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DOI 10.25789/YMJ.2023.84.07

УДК 616.314-089.23

DIAGNOSTIC VALUE OF VERTICAL LINES OF LATERAL HEAD TELERADIOGRAPHS

Aim. To determine the diagnostic value of the vertical lines of lateral teleradiographs in the analysis of the gnathic section of the face and the position of the front teeth. **Material and methods.** A pilot retrospective study of 74 museum teleradiographs in the lateral projection was conducted. It is proposed to use the nasal-subnasal vertical. Parallel to the nasal-subnasal line, lines were drawn through the anterior superior alveolar point prosthion (Pr) and the anterior inferior point of the infradentale (Id). The position of the cutting edge of the incisors relative to the vertical diagnostic lines and the position of the contact point between the upper and lower incisors were evaluated. A visual analysis of the location of the anatomical details of the gnathic part of the face was carried out. **Results.** The result of the analysis of radiographs with a mesotrusion type of dental arches showed that in most cases the anterior alveolar vertical, crossing the prosthion point (Pr), passed through the cutting edge of the upper medial incisor, and the interstitial contact point was located in the middle, between the anterior and posterior alveolar lines. Regardless of the typological features of the dental arches in physiological occlusion, equality of vertical dimensions was noted, which was analyzed along five lines that passed perpendicular to the studied diagnostic verticals of the face. The upper horizontal line passed near the apical base of the upper jaw (point "A"), and the lower - through the point "B", which determines the position of the apical base of the lower jaw. **Conclusion.** Thus, the use of the proposed vertical diagnostic lines allows for a comparative analysis of dental arches of various trusion types, to assess the proportionality of parts of the gnathic section of the face and can be useful for diagnosing malocclusion in various directions, including vertical forms of occlusion and disocclusion.

Keywords: teleradiograph; physiological occlusion; pathological protrusion and retrusion of the incisors; occlusion anomalies.

Introduction. The introduction of modern technologies and equipment makes it possible to use a wider range of diagnostic measures in practical dentistry, not only to assess the risk of the underlying dental pathology, but also to identify concomitant somatic diseases. In particular, the peculiarities of oral cavity pathology in the presence of diabetes mellitus have been noted [1]. This paper presents modern methods of clinical and laboratory research, including radiological ones.

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One of the objective modern methods of radiological examination is cone-beam tomography with applied computer programs for analyzing the results [9]. However, despite the versatility and reliability of this method, there are some limitations for its daily use associated with the material expenditures of patients.

Along with CBCT, the method of teleradiography with numerous author's analysis methods has been widely used in the clinic of orthodontics and prosthetic dentistry [15]. In the present study the experts noted the features of morphometry using horizontal and vertical lines with the measurement of angles between them. The Dreyfus, Kantarovich, and Simon lines were separated from the vertical lines, which made it possible to consider the profile of the face taking into account Schwartz's recommendations. In addition, the typological features of the dentomaxillary arches are noted.

In turn, the types of dental arches, in particular, their protrusion and retrusion variants, affect the morphology of the bone structures of the mandibular joint [6, 17, 19]. Specialists note the peculiarities of the gnathic part of the face in people with congenital pathology, in particular, with cleft lip and palate [3, 18].

Taking into account the size of the head and face, odontometry methods have been proposed [10]. In the present study the authors determined the dependence of the sum of the width of the crowns of the four incisors of the upper arch, with the interzygomatic distance measured between the zygion points.

A comprehensive analysis of morphological dissertation studies of dental status in normal and pathological conditions was carried out, taking into account gender differences and periods of ontogenesis [8, 16]. The works present multifaceted information on the shape and size of the anatomical structures of the craniofacial complex. A comparative analysis of the dental parameters of arches of various types in the transversal, diagonal, and sagittal directions is given [4].

Researchers pay attention to the location of teeth in dentoalveolar segments, noting the location of the apical part of the root relative to the compact and spongy bone [2]. The greatest variability, according to the authors, is observed in the incisor group [7]. Particular attention in this study is paid to the position of the incisors in the anterior-posterior direction.

Based on the analysis of the proportionality of the parameters of the face and dental arches, algorithms for the diagnosis and treatment of patients with occlusal pathology, including the presence of defects in the dentition, have been proposed [5].

As a rule, the information obtained during morphometry determines the tasks of the orthodontist in carrying out therapeutic and dispensary measures [12].

A lot of information concerns the optimization of bite height determination methods, especially in people with vertical abnormalities [11]. Based on this principle, methods for diagnosing and treating patients of different ages with dental arch defects, including complete adentia, have been proposed [14,].

