The theme of the class № 8

Distal bite. Etiology, pathogenesis, prevention

The content of the topic:

Distal (posterior) occlusion is referred to sagittal occlusion anomalies and is characterized by a great variety of clinical forms and presentations.

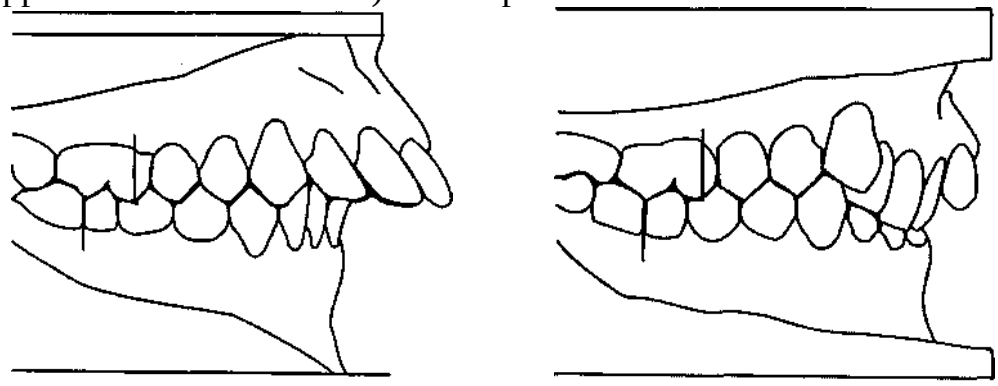
The type of occlusion, at which the upper jaw is protruding excessively, was described for the first time in 1886 by V.V. Dementyev, and in 1889 Sternfelf applied the term "prognathism", which has been widely used in orthodontics ever since. The term "posterior occlusion" was introduced by Licher in 1926, and now it has a lot of synonyms in literature: the 2nd class, anomaly of the 2nd group, posterior occlusion, distal bite, etc.

Posterior occlusion is one of the most widespread anomalies and makes on average from 3.6 to 65 % of all the types of pathologic occlusions. The given data is rather variable, which is explained by the absence of a single technique of examination and criteria difference in the diagnostics of dentognathic anomalies.

Posterior occlusion cases frequency varies in age aspect as well, but, according to many scholars, it takes place in the period of transitional dentition occlusion most often – from 15 to 20 %. This is explained, on the one hand, by unstable relative physiological equilibrium of the dentognathic apparatus in the period of transitional dentition, and on the other hand, by the fact that some anomalies in the period of mastication apparatus final formation disappear as a result of self-recovery.

The clinical symptom of posterior occlusion is the prognathic correlation between the dental arches, which may arise as a result of different interrelations between dentognathic apparatus elements, and also location of the apparatus in the cranium.

Thus, Angle in his anatomico-morphological classification refers the prognathic correlation between the dental arches to 2nd class anomalies, when the lower 1st molars are located distally relative to the upper ones. Angle considers this correlation to be caused by the lower jaw as the only movable bone of the facial skeleton. The author singles out two varieties of the 2nd class: 1) protrusion with frontal upper teeth diereses and 2) frontal part retrusion.



A.Y. Katz recommends taking into account the functional state of mastication muscles during dentognathic anomalies diagnostics. At prognathic jaws correlation the functional insufficiency of the muscles protruding the lower jaw (m.

pterygoideus lateralis) takes place. He refers such dental arches correlations to 2nd group anomalies.

L.V. Ilyina-Markosian, diagnosing prognathic occlusion forms, offers taking into account lower jaw displacement at usual location. She refers prognathic dental arches correlation to sagittal occlusion anomalies, applying the term "posterior occlusion" and singling out its three varieties:

- without lower jaw displacement;
- with lower jaw displacement;
- mixed form.

D.A. Kalvelis takes account of etiological agents when diagnosing dentognathic anomalies. The author refers prognathism to sagittal occlusion anomalies, emphasizing its hereditary nature.

On the basis of etiological signs A. Kantorowicz singles out posterior occlusion arising because of the distal position of the lower jaw or the 1st molars during their eruption.

According to V.Y. Kurliandskyi classification, dental arches correlation anomalies are to be evaluated by the signs of underdevelopment or excessive development of jaws and their combination with normal development. Therefore prognathic dental arches correlation may be caused by excessive development of the upper jaw or lower jaw underdevelopment.

A.I. Betelman refers posterior occlusion to sagittal anomalies and depending on the jaws development degree singles out four clinical forms:

1 – lower micrognathia;
2 – upper macrognathia;
3 – upper macrognathia and lower micrognathia;
4 – upper prognathism with narrowing in the lateral parts.

