hours by topics, types of classes (lectures, seminars, practical classes, laboratory work, independent work of students), the competencies developed, the educational technologies used, the methods and methods of teaching, and forms of assessment.

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Subject plan for studying the discipline and competency matrix (workload is indicated in academic hours)

No.	Name sections and topics (lectures and practical classes)	Classroom classes				Total hours on classroom work	SRSP	Independent work of a student	Formed competencies	Used educational technologies, methods and	Dummies	Forms of current and border control academic performance
		lectures	seminars	practical classes	laboratory work							
	8th semester											
1	Orthodontics as a science. Organization of orthodontic care. Periods of development and formation of the bite. Pediatric examination features.	2		2		4		2	<i>PC-2, PC-15, SPC-1</i>	<i>visualization lecture</i>	<i>Diagnostic plaster model</i>	<i>Oral survey</i>
2	Etiology and classification of dentofacial anomalies. Angle's classification, WHO (ICD-10). Risk factors for the development of dentofacial anomalies.	2		2		4	2		<i>PC-3, PC-16</i>	<i>lecture-visualization</i>		<i>Testing, control work. Solving situational problems</i>



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3	Clinical examination methods for orthodontic patients. Anthropometry of the face and head. Photometry. Analysis of diagnostic jaw models.	2		2		4		2	<i>PC-19, PC-20</i>	<i>visualization lecture</i>	<i>Artificial jaws</i>	<i>A lesson using head mannequins</i>
4	Radiographic diagnostic methods in orthodontics. Orthopantomography (OPT). Teleradiography (TRG): fundamentals of cephalometric analysis (Schwartz, Steiner methods). CBCT in orthodontics.	2		2		4	2		<i>PC-22, PC-23</i>	<i>lecture-visualization</i>		<i>classes using diagnostic models Testing Analysis of OPT</i>
5	Anomalies of teeth and dental arches. Anomalies in the timing of eruption, structure of hard tissues, number, size, shape, and position of teeth. Crowding. Diastema.	2		2		4		2	<i>PC-23, APC-1</i>	<i>visualization lecture</i>	<i>Diagnostic plaster models</i>	<i>analysis of clinical cases.</i>
6	Sagittal malocclusion. Distal occlusion (Angle's class II). Mesial occlusion (Angle's class III). Etiology, clinical	2		2		4	2		<i>PC-22, PC-6</i>	<i>Visualization lecture</i>		<i>classes using training equipment and simulators.</i>



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	presentation, diagnosis, and treatment principles.											<i>Assessing the acquisition of practical skills (abilities). Solving situational problems</i>
7	Vertical and transverse malocclusions. Deep, open, and crossbites. Etiology, clinical presentation, diagnosis, and treatment principles.	2		2		4	2	2	<i>PC-22, PC-4</i>	<i>Visualization on lecture</i>		<i>analysis of clinical cases. Classes using simulators and training equipment</i>
8	Treatment methods for occlusal deformities. Classification of orthodontic appliances. Removable appliances with mechanical and functional action (plates, trainers, LM activators). Designs and activation principles.	2		2		4	2	2	<i>PC-22, APC-1</i>	<i>lecture-visualization</i>		<i>business and role-playing educational game. Classes using simulators and training equipment</i>

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9	Fixed orthodontic appliances. Bracket systems: components, types, treatment stages. Aligners. Indications and contraindications. Retention period.	2		2		4	2	2	PC-2, PC-4	Visualization on lecture		analysis of clinical cases. Use of computer-based training programs
	Total 8 semester	18		18		36	12	12				Credit
	Total hours by discipline:	18		18		36	12	12				60

Examples of educational technologies, methods and teaching techniques (abbreviated): traditional lecture (L), lecture-visualization (LV), problem lecture (PL), lecture-press conference (LPC), lesson-conference (LC), training (T), debates (D), brainstorming (MS), master class (MC), activation of creative activity (ATD), regulated discussion (RD), forum-type discussion (F), business and role-playing educational game (DI, RI), small group method (MG), analysis of clinical cases (CA), preparation and defense of medical history (IB), preparation of written analytical works (AP), preparation and defense of abstracts (R), distance educational technologies (DOT).

Sample forms of current and midterm monitoring of academic performance (abbreviated): T – testing, Pr – assessment of mastery of practical skills (abilities), ZS – solving situational problems, CR – test, KZ – test assignment, IB – writing and defending a medical history, CL – writing and defending a supervisory sheet, R – writing and defending an abstract, S – interview on test questions, D – preparing a report, etc.

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1.4.2. Organization of independent work of students

No.	Topic of independent work for students of 5th semester:	Assignment for independent work	Recommended literature	Deadlines surrender (week number)
1.	Bad habits and their impact on the development of mental retardation. Myofunctional disorders.	Abstract, presentation, preparation of the report.	<p>Pediatric Dentistry: textbook / edited by Yanushevich O. O., Kiselnikova L. P., Topolnitsky O. Z. - Moscow: GEOTAR-Media, 2020</p> <p>Dictionary of professional dental terms / E. S. Kalivradzhiyan, E. A. Bragin, I. P. Ryzhova - Moscow: GEOTAR-Media, 2017</p> <p>Dentistry. International classification of diseases. Clinical characteristics of nosological forms / M. Ya. Alimova, L. N. Maksimovskaya, L. S. Persin, O. O. Yanushevich - Moscow: GEOTAR-Media, 2016</p> <p>Orthodontics. Diagnostics and treatment of dentofacial anomalies and deformities: textbook / L. S. Persin [et al.]. - Moscow: GEOTAR-Media, 2022</p> <p>https://www.sciencedirect.com/journal/american-journal-of-orthodontics-and-dentofacial-orthopedics</p> <p>https://www.omicsonline.org</p> <p>https://pubmed.ncbi.nlm.nih.gov</p>	1



2.	Comparative characteristics of methods of expansion of the upper jaw.	Abstract, presentation, preparation of a report	2
3.	Lingual braces: indications, advantages and disadvantages, adaptation features	Abstract, presentation	3
4.	Prevention of dental anomalies in preschool-aged children. The role of the pediatrician and dentist.	Abstract, presentation, preparation using dummies.	4
5	Functional devices (trainers, LM-activators) in the treatment of bite anomalies in children with mixed dentition.	Abstract, presentation, preparation of the report.	5
6	Dental defects in children. Indications for pediatric dental prosthetics to prevent secondary malocclusions.	Abstract, presentation, preparation of the report.	6
7	Comparative characteristics of methods for measuring diagnostic models: Pon, Korkhaus and Snagina.	Abstract, presentation, preparation of the report.	6

1.4.3. Assessment tools for monitoring academic performance

- **Current and midterm (modular) control**



Current monitoring of students' knowledge may represent:

- oral survey;
- solving situational problems;
- assessment of the acquisition of practical skills using dummies;
- test task; test work;
- checking the completion of written homework;
- checking abstracts, reports, presentations.

Sample situational problems for the discipline:
Situational tasks

Problem #1

An 8-year-old patient whose parents complained of crowded lower jaw teeth. Upon examination, the patient's dental age was 8 years, with the lower incisors crowded and rotated. The upper jaw was normal.

Questions to be addressed:

- Make a preliminary diagnosis.
 - What diagnostic methods need to be carried out?
 - Determine a treatment plan.
-

Problem #2

A 12-year-old patient complains of protruding upper teeth and an inability to close his lips. Physical examination: the upper incisors protrude forward, the sagittal gap is 6 mm, and the profile is convex.

Questions:

- Diagnosis? Angle classification?
 - What additional research methods are indicated?
 - Make a treatment plan.
-

Problem #3



A 6-year-old patient with a bad habit: thumb sucking. Examination revealed a 4 mm gap between the upper and lower incisors when they meet.

Questions:

- Diagnosis?
- What measures are necessary at this stage?
- When should hardware treatment be used?

Boundary (modular) control may represent:

- testing by section (computer);

1. At what age does the formation of the primary dentition end?

- A) By 1 year
- B) By 2.5–3 years
- C) By 4 years
- D) By 6 years

Correct answer: B

2. At what age does the first permanent molar erupt?

- A) 4-5 years
- B) 6-7 years
- C) 8–9 years
- D) 10–11 years

Correct answer: B

3. What period of occlusion is characterized by the presence of all 20 milk teeth?

- A) Newborn
- B) Formed milk bite
- C) Mixed dentition
- D) Permanent bite

Correct answer: B

4. What is characteristic of a physiological orthognathic bite?

- A) All upper teeth completely overlap the lower teeth
- B) The upper incisors overlap the lower ones by 1/3 of the crown height
- C) There is a sagittal gap between the incisors
- D) The lower incisors overlap the upper ones



Correct answer: B

5. At what age does the formation of permanent dentition usually end?

- A) 12-14 years old
- B) 15–18 years old
- C) 18–25 years old
- D) After 30 years

Correct answer: C

Section 1.2. Survey methods and anthropometry (Topics 1–3)

6. What method is used to determine the width of the dental arch?

- A) Ponto's method
- B) Corkhouse method
- C) Schwartz method
- D) Downs method

Correct answer: A

7. The Ponto index allows us to determine:

- A) The length of the anterior segment of the dental arch
- B) The sum of the widths of the crowns of the upper incisors
- C) Premolar and molar indices
- D) The height of the crowns of the teeth

Correct answer: C


8. To measure the length of the anterior segment of the dental arch, the following method is used:

- A) Ponto
- B) Corkhouse
- C) Snagina
- D) Hawley-Gerber-Herbst

Correct answer: B

9. Snagina's anthropometric method is used for:

- A) Determining the width of the dental arch
- B) Determining the length of the dental arch
- C) Definitions of the apical base

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- D) Determining the height of the bite

Correct answer: C

10. What are diagnostic jaw models used for in orthodontics?

- A) To determine the color of teeth
- B) To study the shape of the dental arches and occlusal contacts
- C) To select a filling material
- D) To determine pulp sensitivity

- The remaining test tasks can be found in the FOS app.

• Final control

Final control at the end of the study of the academic discipline it is carried out in the form of a test which is exhibited based on the results of testing and midterm (modular) control in the discipline.

1.4.4. Course policy and assessment criteria

Students' knowledge is assessed using a point-rating system in accordance with the standard "Regulations on the modular point-rating system for assessing students' knowledge.

Discipline "Orthodontics" assessed on a 100-point scale:

The maximum score is 100, of which:

- SRS - 20 points;
- current control - 40 points
- midterm control (module completion) - 40 points.

The results of the two modules are added together to produce an average score.


Scoring Policy	Module 1	Module 2, etc.
SRS	20 points	20 points
Classroom work (activity in discussions, oral questioning, group work, etc.)	40 points	40 points
Total for the module (testing)	40 points	40 points
Total for the discipline:	100 points	
Exam		

Final assessment in the form of a test is carried out based on the results of attendance, current and midterm (modular) assessment.

The final assessment form is a credit.