In addition, the use of modern methods of diagnosis and determination of the features of physiological occlusion are the criteria for the effectiveness of therapeutic and preventive measures [13].

The analysis of literature sources has shown that at present it is necessary to conduct additional research aimed at the development and implementation of modern methods for diagnosing teleradiograms, which formed the basis of the purpose of the work.

Aim. To determine the diagnostic value of the vertical lines of lateral teleradiography in the analysis of the gnathic part of the face and the position of the anterior teeth.

Material and methods of research. The pilot retrospective study was carried out on the basis of departmental materials and included the analysis of 74 lateral teleradiography, both with physiological norm and with various variants of abnormal occlusion.

In the course of the study, generally accepted landmarks were used to draw the plane of the skull base according to Schwartz, by connecting a point located in the middle of the entrance to the Turkish saddle (Se) with a nasal point on the bone (N). To construct the Dreyfus line, a skin point on the bridge of the nose (n) was used, through which a perpendicular was drawn to the plane of the base of the skull. In addition, diagnostic verticals were drawn (Fig. 1).

The main vertical was drawn through the cutaneous nasion point (n) and the subnasal point (sn). In the course of the study, the location of the nasal-subnasal line with the Dreyfus line was analyzed.

Parallel to the nasal-subnasal line, lines were drawn through the anterior upper alveolar point prostion (Pr) and the anterior inferior infradenthale (Id). The position of the cutting edge of the incisors relative to the vertical diagnostic lines and the position of the contact point between the upper and lower incisors were evaluated.

To assess the vertical dimensions of the gnathic part of the face, five lines were drawn perpendicular to the diagnostic verticals. The upper line departed from the subnasal point (sn), below it was the alveolar line from the point of prosthion (Pr), and the third line passed through the point of closure of the lips. The inferior alveolar line passed through the infradental point (Id) and the fifth line passed through the cutaneous supramental point (sm).

The trusion type of dental arches was assessed by the interincisor angle, which varied from 125 to 135 degrees in mesotrusion. An increase in the angle characterized the retrusive type, and a decrease – a protrusion variant of the dental arches.

Visual analysis of the location of anatomical details of the gnathic part of the face was carried out without morphometric analysis, which did not require static analysis of the study results.

Results and discussion. As a result of the study, attention was drawn to the fact that the Dreyfus line often did not coincide with the nasal-subnasal vertical and applying it could be useful for determining Schwartz facial profiles, taking into account the location of the subnasal landmark, which was located in front, behind or on the Dreyfus line.

In this regard, we consider it more rational to use the proposed diagnostic verticals when analyzing facial signs and, in particular, the gnathic part of the face.

Teleradiographs with physiological occlusion were divided into three groups. The first group included images in which the interincisor angle corresponded to the mesotrusive variant. In the second group, the protrusion version of the incisors predominated, and in the third group, the incisors closed in a retrusion pattern, corresponding to the signs of physiological occlusion.

The result of visual analysis of radiographs with the mesotrusion type of dental arches showed that in most cases the anterior alveolar vertical, crossing the prosthion point (Pr), passed almost through the cutting edge of the upper medial incisor, and the interincisor contact point was located in the middle, between the anterior and posterior alveolar lines.

Radiographs of the protrusion type of dental arches showed that in most cases the anterior alveolar vertical, crossing the prosthion point (Pr), also crossed the cutting edge of the superior medial incisor, which, as a rule, was located in front of the indicated line. The interincisor contact point was shifted from the center towards the anterior alveolar line.

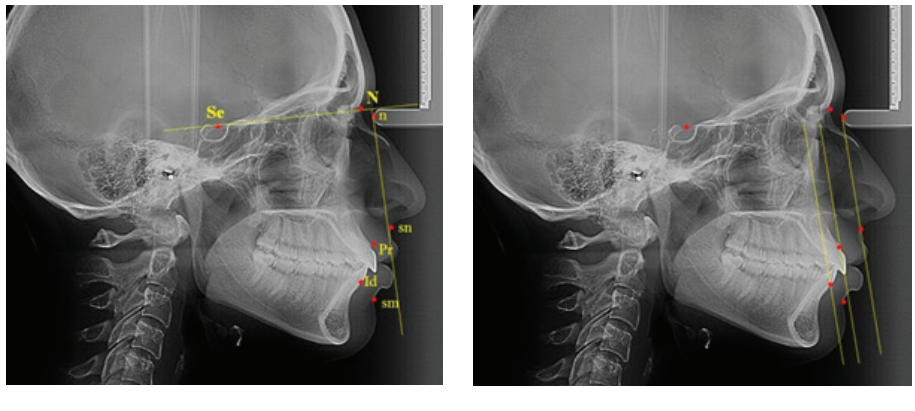
In the study of teleradiographs with the retrusion type of dental arches, it was noted that in most cases the anterior alveolar vertical, crossing the point of prosthion (Pr), did not reach the cutting edge of the superior medial incisor, which, as a rule, was located behind the indicated line. The interincisor contact point was shifted from the center towards the posterior alveolar line, sometimes even touching it (Fig. 2).

