

## MORPHOMETRIC PARAMETERS OF THE FACE IN PATIENTS WITH DECOMPENSATED VERTICAL-ANTERIOR FORM OF INCREASED ABRASION OF TEETH

<sup>1</sup>Subbotin R.S., <sup>1</sup>Puzdyreva M.N., <sup>1</sup>Fishchev S.B., <sup>2</sup>Lepilin A.V., <sup>1</sup>Orlova I.V., <sup>1</sup>Sevastyanov A.V.

<sup>1</sup>St. Petersburg State Pediatric Medical University of the Ministry of Healthcare of the Russian Federation, St. Petersburg, e-mail: roma.seregin.92@mail.ru;

<sup>2</sup>Federal State budgetary Educational Institution of Higher Education "Saratov State Medical University named after V.I. Razumovsky" of the Ministry of Healthcare of the Russian Federation, Saratov

---

The paper presents an analysis of the morphometric parameters of the face in patients with increased abrasion of the teeth with a decrease in the height of the gnathic part. Morphometric parameters of the face in the decompensated vertical-mesial form of increased teeth abrasion were compared with the norm. The obtained data can be used to determine the tactics of orthodontic and orthopedic treatment of patients with increased abrasion. Increased abrasion of the teeth (IAT) is a common nosological form in dentistry. Iordanishvili A.K. (2015) Notes that adult IAT occurs in 3,5-35,4% cases. IAT is less often within younger people (6,3%) than within middle-aged (32,7%) and also within elderly (11,8-20,6%). A ranking place in dentistry goes to patients with increased abrasion of the teeth (IAT), this pathology occurs in 11,8% to 42,6% of cases (2, 4, 5, 8, 9, 10, 11, 12). The reasons of IAT could be hard tooth tissues inferiority, functional congestion of teeth, chemical activation, occupational hazards, muscles of mastication tonus and other factors (2, 6, 7, 8, 12).

---

**Keywords:** orthodontia, orthopedics, increased dental abrasion

Current increased abrasion classifications fail to meet the systematization of clinical aspects of this pathology [3, 5, 10, 11]. The horizontal form of abrasion is diagnosed accurately, but vertical, mixed and other forms are hardly differentiated. That's why besides horizontal form we distinguish vertical-distal and vertical-mesial, depending on occlusion and position of temporomandibular joints elements. Gnathic part of the face is the variable structure of the craniofacial complex. Vertical parameters are most prone to changes, due to anatomical and physiological features of head growth and development (dental changes, occlusion abnormalities, loss of teeth, increased tooth abrasion, etc.). The interalveolar height increase can lead to a bigger muscles of mastication tonus, and cause dysfunction of the temporomandibular joints and structural changes in the jaw bone [4, 5, 8, 10, 11].

There are decompensated and compensated IAT. Decompensated is accompanied by a decrease in the gnathic part of the face height, and in case of compensated IAT the gnathic part of the face height does not decrease or its height change is insignificant. This is due to vacant (false, compensative) hypertrophy of the alveolar crests bony structures [3, 4, 8, 9, 10, 11].

The decrease in the gnathic part of the face height is affected not only by the abrasion of the teeth degree, the anomaly of occlusion in various directions, but also by changes in the maxillofacial region that occur with increased abrasion of hard tooth tissues, loss of antagonists and other associated pathological conditions [6, 8, 9]. At the same time, there is no clear distinction between the forms of lower-

ing the gnathic part of the face height within patients with increased teeth abrasion. The basic morphometric parameters of patients with a reduced gnathic part of the face are not shown.

### Goal of research

Determination of the basic face morphometric parameters within patients with decompensated vertical-mesial form of increased teeth abrasion.

### Material and methods of research

Morphometric examination of parameters was carried out within 30 patients (12 men and 18 women) with decompensated vertical-mesial form of increased abrasion of teeth.

The comparison group consisted of 64 people (27 men and 37 women) with physiological occlusion and intact dentition.

Kefalometric measurements were carried out with reference to the instructions of J.J. Roginsky (1968), F.J. Horoshilkina (1991), and in accordance with the requirements of anthropometry, which provide the definition of the distance between conventional points. A standard caliper with a fission rate of 0.01 mm was used as a tool.

10 parameters of the brain and facial region of the head were included to the statistical processing. Morphometric parameters were measured when the head was placed in the oculoauricular (Frankfurt) horizontal.

Following measuring points were used during cephalometry to determine the main parameters of the head and face in different directions (Fig. 1).

