BULLETIN OF STOMATOLOGY AND MAXILLOFACIAL SURGERY
Volume 20, Issue 4

DOI:10.58240/1829006X-2024.4-55

RESEARCH ARTICLE

Effectiveness of results of complex treatment of pathological wear of hard tissues of teeth

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Received: *Jul 26,2024;* ***Accept:*** *Aug.20,2024;* ***Publish:*** *sep15,2024*

Abstract

Background: Tooth wear is a multifactorial condition that results in the loss of hard dental tissue. Physiological wear does not usually result in any subjective symptoms. Pathological abrasion of hard dental tissues is accompanied by both morphological and functional disorders of the dental system.

Objective: To evaluate the functional and aesthetic results of complex treatment of pathological abrasion of dental hard tissues.

Materials and methods: This is a prospective controlled study that included 82 patients with a clinically confirmed diagnosis of Increased tooth wear of the first and second degree of severity (from 2020 to 2024). The age of the patients ranged from 34 to 68 years (48 men, 34 women).

The examination of patients included: collecting complaints and identifying concomitant somatic diseases, X-ray examination, photographs of the patient's face, bite height, and nasolabial folds.

Distribution of the group:

Group 1 included patients with the first degree of hard tissue loss 47 (29 men, 18 women)

Group 2 included patients with the second degree of hard tissue damage 35 (21 men, 14 women).

During examination, patients complained of aesthetic defects caused by tooth wear and discoloration, discomfort when closing, chewing and phonetic disorders, typical symptoms of TMJ dysfunction, such as pain and crunching in the joints, fatigue of the masticatory muscles and muscle pain, displacement of the lower jaw to the side during vertical movements, a feeling of distension in the ears, headaches and bruxism.

In patients of group 1: tooth wear was restored with orthopedic structures.

In patients of group 2: temporary prosthetic structures and occlusal splints were used to normalize occlusal relationships in case of TMJ and masticatory muscle dysfunction. Gradual raising of the bite was carried out by means of a set of kappa-splints for 14 days, 1 month and 3 months from 1.0 to 5.0 mm until complete restoration of the occlusal height depending on the severity of pathological abrasion of teeth, abrasion of teeth restored by orthopedic structures. Dynamic observation of the clinical condition of the prosthesis structure was carried out in the following periods: 1 week, 1, 6, 12, 24 months,assessment of the condition of the performed restorations were recorded in the medical record of the dental patient.

Results: Clinical radiological results showed satisfactory results and are encouraging in patients of groups 1 and 2. After treatment in patients of groups 2, according to the analysis of the lateral teleroentgenogram of the head, an increase in the height of the lower third of the face is noted, in 28 patients the nasolabial folds were smoothed out. Patients were satisfied with the aesthetic and functional results of the treatment

Conclusions: The results of the study showed that treatment using occlusal splints at the preparatory stage in patients of group 2 with occlusion disorders due to pathological abrasion of hard dental tissues and restoration with orthopedic structures is relevant for normalizing the occlusal relationships of the jaws and this complex treatment method provides a good aesthetic and functional result.

Keywords: *pathological tooth wear, tooth abrasion, loss of tooth surface, complex treatment*

Introduction

Tooth wear (TW) is a condition affecting the hard tissues of the teeth due to factors other than dental caries.

Tooth wear can occur physiologically with age or pathologically as a result of parafunctional habits. Normal physiological tooth wear is an irreversible condition and accumulates with age.

Lamberhts et al. in 1989 found that normal physiological enamel wear is 20-38 μm per year[1].

The loss of enamel and dentin as a result of their abrasion occurs throughout a person's life. This is a natural process, and it begins immediately after the eruption of teeth. The rate of abrasion of hard dental tissues depends on many factors: the hardness of the enamel and dentin, the type of occlusion of the teeth, the magnitude of chewing pressure, nutritional characteristics, a person's lifestyle, etc. Natural (physiological) abrasion of enamel occurs in the horizontal and vertical planes.

The leading etiological factors in the development of this disease are the effects of chemical and abrasive agents, parafunction of the masticatory muscles, and the inferiority of hard dental tissues.

Abrasion has been shown to be the most common cause of tooth wear.

Pathological abrasion of hard dental tissues is a progressive (decompensated) process of hard tissue loss, which is accompanied by a complex of changes of an aesthetic, functional and morphological nature in the teeth and periodontal tissues, masticatory muscles, temporomandibular joint[2].

Among the functional changes, changes in the bioelectrical activity of the masticatory muscles are considered first of all. Increased tooth wear is a polyetiological disease, identified in the International Classification of Diseases as a separate nosological form (according to ICD-10C DO03.0)[3].

External causes of dental erosion can be grouped into the following categories: environment (acidic fumes in factories), diet (acidic foods and drinks), medications (low pH medications), and lifestyle(oral hygiene product)[4-6].