Regardless of the typological features of the dental arches in physiological occlusion, there was an equality of vertical dimensions, which was analyzed along five lines passing perpendicular to the studied diagnostic verticals of the face. The upper horizontal line passed near the apical base of the upper jaw (point "A"), and the lower line passed through point "B", which determined the position of the apical base of the mandible.

It is noteworthy that the line passing through the point of closure of the lips divided the interapical distance into almost two equal halves and corresponded to the location of the interincisor contact point. At the same time, the lines passing through the alveolar points bisected the upper and lower apical occlusal parts.

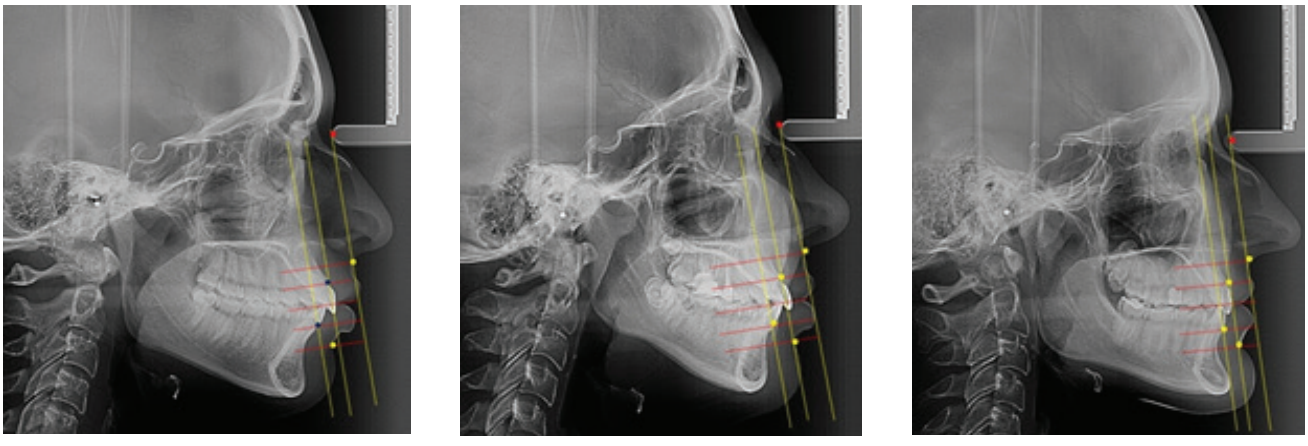
Thus, the use of the proposed vertical diagnostic lines allows for a comparative analysis of dental arches of various trussing types, to assess the proportionality of parts of the gnathic part of the face and can be useful for diagnosing malocclusion in various directions, including vertical forms of occlusion and disocclusion.

When analyzing the abnormal shapes of the anterior teeth, we divided the teleradiographs into two groups. In the first group, there were signs of pathological tooth retrusion, and in the second one



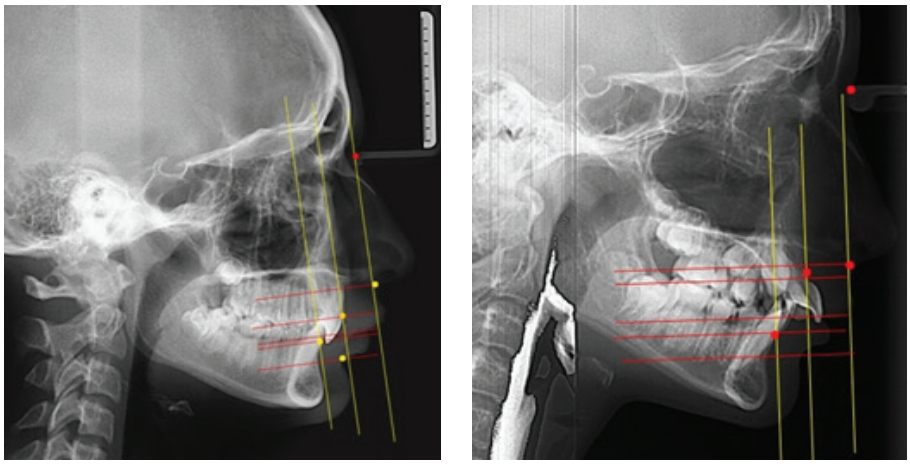
a b

Fig. 1. Main point landmarks with the Dreyfus line (a) and diagnostic verticals (b) on the teleradiograph in lateral projection



a b c

Fig. 2. Location of diagnostic verticals in mesotrusion (a), protrusion (b) and retrusion (c) of incisors in physiological occlusion



a b

Fig. 3. Location of incisors relative to diagnostic verticals in deep occlusion in combination with pathological retrusion (a) and pathological protrusion (b) of anterior teeth on teleradiograph fragments

there were signs of pathological incisor protrusion.

In both the first and the second variants, the change in the position of the incisors, as a rule, was combined with a decrease in occlusion height, which was also visually determined on the fragments of the gnathic part of the face of the studied teleradiography (Fig. 3).

In all variants of pathological incisor retrusion, the cutting edge of the medial incisors deviated significantly posteriorly from the anterior alveolar line and even reached the posterior alveolar vertical.

For variants of pathological incisor protrusion, the cutting edge of the medial incisors deviated significantly anteriorly from the anterior alveolar line. The position of the lower incisors was variable and depended on their protrusion or retrusion position, despite the protrusion of the upper incisors.

The inequality of parts of the gnathic part of the face is to be noted. The position of the labial line did not correspond to the location of the occlusal line and the contact point of the incisors was usually located above the specified landmark.

Thus, the use of the proposed diagnostic verticals can be useful for diagnosing anomalies of the dental arches and occlusion in general.

Conclusion. It is proposed to construct diagnostic vertical lines on a lateral teleradiography, which are based on the main nasal-subnasal vertical, parallel to which the anterior and posterior alveolar verticals pass. The nasal-subnasal vertical is used to construct perpendicular horizontals passing through landmarks generally accepted in clinical dentistry. This method of examination can be used to determine the occlusion height, both in normal and pathological conditions in prosthetic dentistry and orthodontics.

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SOME CRITERIA FOR DAMAGE TO THE CARDIOVASCULAR SYSTEM OF NEWBORNS DUE TO INTRAUTERINE HYPOXIA

DOI 10.25789/YMJ.2023.84.08

УДК 618.3:611.1-053.31

The results of laboratory and instrumental diagnostic methods in newborns with a history of intrauterine hypoxia were analyzed. Electrocardiographic features were revealed in the form of prolongation of the QT interval; diffuse secondary metabolic-hypoxic changes in the myocardium, such as myocardial hypertrophy, increased myocardial biopotentials from the right and left ventricles; severe overload of both atria. An important role in assessing the state of the cardiovascular system is assigned to the determination of markers for assessing the severity of damage: such as malondialdehyde (MDA) and brain natriuretic peptide (BNP) in the blood serum. As a result of the study, a significantly higher (1.2 times) MDA level was determined in newborns with antenatal hypoxia with NT-proBNP values 4 times higher than the reference laboratory values for the reagent kit. The results obtained suggest the importance of further research into the role of antenatal hypoxia in assessing the state of the cardiovascular system of children.

Keywords: intrauterine hypoxia, electrocardiogram, newborn, malondialdehyde (MDA), natriuretic peptide (BNP), cardiovascular system.

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Background: The characteristics and effects of intrauterine hypoxia on the cardiovascular system (CVS) of newborns and the consequences it causes continue to be a relevant topic for research, because CVS lesions occur, according to Russian authors, in 40–70% of cases [11], occupying second place in the list of pathological conditions of the perinatal period. It is generally accepted that the main cause of hypoxic heart damage in newborns is a decrease in energy production in the myocardial cell due to perinatal “hypoxic injury” and relative coronary insufficiency caused by the mismatch of the existing coronary blood flow with the functional needs of the heart, resulting from the high hemodynamic load on the ventricular myocardium during the period of postpartum adaptation blood circulation.

The cause of intrauterine hypoxia may be a decrease in oxygen content at the preplacental, placental and postplacental levels. A lack of oxygen supply can develop gradually and be chronic [2], leading to disruption of compensation mechanisms, resulting in activation of anaerobic glycolysis and centralization of blood circulation [6]. Fetal hypoxia leads to dis-