MEDICINE

MORPHOMETRIC PARAMETERS AND GRAFIC MODEL OF HUMAN`S TEETH CROWNS

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Abstract. *Our work is devoted to study of individual anatomic variability of forward teeth (cutters) of the human. By the purpose of work was the finding-out of dependence of linear parameters crowns of cutters from a number of the factors. The basic methods of performance of work were morphometric, virtual modeling and statistical processing with dispersions by the analysis.*

We suggested the method of measuring parameters of front teeth crowns and a computer program that allows using appropriate mathematical calculations to create graphical reconstruction of each tooth.

Keywords: *Individual anatomic variability, forward teeth, teeth crowns, morphometric parameters, graphic model.*

The problem of individual anatomical variability is constantly in sight of researchers. It includes questions variations of different structure depending on a variety of natural and artificial factors. Doctors of various specialties undoubtedly need knowledge of the structure of organs and systems. Information on the range of individual anatomical variability permanent front teeth (incisors) rights are important for practical and theoretical medicine. Also morphometric parameters of human teeth crowns sizes can be used in the manufacture of artificial teeth [1].

A known method is determining of the main geometric parameters of human teeth using computed tomography [2]. This method involves the study of the tooth using computed tomography to obtain axial cuts of tooth, segmentation obtained images, building volume computer model of the tooth and complex measuring geometric parameters for dental crowns.

However, this method requires the implementation of CT that complicates large-scale morphological studies and reduces accuracy by making mistakes in the averaging reconstruction within the object (tooth).

A known method is determining the anatomical features of human teeth [3], including fixing jaw on the plateau of the locking device, determining the level of the anatomical neck of the tooth, setting coordinate system, measurement coordinate of crown axial cuts using indicator linear movement, determine configuration characteristics of the surface of the crown and construction geometric model of the tooth.

However, with this method is possible only to determine the configuration characteristics of the surface of the tooth crown and identifying key geometric parameters that characterize the main sizes of teeth requires additional measurements and related calculations.

The purpose and objectives of the study - the creation of such method for determining the geometric parameters of human teeth crowns, which would allow by the introduction of certain procedures for measuring linear and angular characteristics of the tooth and related mathematical calculations, simplify definition of geometrical parameters of human teeth crowns and improve functionality of morphological studies.

This result can be achieved if the method of determining the geometric parameters of the crowns of the teeth of man, which consisting of fixing teeth on the plateau of the locking device, determining the level of the anatomical neck of the tooth, setup coordinate system under our proposed invention [4, 5], performing designation coordinate mesial and distal boundary points cervical tooth measuring cervical width of the crown, cervical mesial and distal angles of inclination crowns, mesial and distal elevation crowns, determine coordinates of mesial and distal borders crowns on the cutting edge, the width of the crown on the cutting edge, mesial and distal crown angles on the cutting edge, the height and angle of conditional median vertical crown and create schematic the configuration of crown model.

Materials and methods.

To determine the individual anatomical variability crowns of the front teeth of human contact we made the models of the upper and lower jaws from gypsum. In the protocols of observations was recorded the passport data, sex, date and place of birth, the presence of dental treatment at the examinees and their parents to identify hereditary factors, as well as the type of bite, facial angle, the shape of the palate and face.

The models were made of plaster of a high strength by two-layer prints. This allows measuring with high accuracy by using tools. On the models in the vestibular norm, using calibrated micrometer (Renfert № 1119) was measured the width of the cutting edge, the height of the medial and lateral crowns.

Was measured the height of the clinical crown of the tooth, that is, the angle of the crown to the top of the gingival papillae. With protractor we measured the angle between the cutting edge and the medial height of each tooth 1.2; 1.1; 2.1; 2.2; 4.2; 4.1; 3.1; 3.2, and the angle between the cutting edge and the lateral height of the crown. The amount of curvature of the equator of crown was not taken into account. We have used our own developed method of measuring of the parameters of teeth crowns, which allows using of the proposed program on the PC, with the help of appropriate mathematical calculations to obtain the values of the of the cervical width crown, values of medial and lateral angles, and also the height of the crown and its angle of inclination relative to the horizontal plane. These data allow you to create graphic reconstruction of each tooth.

Found that by putting in method of determining the geometrical parameters of human dental crown, measure procedure of some linear and angular characteristics of the tooth and the related mathematical calculations, achieved major simplification of the determining of geometrical parameters of human teeth crowns and extend the functionality of morphological studies.

In Figure 1 is shown configuration model crown of incisor of the left half lower jaw with determination and calculation of measuring geometric parameters; in Figure 2. - averaged outline configuration model crowns of incisors of left half of the mandible: a) - rectangular, b) - direct mesial and blunt distal cervical angles, c) - with a blunt mesial and right distal cervical angles, d) - with blunt mesial and distal cervical corners).