Intrinsic dental erosion is caused by stomach acid entering the mouth and teeth as a result of gastroesophageal reflux[7]

Men experience more tooth wear than women due to the increased occlusal forces in men ,the prevalence of tooth wear increases with age.

Internal causes of dental erosion caused by various etiologic factors such as erosion, attrition, wear and abfraction. The term tooth surface loss (TSL) was proposed by Eccles to include all causative factors regardless of the exact cause of wear[8], and includes factors such as dentinogenesis imperfecta, amelogenesis imperfecta and trauma.

The causes of increased wear can be:

- functional insufficiency of hard dental tissues, caused by their morphological inferiority:
- congenital (due to disorders of amelo- and dentinogenesis in diseases of the mother and child);
- hereditary (Stainton-Capdepont syndrome); - endogenous (neurodystrophic diseases, disorders of the endocrine system, in particular. parathyroid glands, metabolic disorders of various etiologies);

The occurrence of a specific form of localization of tooth wear in orthognathic, direct or deep bite depends on the individual structure of the TMJ, incisal overlap, occlusal curve and direction of traction of the masticatory muscles[9]. All these elements together determine the nature and degree of freedom of movement of the lower jaw.

A decrease in occlusal height mainly depends on the depth or degree of tooth wear, type of bite, size and topography.

Abnormal wear can range from mild sensitivity caused by attrition or erosion to significant tooth destruction caused by wear. Furthermore, treatment of wear can range from simple preventive care to complete oral rehabilitation[10].

A separate questionnaire has been developed for problems related to appearance: the Oral Esthetics Scale (OES).The questionnaire consists of 10 items to assess how patients perceive the aesthetics of their teeth and face (0 = very dissatisfied, 10 = very satisfied)..It has been shown that patients with severe tooth wear have impaired OHRQoL comparable to those in patients with complete edentulism[11].

The prevalence of abnormal tooth wear reaches a fairly high percentage among individuals seeking prosthetic care. The anatomical shape of the crown of the tooth is disrupted and, at the same time, the nature of the chewing pressure on the cutting and chewing surfaces, as well as the periodontium and elements of the TMJ, changes. This is one of the factors contributing to the acceleration of the process of pathological abrasion, which is based on the weakening of the functional tolerance of hard dental tissues.

Functional occlusal overload of teeth or dental arches, caused by[12]:

- defects of dental arches (reduction in the number of antagonizing pairs of teeth);
- parafunctions of masticatory muscles (bruxism, non-food chewing, etc.);
- harmful physical or chemical factors (vibration, physical stress, acid and alkaline necrosis, dust);
- combined (combined) effects of the listed factors.

With increased abrasion, the structure of hard tissues of the tooth is disrupted: there is a decrease in the

clarity of the interprismatic spaces of the enamel, a disruption of the connection between the prisms, obliteration of the dentinal tubules. Fibrous degeneration and the formation of petrifications are observed in the pulp. If the process of formation of replacement dentin is slow, hyperesthesia (increased sensitivity) of the teeth appears[13].

The degree of hyperesthesia depends on the rate of abrasion of hard tissues, the reaction of the pulp and the threshold of pain sensitivity of the human body[14].

Classification of pathological tooth wear.

This classification includes various clinical aspects of functional and morphological nature, stage of development, depth, extent, area of damage and functional disorders.

In 1984, Smith and Knight developed the tooth wear index (TWI) where four visible surfaces (buccal, cervical, lingual, occlusal-incisal) of all teeth present are scored for wear, regardless of the cause[15].

Abrasion of hard tissues on occlusal surfaces is assessed by the following code:

0- No changes; 1- loss of enamel contour; 2 loss of enamel and dentin less than 1/3 of the surface; 3 loss of enamel and dentin more than 1/3 of the surface; 4 complete loss of enamel, exposure of dentin or exposure of the pulp.

The interpretation of the obtained data is carried out taking into account the age of the patient being examined

Depending on the duration of the lesion.

1) limited pathological abrasion;
2) general pathological abrasion.

Depending on the change in dentin sensitivity.

1) within normal limits;
2) with hyperesthesia.

Grippo put forward a new classification of hard tissue lesions of teeth , and defined four categories of tooth wear[16]

● Attrition: the loss of tooth substance as a result of tooth to tooth contact during normal or parafunctional masticator activity.

● Abrasion: the pathological wear of tooth substance through bio-mechanical frictional processes, e.g. tooth brushing.

● Erosion: the loss of tooth substance by acid dissolution of either an intrinsic or extrinsic origin, e.g. gastric acid or dietary acids.

● Abfraction: the pathologic loss of tooth substance caused by bio-mechanical loading forces.