S.I. Kryshtab offered a pathogenetic classification of sagittal lower jaw deformations. It is based on the degree of the articular process, as the center of lower jaw longitudinal growth, being included into the pathologic process, and divided this deformation into two nosologic groups: condylar and extra-condylar. The author considered typical of condylar ones to be characterized by jaws bodies underdevelopment, and of supracondylar – alveolar process reduction.

In recent years cephalometric is widely used in the diagnostics, prognosis, and choosing the method of treating an orthodontic pathology. Cephalometric is used as an additional investigation method, which allows characterizing facial skeleton growth peculiarities, localization, patient's individual profile.

A. EI-Nofeli (1964), analyzing cephalometrics data, singles out two forms of posterior occlusion:

1) dental posterior occlusion with normal correlation of facial elements;

2) skeletal posterior occlusion with pathologic correlation of facial elements. A.M. Schwarz (1969) and F.Y. Khoroshilkina (1976) during studying lateral head cephalometrics detected three basic forms of posterior occlusion: dento-gnathic, gnathic, and combined.

A.S. Shcherbakov (1967) differentiates dento-gnathic and skeletal forms of posterior occlusion.

According to the WHO systematics (Geneva, 1968), posterior occlusion is represented in several chapters:

- jaw size anomalies (upper jaw macrognathia, lower jaw micrognathia);
- anomalies of jaws position relative to the skull base (upper jaw prognathism, lower jaw retrognathia);
- dental arches correlation anomalies (posterior occlusion).

Posterior occlusion may be caused by different etiological agents and be the consequence of many functional and morphological dento-gnathic apparatus damages. Heredity is of big importance in prognathism development. Studying twins, some scholars (Siemens, Praeger, Kantorowicz, Korkhaus, 1939) concluded that anomalies, including prognathism, may be inherited. Not only face type, but also jaw size and occlusion form may be alike. Prognathism is also caused by constitutional peculiarities of the organism, the state of the patient's reactivity to environmental factors influence.

Intrauterine factors are also significant in posterior occlusion formation, first of all that is mechanical fetal injuries. In the womb the fetus is in the amniotic fluid protecting it from shakings and strokes. Fluid quantity changes in different periods of intrauterine development – from 2 L (6 months of pregnancy) to 1 L (in the end of pregnancy). Increase in amniotic fluid quantity leads to amniotic pressure increase, which in its turn causes violations of fetal blood supply, and in case of its decrease may lead to pressure on different parts of fetus. Amniotic pressure on the fetus, tight irrational clothes of the pregnant woman, wearing high heels create unfavorable environment for the development of the embryo and fetus, which not infrequently causes occlusion anomalies.

At typical fetal position the upper and lower extremities are pressed to the face, and due to the high pressure of the amniotic fluid or mechanical pressure from outside there may appear a deformity or growth inhibition of the maxillofacial skeleton.

Schwarz considers that the ventral fetus position may lead to distal lower jaw position.

Special attention must be paid to the mother's level of health during pregnancy. The influence of radioactive, pharmacological, and other external agents, hard working conditions, irrational unbalanced diet, metabolic disorder and endocrine glands dysfunction, injuries, early pregnancy toxemia may lead to dento-gnathic apparatus development deviations.

The parents' age, especially the mother's, at the time of child's birth, presence of hereditary, chronic, and specific diseases also mean a lot.

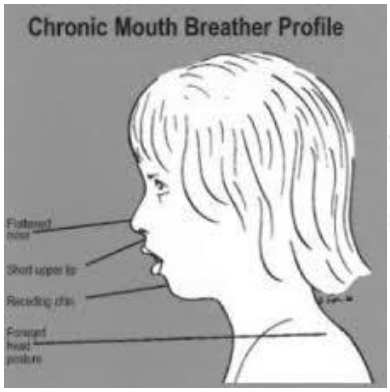
Posterior occlusion may appear at difficult prolonged labor. Obstetric intervention at abnormal labor (forceps or vacuum delivery) sometimes causes an injury of the dental germs or TMJ, which not infrequently leads to prognathism.

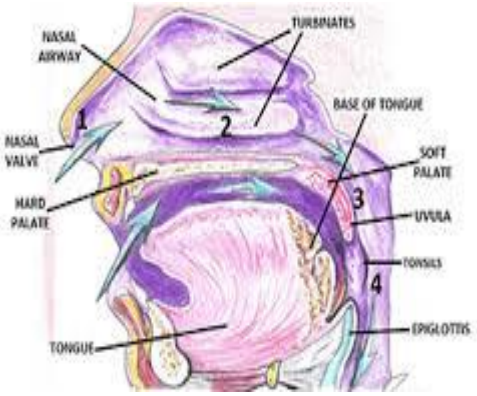
Etiological agents, arising as a result of extra-uterine agents influence, are the main ones causing posterior occlusion.