The following scale of grades and scores is used to evaluate student performance:


Rating and Scoring Scale				
Maximum score	Intervals			
	unsatisfactory	"satisfactorily"	"Fine"	"Great"
20	0-11	12-15	16-17	18-20
40	0-23	24-30	31-35	36-40

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60	0-35	36-45	46-53	54-60
100	0-59	60-75	76-89	90-100

Academic achievement grading scale

Rating (points)	Letter grading system	Value for calculating GPA	Digital equivalent of the assessment	Assessment according to the traditional system
96-100%	A+	4.00	5	Great
93-95.99%	A	3.75		
90-92.99%	A-	3.67		
87-89.99%	B+	3.33	4	Fine
83-86.99%	B	3.00		
80-82.99%	B-	2.67		
77-79.99%	C+	2.33	3	Satisfactorily
73-76.99%	C	2.00		
70-72.99%	C-	1.67		
67-69.99%	D+	1.33	2	
63-66.99%	D	1.00		
60-62.99%	D-	0.67		
00-59.99%	F	0.00	1	Unsatisfactory
	P			Credit
	NP			Fail
	I		Not taken into account when calculating the average grade	Failed to comply with all disciplinary requirements for a valid reason

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	W			Refusal to attend a course that is not mandatory
	AU			Attended the course as a listener, without receiving grades (awarded to a student if he/she has attended at least 80% of the classes in the additional discipline as a listener).

I - awarded to a student who has failed to complete all course requirements for a valid reason. The student has the right to complete all course requirements within the time limit established by the educational institution, after which the grade will be adjusted.

W - assigned to a student who decides to withdraw from a course no later than the sixth week of the semester. Applies only to elective courses.

AU - awarded to a student if he/she has attended at least 80% (eighty percent) of the classes in the additional discipline as a listener.

For each discipline, GPA is calculated automatically in the information system.

GPA (Grade Point Average) is a weighted average of a student's academic achievement. GPA is a key indicator of academic performance.

Based on academic performance, a GPA is calculated, with a maximum of 4.0. A student's GPA is calculated based on their academic performance in each semester and at graduation.

1.4.5. Educational, methodological and informational support of the discipline

List of sources and literature:

a) main literature:

1. Williams Obstetrics. 25 ed. Gunningham Leveno, Bloom Dashe, Loffman Casey Spong
2. Ambulatory Gynecology John V. Knaus, Marko J. Jachtowycz
3. Gynecology: V. E. Radzinskiy, A. M. Fuks. Moscow: GEOTAR-Media, 2020



4. Obstetrics / ed. by V. E. Radzinskiy, A. M. Fuks, Ch. G. Gagaev. M.: GEOTAR-Media, 2023
5. Obstetrics and gynecology : textbook : Vol. 1,2,3,4 Physiological obstetrics /1. S. Sidorova, N.A. Nikitina. Moscow: GEOTAR-Media, 2021.

b) additional literature:

1. Examination review for ultrasound. Abdomen & obstetrics and gynecology. Steven M. Penny. 2 ed. 2018.
2. Oxford Textbook of Obstetrics and Gynaecology. Sabaratnam Arulkumaran, William Ledger, Lynette Denny. 2020
3. 100 cases in Obstetrics and Gynaecology. Janice Rymer. 2015.
4. Diagnostic Imaging: Gynecology. Akram M. Shaaban. 2015
5. Gynecological and Breast Cytopathology Board Review and Self-Assessment. Walid E. Khalbuss Marilee Means 2013.
6. Atlas of Gynecologic Oncology Imaging. Oguz Akin. 2014.

List of resources of the information and telecommunications network "Internet" necessary for mastering the discipline

Provide links to websites that are publicly accessible.

List of resources of the information and telecommunications network "Internet" required for mastering the discipline (modules)


- medboocs\obstetrics and gynecology.pdf
- www.kyrlibnet.kg.
- www.iprbookshop.ru.
- www.consilium-medicum.com.
- www.medportal.ru.
- www.studmedlib.ru
- Cochrane.org, sciencedirect.com.
- www.mediliter.ru, www.meduniver.com,
- kingmed.info, vk.com, itweek.ru, medlit.biz,
- allmedbook.ru, booksmed.com, medicalenglish.ru,
- library.bsu.edu.ru, rutracker.org.

1.4.6. Material and technical support of discipline

When teaching students, modern methods and forms of teaching are used, using the latest information technologies, electronic educational resources and other information systems necessary for the successful implementation of educational, scientific and therapeutic activities.

The department has the necessary equipment for teaching, including demonstration devices, multimedia, educational films, simulators, maps, posters, and visual aids. The classroom requirements include computer labs, academic and specially equipped classrooms and laboratories, and a blackboard.

The lecture room is equipped with a power supply kit (220 V, 2 kW, complete with an RCD), specialized furniture and office equipment (a blackboard for writing with

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chalk and felt-tip pen, a stand-lectern, a lecturer's desk, a chair-chair, classroom tables, a classroom chair, as well as technical teaching aids (a wall-mounted screen with an electric drive and remote control, a multimedia projector with a laptop).

A new innovative teaching method is used for presentations, lectures and videos.

The "Orthodontics" section is selected, along with a nosology related to the topic of the practical lesson or lecture. Each nosology is accompanied by an explanation of the etiology, definition, classification, patient complaints, risk factors, and medical and life history.

Table 1


No. p/p	Type	Name	Note
1.	Presentations.	Throughout the lecture course	From 20 to 30 slides per presentation
2.	Written and test assignments.	Throughout the lecture course	In a significant way quantity
3.	Practical training. Simulation center (stations)	Throughout the course	In a significant way quantity

List of premises used

Table 2.

No.	Audience type	List of equipment
1	An auditorium for lecture-type classes.	A stationary multimedia projector, laptop, 3x4 m screen, whiteboard, and audio equipment. (microphone, speakers)
2	Auditorium for seminars, ongoing monitoring and midterm assessment, group and individual consultations	Stationary multimedia projector, laptop, 3x4 m screen, interactive whiteboard, dummies, phantoms.

1.4.7. Student research work

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The research project in the discipline "Orthodontics" has the following goals: increasing the level of professional and creative training of students, improving the forms of involving young people in scientific research and using the creative potential of students to solve current scientific problems.

The research work is aimed at solving the following problems:

- to form an idea of the main stages of scientific research activities;
- to teach how to use the conceptual apparatus of scientific research in work;
- teach how to work with various information sources;
- development of skills for perception and analysis of professional information;
- development and improvement of decision-making and implementation abilities;
- training students by means of their acquisition of methods, techniques and skills for carrying out scientific research work during the learning process;
- development of their creative abilities, independence, initiative in studies and future professional activities within the framework of their specialty.

The program of scientific research work of students (SRW), as a section for mastering practical skills, includes:

- study of specialized literature and other scientific and medical information, achievements of domestic and foreign science and technology in the field of medical knowledge, preparation of scientific abstracts (literature reviews);
- participation in conducting scientific research or in carrying out certain developments in departments;
- collection, processing, analysis and systematization of scientific information on a topic or assignment;
- preparing reports and presenting a paper at a conference, preparing scientific work for publication;
- participation in mass events of the research and development system (student scientific conferences, seminars, subject Olympiads, competitions, Science Week, exhibitions, discussions, debates, etc.).

To solve the problem, students are offered to read and meaningfully analyze scientific monographs and articles on various issues of obstetrics and gynecology contained in list of resources of the information and telecommunications network "Internet":

<http://journals.medi.ru>

www.agog.org

www.obgyn.onlinelibrary.wiley.com

www.journals.lww.com

<http://www.doctor-ru.org/>

<http://www.med2000.ru/catalog.htm>

http://www.nlr.ru/res/inv/ic_med/index.php

<http://www.elibrary.ru/>

<http://www.medmir.com/>



<https://pubmed.ncbi.nlm.nih.gov/>

<https://www.researchgate.net/>

<https://progressinorthodontics.springeropen.com/>

The results of work with scientific monographs and articles are discussed during practical classes.

To develop and improve communication skills, decision-making skills, and medical tactics in emergency situations, special training sessions are organized in the form of work in small groups, role-playing games, brainstorming, discussions, presentations, or, in preparation for which, students are divided into groups in advance, defending one or another point of view on the issue under discussion.

2. Educational and methodological materials

Educational and methodological materials (EMM), as methodological support for the discipline, are presented in the form of lecture texts, developments of practical classes, both in printed and electronic form.

2.1. Lecture notes

Lecture Topic #1: Organizational Issues in Orthodontics. Periods of Development and Formation of the Bite. Methods of Examining an Orthodontic Patient.

1. The purpose of the lecture:

To study the organizational foundations of orthodontic care, age stages of morphogenesis of the dental system and modern methods of clinical and paraclinical examination of a patient with dental anomalies.

2. Issues under consideration:

- Orthodontics as a section of dentistry: goals, objectives, connections with other disciplines.
- Organization of orthodontic care, office equipment, medical documentation.
- Intrauterine and postnatal periods of bite formation.
- Clinical examination methods: anamnesis, examination of the face and oral cavity, photometry.
- Anthropometric methods of analysis of diagnostic models (Pont, Korkhauz, Snagina).

3. Educational technologies:

- Lecture-visualization (multimedia presentation, 3D models of the skull, photographs of patients).



4. Primary and secondary literature:

1. Persin L.S. Orthodontics. Diagnosis and treatment of dental anomalies. – Moscow: GEOTAR-Media, 2020.
2. Proffit WR, Fields HW, Sarver DM Contemporary Orthodontics. – 6th ed. – Elsevier, 2018.
3. Khoroshilkina F.Ya. Orthodontics. Defects of teeth, dentition, bite anomalies. – M.: MIA, 2019.

Lecture notes:

Orthodontics (from the Greek orthos, meaning straight, and odontos, meaning tooth) is a branch of dentistry that studies the etiology, pathogenesis, diagnosis, prevention, and treatment of dental anomalies (DMA) and deformities. The primary goal of orthodontics is not only tooth alignment but also the creation of a harmonious, functionally stable, and aesthetically pleasing dental system that ensures the health of the periodontium, temporomandibular joint (TMJ), and the body as a whole. Modern orthodontics is closely linked to pediatric dentistry (early detection of pathologies), surgical dentistry (tooth extractions, frenuloplasty), orthopedic dentistry (prosthetics), otolaryngology (nasal breathing correction), and speech therapy (speech and swallowing normalization).

Orthodontic care is provided in specialized offices and departments of dental clinics. The orthodontist's work is regulated by orders of the Ministry of Health of the Kyrgyz Republic. The primary document is the "Orthodontic Patient Medical Record" (Form No. 043/u), which records complaints, anamnesis, physical examination data (including hygiene indices), results of additional diagnostic methods (TRG, OPG analysis), ICD-10 and Angle's classification diagnosis, and the treatment plan and its stages. Informed consent from the patient or their legal representative is mandatory. A photographic record (intra- and extraoral images) is an essential part of the diagnosis and serves as a legal document.