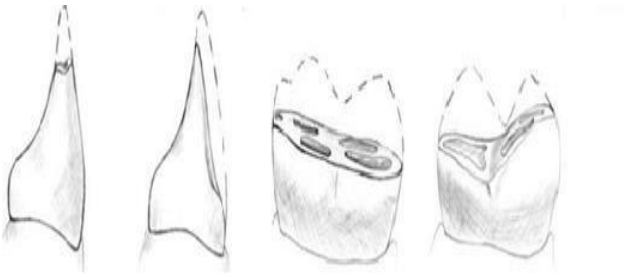

Fig1.Three clinical forms of increased abrasion: vertical, horizontal and mixed

In the vertical form with normal overlap of the anterior teeth, abrasion is observed on the palatal surface of the anterior teeth of the upper jaw and the labial surface of the antagonist teeth on the lower jaw. The situation changes with the reverse overlap: the labial surface of the upper anterior teeth and the lingual surface of the lower teeth are abraded.

With the vertical form of abrasion, the contact surfaces of the teeth become flatter and, as a consequence, their mesial displacement and shortening of the dental arch occur. This is also an adaptive reaction that ensures a decrease in triangular gaps in the area of gingival retraction (atrophy). Under certain conditions (eating soft food, deep incisal occlusion, tooth mobility, etc.), physiological abrasion may be delayed and the anatomical shape of the crowns is preserved.

The horizontal form is characterized by shortening of the crowns along the horizontal plane: horizontal abrasion facets on the cutting and chewing surfaces. In the mixed form, increased abrasion develops both in the vertical and horizontal planes.

The horizontal form of pathological abrasion is most often observed with a direct bite and can be generalized or limited (horizontal abrasion with a direct bite is associated with the absence of incisal overlap and weak expression of the articular tubercles). Increased sensitivity of dentin and increased electrical excitability of the pulp are observed. In the horizontal plane, the cutting surfaces of the incisors and canines wear out, the prominence of the tubercles of the premolars and molars decreases. This can be considered as an adaptive reaction of the body: a decrease in the functional capabilities of the periodon is compensated by a decrease in the height of the clinical crown of the tooth.

Increased tooth wear: can be limited and widespread, respectively, a localized and generalized form of wear are distinguished.

The localized form is more often found in the area of the front teeth, the generalized (diffuse) form is determined throughout the dental arch.

Depending on the compensatory-adaptive reaction of the masticatory apparatus, 2 clinical forms of increased wear of hard dental tissues should be distinguished: uncompensated and compensated. These forms can be observed both in localized and generalized forms of increased tooth wear[17].

The most recent consensus recommended in the European Consensus Statement such as the Tooth Wear Index (TWI), 11 the Basic Erosive Wear Examination (BEWE), 5 and the Tooth Wear Evaluation System (TWES) introduced the principle of multi-stage sequential (modular) evaluation of tooth wear in dentistry[18].

Patients with a moderate degree of pathological wear most often consult a dentist with complaints of tissue loss up to 2/3 of the height of the tooth crown, increased tooth sensitivity, discomfort in the temporomandibular joints. In addition to defects in hard dental tissues, with increased tooth wear, specific changes in the configuration of the face, posture, occlusion are observed; as well as the occurrence of a pain symptom complex and TMJ pathology, which changes the quality of life of patients due to dental health.

Functional and morphological disorders pathological wear

1. The tone of the masticatory muscles increases, their asynchronous contractions occur
2. The duration of the chewing process is extended, the oscillations of rhythmic waves on masticatigrams change.
3. The efficiency of the chewing function decreases.
4. Neuromuscular disorders develop.
5. The oral mucosa is often injured.
6. The sensitivity of teeth to various irritants increases.
7. The height of the interocclusal gap decreases.
8. The lower part of the face is shortened.
9. The ratio of the TMJ elements changes.
10. In some cases, occlusal-articulatory dysfunctional syndrome develops.

Treatment of pathological tooth wear

Timely correction of moderately increased tooth wear makes it possible to prevent further progression of the process and avoid complications [19].

Traditional methods of restoring defects in hard dental tissues that occur with increased wear do not meet the principles of minimally invasive treatment, do not compensate for the functional aspects of occlusion, and in some cases do not meet aesthetic parameters.

The use of various methods for correcting this pathology should take into account the prevailing number of quality of life parameters).Restoration of the anatomical shape of worn teeth depends on the degree, type, and form of the lesion[20-24.]

When choosing a material for crowns, its wear resistance should be taken into account. If the antagonist teeth have uninfected enamel, metal, metal-ceramic, porcelain crowns can be used. For antagonists with a degree of anomaly, plastic crowns, metal crowns made of precious metal alloys; ceramic are preferable.