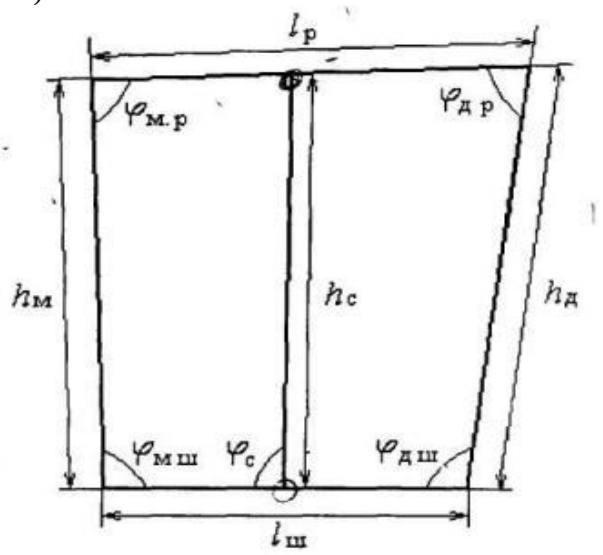

Fig. 1.

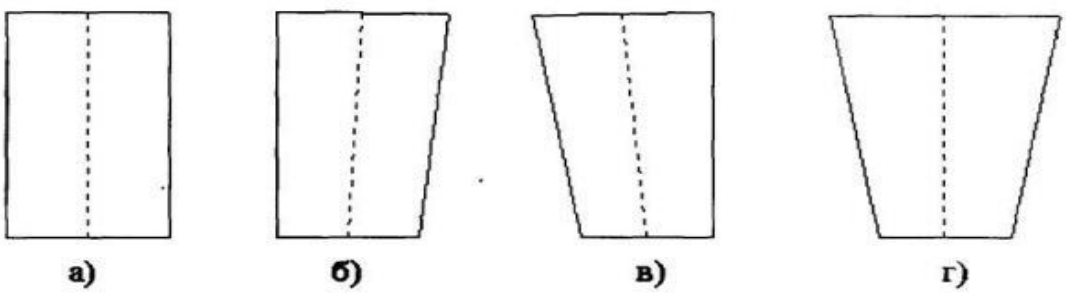

Fig. 2.

The method offered can be implemented as follows: performed fixing jaw on the plateau of the fixing device is carried out to determine the level of the anatomical neck of the tooth and established coordinate system, the horizontal axis is parallel to the line of the anatomical neck, and the vertical axis is perpendicular to the line of the anatomical neck through its middle. Performing (see. Figure 1.) notation coordinates mesial and distal boundary points cervical tooth crown width measuring cervical Lш, measurement gum φм.ш mesial and distal φд.ш, crown angles of inclination. Also performed measurements mesial hм and distal hд crown heights. According to these measured parameters using trigonometric formulas calculates the coordinates of mesial and distal borders of crowns on the cutting edge, determine the width Lp crown on the cutting edge and defining φм.р mesial and distal φд.р crown angles at the cutting edge. For the determination of the overall geometric orientation of dental crowns in a row held determine the height hc and tilt angle φc of conditional median vertical crown. The height hc is calculated as the distance between the mid-point and cutting edges neck crown. Angle φc of tilt conditional median vertical crown measured in mesial direction (to the center). According to the obtained geometric parameters performed procedure for creating schematic the configuration model of the tooth.

The mean values of the parameters of all eight incisors were determined. They were next. At the upper right lateral tooth: the medial height of the crown is 4.31 ± 0.16 mm; Lateral height - 4,17 ± 0,16 mm; The cutting edge width is 5.53 ± 0.12; The width of the cervical margin is 5.74 ± 0.10. At the upper right medial incisor, respectively: 4.78 ± 0.17 mm; 4.81 ± 0.18 mm; 7.06 ± 0.3; 7.03 ± 0.3; At the upper left medial incisor - 4,83 ± 0,18 mm; 4.99 ± 0.18 mm; 7.20 ± 0.28; 7.07 ± 0.31; At the upper left lateral incisor - 4,49 ± 0,18 mm; 4.35 ± 0.16 mm; 5.58 ± 0.12; 5.69 ± 0.08. Lower teeth had the following parameters. In the lateral right incisor, the medial height of the crown was 4.02 ± 0.17 mm; Lateral height - 4.35 ± 0.16 mm; The width of the cutting edge is 5.31 ± 0.08; The width of the cervical part is 4.61 ± 0.07. In the right medial lower tooth, the parameters were respectively 4.14 ± 0.15 mm; 3.93 ± 0.14 mm; 4.96 ± 0.10; 4.61 ± 0.07. The left medial lower incisor is 4.22 ± 0.12 mm; 3.97 ± 0.15 mm; 5.09 ± 0.10; 4.61 ± 0.08. The lateral left lower incisor has the following values-4.15 ± 0.17 mm, respectively; 4.06 ± 0.08 mm; 5.33 ± 0.01; 4.93 ± 0.08.

