APPLICATIONS OF ELECTROMYOGRAPHY AND MYOSTIMULATION INTO MEDICAL AND DIAGNOSTIC TACTICS IN THE COMPLETE ABSENCE OF TEETH

Akbarov Avzal Nigmatullaevich[1]
[1]Head of the Department of Faculty of Orthopedic Dentistry
Doctor of Medical Sciences, Professor
Salimov Odilxon Rustamovich[2]
[2]Head of the Department of Propaedeutics of Orthopedic Dentistry,
Doctor of Medical Sciences, Associate Professor
Raximov Baxtiyorjon Gafurdjanovich[3]
[3]Assistant of the Department of Propaedeutics of Orthopedic Dentistry
https://doi.org/10.5281/zenodo.7273602

Annotation. Myostimulation and electromyostimulation are important because of the parts involved, both diagnosis and treatment in orthopedic dentistry. This article takes into account the assessment of the electromyography of the masticatory muscles with the study of data on the direct correlation of changes in body mass index (BMI) and indicators of physical activity regressing with age.
Keywords: electromyography, myostimulation, body mass index, masticatory muscles, complete edentulism.

Introduction. M.Palinkas et al. (2010) reliably determined a progressive decrease in the thickness of the chewing muscles at rest and with maximum contraction in people over the age of 60, which is accompanied by a decrease in the electromyographic activity of the masticatory muscles in adulthood (Cecilio F.A., 2010, Akbarov A.N., 2017). This is confirmed by the progressive increase in the world scientific and practical interest in electromyography in dentistry.

Until now within the framework of the interconnection discussion of the influence between the inflammatory component and nutrition in adentia remain. The theory of maintenance of inflammatory processes in the oral cavity, as a resultant retrospective factor of adentia, seems to us the most justified (Hämäläinen P., 2004).

In this aspect, with the purpose of optimal assessment the electromyography of the masticatory muscles it is necessary to take into account the data (Kaur M., 2009) on the direct correlation of changes in body mass index (BMI) and indicators of low physical activity regressing with age.

Criteria for excluding patients from the study due to nonobjectivity and obtaining deliberately nonobjective results:

- functional inferiority of the jaw joint (limited opening of the mouth, dislocation, muscle dysfunction, etc.);
- diseases of the jaw joint (arthrosis, osteoporosis, myopathy);
- the presence of any parafunctional disorders;

Before starting each study food was placed in the patient's tongue. The patient, closing his jaw in occlusion, supports the food with his tongue and after the signal begins unilateral chewing movements.

The study was carried out in the dynamics of chewing movements. During the study neck movements and head movements were minimized / excluded during electromyogram recording.

The capabilities of the method of surface electromyography allowed it possible to study biopotentials in various muscle groups participating in the act of chewing: lifting the lower jaw - the anterior parts of the right and left temporal, right and left masticatory muscles; in the muscles that lower the lower jaw - the right and left suprahyoid and cervical muscles, the right and left sternum - the clavicular-mastoid muscles, which balance the position of the head on the spinal column and ensure the position of the lower jaw at rest.

Two seances are required for each patient. The first seance is familiarization with the procedure. The results of the analysis were the data of the second measurement seance.

When carrying out functional tests using food for chewing, the physician independently selects three natural food samples of moderately hard consistency of a convenient size and texture. The optimal standard size of food samples (according to Gaszynska E., 2017) for electromyography 23 × 11 mm.

After removing fat the skin with alcohol to register the biopotentials of the studying muscles, surface electrodes with an applied gel-guide are fixed on the skin (Fig.5.3) in the area of the motor zone of the muscle under study parallel to the muscle fibers, using round children's Ag / AgCl electrodes (diameter 30 mm).

The placement of the electrodes is carried out in accordance with the recommendations of SENIAM (2016). Muscle activity was assessed according to BTS FREEEMG 300 (BTS Bioengineering, Milan, Italy), followed by analysis of the data obtained using a SMART version 1.10.0225 analyzer using 20 - Hz and 450 - Hz Butterworth filters, calculating the root mean square root with a time window of 300 milliseconds.

The patients were examined in 2 seances of three phases: during rest - without chewing, during isometric maximum contraction and during chewing.

Before the study, the values of "rest" were recorded electromyographically for 10 seconds with an estimate of the time of one chewing movement (cycle). The isometric maximum contraction was assessed in the dynamics of the amplitude of chewing (ACh) for 20 seconds, followed by the calculation of the maximum peak of contractility - the amplitude of maximum contraction (AMC). Within the framework of the dissertation the study of the difference between the thickness of the masticatory muscles at rest and at the moment of maximum compression was carried out. Measurements of the thickness of the masticatory muscles at rest and at maximum compression were evaluated by ultrasound imaging.

BMI was calculated using the formula - body weight in kg divided by height in meters, raised to the second power, using the protocol for measuring the sex - interval (Bassey E.J., 1986). The somatic cell mass index (SCMI) was calculated using Bodygram MF Plus v.1.2 for Windows. Arm muscle strength was determined using a portable hand dynamometer in a sitting position with an upper limb bent at a 90 ° angle based on the average of two successive measurements.

To increase the reliability and objectivity of the electromyographic assessment of the masticatory muscles a comparative analysis of the body mass index (BMI), somatic cell mass index (SCMI), arm muscle strength (AMS) and the difference in the tension of the masticatory muscles was carried out (Table 5.5).

Table 5.5

Analysis of electromyography of masticatory muscles in edentulous patients with complete removable dentures

Parameter	Edentia + Complete removable dentures	Control group, norm
Age, years	64.40±6.08	66.11±7.23
AMS, kg	13.67±3.63	14.84±4.79
BMI, kg /m2	24.89±4.12	28.67±4.20
SCMI, kg / m_2	6.29±0.86	6.50±1.18
The difference in the tension of the muscles of the masticatory, mm	3.77±1.74	3.67±1.73

As a result of the comparative analysis of the studied parameters of BMI, SCMI and AMS for edentulous and complete removable dentures no statistically significant differences were revealed.

With increasing age with the loss of natural teeth and adentia it was revealed that the average indicators of electromyographic activity decreases in active m. masseter (- 0.812; P = 0.111) and m. temporalis during active (- 2.693; P = 0.023) and passive (- 2.064; P = 0.027) muscle contractions, while a decrease in BMI is noted.

Similarly, in patients with complete secondary edentulousness the mean electromyographic activity during one chewing cycle decreases with age in active m. masseter (- 1.491; P = 0.171) and m. temporalis during active (- 2.813; P = 0.021) and passive (- 2.160; P = 0.023) muscle contractions.

With increasing age with the loss of natural teeth and edentulousness electromyographic evaluation revealed that the amplitude of maximum compression (AMC) decreases in m. temporalis during active (- 3.849; P = 0.017) and passive (- 2.305; P = 0.083) muscle contractions, while there is an ex pressed increase in the mass index of somatic cells of the MISC (21.858; P = 0.067) against the background of a decrease in BMI (- 6.912; P = 0.017).

Similarly, in patients with complete secondary edentulousness during one chewing cycle AMC decreases with age in m. temporalis during active (- 2.256; P = 0.034) and passive (- 1.338; P = 0.084) muscle contractions.

Patients in the control group with natural dentition had significantly higher mean values of electromyographic activity m. temporalis during active (25.692; P = 0.044) and passive (18.386; P = 0.065) muscle contractions. Electromyographic activity during one chewing cycle was in m. temporalis during active (25.908; P = 0.047) and passive (18.204; P = 0.073) muscle contractions.

Normally, with age the amplitude of maximum compression in m. temporalis during active (59.177; P = 0.054) muscle contractions. The amplitude of maximum compression during one chewing cycle in active m. masseter (26.935; P = 0.086) and m. temporalis during active (43.839; P = 0.034) and passive (30.411; P = 0.047) muscle contractions.

Conclusion: Thus, electromyography is an objective, non-invasive method for assessing the activity of the masticatory muscles in patients with complete secondary edentulousness. The functional performance of the masticatory muscles does not depend on muscle efforts, but directly correlates with the maximum peak of contractility and the amplitude of maximum compression.

References:

1. Agzamkhodzhaev S.S., Kalandarova Sh.S., Khodzhimetov A.A. Biochemical indicators of mixed saliva in persons using removable plate prostheses: scientific publication // Journal of Theoretical and Clinical Medicine. - Tashkent, 2009. - N4. - P. 69-72.
2. Brovko V.V., Kresnikova Yu.V., Onufriev A.B., Maliy A.Yu. Results of orthopedic treatment of partial missing teeth in elderly patients // Russian Dentistry. - 2009; - Vol.2, No. 1. - P. 55-59.
3. Gilmanova N.S. Adaptation to complete removable dentures of middle-aged persons depending on their psycho-emotional status: scientific publication / N. S. Gilmanova, E.V. Orestova, I.A. Voronov // Ros. dental journal. - M., 2007. - No. 3. - P. 26-29. -
4. Julev E.N. Partial removable dentures (theory, clinic and laboratory technology). - N. Novgorod: Nizhniy Novgorod State Medical Academy, 2000. - 428 p.
5. Irsaliev F.Kh. Characteristics of the contingent of patients with allergic diseases in need of dental care / F.Kh. Irsaliev, J.Kh. Akhmedov, V.F. Garib // Dentistry. - Tashkent, 2009. - No. 1-2. - P. 39-41.
6. Irsaliev Kh.I. The state of the barrier-protective complexes of the prosthetic bed when using removable plate prostheses / Kh.I. Irsaliev, Zh.U. Abduvakilov, P.M. Akhmedov // Stomatologiya. - Tashkent, 2003. - No. 1-2. - P. 120-122.
7. Kopeikin V.N. Errors and complications when using removable plate and clasp prostheses // Med. business, 2003.-N1.-P.9-12.
8. Kopeikin V.N., Mirgazizov M.Z. Orthopedic dentistry. M .: Medicine, 2001.624 p.
9. Kopeikin V.N., Mirgazizov M.Z., Maliy A.Yu. Errors in orthopedic dentistry: Professional and medico-legal aspects. - M., 2002.240 p.
10. Kresnikova Yu.V. Clinical and epidemiological study of the results of orthopedic treatment of patients with partial absence of teeth // Abstract of the thesis. diss. ... can d.med. sciences. - M., - 2008 .-- 21p.
11. Minyaeva V.A. Problems of removable dentoalveolar prosthetics, St. Petersburg, 2005, 190 p.
12. Trezubov V.V., Kosenko G.A. Qualitative characteristics of removable plate dentures with thermoplastic bases // Institute of Dentistry. - 2011. - N1. - P.58-59.
13. Al-Ghannam N.A., Fahmi F.M. Effect of direct relining on stresses at the denture base and the metal frame of removable partial dentures //J. Contemp. Dent. Pract. -2005 Feb.15. –Vol.6. -N1. –P.37-47.
14. Applegate OC. Essentials of Removable Partial Denture Prosthesis 10rded. Philadelphia: Saunders -2005. -189 p.
15. Eliason C.M. RPA clasp design for distalextension removable partial dentures. // J.Prosthet. Dent. -2003. –Vol.49. -N1. –P.25-27. .
16. Hindels G.W. Load distribution in extension saddle partial dentures //J. Prosthet. Dent. -2001. –Vol.85. -N4. –P.324-329.
17. Kaplan D. Flexible removable partial dentures: design and clasp con-cepts // Dentistry Today.com. Issue Date: December 2008, Posted On: 12/15/2008
18. Kratochvil F.J., Thompson W.D., Caputo A.A. Analysis of stress patterns on teeth and bone with retainers for removable partial dentures //J. Pros-thet. Dent. -2001. –Vol.46. -N1. –P.21-28.

19. Sato Y., Tsugar K., Abe Y., Asahar S., Akagawa Y. Analysis of stiffness and stress in I-bar clasps //J. Oral Rehab. -2011. –Vol.28.-N6
20. Akbarov Avzal Nigmatullaevich, Khabilov Bekzod Nigmonovich, Kosimov Ahror Abror ugli. VARIETY OF BONE-PLASTIC MATERIALS AND THEIR MAIN PROPERTIES (LITERATURE REVIEW) Web of Scientist: International Scientific Research Journal 3 (9), 140-146
21. Туляганов , Ж., Миррахимова , М., & Косимов , . А. (2022). ОЦЕНКА КАЧЕСТВА И ЭФФЕКТИВНОСТИ СЪЕМНЫХ ПРОТЕЗОВ НА УРОВЕНЬ ЖИЗНИ БОЛЬНЫХ С ПОЛНОЙ АДЕНТИЕЙ. Eurasian Journal of Medical and Natural Sciences, 2(6), 477–481.
22. Акбаров Авзал Нигматуллаевич, & Хабилов Даврон Нигманович. (2022). АКУТУАЛЬНОСТЬ ОЦЕНКИ КАЧЕСТВА ЖИЗНИ ПАЦИЕНТОВ ПОСЛЕ РЕЗЕКЦИИ ВЕРХНЕЙ ЧЕЛЮСТИ. Proceedings of International Conference on Scientific Research in Natural and Social Sciences, 1(1), 38–41. Retrieved from - https://econferenceseries.com/index.php/srnss/article/view/30
23. Акбаров Авзал Нигматуллаевич, Хабилов Даврон Нигманович, & Мухитдинова Фарзона Гайратовна. (2022). ИЗУЧЕНИЕ РАСПРОСТРАНЕННОСТИ ЗАБОЛЕВАНИЙ СЛИЗИСТОЙ ПОЛОСТИ РТА У ПАЦИЕНТОВ, ПЕРЕНЕСШИХ COVID-19. Proceedings of International Conference on Scientific Research in Natural and Social Sciences, 1(1), 42–45. Retrieved from https://econferenceseries.com/index.php/srnss/article/view/31