Understanding the age periods of development of the dental and maxillary system (DMS) is a cornerstone of orthodontics. The intrauterine period (embryonic and fetal) – the formation of dental plates occurs in the 6th to 7th week of embryogenesis. Adverse factors (toxycosis, maternal infections, medications, alcohol, smoking) during critical periods of development can lead to severe congenital malformations of the maxillofacial region (cleft lip and palate, syndromes). The neonatal and infancy period (from birth to 6 months) is characterized by the absence of teeth in the oral cavity. The lower jaw occupies a distal position relative to the upper jaw – this is physiological (infantile) retrogenia, which creates conditions for proper sucking. The gingival folds are semicircular.



Period of temporary (milk) bite(6 months to 3 years) begins with the eruption of the first teeth (usually the lower central incisors). By 2.5 to 3 years of age, there should be 20 primary teeth in the oral cavity. Signs of a formed primary dentition include tight contacts between the teeth (absence of tremas and diastemas), vertical alignment of the teeth, and the distal surfaces of the second primary molars in the same vertical plane (terminal plane). The period of prepared primary dentition (3 to 6 years) is a period of relative rest and preparation for the replacement of teeth. Active jaw growth occurs, resulting in the appearance of physiological tremas and diastemas by 4 to 5 years, indicating normal growth of the alveolar processes and readiness for the eruption of larger permanent teeth. Physiological abrasion of the cusps of the primary teeth occurs.

The period of mixed dentition(from 6 to 12-14 years) – the most crucial and dynamic period. It begins with the eruption of the first permanent molars ("sixths") and the replacement of the incisors. During this period, both primary and permanent teeth are present in the oral cavity. The key factor is the relationship of the first permanent molars, according to which Angle identified his classes. By the end of this period, the canines and premolars are replaced, and the formation of the permanent dentition is complete, with the exception of the third molars. The period of permanent dentition (after 12-14 years) – there are 28 permanent teeth in the oral cavity. Root formation continues, "occlusal adjustment" occurs – the grinding of the cusps to create multiple contacts. By 18-25 years, facial skeletal growth is complete, and the dentition is considered fully formed.

A clinical examination of an orthodontic patient includes collecting complaints (aesthetic, functional, and morphological), a medical and health history, and an assessment of the patient's general condition. During a facial examination, symmetry, proportions (the height of the lower and middle thirds), the severity of the nasolabial folds, and the profile (straight, convex, or concave) are assessed. An oral examination includes an assessment of hygiene, the condition of the mucous membrane, the frenulum of the lips and tongue, the position of the teeth, the shape of the dental arches, and the type of bite. Photometry—standardized photography of the full face, profile, semi-profile, and intraoral images—is a mandatory component of the diagnosis.

Analysis of diagnostic jaw models is an integral part of the examination. Measurements are taken using a compass and ruler. The Pont method is based on the correlation between the sum of the mesiodistal dimensions of the four upper incisors and the width of the dental arch in the premolar and molar region. The premolar and molar indices are calculated. The Korkhaus method measures the length of the anterior segment of the dental arch (from the contact point between the central incisors to the line connecting the Pont points on the premolars). The Snagina method determines the width of the apical base of the jaws (the distance



between the points in the projection of the root apices of the canines and premolars). Comparison of the obtained data with standard values allows for an objective assessment of the degree of narrowing/widening of the dental arches, space constraints, and the rationale for a treatment plan.

Lecture Topic #2: Etiology and Classification of Dentofacial Anomalies. Angle's Classification, WHO (ICD-10).

1. The purpose of the lecture:

To study the main etiological factors in the development of dental anomalies, to master the principles of classification of dental anomalies according to Angle and WHO (ICD-10), which is necessary for diagnosis and selection of treatment tactics.

2. Issues under consideration:

- Endogenous and exogenous risk factors for the development of CAD.
- Bad habits, functional disorders as causes of anomalies.
- Classification of dentoalveolar anomalies according to Angle (I, II, III classes).
- WHO classification (ICD-10) as applied to orthodontic pathology.
- The importance of classifications for clinical practice.

3. Educational technologies:

- A problem-based lecture with analysis of clinical cases, demonstration of diagnostic models and photographs.

4. Primary and secondary literature:

1. Persin L.S. Orthodontics. Diagnosis and treatment of dental anomalies. – Moscow: GEOTAR-Media, 2020.
2. Proffit WR, Fields HW, Sarver DM Contemporary Orthodontics. – 6th ed. – Elsevier, 2018.
3. ICD-10. International Statistical Classification of Diseases and Related Health Problems. 10th revision.

Lecture notes:

The etiology of dental and jaw anomalies (DMA) is multifactorial. All causes can be divided into two broad groups: endogenous (internal) and exogenous (external). Endogenous factors include genetic predisposition (hereditary anomalies of bite,



jaw size, and number of teeth), endocrine disorders (dysfunction of the thyroid gland, pituitary gland, and gonads), and intrauterine developmental disorders (toxicosis, infections, and fetal hypoxia). Exogenous factors act after birth: disruption of natural feeding (artificial feeding through a nipple with a large opening does not stimulate the growth of the lower jaw), bad habits (thumb sucking, pacifiers after 2 years, putting the tongue between the teeth, biting the lip, cheek), pathology of the ENT organs (mouth breathing with adenoids, rhinitis), dysfunction (infantile swallowing, incorrect articulation of the tongue during speech), premature loss of temporary teeth (leads to the displacement of adjacent teeth and lack of space for permanent ones), injuries to the maxillofacial region.

Functional disorders occupy a special place. Mouth breathing, which occurs when nasal breathing is obstructed, leads to the development of an "adenoid" facial type: a narrow face, lax facial muscles, a narrowed upper jaw, a V-shaped dentition, a distal position of the lower jaw, and an open bite. Infantile swallowing (with the tongue inserted between the teeth) prevents the incisors from closing and contributes to the development of an open bite. Incorrect articulation of the tongue when pronouncing sounds can also cause tooth displacement.

Several classifications are used to systematize and standardize diagnoses in orthodontics. The most well-known is Angle's classification (1899), based on the relationship of the first permanent molars of the upper and lower jaws. Angle believed that the upper first molar occupies a stable position (the occlusal key). Three classes are distinguished:

- **Class I (neutral occlusion):** The anterior buccal cusp of the upper first molar is located in the intercuspatal groove of the lower first molar. Anomalies are localized in the anterior region (crowding, diastema, protrusion of the incisors).
- **Class II (distal occlusion):** The lower first molar is displaced distally (posteriorly) relative to the upper one. Two subclasses are distinguished: II/1 – protrusion of the upper incisors, II/2 – retrusion of the upper incisors (deep bite).
- **Class III (mesial occlusion):** The lower first molar is displaced mesially (anteriorly) relative to the upper molar. Characterized by reverse incisor overlap.

Angle's classification is simple and widely used, but has disadvantages: it does not take into account anomalies in the vertical and transverse planes and does not evaluate the skeletal forms of anomalies.

In clinical practice in the CIS countries, the Kalvelis classification is also used, detailing dental anomalies, dental arches, and occlusion. Internationally, the ICD-10 (International Classification of Diseases, 10th revision) is used for coding



diagnoses. Section K00-K14, "Diseases of the Digestive System," contains subcategories for orthodontic pathology:

- K07.0 – Basic anomalies of jaw size (macrognathia, micrognathia).
- K07.1 – Anomalies of maxillofacial relationships (asymmetry, prognathism, retrognathia).
- K07.2 – Anomalies of dental arch relationships (distal, mesial, crossbite).
- K07.3 – Anomalies of tooth position (crowding, displacement, diastema).
- K07.4 – Unspecified malocclusions.

The use of ICD-10 is mandatory when preparing medical documentation and statistical reporting.

Lecture Topic #3: Anomalies in the Development of Bite, Teeth Shape, and Arrangement. Dental Arch Anomalies.

1. The purpose of the lecture:

To study in detail the clinical manifestations, diagnosis and classification of anomalies of individual teeth (number, size, shape, position) and dental arches (shape, dimensions in the transverse and sagittal planes).

2. Issues under consideration:

- Anomalies in the number of teeth (edentia, hyperdontia).
- Anomalies in the size and shape of teeth (macrodontia, microdontia, crown anomalies).
- Anomalies in the position of individual teeth (dystopia, tortoposition, transposition).
- Anomalies of the dental arches: narrowing, widening, lengthening, shortening.
- Diagnosis and significance of these anomalies in the pathogenesis of bite disorders.

3. Educational technologies:

- Lecture-visualization, demonstration of diagnostic models, analysis of clinical cases.

4. Primary and secondary literature:

1. Persin L.S. Orthodontics. Diagnosis and treatment of dental anomalies. – Moscow: GEOTAR-Media, 2020.



2. Khoroshilkina F.Ya. Orthodontics. Defects of teeth, dentition, bite anomalies. – M.: MIA, 2019.

Lecture notes:

Anomalies of teeth and dental arches are the basis for the development of more complex disorders – malocclusions. Their timely diagnosis helps prevent the development of severe forms of pathology.

Anomalies in the number of teeth. A distinction is made between partial (hypodontia) and complete (anodontia) adentia (absence of a tooth). The most common absences are third molars, lateral incisors, and second premolars. Adentia can be primary (absence of a tooth bud) or secondary (retention, tooth loss). Hyperdontia (supernumerary teeth) is the presence of extra teeth, most often in the area of the central incisors (mesiodens) or molars. Supernumerary teeth disrupt the position of adjacent teeth, causing their retention, a diastema.

Anomalies in the size of teeth. Macrodonia is enlarged teeth (usually the central incisors). This leads to crowding and a lack of space in the dental arch. Microdonia is undersized teeth (usually the lateral incisors, or "cone-shaped" teeth). This causes the appearance of gaps, a discrepancy between the size of the teeth and the jaws, and aesthetic problems.

Anomalies in the shape of teeth. Anomalies of the crown (spicule-shaped, cuboidal teeth, fusion, invagination), root (curvature, accessory roots), and hard tissue structure (enamel hypoplasia, fluorosis) are common. The most common anomalies encountered in orthodontic practice are the shape of the lateral incisors (conical shape) and fusion of the teeth (synostosis).

Anomalies in the position of individual teeth (dystopia). These include:

- **Vestibular position**– displacement of the tooth towards the vestibule of the mouth (usually canines).
- **Oral (palatal/lingual) position**– displacement of a tooth towards the oral cavity (often lateral incisors or second premolars).
- **Mesial/distal displacement**– shift along the dentition.
- **Supraposition/infraposition**– vertical displacement relative to the occlusal plane.
- **Torto position**– rotation of a tooth around its longitudinal axis (often incisors).
- **Transposition**– mutual change in the position of two teeth (for example, canine and premolar).
- **Retention**– delayed eruption of a fully formed tooth (often canines, central incisors, second premolars).



The reasons for retention may be lack of space, the presence of a supernumerary tooth, trauma, or abnormal position of the rudiment.

Anomalies of the dental arches. They are assessed in three planes.

- **In the transversal plane:** Narrowing of the dental arches—a decrease in width (measured using the Pont method). This occurs most frequently, especially in the upper jaw. It leads to space loss, crowding, and crossbite. Widening of the dental arches—an increase in width—is less common.
- **In the sagittal plane:** Elongation of the dental arch – an increase in the length of the anterior section (protrusion of the incisors). Shortening – a decrease in length (retrusion of the incisors, crowding). Measured by the Korkhaus method.
- **In the vertical plane:** alveolar lengthening or shortening in certain areas, which leads to the formation of a deep or open bite.

The shape of the dental arch can also be abnormal: V-shaped (narrowing in the lateral sections and protrusion of the frontal sections), saddle-shaped (narrowing in the area of the premolars), trapezoidal, asymmetrical.

Diagnosis of dental and dentition anomalies is based on a clinical examination and analysis of diagnostic models, as well as optically perforated glosses (OPG) (to detect retention and edentia). Treatment depends on the patient's age and the severity of the anomaly and may include the extraction of individual teeth (for orthodontic reasons), widening of the dental arches, creating space with springs and screws, and normalizing the position of individual teeth with braces or removable appliances.

Lecture Topic #4: Types of Orthodontic Treatment. Classification of Orthodontic Appliances.

1. The purpose of the lecture:

To familiarize students with the main types of orthodontic treatment (preventive, hardware, surgical, combined) and a detailed classification of orthodontic devices by mechanism of action, method of fixation, and functional purpose.

2. Issues under consideration:

- Classification of methods of treatment of rhinoplasty (hardware, functional, surgical, prosthetic, combined).



- Classification of orthodontic devices by operating principle (mechanical, functional, combined).
- Removable and fixed appliances: indications, advantages and disadvantages.
- The main elements of removable appliances (base, clasps, screws, arches, springs, bite plates).

3. Educational technologies:

- Lecture-visualization, demonstration of real orthodontic devices, work with phantoms.

4. Primary and secondary literature:

1. Khoroshilkina F.Ya. Orthodontics Handbook. – M.: Medicine, 2017.
2. Proffit WR Contemporary Orthodontics. – 6th ed. – Elsevier, 2018.

Lecture notes:

Treatment of dental and jaw abnormalities is a complex process that may involve various methods depending on the etiology, patient age, and severity of the pathology. The following types of orthodontic treatment are distinguished:

- **Preventive (myotherapeutic):** Aimed at eliminating risk factors (bad habits, mouth breathing) and normalizing functions (breathing, swallowing, speech) using specialized exercises (myogymnastics) and trainers. Most effective in early childhood.
- **Hardware (orthodontic):** the main method, which consists of the use of removable and fixed devices for moving teeth, stimulating jaw growth, and changing the shape of dental arches.
- **Surgical:** tooth extraction for orthodontic reasons (to eliminate space shortage), frenulum plastic surgery, compact osteotomy (weakening of bone tissue to accelerate tooth movement), orthognathic surgeries (movement of jaws in case of severe skeletal anomalies in adults).
- **Prosthetic:** replacement of dental defects in children to prevent secondary deformations and restore function.
- **Combined:** a combination of several methods (for example, hardware treatment + surgery).

Classification of orthodontic appliances.

According to the operating principle, the devices are divided into:

1. **Mechanical:** The force is generated by activating active elements (screws, springs, archwires, ligatures, elastics). These include plates with screws and bracket systems.



2. **Functional:** The force is generated by the contraction of the patient's own muscles, which are transmitted to the teeth and jaws through special devices (bite pads, pads, shields). Examples: Frenkel apparatus, Andresen-Goipl activator, trainers, LM activators.
3. **Combined (combined):** contain elements of both mechanical and functional action.

According to the method of fixation, a distinction is made between:

- **Removable devices:** The patient can remove and put them on independently. Advantages: easy hygiene, the ability to correct outside the mouth, lower cost. Disadvantages: require high patient cooperation (discipline), effectiveness depends on the duration of wear, used mainly in mixed dentition.
- **Fixed appliances:** They are fixed to the teeth for the entire period of active treatment and can only be removed by the doctor. Advantages: high efficiency, do not depend on the patient's cooperation, precise control of tooth movement in three planes. Disadvantages: difficult hygiene, higher cost. These include braces.

Main elements of removable devices:

- **Base (plate):** The base of the appliance is made of acrylic plastic. It adheres to the palate or lingual surface of the alveolar process.
- **Fixing elements (clasps):** They hold the appliance on the teeth. They come in wire (bent – Adams, Schwartz, round clasp) and cast.
- **Active (operating) elements:**
 - **Screws:** to expand or lengthen the dental arch (require periodic activation by the patient or parents).
 - **Springs:** for moving individual teeth (vestibular, oral, for distalization).
 - **Vestibular arches:** for retraction (backward displacement) of incisors.
 - **Bite pads:** for bite separation in the treatment of deep bite and cross occlusion.
 - **Occlusal pads:** prevent the device from shifting and transmit chewing pressure.

The choice of device depends on the diagnosis, the patient's age, the stage of bite formation and the planned type of tooth movement.



Lecture Topic #5: Treatment Methods for Dental Atrophy. Modern Approaches and Biomechanics of Tooth Movement.

1. The purpose of the lecture:

To reveal modern approaches to the comprehensive treatment of dental anomalies and to deepen knowledge of the biological basis of tooth movement under the influence of orthodontic forces.

2. Issues under consideration:

- Biological basis of tooth movement: sliding fibrous tissue theory, role of the periodontium, resorption and apposition of bone tissue.
- Types of tooth movement (body, tilting-rotational, torque).
- Concepts of orthodontic force: optimal, threshold, and excessive. Complications of excessive force.
- Modern interdisciplinary approach in the treatment of dental caries (orthodontist, surgeon, periodontist, orthopedist).

3. Educational technologies:

- Problem-solving lecture, computer simulation of tooth movement.

4. Primary and secondary literature:

1. Proffit WR, Fields HW, Sarver DM Contemporary Orthodontics. – 6th ed. – Elsevier, 2018.
2. Persin L.S. Orthodontics. Diagnosis and treatment of dental anomalies. – Moscow: GEOTAR-Media, 2020.

Lecture notes:

Orthodontic tooth movement is a biological process based on the ability of bone tissue and the periodontium to remodel under the influence of prolonged force. Understanding this process is critical for safe and effective treatment.

Biological basis of tooth movement. The tooth is suspended in the alveolus by periodontal fibers. When orthodontic force is applied, pressure and tension zones are created in the periodontium. In the pressure zone (the side toward which the tooth is moving), the periodontal ligament is compressed, blood flow is disrupted, stimulating the activity of osteoclasts—cells that break down bone tissue (resorption). In the tension zone (the opposite side), the periodontal fibers are stretched, stimulating the activity of osteoblasts—cells that form new bone tissue (apposition). These processes occur continuously, ensuring tooth movement within the bone. A distinction is made between direct resorption (from the periodontal



side) and undermining (indirect) resorption (from the inner surface of the alveolus due to excessive force).

Types of tooth movement:

- **Tilt-rotation:** The simplest type of movement occurs when the tooth rotates around a pivot point located at the apex or mid-root. The crown moves in one direction, and the root in the opposite direction.
- **Body:** Progressive movement of the entire tooth without changing its tilt. This requires the application of a pair of forces and more complex mechanics (rectangular archwires in the bracket slots).
- **Torque:** change in the inclination of the tooth root in the vestibulo-oral direction with a relatively stable position of the crown (control of the inclination of the incisors).
- **Intrusion:** immersion of the tooth into the alveolus (reduction in the height of the crown).
- **Extrusion:** protrusion of a tooth from its socket.

Orthodontic force. The effectiveness and safety of treatment directly depend on the magnitude of the applied force. A distinction is made between:

- **Threshold force:** the minimum force that can cause tooth movement.
- **Optimal strength:** The force that produces the fastest possible movement with minimal side effects (pain, root resorption). The optimal force depends on the root surface area and the type of movement (e.g., for incisor tilting – 10-20 g, for canine body movement – 50-100 g).
- **Excessive force:** causes compression of periodontal vessels, tissue necrosis, severe pain, slows down movement (due to the development of the hyalinized zone) and increases the risk of irreversible resorption of tooth roots.

Modern interdisciplinary approach. Nowadays, treatment of complex occlusal problems is rarely performed in isolation. Orthodontists work closely with related specialists:

- **Dental surgeon:** tooth extraction for orthodontic reasons, frenuloplasty, exposure of crowns of impacted teeth, installation of mini-implants for skeletal support.
- **Maxillofacial surgeon:** performing orthognathic surgeries for skeletal anomalies in adults.
- **Periodontist:** Treatment of periodontal diseases before, during and after orthodontic treatment in adult patients.
- **Orthopedic dentist:** prosthetics after completion of orthodontic treatment to replace edentia or restore the anatomical shape of teeth.



- **Speech therapist and otorhinolaryngologist:** correction of functional disorders.

This approach ensures stable and predictable results, improving not only the bite but also the patient's overall dental health.

Lecture Topic #6: Treatment of Malocclusion with Removable Appliances. Functional Appliances.

1. The purpose of the lecture:

To study in detail the design, operating principles, indications and application methods of the main types of removable orthodontic appliances, especially functional ones, used during the transitional dentition period.

2. Issues under consideration:

- Removable mechanical devices: plate with screw, vestibular arch, springs.
- Functional devices: Andresen-Goypl activator, Frankel function regulator, trainers, LM activators.
- Indications and contraindications for the use of removable devices.
- Principles of activation of screws and arches, mode of wearing devices.

3. Educational technologies:

- A master class with a demonstration of the devices, work in small groups, and activation practice on phantoms.

4. Primary and secondary literature:

1. Khoroshilkina F.Ya. Orthodontics Handbook. – M.: Medicine, 2017.
2. Satish Chandra, Shalu Chandra. Textbook of Functional Appliances in Orthodontics. – Jaypee, 2020

Lecture notes:

Removable orthodontic appliances remain an important tool in the orthodontist's arsenal, especially when treating children with mixed dentition. They not only allow for the movement of individual teeth but also influence jaw growth and normalize function.

Removable mechanical devices. The most common type of appliance is a plate-and-screw device. It consists of an acrylic base that fits tightly against the palate.



An orthodontic screw is welded into the base; when activated, the halves of the base move apart, applying pressure to the teeth and alveolar ridge. It is used to widen the maxilla, lengthen the dental arch, and distalize molars. A vestibular arch (usually an Adams arch) is used to retract protruding incisors. Springs (hand-shaped or serpentine) are used for vestibular or oral movement of individual teeth. Removable mechanical appliances also include plates with bite pads for disengaging the bite during the treatment of deep or crossbites.

Functional devices. They work by transferring the force of the chewing and facial muscles to the teeth and jaws. They are typically a monoblock or biblock design and are held in place in the mouth by muscle tone.

- **Andresen-Goypl activator:** A plastic monoblock that unites the upper and lower dental arches in a constructive occlusion position (the lower jaw is pushed forward). It stimulates the growth of the lower jaw and is used to treat distal occlusion (Class II) in growing patients.
- **Frenkel function regulator (FFR):** A more complex frame-based appliance with metal cheek shields and lip pads that retract the soft tissues of the cheeks and lips from the dental arches, eliminating their pressure. It stimulates jaw growth in the transverse and sagittal directions.
- **Trainers and LM activators:** Flexible silicone mouthguards that passively position the tongue, lips, and lower jaw. They are used to eliminate bad habits, normalize swallowing and breathing, and correct minor anomalies in the early mixed dentition.

Indications for the use of removable devices:

- Treatment during the period of mixed dentition (up to 12-13 years).
- The need to influence the growth of the jaws (expansion, stimulation).
- Normalization of functions (breathing, swallowing).
- Elimination of bad habits.
- As a stage of treatment before fixed appliances or during the retention period.

Disadvantages of removable devices:

- They require high motivation and discipline from the patient (the device must be worn 14-16 hours a day, mainly at home and at night).
- Less precision in controlling the movement of individual teeth compared to braces.
- Impact on speech during the adaptation period.



Activation principles: The patient or parents should be carefully instructed on how and how often to activate the screw (usually 1/4 turn 1-2 times per week). The doctor activates the vestibular arches during the appointment by tightening them.

Lecture Topic #7: Orthopedic (hardware) methods of treating dental cartilage. Braces.

1. The purpose of the lecture:

Explore fixed orthodontic technology—brackets—as the primary treatment method for permanent dental malocclusion. Explore the types of braces, their components, treatment stages, and operating principles.

2. Issues under consideration:

- The history of brace development. Types of braces by material and design (ligature, self-ligating, lingual).
- Components of the bracket system (bracket, arch, ligature, rings, locks).
- The stages of orthodontic treatment with braces: leveling, occlusion correction, gap closure, finishing.
- Indications, contraindications, complications. Hygiene when wearing braces.

3. Educational technologies:

- Lecture-visualization, demonstration of braces and instruments, work with phantoms.

4. Primary and secondary literature:

1. Arsenina O.I. Modern fixed orthodontic equipment. – M.: MGMSU, 2018.
2. Proffit WR Contemporary Orthodontics. – 6th ed. – Elsevier, 2018.

Lecture notes:

A brace system is a complex, fixed device consisting of multiple components that allows the dentist to precisely control the movement of each tooth in three planes. It is the "gold standard" for treating most dental problems in adolescents and adults.

Types of braces. A bracket is a small clasp attached to the tooth enamel using a special adhesive (bond). Depending on the material used, brackets are made of:



- **Metal:**Stainless steel or titanium. These are the most durable, inexpensive, and effective. Aesthetic drawback: they are noticeable on the teeth.
- **Ceramic and sapphire:**aesthetically pleasing, less noticeable, but more fragile and more expensive than metal ones.
- **Plastic:**the cheapest, but quickly lose their aesthetics and durability.

By the method of fixing the arch in the bracket groove:

- **Ligature:**The archwire is secured with rubber or metal ligatures (wires). These ligatures require frequent replacement.
- **Self-ligating (non-ligating):**The archwire is secured with a snap-on cover onto the bracket itself. This ensures less friction, faster tooth movement, and reduces appointment time.

By place of fixation on teeth:

- **Vestibular:**are fixed to the outer (buccal) surface of the teeth. They are the most common.
- **Lingual:**They are fixed to the inner (lingual/palatal) surface of the teeth. They are completely invisible, but are significantly more expensive, more difficult to install and treat, and require a longer speech adaptation period.

Components of the bracket system:

- **Bracket:**has a groove for the arch and “wings” for fixing ligatures or elastic chains.
- **Orthodontic bands:**metal rings with locks, fixed with cement on chewing teeth (molars) for reliable support.
- **Arc:**The main active element is a wire made of nickel-titanium alloy (with shape memory) or steel. The arches come in round (for initial leveling) and rectangular (for precise root angle control – torque).
- **Ligatures:**rubber rings or wires for attaching the arch to the bracket.
- **Elastic chains and springs:**to close spaces between teeth or to open them.
- **Additional elements:**buttons, hooks for wearing intermaxillary elastics (tractions), which correct the closure of the dental arches.

Stages of treatment with braces:

1. **Leveling:**alignment of teeth in a dental arch using thin round arches.
2. **Occlusion correction:**Correction of malocclusion using intermaxillary elastics, more rigid arches, and bite pads.
3. **Closing gaps:**After the teeth are aligned, the remaining gaps are closed using elastic chains or springs.



4. **Finishing:** precise adjustment of occlusal contacts, placing teeth in an ideal position using rectangular arches and curves on them.

Indications: Most of the ZCA are in the permanent dentition.

Contraindications: poor oral hygiene (risk of caries and enamel demineralization around braces), severe periodontal disease, mental illness.

Complications: Enamel demineralization (white spots), caries, gingivitis, gum recession, and root resorption due to excessive force. Meticulous hygiene (special toothbrushes, interdental brushes, and an irrigator) and regular dental checkups can help minimize complications.

Lecture Topic #8: Treatment of dental cartilage with braces. Types of braces. Aligners.

1. The purpose of the lecture:

Continue your study of fixed appliances, deepening your knowledge of the different types of braces, and consider an alternative modern treatment method – aligners (transparent aligners).

2. Issues under consideration:

- Comparative characteristics of metal, ceramic, sapphire and lingual braces.
- Self-ligating braces: advantages and features of operation.
- Aligners (Invisalign, 3D Smile): manufacturing technology, treatment planning in the ClinCheck program.
- Indications and limitations for treatment with aligners.

3. Educational technologies:

- A visualization lecture, video demonstration of ClinCheck operation, and clinical case examples.

4. Primary and secondary literature:

1. Arsenina O.I. Modern fixed orthodontic equipment. – M.: MGMSU, 2018.
2. Proffit WR Contemporary Orthodontics. – 6th ed. – Elsevier, 2018.

Lecture notes:

Continuing with the topic of fixed treatment, let's take a closer look at the various types of braces and their features. Metal braces remain the most reliable and affordable. Ceramic and sapphire braces are chosen by patients who prioritize



aesthetics. However, they have greater friction with the archwire, which can slow down treatment, and are more fragile. Lingual braces are the pinnacle of aesthetics, as they are completely hidden from view. However, treatment with them is a challenging experience for the dentist: it requires specialized training, an indirect bonding stage, longer appointments, and for the patient, a long speech adaptation period and tongue discomfort.

Self-ligating braces. Unlike ligature-based braces, where the archwire is pressed into the groove with a rubber band or wire, here it is secured with a built-in latch or clip. Advantages:

- Reduced friction between the archwire and bracket, allowing lighter forces to be used.
- Acceleration of tooth movement in the initial stages.
- Fewer doctor visits (no need to change ligatures).
- Making oral hygiene easier.

Aligners (transparent aligners). This revolutionary method has become a fully fledged alternative to braces for many clinical situations. Aligners are a set of thin, transparent, removable polymer trays that fit over the teeth and gradually move them into the desired position. Treatment begins with digital planning: an impression is taken (or an intraoral scan is performed), and the doctor uses a specialized computer program (such as ClinCheck) to create a virtual 3D setup—the final position of the teeth and all the intermediate stages. Models are then printed on a 3D printer, from which a series of aligners are manufactured. The patient wears each aligner for 1-2 weeks, 20-22 hours a day, removing it only for eating and brushing.

Advantages of aligners:

- Maximum aesthetics (invisible on teeth).
- Comfort (no sharp edges, does not injure the mucous membrane).
- Easy oral hygiene (the trays are removable).
- Possibility to see the final result before starting treatment (in the program).

Disadvantages and limitations:

- They require high patient discipline (they must be worn strictly on time).
- Not all types of anomalies can be treated with aligners (complex cases of skeletal forms, severe tooth rotation, the need to remove and close large gaps are more difficult and may require a combined approach).
- High cost compared to simple metal braces.



The choice between braces and aligners is always the result of a joint discussion between the doctor and the patient, taking into account the clinical picture, financial capabilities, and willingness to cooperate.

Lecture Topic #9: Prevention of gingival discoloration. Retention period. Complex treatment.

1. The purpose of the lecture:

To study a set of preventive measures to prevent the development of dentoalveolar anomalies, as well as the principles of managing the retention period to consolidate the results of orthodontic treatment and prevent relapses.

2. Issues under consideration:

- Antenatal and postnatal prevention of CFA.
- The role of oral hygiene and timely prosthetics in children.
- Retention period: goals, duration, types of retention devices (removable and fixed retainers).
- Causes of relapses and ways to prevent them.
- The concept of complex treatment and interaction with other specialists.

3. Educational technologies:

- Lecture-visualization, discussion of clinical cases of relapses.

4. Primary and secondary literature:

1. Vinogradova T.F. Pediatric Dentistry. – M.: GEOTAR-Media, 2020.
2. Proffit WR Retention and Relapse in Orthodontics. – Elsevier, 2019.

Lecture notes:

Prevention of dental and jaw abnormalities is a comprehensive set of measures aimed at preventing the onset or progression of pathologies. This begins long before a child's birth and continues throughout the entire growth period.

Antenatal prophylaxis This program is conducted during pregnancy and is aimed at creating favorable conditions for fetal development. It includes: a healthy lifestyle for the expectant mother, proper nutrition, infectious disease prevention, avoiding bad habits, and taking vitamins and minerals (especially folic acid, calcium, and vitamin D).



Postnatal preventionis carried out after the birth of the child and includes:

- Proper natural feeding (active sucking stimulates the growth of the lower jaw).
- Timely introduction of solid food to develop chewing muscles.
- Prevention and treatment of rickets.
- Combating bad habits (weaning off a pacifier by 1.5-2 years, controlling thumb and lip sucking).
- Normalization of nasal breathing (timely treatment of ENT pathology).
- Oral cavity sanitation, timely treatment of caries of primary teeth and their restoration (fillings, children's crowns).
- **Children's dental prosthetics** In cases of premature loss of primary teeth, to maintain space in the dental arch and prevent displacement of adjacent teeth, removable plate dentures with artificial teeth or fixed structures ("spacers") are used.

Retention period. After braces are removed or active treatment with removable appliances is completed, an equally important stage begins: retention. Its purpose is to hold the teeth in their current position while the periodontal tissues and bone adapt to the new alignment. The duration of the retention period varies from person to person, but typically lasts at least 1.5-2 years, and in some cases, lifelong. Retention appliances are classified as:

- **Fixed retainers:** A thin wire or strip bonded with composite to the lingual/palatal surfaces of the anterior teeth (usually from canine to canine). They are reliable, do not depend on the patient's cooperation, and require careful hygiene.
- **Removable retainers:** Clear aligners (similar to aligners) or plates with a vestibular arch. These are intended to be worn overnight.

Causes of relapses(return to the original anomaly):

- Failure of the patient to comply with the regimen for wearing the retention device.
- Continued growth of the jaws (especially the lower jaw) after removing braces in adolescents.
- Persistent pressure of soft tissues (lips, cheeks, tongue).
- The presence of bad habits that have not been eliminated.
- Fibrous traction of periodontal fibers that strive to return the tooth to its original position.

Complex treatment– the key to success in complex cases. An orthodontist doesn't work alone. Successful treatment depends on coordinated collaboration with a surgeon (extractions, implants), a periodontist (gum treatment), an orthodontist



(prosthetics), a speech therapist (speech correction), and an osteopath. Only this approach allows for stable, functional, and aesthetic results to last for years.

Topic of Practical Lesson #1: Organizational Issues in Orthodontics. Periods of Development and Formation of the Bite. Methods of Examining an Orthodontic Patient.

1. Objective of the lesson:

To master the organizational principles of an orthodontic office, to study the periods of bite formation and to master the basic methods of clinical examination of an orthodontic patient (collecting anamnesis, examination, photometry).

2. Educational technologies:

- Pre-test, work in small groups with diagnostic models and photographs of patients, role-playing game “doctor – patient”, post-test.

3. Basic concepts that students should learn while studying the topic:

- Organization of an orthodontic office, medical documentation (form 043/u).
- Periods of bite formation (temporary, mixed, permanent) and their physiological characteristics.
- Methodology for collecting complaints and anamnesis from an orthodontic patient.
- Clinical examination of the face and oral cavity, assessment of profile, symmetry, lip closure.
- Photo protocol in orthodontics (intra- and extraoral images).

4. Questions for the lesson:

- What is the structure and equipment of an orthodontic office according to sanitary standards?
- What are the main sections of an orthodontic patient’s medical record (form 043/u)?
- Name the timing and sequence of eruption of temporary and permanent teeth.
- What characterizes the period of formed temporary bite (3-6 years) and what physiological changes occur during it?
- What features are assessed when examining a patient's face from the front and in profile?
- What is the technique for performing intraoral photography?



5. Questions for self-control:

- List the signs of physiological (infantile) retrogenia of a newborn.
- What are physiological tremas and diastema, and at what age do they appear?
- How to evaluate the type of facial profile (straight, convex, concave)?
- What are the most common complaints of an orthodontic patient?

6. Primary and secondary literature on the topic:

1. Persin L.S. Orthodontics. Diagnosis and treatment of dental anomalies. – Moscow: GEOTAR-Media, 2020.
2. Proffit WR Contemporary Orthodontics. – 6th ed. – Elsevier, 2018.

Topic of Practical Lesson #2: Etiology and Classification of Dentofacial Anomalies. Angle's Classification, WHO (ICD-10).

1. Objective of the lesson:

Learn to identify etiological factors in the development of dentoalveolar anomalies when collecting anamnesis and master the principles of diagnosis in accordance with the Angle and ICD-10 classifications.

2. Educational technologies:

- Analysis of clinical cases (Case-study), analysis of diagnostic models with different types of bite, solving situational problems.

3. Basic concepts that students should learn while studying the topic:

- Endogenous and exogenous risk factors for the development of CAD.
- Bad habits and functional disorders (mouth breathing, infantile swallowing).
- Angle's classification (I, II, III classes) and its subclasses.
- Coding of orthodontic pathology according to ICD-10 (headings K07.0–K07.4).
- The importance of classifications for choosing treatment tactics.

4. Questions for the lesson:

- What genetic syndromes are most often associated with dental anomalies?
- How does artificial feeding affect the development of a child's bite?



- What is the mechanism by which mouth breathing influences the development of maxillary narrowing?
- On what basis did Angle distinguish classes I, II and III of occlusion anomalies?
- What is the difference between subclass II/1 and II/2 according to the Angle classification?
- Write down the ICD-10 code for the diagnosis of "Distal occlusion" and "Crowding of teeth".

5. Questions for self-control:

- List the main exogenous causes of the development of mesial occlusion.
- What are the disadvantages of Angle's classification from the perspective of modern orthodontics?
- What is the difference between primary and secondary adentia?
- Why is it important to indicate the ICD-10 code in the patient's medical record?

6. Primary and secondary literature on the topic:

1. Persin L.S. Orthodontics. Diagnosis and treatment of dental anomalies. – Moscow: GEOTAR-Media, 2020.
2. ICD-10. International Statistical Classification of Diseases.

Topic of Practical Lesson #3: Anomalies in the development of bite, shape, and arrangement of teeth. Anomalies of dental arches.

1. Objective of the lesson:

To master the skills of diagnosing anomalies of individual teeth (size, quantity, position) and dental arches (shape, dimensions in the sagittal and transverse planes) using diagnostic models.

2. Educational technologies:

- A lesson using phantoms and diagnostic models, taking measurements (Pont, Korkhaus methods), working in small groups.

3. Basic concepts that students should learn while studying the topic:

- Anomalies in the number of teeth (edentia, hyperdontia).
- Anomalies in the size and shape of teeth (macrodontia, microdontia).



- Anomalies in the position of individual teeth (dystopia, tortoposition, transposition, retention).
- Anomalies in the shape and size of dental arches (narrowing, widening, lengthening, shortening).
- Methodology of anthropometric measurements on models (width according to Pohn, length according to Korkhaus).

4. Questions for the lesson:

- What is the difference between primary adentia and secondary adentia (retention) according to OPG data?
- What are the clinical signs of maxillary canine retention?
- What is dental transposition? Give an example.
- How to calculate space deficit in a dental arch using the Pon method?
- What does the V-shaped shape of the upper jaw dentition indicate?
- What are the standard values for the length of the anterior segment of the dental arch according to Corkhouse?

5. Questions for self-control:

- What types of tooth rotations does the term "tortoposition" include?
- Name the most common location of supernumerary teeth.
- How to distinguish microdontia of a lateral incisor from a conical tooth shape?
- What parameters of the dental arch are assessed in the transverse plane?

6. Primary and secondary literature on the topic:

1. Khoroshilkina F.Ya. Orthodontics. Defects of teeth, dentition, bite anomalies. – M.: MIA, 2019.
2. Persin L.S. Orthodontics. Diagnosis and treatment of dental anomalies. – Moscow: GEOTAR-Media, 2020.

Practical Lesson Topic #4: Types of Orthodontic Treatment.

Classification of Orthodontic Appliances.

1. Objective of the lesson:

Study the classification of treatment methods for occlusal ligaments and become familiar in detail with the design elements of removable orthodontic appliances, their purpose, and activation principles.



2. Educational technologies:

Visualization lecture

3. Basic concepts that students should learn while studying the topic:

- Classification of treatment methods: hardware, surgical, prosthetic, combined.
- Division of devices according to the operating principle (mechanical, functional).
- Removable and fixed appliances: indications, advantages, disadvantages.
- Elements of removable appliances: base, clasps (Adams, Schwartz), screws, vestibular arches, springs, bite pads.
- Rules for screw activation and arch correction.

4. Questions for the lesson:

- What is the fundamental difference between mechanical and functional devices?
- What are the indications for the use of removable plate appliances in mixed dentition?
- How is the Adams clasp constructed and on which teeth is it usually placed?
- For what purpose is a bite pad included in the design of the plate?
- Demonstrate on a phantom how to correctly activate an orthodontic screw ($\frac{1}{4}$ turn).
- How often should a patient activate the screw of the device when expanding the upper jaw?

5. Questions for self-control:

- List the main disadvantages of removable appliances compared to fixed ones.
- What types of springs are used for vestibular tooth movement?
- What is "patient cooperation" and why is it important when treating with removable appliances?

6. Primary and secondary literature on the topic:

1. Khoroshilkina F.Ya. Orthodontics Handbook. – M.: Medicine, 2017.
2. Proffit WR Contemporary Orthodontics. – 6th ed. – Elsevier, 2018.



Topic of Practical Lesson #5: Treatment Methods for Dental Atrophy. Modern Approaches and Biomechanics of Tooth Movement.

1. Objective of the lesson:

To develop an understanding of the biological basis of orthodontic tooth movement and learn to differentiate the choice of treatment method depending on the patient's age and diagnosis.

2. Educational technologies:

- Problem-solving lecture-discussion, computer simulation of tooth movement (video clips)

3. Basic concepts that students should learn while studying the topic:

- Biomechanics: pressure and tension zones in the periodontium, bone resorption and apposition.
- Types of tooth movement: tilting-rotational, body, torque, intrusion, extrusion.
- The concept of optimal, threshold and excessive orthodontic force.
- Complications of force overdose (root resorption, pain, hyalinization).
- Interdisciplinary interaction of the orthodontist with related specialists.

4. Questions for the lesson:

- Which cellular elements of bone tissue are responsible for resorption and apposition during tooth movement?
- How does the body movement of a tooth differ from the tilting-rotational movement in terms of the application of forces?
- Why is it important to use light and sustained forces rather than large, instantaneous loads when using braces?
- In what clinical cases does an orthodontist refer a patient for consultation with a maxillofacial surgeon?
- What is the role of a periodontist in treating adult patients with gum disease?

5. Questions for self-control:

- What is periodontal hyalinization and what are its consequences?
- List the indications for the removal of permanent teeth for orthodontic reasons.
- What modern methods can speed up orthodontic tooth movement?

6. Primary and secondary literature on the topic:



1. Proffit WR Contemporary Orthodontics. – 6th ed. – Elsevier, 2018.
2. Persin L.S. Orthodontics. Diagnosis and treatment of dental anomalies. – Moscow: GEOTAR-Media, 2020.

Practical Lesson Topic #6: Treatment of Malocclusion with Removable Appliances. Functional Appliances.

1. Objective of the lesson:

To acquire knowledge about the design, mechanism of action and clinical application of functional orthodontic appliances (activators, trainers) and learn to determine indications for their use in children.

2. Educational technologies:

- Work in small groups, solving situational problems.

3. Basic concepts that students should learn while studying the topic:

- Functional devices: Andresen-Goypl activator, Frankel function regulator (FFR).
- Trainers and LM-activators: design, mechanism of action, indications.
- The concept of "constructive bite" and its definition.
- The role of functional devices in normalizing jaw growth.
- Indications and mode of wearing functional devices.

4. Questions for the lesson:

- What is the mechanism of action of Andresen-Goypl activator in the treatment of distal occlusion?
- How does a Frenkel function regulator differ from a monoblock activator?
- At what age is it most effective to use trainers and why?
- How to determine the amount of lower jaw protrusion when taking a constructive bite for the production of an activator?
- What is the recommended wearing regimen for a removable functional appliance (time of day)?

5. Questions for self-control:

- List the main design elements of the Frenkel function regulator.
- What bad habits can a trainer help eliminate?
- What is the difference between a trainer and an aligner?



6. Primary and secondary literature on the topic:

1. Satish Chandra, Shalu Chandra. Textbook of Functional Appliances in Orthodontics. – Jaypee, 2020
2. Khoroshilkina F.Ya. Orthodontics Handbook. – M.: Medicine, 2017.

Topic of Practical Lesson #7: Orthopedic (hardware) methods of treating dental cartilage. Braces.

1. Objective of the lesson:

Learn the components of a brace system, the stages of its fixation, and learn to recognize different types of braces, as well as evaluate their advantages and disadvantages.

2. Educational technologies:

- Demonstration of tools and materials for fixing braces
- **3. Basic concepts that students should learn while studying the topic:**
- Types of braces by material (metal, ceramic, sapphire) and design (ligature, self-ligating).
- The components of the bracket system: bracket, arch, ligature, ring, lock.
- Stages of orthodontic treatment with braces: leveling, occlusion correction, gap closure, finishing.
- Tools for fixing and removing braces.
- Oral hygiene rules when wearing braces.

4. Questions for the lesson:

- What is the advantage of self-ligating braces over ligature braces?
- What function do orthodontic bands perform on molars?
- Why are round nickel-titanium archwires used at the initial stage of treatment, rather than rectangular steel ones?
- Demonstrate on the phantom the correct position of the bracket on the tooth crown (in the center of the clinical crown).
- What hygiene products are essential for a patient with braces?

5. Questions for self-control:

- List the indications for the use of ceramic braces.



- What are indirect bonded braces and what are their advantages?
- What complications are possible with poor hygiene during treatment with braces?

6. Primary and secondary literature on the topic:

1. Arsenina O.I. Modern fixed orthodontic equipment. – M.: MGMSU, 2018.
2. Proffit WR Contemporary Orthodontics. – 6th ed. – Elsevier, 2018.

Topic of Practical Lesson #8: Treatment of dental arches using braces.

Types of braces. Aligners.

1. Objective of the lesson:

Expand your knowledge of the different types of braces, including lingual braces, and master the digital treatment planning algorithm for aligners, as well as conduct a comparative analysis of these methods.

2. Educational technologies:

- Discussion "Braces vs. Aligners".

3. Basic concepts that students should learn while studying the topic:

- Lingual braces: indications, features of fixation and adaptation.
- Aligners: manufacturing technology (3D scanning, digital setup ClinCheck).
- Indications and limitations for the use of aligners.
- Comparison of braces and aligners based on effectiveness, aesthetics, and comfort.
- The principle of replacing aligners during treatment with aligners.

4. Questions for the lesson:

- What are the main complaints of patients in the first days after fixing lingual braces?
- What is a "virtual setup" (ClinCheck) and what information does it provide to the doctor and the patient?
- For what types of malocclusions is treatment with aligners less predictable?
- How often should a patient change aligners for new ones?
- What are the advantages and disadvantages of aligners compared to vestibular braces?



5. Questions for self-control:

- Why are attachments (composite overlays) fixed to aligners and teeth?
- How often should a patient visit the dentist when using aligners versus braces?
- Is it possible to treat the skeletal form of progenia with aligners only?

6. Primary and secondary literature on the topic:

1. Arsenina O.I. Modern fixed orthodontic equipment. – M.: MGMSU, 2018.
2. Proffit WR Contemporary Orthodontics. – 6th ed. – Elsevier, 2018.

Topic of Practical Lesson #9: Prevention of gingival discoloration.

Retention period. Complex treatment.

1. Objective of the lesson:

Learn to develop a preventative care plan for children of different age groups, master the principles of managing the retention period, and develop skills for an interdisciplinary approach to treating complex orthodontic patients.

2. Educational technologies:

- Analysis of clinical cases of relapse, work in small groups to develop a prevention plan, discussion on the role of related specialists

3. Basic concepts that students should learn while studying the topic:

- Antenatal and postnatal prevention of CFA.
- The role of oral hygiene and pediatric dental prosthetics in the prevention of deformities.
- Retention period: goals, terms, types of retention devices (fixed and removable retainers).
- Causes of relapses of ZCA and methods of their prevention.
- Complex treatment: interaction between an orthodontist, a surgeon, a periodontist, an orthopedist, and a speech therapist.

4. Questions for the lesson:

- What recommendations for the prevention of ZCA should a doctor give to parents of a newborn?



- What is the role of pediatric dental prosthetics in the early loss of primary molars?
- What types of retention devices do you know, and what are their advantages and disadvantages?
- What is the minimum recommended retention period after braces are removed?
- What factors can trigger a relapse of lower incisor crowding?
- Create a plan for the interdisciplinary management of a 12-year-old patient with distal occlusion and mouth breathing.

5. Questions for self-control:

- At what age should you start preventing bad habits in a child?
- Why might patients be advised to wear a retainer for life even after successful orthodontic treatment?
- What specialists, besides dentists, are involved in the rehabilitation of children with congenital cleft palates?

6. Primary and secondary literature on the topic:

1. Vinogradova T.F. Pediatric Dentistry. – M.: GEOTAR-Media, 2020.
2. Proffit WR Retention and Relapse in Orthodontics. – Elsevier, 2019.

3. METHODOLOGICAL RECOMMENDATIONS/INSTRUCTIONS FOR STUDENTS

3.1. Methodological recommendations for students on studying the discipline

The theoretical component of the course "Orthodontics and Pediatric Prosthetics" is designed not only to deepen and consolidate the knowledge gained in the classroom, but also to promote the development of students' clinical thinking, skills in analyzing diagnostic data, and treatment planning.



The material taken during lectures must be regularly reviewed and supplemented with information from other sources of literature, presented not only in the course program, but also in periodicals (Orthodontics, Dentistry, American Journal of Orthodontics and Dentofacial Orthopedics).

When studying this course, it is necessary to first read the recommended literature for each topic and compile a brief summary of the key concepts, terms, and information that must be memorized and that is fundamental to mastering subsequent course topics. Particular attention should be paid to the biomechanics of tooth movement, telerradiograph analysis (TRG), and classifications of dentofacial anomalies. To expand your knowledge of this course, it is recommended to use online resources, conduct searches in various systems, and consult materials from websites recommended by the instructor (PubMed, eLibrary, websites of professional orthodontic associations).

Each student maintains a workbook, the design of which must meet the following requirements:

- the title page indicates the subject, year, group, last name, first name, and patronymic of the student;
- each work is numbered in accordance with the methodological instructions, and the date of completion of the work is indicated;
- fully write down the title of the work, the purpose and principle of the method, briefly describe the progress of the task and the object of the study (for example, calculation of TRG parameters or analysis of a diagnostic model);
- If necessary, provide a graphic image (a drawing of the cephalometric analysis, a diagram of the apparatus); the results of the tasks are presented in the form of graphic images with mandatory captions to them, as well as tables or described verbally;
- At the end of each work, a conclusion or inference is made (for example, “Based on the cephalometric data, a skeletal form of distal occlusion was diagnosed”), which is discussed when summing up the lesson.



All initial notes must be made in the notebook as the assignments are completed. The teacher periodically reviews the workbook to ensure the student's academic performance and the quality of their work.

3.2. Methodological recommendations for completing independent work

When studying the discipline "Orthodontics and Children's Prosthetics", the following types of independent work of students are used:

- study of theoretical material using lecture notes and recommended teaching aids, educational dummies, educational literature, and reference sources;
- independent study of some theoretical issues not covered in lectures, with writing papers and preparing presentations;
- analysis of issued telerradiograms (TRG) and orthopantomograms (OPTG) with calculation of cephalometric parameters and writing of a conclusion;
- anthropometric study of diagnostic models of jaws (Pont, Korkhaus methods) with determination of space deficit;
- preparation for testing and modular control.

Students are invited to read and analyze monographs and scientific articles on orthodontic issues (e.g., modern methods for accelerating tooth movement, the use of mini-implants, and digital technologies in orthodontics). The results of this work are discussed during practical lessons.

To develop independent work skills, students complete assignments by independently consulting textbooks, reference books, and scientific and methodological literature. Assignment completion is assessed both during practical classes through oral presentations and group discussions, and through written independent work (conclusions on the analysis of the TRG).

Section 1.4.2 provides topics for independent study of the theoretical material, assignments for each topic, the deadline for submission, and textbook references. Section 1.4.3 lists topics for writing an essay. Section 2.2 provides assignments, problems, and exercises for each course topic. A list of literature required for independent study is provided.



Independent work helps students develop essential skills such as selecting and solving a given problem (for example, choosing a treatment method for a specific anomaly), collecting and analyzing published data, and the ability to identify key points and draw informed conclusions.

3.3. Methodological recommendations for the implementation of practical/seminar classes, laboratory work

Practical classes These are held after lectures and serve as explanatory, generalizing, and reinforcing elements. They can be held not only in the classroom, but also in a phantom classroom, and even in a clinical office (for patient demonstrations).

During practical classes, students absorb and comprehend new educational material, practice manual skills (screw activation, bracket fixation on a phantom), and learn to interpret data from additional examination methods. Practical classes are systematic, regularly following each lecture or two or three lectures.

Practical classes are carried out according to the schedule of the educational process and independent work of students in the discipline.

When preparing for practical training, it's important to study the methodological guidelines in advance. Pay attention to the purpose of the training, the key questions for preparation, and the content of the training topic.

Before each practical lesson, students review the seminar plan, including a list of topics and questions, a bibliography, and homework assignments for the material covered. The following seminar preparation plan is recommended:

1. Work through the lecture notes.
2. Read the primary and secondary literature recommended for the section being studied.
3. Answer the questions in the seminar plan.
4. Study the topic and select literature for writing essays, reports, etc.



When working on phantoms and with diagnostic models, it is necessary to strictly observe the rules of asepsis and antisepsis, as well as safety precautions when working with sharp instruments (forceps, wire cutters).

3.4. Guidelines for completing papers, reports, and essays

Abstract– a written summary of the content of a scientific paper on the given topic. This is an independent research paper in which the student explores the essence of the problem under study, with elements of analysis relevant to the topic of the paper. The paper presents various points of view, as well as personal perspectives on the issues covered by the paper (for example, a comparison of the effectiveness of various treatment protocols for distal occlusion). The paper's content should be logical, and the presentation of the material should be problem-based and thematic.

Requirements for the abstract:


The length of the abstract may vary between 9-10 printed pages. Main sections: table of contents (outline), introduction, main content, conclusion, bibliography.

The text of the abstract should contain the following sections:

- title page indicating: name of the university, department, topic of the abstract, full name of the author and full name of the teacher;
- introduction, relevance of the topic;
- main section;
- conclusion (analysis of the results of the literature search); findings;
- The list of literary sources must have at least 10 bibliographic titles, including online resources.

The text part of the abstract is formatted on a sheet of the following format:

- top indent – 2 cm; left indent – 3 cm; right indent – 1.5 cm; bottom indent – 2.5 cm;
- text font: Times New Roman, font height – 14, space – 1.5;
- Page numbers are at the bottom of the sheet. The first page is not numbered.