The character of child's feeding considerably influences jaws growth and development. A child is known to be born with distal lower jaw location (physiological retrognathia).

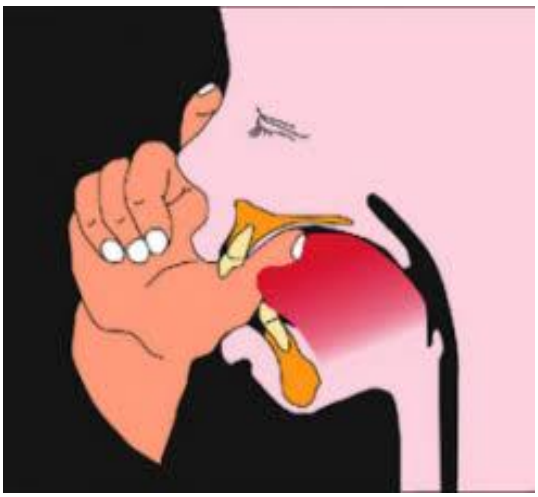
The function of sucking is a big load on the infant's mastication muscles. Due to the functional tension of muscles and intensive transfer of the lower jaw forward, by the end of the lactation period neutral position of jaws is noted. At artificial feeding lower jaw growth is inhibited and it takes the distal position, which leads to physiological retrognathia preservation. Artificial feeding from a bottle violates favorable functional irritation and the mastication apparatus is inhibited in its development: sucking movements do not require lower jaw displacement, mixture from the bottle pours into the infant's mouth, and rubber nipples cannot substitute natural feeding. The character of food also matters in posterior occlusion development. Feeding children with soft, grinded food, which does not require intensive mastication, develops mastication "laziness" in children. This leads to underdevelopment of the mastication muscles, which not infrequently causes underdevelopment of the lower jaw alveolar process.

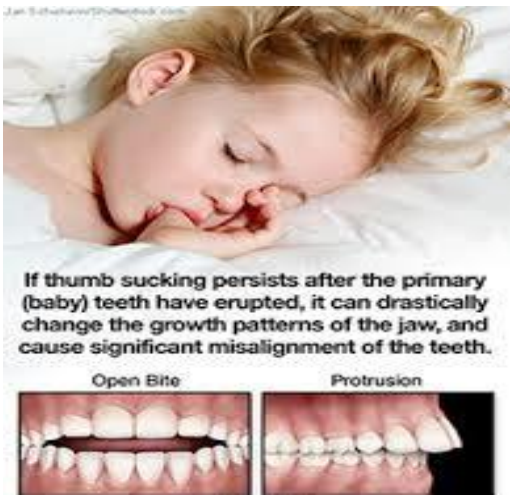
Nasal breathing violation may be one of the reasons for prognathism. At mouth breathing the tongue changes its position – it is adjacent not to the palatine surfaces of the upper teeth, but to the lower teeth. Without inner tongue support the upper dental arch narrows from the sides, becomes elongated and protrudes in the frontal part. Negative pressure forms in the nasal cavity at nasal duct obstruction. As a result of reinforced drawing in of the air and constant pressure of the air flow from the side of the oral cavity high palate forms and dental arches form changes. Posterior occlusion formation is promoted by infantile diseases, especially rachitic. Vitamin D deficiency violates calcium and phosphorus metabolism. Bones become "soft" and are easily deformed. At that, growth zones activity is considerably disturbed.





Children's pernicious habits take significant place in prognathism etiopathogenesis. These habits include sucking fingers, tongue, lips, rubber nipple and other objects. All these habits exist in the period of occlusion formation and, acting for a long period of time, provoke bone deformation. For instance, thumb sucking cause’s upper frontal teeth protrusion, excessive development of the interincisor bone because of mechanical pressure and trophism change on certain parts of the jaw bone. At that, the anterior part of the lower jaw is underdeveloped and flattened.





Head position during sleep is very important. If the head is thrown back, the lower jaw acquires the distal position as this increases the recoil of the muscles dislocating the lower jaw backwards. The tongue position and functional state also influence dental arches and occlusion formation. Posterior occlusion most often arises because of the slow growth and development of the lower jaw after an injury, chronic inflammation, congenital absence or death of dental germs, premature extraction of milk teeth, permanent teeth retention on the lower jaw, supplemental teeth on the upper jaw.