The theme of the class № 5

Sagittal malocclusion. Mesial bite. Etiology, pathogenesis, prevention

The content of the topic:

Mesial occlusion belongs to sagittal plane anomalies and is rather widespread dentognathic pathology, observed in any period of occlusion formation.

The term “mesial occlusion” was introduced into orthodontic practice by Lisher in 1926. In literature there are such terms for this pathology: progenia, forced occlusion, anterior type, inverse occlusion, articular progenia.

The progenia part among all dentognathic anomalies and deformations comprises from 1.9 to 18 %.

Parents apply to hospitals with their children concerning mesial occlusion already at young age more often than at other types of deformations. This happens because parents pay attention to the lower teeth covering the upper ones even when the pathology is not full-blown yet, and any other anomaly, for instance, posterior occlusion or deep overbite, is still imperceptible.

By Angle’s classification (1889) mesial occlusion belongs to the 3rd class and is detected by lower jaw mesial dislocation. As a result 1st molars correlation violation is marked. The mesiobuccal tubercles of 6|6 teeth come upon the distal buccal tubercles of 6|6 teeth, and at more evident pathology the mesiobuccal tubercles of 6|6. teeth come into the space between 76|67 teeth. Thus, the 2nd premolar articulates with the intertubercular space of the l st molar ahd at more evident mesial lower jaw dislocation even the 1st premolar of the upper jaw articulates with it.

Lower jaw displacement may be both uni- and bilateral. At unilateral displacement median line correlation violation is observed. Unilateral displacement is mostly a consequence of the premature extraction of the 2nd temporary molar on the lower jaw on one side. Distally located teeth and teeth standing in front of the defect transfer to the side of the extracted tooth.

By Katz’ classification (1940) mesial occlusion belongs to the 3rd group of anomalies and arises because of excessive functioning of the muscles protruding the lower jaw, or insufficient function of retractors group.

Functional pathology of this deformation consists in the following: articulate movements prevail in the child – opening and closing of the mouth, and gliding, movements are absent, impossible because of the protruded lower jaw. This condition leads to rearrangement in the joint. Besides, a certain group of teeth does not participate in mastication – incisors are excluded from mastication. Their function is taken by lateral teeth – premolars and molars, which consequently bear an increased load.

L.V. Ilyina-Markosian refers this pathology to sagittal occlusion anomalies, applying the term “anterior occlusion”, meaning lower jaw protrusion at usual location, and singles out its three varieties:

- without lower jaw displacement:

1) general anterior occlusion;
2) frontal anterior occlusion; o with lower jaw displacement;
- combined form.

D.A. Kalvelis (1957), taking into account etiological factors and hereditary character, refers progenia to sagittal occlusion anomalies, dividing it into true and false.

V.Y. Kurliandskyi (1957) and A.I. Betelman (1956) based their classification on the degree of jaw development. Thus, according to V.Y. Kurliandskyi, progenia is referred to dental arches correlation anomalies and arises because of:
- lower jaw overgrowth;
- upper jaw underdevelopment.

According to A. I. Betelman's classification mesial occlusion belongs to sagittal plane anomalies and has such clinical forms:
1) upper jaw micrognathia;
2) lower jaw macrognathia;
3) lower jaw macrognathia and upper jaw micrognathia.

A.M. Schwarz (1969) and F.Y. Khoroshilkina (1976) studying lateral teleroentgenograms of head detected dento-alveolar, gnathic, and combined forms of mesial occlusion.

A.S. Shcherbakov (1967) singles out dento-alveolar and skeletal forms.

S.I. Doroshenko (1968) on the grounds of interpretation data of lateral head teleroentgenograms of patients with anterior dental arches correlation came to a conclusion that it may be caused by the degree of jaws development, their form, location in the skull, lower jaw location in the TMJ, various correlations of bones in the skull. On the basis of these facts the author singles out the following forms of mesial occlusion:

1) progenia as a consequence of lower jaw overgrowth:
a) its body and branch;
b) body;
c) branch;
d) frontal part of the jaw;
2) progenia caused by upper jaw underdevelopment:
a) its body;
b) frontal part of the jaw;
3) progenia caused by the anterior location of the lower jaw:
a) in the skull;
b) in the joint.