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The abstract must be written competently and in a respectful manner. References to references, including periodicals from the past five years, must be included.

Abstract evaluation criteria:


- relevance of the research topic;
- compliance of the content with the topic;
- depth of material processing;
- the correctness and completeness of the development of the questions posed;
- the significance of the conclusions for further practical activities;
- correctness and completeness of use of literature;
- compliance of the abstract design with the standard;
- the quality of the message and answers to questions during the defense of the abstract.

3.5. Methodological recommendations for student research work

The goal of the research work in orthodontics is to develop the intellectual abilities of students by studying the algorithm of scientific research and acquiring initial experience in carrying out a research project using the educational material of the chosen specialty.

The main objectives and results of the research work are:

- mastering scientific methods of cognition and deepening the theoretical knowledge of students in their specialty;
- mastering modern methods of scientific research in orthodontics (cephalometric analysis, statistical data processing, analysis of digital models);
- development of students' practical skills in independently searching for scientific and technical information, conducting theoretical and/or experimental work;
- students acquire the ability to analyze the results of conducted research, formulate conclusions and recommendations;

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- developing in students the ability for independent, creative, active work to continuously update and enrich their scientific knowledge.

When completing research work, a student must master the following basic steps:

- independent search for information on a given topic (for example, the effectiveness of early treatment of cross-occlusion);
- selection of essential information necessary for full coverage of the problem being studied, separation of this information from secondary information (within the framework of a given topic);
- analysis and synthesis of knowledge and research on the problem;
- generalization and classification of information on research problems;
- logical and consistent disclosure of the topic;
- generalization of clinical and scientific knowledge on the problem and formulation of conclusions from a literature review of the material;
- stylistically correct presentation of scientific thought of the abstract type;
- competent design of scientific abstract text;
- correct formatting of scientific work (including references to sources, list of references);
- creation of a glossary of terminology;
- role-playing games and trainings on a given topic, discussions, situational tasks.

For research work, senior students are recommended to:

- write an abstract using general scientific and special methods;
- participate in the department's research projects (for example, analysis of long-term treatment results for patients with various types of CAD);
- prepare and deliver a report or presentation on a given topic at conferences and round tables;
- to study and analyze general concepts, programs, clinical protocols on a given topic (for example, treatment protocols for patients with cleft lip and palate);



- write a case history of an orthodontic patient with an analysis of clinical and paraclinical examination data (photo protocol, model analysis, TRG analysis).

In order to conduct research work, it is recommended for 8th semester students:

- participate in a scientific project, scientific conference;
- manage a planned or standardized patient under the guidance of a teacher;
- write a case history of an orthodontic patient, draw up a cephalometric analysis protocol;
- present a prepared report at a conference;
- to study and analyze clinical guidelines and protocols for the management of orthodontic patients.

4. Glossary

Adentia— complete or partial absence of teeth. It can be primary (absence of a tooth bud) or secondary (retention or loss of a tooth).

Activator— a functional orthodontic appliance (for example, Andresen-Goypl), which is a monoblock that transfers the force of the chewing muscles to the jaws to stimulate their growth and normalize the bite.

Activating the device— the procedure of activating the active elements of the orthodontic appliance (turning the screw, tightening the arch) to create the required force.

Angulation (angulation tilt)— the inclination of the tooth crown relative to its root in the mesiodistal direction. Controlled by the bracket slot and rectangular archwire.

Malocclusion— deviations from the normal (physiological) closure of the dental arches. Classified by planes: sagittal (distal, mesial), vertical (open, deep), transverse (cross).

Frenkel's apparatus (function regulator)— a functional frame apparatus with cheek shields and lip pads, designed to relieve soft tissue pressure and stimulate jaw growth.



Apical basis— a conventional plane passing at the level of the apices of the teeth's roots. Its width (Snagina's method) is an important diagnostic parameter when planning dental arch expansion.

Base of a removable appliance— a plastic base (plate) adjacent to the palate or lingual surface of the alveolar process, on which all other elements of the device are attached.

Biomechanics in orthodontics— a section that studies the effect of forces on teeth, periodontium and jaw bone tissue, as well as the patterns of tooth movement under the influence of devices.

Brackets— a fixed orthodontic appliance, bonded to tooth enamel using composite material. It has a slot for installing an archwire and wings for securing ligatures.

Braces— a complex fixed device consisting of braces, rings, arches and auxiliary elements, ensuring precise movement of teeth in three planes.

Vestibular arch— a wire element of a removable appliance located on the vestibular surface of the incisors. It is used for retraction (backward displacement) or retention of the anterior teeth.

Orthodontic screw— a mechanical device built into the base of a removable appliance. When activated (unscrewed), it moves the base parts apart, allowing for widening or lengthening of the dental arch.

Temporomandibular joint (TMJ)— a paired joint connecting the lower jaw to the base of the skull. Its dysfunction often accompanies malocclusion.

Bad habits— recorded motor reactions (thumb-sucking, tongue thrusting, lip biting) that have a long-term negative impact on the development of the dental system.

Hyperdontia (supernumerary teeth)— an anomaly in the number of teeth, characterized by the presence of extra teeth (usually in the area of the central incisors - mesiodens).

Deep bite (deep incisor occlusion)— a type of vertical anomaly in which the upper incisors overlap the lower ones by more than 1/3 of the crown height, often with injury to the palatal mucosa.

Diastema— the space between the central incisors (usually the upper ones) when the dental arches are closed. Trema — the space between any other teeth.



Distal occlusion (prognathism, Angle class II)— a sagittal anomaly in which the lower jaw (or lower dentition) is displaced posteriorly relative to the upper jaw. Characterized by a "bird-like profile" and a sagittal gap.

Orthodontic arch— a wire inserted into the bracket slots. It is the main source of force in the bracket system. Due to the "shape memory" effect, it tends to return to its original position, moving the teeth.

Dentofacial anomaly (DFA)— a congenital or acquired deviation from the norm in the structure and function of teeth, dental arches, jaws and their relationship.

Infantile swallowing— preservation of the infantile swallowing pattern in a child over 3-4 years old, with the tongue being placed between the teeth, which prevents the incisors from closing and contributes to the formation of an open bite.

Clammer— an element of a removable appliance designed to secure it to the supporting teeth. It can be bent (wire) or cast.

Cone beam computed tomography (CBCT)— a modern method of 3D X-ray diagnostics that allows obtaining a three-dimensional image of the maxillofacial region for an accurate assessment of the position of impacted teeth and TMJ pathology.

Ligature- a rubber ring or metal wire with which the arch is fixed in the bracket groove.

Lingual technique— a method of treatment using fixed devices (braces), in which the braces are fixed to the inner (lingual or palatal) surface of the teeth, making them completely invisible.

Macrodontia— an anomaly in the size of a tooth, characterized by an increase in the size of the crown compared to the average norm.

Mesial occlusion (progenia, Angle class III)— a sagittal anomaly in which the lower jaw (or lower dentition) is displaced anteriorly relative to the upper jaw. Characterized by reverse overbite and a concave facial profile.

Microdontia— an anomaly in the size of a tooth, characterized by a decrease in the size of the crown (for example, conical lateral incisors).

Myogymnastics— a method of functional prevention and treatment of occlusal disorders using special exercises aimed at training and normalizing the tone of the chewing, facial muscles and muscles of the tongue.



Inclination-rotational movement— a type of tooth movement in which the crown moves in one direction and the root in the opposite direction around the rotation point.

Reverse incisor overlap— a type of occlusion of the frontal teeth in which the lower incisors are positioned in front of the upper ones. A pathognomonic sign of mesial occlusion.

Orthognathic bite— the most anatomically and functionally perfect type of physiological occlusion, considered the standard. It is characterized by a 1/3 overlap of the lower incisors with the upper ones and a fissure-tubercular contact of the lateral teeth.

Orthodontic force— a measured mechanical impact on a tooth or group of teeth, causing restructuring of bone tissue and periodontium, leading to tooth movement.

Orthopantomography (OPTG)- a panoramic X-ray of both jaws, allowing to assess the condition of all teeth, rudiments, temporomandibular joints and maxillary sinuses.

Open bite (vertical disocclusion)— a vertical anomaly in which there is no contact between the dental arches in the anterior and/or lateral area.

Cross occlusion— a transverse malocclusion in which the buccal cusps of the upper lateral teeth meet the buccal cusps of the lower teeth, or the lower jaw is displaced to the side.

Periodontal ligament (periodontium)— connective tissue filling the space between the tooth root and the alveolar wall. It plays a key role in the biomechanics of tooth movement.

Treatment plan— a detailed algorithm of the orthodontist's actions, including the stages of treatment, the choice of equipment, the need for tooth extraction, and the duration of the active and retention periods.

Progenia— see Mesial occlusion.

Prognathia— see Distal occlusion.

Prevention of CFA— a system of measures (antenatal and postnatal) aimed at preventing the occurrence and progression of dentoalveolar anomalies.

Root resorption— physiological (in small volumes) or pathological (with excessive forces) process of loss of hard tissues of the tooth root during orthodontic treatment.



Retention device (retainer)— a removable or non-removable device designed to hold teeth in the achieved position after completion of active orthodontic treatment.

Tooth retention- delay in the eruption of a fully formed tooth, which remains in the thickness of the bone.

Sagittal fissure— the distance between the vestibular surfaces of the lower incisors and the palatal surfaces of the upper incisors in the horizontal plane when the dental arches are closed. Characteristic of distal occlusion.

Self-ligating bracket— a bracket in which the archwire is fixed without the use of ligatures (elastic bands or wires), using a built-in clip or latch, which reduces friction and speeds up treatment.

Crowding of teeth— an abnormality in the position of teeth, in which they are located close together, overlapping each other due to a lack of space in the dental row.

Teleradiography (TRG)— an X-ray of the skull in a lateral or frontal projection, taken from a distance to minimize distortion. Used for cephalometric analysis.

Torque— the inclination of the tooth crown in the vestibulo-oral direction relative to its root. Controlled by rectangular archwires in the bracket slots.


Transposition of teeth— an anomaly of position in which two teeth change places (for example, a canine and a first premolar).

Trainer— an elastic silicone functional device (mouth guard) designed for passive normalization of the tongue position, muscle training, and elimination of bad habits in children.

Cephalometric analysis— a method of studying teleroentgenograms (TRG), which consists of measuring the angular and linear parameters of the skull, jaws and teeth to establish an accurate diagnosis and plan treatment.

Aligner— a transparent, removable, thin polymer tray included in a kit for sequential tooth movement. It is manufactured using 3D printing based on a digital treatment plan.

Engle's classification— the most common classification of bite anomalies in the world, based on the relationship of the first permanent molars of the upper and lower jaws (I, II, III classes).

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Application1

Change Registration Sheet Form

p/p	Document (order, order, etc. (indicating the number and date) which reflects the changes	Signature	Full name
1			
2			
3			

5. Reference materials and appendices *–are indicated as necessary.*