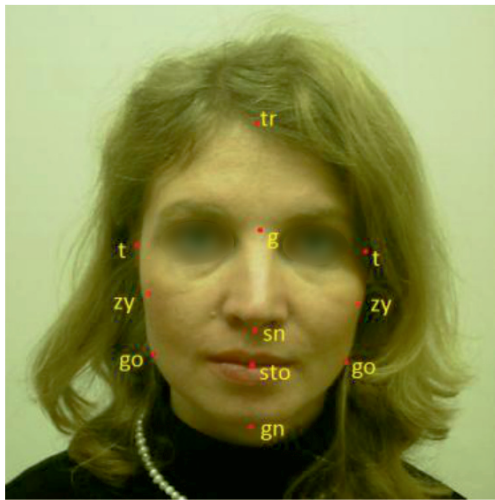


Fig. 1. A photograph of a person with dotted cephalometric points (frontal plane)

Glabella – *glabella* (*g*) – the most protruding forward point on the midline between the eyebrows;

Trichion – *trichion* (*tr*) – the upper point of the median line of the forehead on the border of the scalp;

Chin – *gnathion* (*gn*) – a point located on the middle line on the lower edge of the chin;

Upper nasal – *nasal* (*n*) – a point located above the root of the nose at the level of the nasophilic suture;

Subnasal – *subnasale* (*sn*) – a point located at the intersection of the nasal septum with the upper lip;

Oral – *stomion* (*sto*) – the point of intersection of the line of closure of the lips with the mid sagittal plane;

Zygomatic – *zygion* (*zy*) – the most prominent point outside the zygomatic arch;

Goat – *tragion* (*t*) – the point located on the upper edge of the tragus of the ear;

Mandibular – *gonion* (*go*) is the most outward point on the corner of the lower jaw;

Pogonion – *pogonion* (*pg*) – the most protruding point on the chin.

Distances between individual cephalometric points made it possible to determine the size of the head and face in different directions and to evaluate the parameters of the gnathic part of the face with physiological occlusion of permanent teeth. Measurements on the head and face were carried out in three mutually perpendicular directions.

In the sagittal direction, the length of the head (*g-ops*), the distance from the tragus of the ear to the nasal points and points on the lower jaw (*t-n*; *t-sn*; *t-pog*; *t-gn*). The depth of the face was calculated with the formula using distances between points (*t-t*) and (*t-n*).

### Results of the research and their discussion

Law of the relation between the shape of the head and various morphometric parameters of the face is established within the examined control group.

We have determined the morphological features of the head structure and its separate parts (face, gnathic part of the face, intergnathic distance, lower jaw). Morphometric parameters are considered in accordance with sexual dimorphism. The sizes of the head and face were studied. The relation between individual morphometric parameters of the head and face in men and women were determined.

The study results of the morphometric parameters of the head with comparison group are presented in the table 1.

Table 1

#### Morphometric parameters of the head and face

Morphometric parameters	Face size (mm)	
	males	females
n-me (face height)	125,64 ± 6,3	111,87 ± 2,26
gl – me	136,75 ± 3,29	122,34 ± 2,34
n-inc (height of nasomaxillar complex)	81,47 ± 3,52	73,45 ± 2,24
sn-inc (height of dental alveolar part of upper jaw)	21,82 ± 1,17	20,07 ± 1,24
n-sn	61,19 ± 2,7	58,57 ± 2,29
sn-spm (intergnathic height)	55,84 ± 4,5	53,16 ± 1,54
gn – me	6,52 ± 1,29	6,02 ± 1,19
inc – spm (height of dental alveolar part of lower jaw)	21,96 ± 1,89	21,14 ± 1,27
zy – zy	143,57 ± 5,1	138,41 ± 3,72
sn – gn	65,46 ± 1,43	63,28 ± 2,16

**Table 2**  
Morphometric parameters of the facial skeleton measurement within patients with decompensated vertical-mesial form with increased abrasion of teeth

Morphometric parameters	Face size (mm)	
	males	males
n-me (face height)	108,6 ± 3,11	105,26 ± 2,53
gl – me	118,3 ± 3,29	115,24 ± 2,33
n-inc (height of nasomaxillar complex)	71,53 ± 2,56	69,45 ± 2,34
sn-inc (height of dental alveolar part of upper jaw)	12,36 ± 2,37	11,6 ± 1,62
n-sn	52,18 ± 3,26	52,44 ± 3,54
sn-spm (intergnathic height)	36,68 ± 2,32	34,71 ± 1,47
gn – me	43,31 ± 3,65	42,51 ± 2,84
inc – spm (height of dental alveolar part of lower jaw)	14,96 ± 1,79	13,54 ± 1,37
zy – zy	133,27 ± 6,35	131,471 ± 6,73
sn – gn	54,37 ± 2,16	52,56 ± 1,56

Thus most of the morphometric parameters of the head and face within male patients were larger than within females and were significantly different.

In general, the morphological height of the face and the height of the nasal part within males were larger than within females. At the same time, the height of the gnathic part was not significantly different in men and women.