In the WHO classification mesial occlusion is presented in the following chapters:

- jaw size anomalies:
– upper jaw micrognathia;
– lower jaw macrognathia;
- anomalies of jaws location relative to the skull base:

a) lower jaw prognathism;
b) upper jaw retrognathia;

- dental arches correlation anomalies:

a) mesial occlusion.

Mastication apparatus development is tightly connected with the development of the whole organism. It begins from the fifth week of embryonal development (when the first teeth germs anlage takes place) and continues during many years after the child is born until complete formation of permanent occlusion in mature age (18–20 years). If after child's birth the lower jaw alveolar process protrudes relative to the one of the upper jaw, this testifies to possible formation of mesial occlusion at temporary teeth eruption.

From the point of view of etiopathogenesis, all this period of time is expedient to be divided into three stages:

1) intrauterine, antenatal. During this time the fetus is under mother's organism protection, and its development disturbance considerably depends on the mother's state, and less – on environmental factors;
2) labor stage;
3) postnatal, when the child is under the influence of environmental factors, adapts to them at the expense of congenital and inherited properties.

In the intrauterine period the fetus is under "mother's protectorate", in a peculiar "microenvironment", but it can create a number of different conditions, negatively influencing the development of the embryo as a whole, and in particular – facial part development. This influence may be conditioned by different factors:

- physical (fetus mechanical injury, radiation damage, thermal agents, vibration, etc.);
- chemical (intake of different pharmacological, and especially hormonal preparations,Alcoholic beverages, smoking during pregnancy);
- biological (infectious diseases, genetic or hereditary diseases);
- social (conditions and way of life and work of the pregnant woman, diet in this period).

These agents, influencing the organism, leave a certain trace, the so-called "phylogenetic background", which later declares itself in ontogenesis as congenital dento-gnathic anomalies.

Enumerated factors influence leads to specific and nonspecific diseases of the mother and father, which can be communicated from generation to generation by a dominant or a recessive character as a genetic disease of the whole organism or only of the dento-gnathic apparatus. Also progenia and upper jaw underdevelopment may be caused by the form, size and function of the tongue in the period of oral cavity embryonal development. The tongue, mainly pressing on the anterior part of the lower jaw, causes progenia, and its belated deepening onto the bottom of the oral cavity causes narrowing of the inter-maxillary bone and upper jaw alveolar processes.

Besides, mesial occlusion may be caused by water-salt and vitamin metabolism disorders, early pregnancy toxemia. It has been established that pregnancy and labor pathologies frequency and progenia frequency are in direct proportion.

Labor stage: progenia is more often (33 %) observed in children, who were bom at transverse lie, breech presentation or footling presentation, after prolonged labor with a long anhydrous period, augmentation of labor, or operative delivery.

Postnatal period: the most critical for a child are the first months, later on – two first years of life. In the first period the child is under the influence of the environment, and it is the time when permanent occlusion foundation is laid.

Mesial occlusion may be caused by congenital peculiarities of the facial skeleton bone structure, especially of the lower jaw, inter-maxillary bone underdevelopment, calcium metabolism disorder because of rachitis or other diseases, partial or multiple adentia in the region of the upper jaw, multiple retention of the upper teeth or their premature loss, supplemental teeth on the lower jaw, late transitional dentition.

The shortened or irregularly attached tongue frenulum exerts constant pressure on the frontal part of the lower jaw, which leads to progenia. This is also promoted by macroglossia.

Palatopharyngeal tonsil hypertrophy leads to the reduction of the opening for air flow passage. Pressure is observed in the region of the epiglottis because of lingual tonsil enlargement, and the child, to ease breathing, instinctively protrudes the lower jaw, abducting the root of tongue together with the enlarged tonsil. Such mouth breathing causes mesial occlusion also because the habit of protrading the lower jaw appears.

Irregular swallowing (infantile type), irregular tongue location in the oral cavity during speaking and in quiescence, uneven wearing down of temporary teeth tubercles at the beginning of transitional dentition occlusion, especially of the lower canine teeth, uneven transitional dentition on both jaws – all these are etiological agents of progenia.

Individual lower incisors torsion leads to dental arches closure disorder, causes lower jaw protrusion. Upper jaw underdevelopment in the frontal part because of chronic inflammatory processes, new formations, surgical interventions on the jaws, endocrine disturbances, hypophysis hyperfunctioning leads to anterior occlusion formation.