The remaining parameters (angles, crown height and the slope of its axis) allowed to create virtual models on which it was found out that the shape of the crowns was mainly straight and trapezoidal. In this work, the extreme variants of the structure of the crowns are shown. The coefficient of variation calculated in all cases revealed the most variable only the width of the cutting edge at the upper medial incisors. According to this parameter by analysis of variance was monitored individual anatomical variability. It turned out that there is a reliable asymmetry - the left teeth are larger than the right; sexual dimorphism is quite pronounced - in 13% of cases, the teeth are larger in men than in women. A mathematically reliable dependence of the upper teeth on the palatine index was revealed - the upper teeth in 0.03% of cases increase with it. The teeth are enlarged as the face angle changes from ortho- to prognathism. Visually the increase in teeth as the shape of the face changed from round to rhombic was determined, but this was not confirmed by mathematical certainty.

Conclusions.

1. Obtaining geometrical parameters of crowns of teeth and statistical analysis allowed to identify the main sizes and averages outline configuration models of human teeth crowns.

2. Our proposed invention can be used to determine basic geometric characteristics of human dental crowns and configuration artificial teeth.

3. Thus, due to the introducing into the method of determining of the geometric parameters of human teeth crowns the procedure of measuring of some linear and angular characteristics of the tooth and carrying out the appropriate mathematical calculations, we achieved simplification of the definition of basic geometric parameters of human teeth crowns and expanding of the functionality of morphological research.

4. The results of our research allow us to recommend for domestic industry to manufacture artificial teeth with defined configurations.

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ACTIONS OF MEDICAL SPECIALIST IN FEBRILE STATES DURING CHILDHOOD

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Abstract. *One of the most common symptoms in childhood sickness is the elevated body temperature. It is a cause for which parents seek the help of medical professionals. Hyperthermia is a condition that is due to pathological causes. During fever the thermoregulation is always impaired. Depending on the cause feverish reactions are divided into infectious and non-infectious. In most of the cases among children the increased body temperature is brief and it is an universal protective reaction, that prevents or slows down the progression of many microorganisms and stimulates the immune response. Health professionals are obliged to explain the reasons for the temperature raising. They have to clarify the need for treatment to parents, as well as to older siblings. Febrile conditions affect the whole organism. The prognosis for hyperpyrexic conditions and febrile seizures, as part of them, is favorable. It is necessary to conduct proper treatment for the disease that causes a rise in the body temperature. Also importatnt fact is the fast applying of preventive measures in case of febrile illness: physical therapy, cold compresses, wet wraps, massages, antipyretic agents, oral rehydration.*

Keywords: *children, fever, prevention, medical specialists, termoregulation*

I. Introduction

One of the most common symptoms in childhood sickness is the elevated body temperature. It is a cause for which parents seek the help of medical professionals. By itself, the increased body temperature is not lethal factor. Hyperthermia / fever / is a condition that is due to pathological causes. During fever the thermoregulation is always impaired. Depending on the cause feverish reactions are divided into infectious and non-infectious. Infectious fever is caused by viral or bacterial agents. Non-infectious fever is a result of various factors - foreign proteins to the body, denaturation of its own proteins, necrosis of cells, haemorrhages, haemolysis of red blood cells, some allergic reactions.

II. Exposition

In most of the cases among children the increased body temperature is brief and it's an universal protective reaction, that prevents or slows down the progression of many microorganisms and stimulates the immune response. Health professionals are obliged to explain the reasons for the temperature raising. They have to clarify the need for treatment to parents, as well as to older siblings. It is essential not to ignore the concerns and anxiety of parents, even if the child does not seem seriously ill.

The effects of hyperthermia are divided into:

Useful effects:

- ✓ different immune mechanisms function better during the fever;
- ✓ growth of certain microorganisms is suppressed at high temperatures;
- ✓ Adverse effects:
- ✓ deterioration of severely disabled or suffering from chronic lung or heart disease children;
- ✓ temperatures above 40oC, although rarely, can cause neurological signs;
- ✓ children under 5 and especially between 6 months and 3 years of age are at high risk of febrile seizures, especially during ascertained axillary body temperature above 39oC.

Febrile conditions affect the whole organism. There are changes from: