

RADIO-IMAGING INVESTIGATIONS ALGORITHM OF THE TEMPOROMANDIBULAR JOINT

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Keywords:
temporomandibular
articulation,
deprogrammer,
biomechanics

Abstract: The purpose of this study is to collect a set of resources to investigate the temporomandibular articulation. The study of the biodynamic changes of the temporomandibular joint after the accomplishment of overdenture with support on the natural teeth or on implants, was conceived as a set of clinical and laboratory tests that allows us a clear and objective evidence of these ones. A mixed methodology was used based on a questionnaire survey, joint angle measurements and measurements of the anterior determinant. The main conclusions concern that toothless implant restoration produces a change in the joint biodynamics that should be monitored and compared quantitatively and qualitatively with joint physiological biomechanics and with joint biomechanics in the case of non-implant prosthesis. This research is an applicative one, aimed to solve short-term problems, current issues, contributing to the development of an interdisciplinary scientific field represented by the correlation between implant and occlusion.

Cuvinte cheie:
articulație temporo-
mandibulară,
deprogramator,
biomecanică

Rezumat: Scopul acestui studiu este să colecteze un set de mijloace de investigare a articulației temporo-mandibulare. Studiarea modificărilor biodinamicii articulației temporo-mandibulare după realizarea supraprotezărilor cu sprijin pe dinți naturali sau pe implante, a fost concepută ca un ansamblu de probe clinice și paraclinice care să ne permită o evidențiere clară și obiectivă a acestora. S-a folosit o metodologie mixtă bazată pe ancheta de chestionar, măsurarea unghiului articular și măsurarea determinantului anterior. Principalele concluzii vizează faptul că restaurarea edentațiilor prin implant produce o modificare a biodinamicii articulare care trebuie monitorizată cantitativ și calitativ și comparată cu biomecanica fiziologică a articulației și cu biomecanica articulară în cazul protezării fără implant. Cercetarea de față este una aplicativă, menită să rezolve probleme pe termen scurt, probleme curente, să contribuie la perfecționarea unui domeniu științific interdisciplinar reprezentat de corelarea dintre implantologie și ocluzologie.

Algorithm - the mathematical term for a system of rules and operators to perform an operation system in a given order, to solve any kind of problems; basic rules, symbols and operators to make any kind of logical or mathematical calculations; series of reasoning or operations aimed to solve problems.

Due to localisation and anatomical complexity, temporomandibular joint structures are difficult to visualise.

In terms of imaging, with all the progress made in medicine, the classic X-ray still maintains its validity, both in the correct diagnosis and for treatment evaluation or documentation.

For more complex investigations, we may appeal to CT or MRI, where we can resort to trans-cranial, lateral-oblique standard incidences (Schüller technique).(1)

Of all possible imaging methods, taking into account the technical feasibility and the importance of data collected, we will use in our research the orthopantomography and the CT for guidance.

Once the articular pathology installed, not only a dislocation of the meniscus may appear, clinically experienced by the practitioner and patient through fragments with or without joint pain, but also a number of changes in joint surface

anatomy. Those lead to changes in slope angle of the articular tubercle and the articular surface of the medial condyle.

Prostheses on implants require compulsorily the necessary balanced occlusions meant to protect the support pillars of the prosthetic work (that may be represented by the natural teeth or by implant-structures without ligament resilience, from the unbalanced impact of the premature contacts and interferences in both static occlusion and in dynamic movements in the jaw. The objectification of the temporomandibular joint biodynamics after overdenture achievement with support on the natural teeth or on implants, was conceived as a set of clinical and laboratory tests to allow us a clear and objective emphasis of these changes.

The samples were made in collaboration with all the dental clinics at national and international level and concern:

1. centralization of responses on joint pathology;
2. ortopantomography measuring the angle of displacement of the condyle in the temporomandibular joint, which will probably be lower if the condyle will be moved anteriorly, in contact with the slope of the articular tubercle and will tend to normal values when the condyle will be supported in the glenoid cavity;

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Article received on 10.09.2012 and accepted for publication on 02.11.2012
ACTA MEDICA TRANSILVANICA December 2012;2(4):306-307

CLINICAL ASPECTS

3. incisal slope inclination angle measurement when the mandible is positioned in centric relation with the deprogrammer or Lucia jig. The smaller the angle, the mandible will be situated above, what would be in line with the condilian movement angle to the level of the temporomandibular joint. The larger and closer the angle to the value found in the literature, 146-160°, it will be in line with the positioning of the condyle in the glenoid cavity. Thus, on this position, the next overdenture will be built on implants and the cuspidal slopes, if they observe the incisal slope inclination, we certainly have a good stability of the condyle in the glenoid cavity and of the prosthetic work without premature contacts in centric relation. Below, we will briefly describe three of our samples under study:

Sample survey - in our research, we used a type of questionnaire conceived by ourselves, aiming at highlighting items, such as age, age of the implant prosthesis or on natural teeth, the existence or pre-existence of joint pathology, individual habits. We also used questions that, cumulated may give indications regarding the existence of certain interocclusal relation disorders, developmental disorders that can endanger the maxillary facial health of the subject, questionnaire developed based on the Kios' model.

The measurement evidence of articular angle - orthopantomography is placed on a negatoscope. At the top of the articular condyle, a horizontal line is drawn parallel to the edge of the negatoscope screen-considered as the master plan. In parallel, a line is marked with a ruler above the anterior slope of the articular condyle. The angle of intersection between the horizontal and oblique line represents the sagittal condylar guide. According to the literature, this angle varies between 40-60°. These measurements were made at the both temporomandibular joints, both in the control group and in the study group, being subsequently compared statistically.(41)

Measurement test of the anterior determinant - for the measurement of the anterior determinant, we used as Duracrol material and wax, strips of 0.4 mm in thickness. The patient was asked to do an exercise: being in propulsion and using as guidance the index finger of the examiner, the patient led the jaw in retropulsion until the maximum intercuspidian position. Then, we prepared the Duracrol material under the shape of a sphere with the size of the two central incisors, and we applied it (fixing it with the index finger) on the labial upper central incisor to their palatal face. The patient was asked to repeat the exercise in the same conditions; he scored a slope on the palatal front of the piece of Duracrol. The same exercise was repeated by the patient in the same conditions, using a strip of wax instead Duracrol. We used the strip wax mainly in the patients with overdenture than normal, which, due to this, shear the piece of Duracrol. Then, we measured the slope. A first conclusion shows that at the level of the temporomandibular joint, there are, at the same time, with the installation of edentations, physiological biomechanical changes given by the periarticular muscle tone and by the biodynamics of the articular component elements, respectively by the condyle and meniscus, bringing about changes of the internal articular anatomy. Edentations restoration through implants produces a change in joint biodynamics that should be monitored quantitatively and qualitatively and compared with the physiological joint biomechanics and with joint biomechanics in case of non-implant prosthesis. The present research is an applied research which is designed to solve short term problems, current issues, contributing to the development of an interdisciplinary scientific field represented by the correlation between the implant and occlusion. Regarding the orthopantomography analysis, it has been observed that 56% had an anterior displacement of the

condyle in the glenoid cavity, which leads to a decrease of the condyle slope inclination. The results are consistent with the responses to the written questionnaire regarding noises, pain and latero deviation during chewing and mouth opening. The analysis of the anterior determinant and the registration of the inclination angle of the anterior determinant slope in the control group are as follows: 46% of the subjects presented abnormal levels, aspect that is consistent with the orthopantomography analysis and confirms the condylar movement in glen.

Please note that this analysis we only made in propulsion and retropulsion motion until centric relation. This study raises the question of also researching the right and left lateral movements.

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