The height of the lower jaw (inc- me) was mostly twice the size of the dental alveolar part of both the upper and lower jaws. The joint height of the dental alveolar parts of the upper and lower jaws corresponded to the dimensions of the lower jaw height, and according to these signs of sexual dimorphism was not identified. The height of dental alveolar part of the upper jaw (sn – inc) corresponded to the dental alveolar part of the lower jaw (inc – spm) both in males (21,82 + 1,17 and 21,96 + 1,89 respectively) and females (20,07 + 1,24 and 21,14 + 1,27 respectively).

The results of the facial skeleton measurement within patients with decompensated vertical-mesial form with increased abrasion of teeth are shown in the table 2.

The results of the study showed that the height of the face nasal part (n-sn) corresponded to the lower part of the face (sn-gn) and the difference in these parameters was about 1-2 mm. It should be noted that the height of the dental alveolar part of the upper jaw (sn – inc) was about three times smaller than the height of the nasal part of the face and did not correspond to the dental alveolar part of the lower jaw (inc – spm). The height of the intergnathic part (sn-spm) was reduced by 9-13 mm. Thus, the height decrease of the gnathic part of the

face, especially the height of the lower jaw and intergnathic distance, was evident within patients. The interocclusion gap within the patients of this group was between 4-10 mm.

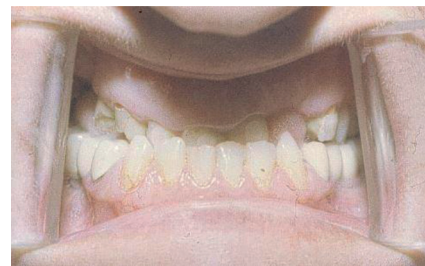


Fig. 2. Oral cavity of the patient Sh. 54 years. The presence of vertical-mesial facets of abrasion of teeth

During the oral cavity examination within patients of this group, there were objected a decrease in the interalveolar height, the presence of defects in the dentition, dental alveolar deformation of the dentition, the facet of abrasion in the vertical-mesial direction (Fig. 2).

**References**

1. Berdin V.V., Sevastyanov A.V., Fishchev S.B., Dmitriyenko D.S., Lepilin A.V. To a question of determination of the sizes of tooth arches in the sagittal and transversal directions // Stomatology of children's age and prevention. – 2013. – T. XII – No. 3(46). P. 43-45.
2. Iordanishvili A.K. Age-related changes in the masticatory-speech apparatus. Publishing House "Man", St. Petersburg, 2015. – P. 13.
3. Ramanovsky A.P. Antropometrichesky method of an assessment of harmony of the person // Problems, achievements and prospects of development of medicobiological sciences and practical health care. – Works KGMU. – 2002. – Vol. 138, p. 1. – P. 167-170.

4. Sevastyanov S.B. Fishchev I.V. Orlov, etc. specifying the location of permanent teeth, depending on the size of orthopantomogram. / .. A. // Pediatric Dentistry and prevention. – 2014. – T. XIII. – № 4 (51). – P. 48-50.
5. Fishchev S.B., Sevastyanov A.V., Dmitriyenko D.S., Berdin V.V., Lepilin A.V. The key linear parameters the zubo-chelyustnykh of arches at a normodontizm of second teeth // Stomatology of children's age and prevention. – 2012. – T. XI – No. 3(42). P. 38-42.
6. Fishchev S.B., Sevastyanov A.V., Orlova I.V., Korolev A.I., T.S. Bagamaev the efficiency of the computer simulation results of treatment of patients with defects of dentition in combination with a distal occlusion. // Pediatric dentistry and prevention. – 2015. – T. XIV. – № 1 (52). – P. 23-28.
7. Bolton W.A. The clinical application of a tooth-size analysis. // Am. J. Orthod., 1962, – № 48. – P. 504-529.
8. Gesch D., Kirbschus A., Gedrange T. Do bivariate and multivariate cephalometric analyses lead to different results concerning the skeletal cause of postnormal occlusion? // Funct Orthod. 2005 Summer-Fall;22(2):6-8, 10, P. 12-13.
9. Poosti M., Jalali T. Tooth size and arch dimension in uncrowded versus crowded Class I malocclusions // J. Contemp. Dent. Pract. – 2007. 8(3). – P. 45-52.
10. Potter R.H., Nance W.E. A twin study on dental dimension. I, Discordance, asymmetry and mirror imagery // Am. J. Phys. Antropol. – № 44. – 1976. – P. 391-395.
11. Potter R.H., Nance W.E. A twin study on dental dimension. II, Independent genetic determinants // Am. J. Phys. Antropol. – № 44. – 1976. – P. 397-412.
12. Tanaka M.M., Johnson L.E. The prediction of the size of unerupted canines and premolars in a contemporary orthodontic population. JADA 88: 798-801. – 1974.