Pernicious habits are very important: sucking of the upper lip, tongue, fingers, and different objects, sleeping on a high pillow, putting a palm or a fist under the chin in sitting position.

There are differentiated physiological and pathological types of progenia.

Physiological progenia is characterised by multiple contacts between the dental arches both in the front and lateral parts. It is viewed as an anatomic variant, which does not require any orthodontic treatment.

At pathologic progenia contacts between teeth are violated. There occur morphological, functional, and esthetic changes of the dentognathic apparatus, which require orthodontist's intervention.

Most authors differentiate two main progenia forms: true and false.

L.V. Ilyina-Markosian divides false progenia into two forms:

- anterior false progenia;
- forced occlusion.

Their etiology, pathogenesis, functional and morphological disturbances, and treatment differ. Some authors (L.V. Ilyina-Markosian, D.A. Kalvelis) view false progenia as inverse overbite of individual upper frontal teeth at preserved correct correlation of both dental arches along the full length. A.I. Betelman, Y.M. Aleksandrova, A.D. Mukhina refused from this term and classify false progenia as upper frontal teeth palatine position.

Forced occlusion is a kind of false progenia and develops as a result of the habit of protruding the lower jaw. This form of false progenia is also called articular.

Mesial occlusion has characteristic facial and intraoral features. The main facial feature is lower jaw protrusion. At external examination, in cases of lower jaw enlargement the disturbed harmony of face profile attracts attention: the chin and upper lip protrude considerably, at that the upper lip somewhat falls back relative to the lower one, the subnasal fold is deep, the lower lip red border is wide. At deep overbite the lower part of face is not infrequently shortened, as a result of which the lower lip is thickened. At increased lower jaw angles and open bite the lower part of face is elongated, the lips close tensely, the oral fissure not infrequently gapes. If mesial occlusion combines with forward lower jaw shift, facial signs of disturbances are fullblown.

Oral cavity examination shows that the lower jaw is located in front of the upper one, its dental arch is wider.

The closure of the 1st permanent molars and canine teeth by 3rd Angle's type may be by 1/2 size of the 1st permanent molar tubercle, by one tubercle, by 1/2 of the 1st permanent molar crown and more.

Frontal teeth correlation may vary: in some cases the labial surface of the upper incisors touches the lower incisors lingual surfaces, in other cases there is an inverse sagittal gap between the frontal teeth by 3 mm and more. Inverse overbite depth may be minimal, moderate, or deep.

Mesial occlusion is more often complicated with upper jaw narrowing, which causes lower lateral teeth prevailing over the upper ones. The upper jaw may be flattened in the frontal part. Uni- or bilateral crossed relation is observed in the lateral parts.

The upper frontal teeth as a result of microgenia are located with torsions, transfer vestibularly, there is often observed frontal teeth congestion orally. The lower incisors sometimes deviate vestibularly, as a result of which diastems and diaereses form between them, or they press the upper incisors, increasing their palatine inclination.

At a most evident anomaly the lower jaw as though absorbs the upper one. The contact in the region of lateral and frontal teeth is violated, only the gliding of the lower teeth lingual surface on the upper teeth buccal surfaces takes place.

Functional disorders are also very important at mesial occlusion. Face form is violated. At the absence of occlusive contact between incisors food biting becomes impossible. Because of the forward shift of the whole lower jaw dental arch and molars correlation violation the general mastication area decreases. Tubercular closure, which forms between the masticatory teeth, hampers food grinding.

Sometimes, because of lower jaw protrusion, functional disorders, conditioned by its articular heads location in the glenoid fossae, there appears pain in the joints, crunch, clicking.

The speech of patients with mesial occlusion is violated, lisping appears.

Dense location of the lower frontal teeth combines with dental tartar deposit, precervical caries, gingivitis.

For the differential diagnostics of dento-gnathic and gnathic forms of mesial occlusion the clinical functional test is used: the patient's face form is evaluated in profile at usual occlusion (the symptom of "capricious face") and if the patient can shift the lower jaw backwards to the maximum till the marginal incisors closure, and at that 1st permanent molars correlation becomes characteristic of the neutral occlusion, the dento-alveolar form of mesial occlusion with lower jaw protrusion is diagnosed. In another case mesial occlusion is caused by the difference in the dento-gnathic arches and/or jaws sizes. If jaw dislocation is present, face expression improves after the jaw is set in correct position.