In case of abnormal tooth wear due to bruxism and parafunctions, preference should be given to metal-plastic (with a metal Chewing surface) dentures made of base metal alloys as they are more resistant to abrasion.

Metal-ceramic dentures in such patients should be used sparingly due to possible splitting of the coating with involuntary dysfunctional excessive occlusal overload: night grinding of teeth, spastic clenching of the jaws. The choice of a treatment plan for abnormal tooth wear complicated by partial edentia is necessarily based on EOD data and X-ray control of the defensive teeth.

The treatment plan for orthopedic patients with abnormal tooth wear depends on the degree and form of tooth wear.

Treatment of early forms of abrasions without TMJ pathology helps prevent further development of the pathology. This can be done with metal inlays or cast metal crowns on opposing teeth in the occlusal zones on both sides. In this case, it is not necessary to increase the bite height, but only to achieve a stop in tooth wear and a decrease in occlusion. In case of hyperesthesia, desensitizing agents, pastes containing fluoride, 10% solution for CaCl electrophoresis, calcium gluconate are used.

Treatment of pathological wear and degree without defects in the dental arches. An absolute indication for treatment is a two-stage treatment of TMJ. At the first stage, a mouth guard is used to gradually raise the interalveolar height, at the second stage - adequate prosthetics with crowns, partial crowns. In the absence of lateral TMJ pathologies, treatment is carried out simultaneously with the adjustment of the bite by 2-3 mm.

Treatment of pathological abrasion and the degree of defectiveness of the dentition. In case of defects of the dentition, prosthetics are usually performed using bridge prostheses with metal occlusal pads on the antagonist teeth, followed by aesthetic prosthetics of the group on the front teeth. In case of unlimited defects of the dentition, prosthetics are performed using removable structures.

Treatment of pathological abrasion of the II-III degree is necessarily carried out in two stages.

- normalization of the crown height.

Correct position of the lower jaw in the sagittal, transverse and vertical direction, chewing functions.

- rational prosthetics of the dentition.

Measuring and recording mandibular function and

masticatory muscle status adds invaluable information to the diagnostic process and is critical to neuromuscular dentistry. Objective information about TM joint status further adds to the clinician's data.

The use of computerized electrodiagnostics is an advanced method for accurately and objectively identifying and treating TMJ.

Computerized mandibular scanning (CMS) or "jaw tracking" was invented by Dr. Bernard Jankelson and further developed and refined by his son Dr. Robert R. Jankelson in 1971.

In the past, these technologies were unavailable, leading to erroneous conclusions, misdiagnosis, and inappropriate treatment. Today, accuracy and precision are key to objectively identifying and treating TMJ and are essential for the doctors. The K7x Myotronics Evaluation System provides the dental clinician or researcher with three technologies for measuring, displaying, and storing objective data on physiologic and anatomical status and function: jaw tracking, electromyography, and joint sonography.

This objective data enhances the doctor's diagnostic and treatment considerations with information not previously available.

Aim:To evaluate the functional and aesthetic results of complex treatment of pathological abrasion of dental hard tissues.

Materials and methods

2.1 Study population

The study included 82 patients with pathological abrasion of hard dental tissues (from 2020 to 2024). The patients' age ranged from 34 to 68 years (48 men, 34 women).

2.2 Study design

This is a prospective controlled study, which is a clinical and radiographic examination conducted in a clinical setting.

Inclusion criteria

• patients with a clinically confirmed diagnosis of "Increased tooth wear of moderate severity" (ICD-10, code K03.0);
• patients' age from 35 to 44 years;
• patients with bite pathology;
• absence of severe somatic pathology requiring inpatient treatment or prolonged drug therapy;
• informed consent to participate in the study.

Exclusion criteria

Patients with systemic diseases; patients received treatment during the previous year.

The examination of patients included: collecting complaints and identifying concomitant somatic diseases, X-ray examination and index determination of the condition of periodontal tissues, a set of neuromuscular dentistry measures and an assessment of the condition of the restorations performed, and studying: photographs of the patient's face, bite height, and nasolabial folds.

All patients participating in the study were surveyed to determine the quality of life due to dental health before and after complex treatment.

During the examination, patients complained of aesthetic defects caused by tooth wear and discoloration, discomfort when closing, chewing, and phonetic disorders, typical symptoms of TMJ dysfunction, such as pain and crunching in the joints, fatigue of the masticatory muscles and muscle pain, displacement of the lower jaw to the side during vertical movements, a feeling of distension in the ears, headaches, and bruxism.

Group distribution

Group 1 included patients with the first degree of hard tissue loss 47 (29 men, 18 women),

Group 2 included patients with the second degree of hard tissue damage 35 (21 men, 14 women).

RESULTS

During examination of the oral cavity, attention was mainly paid to the condition of hard dental tissues. Signs of increased tooth wear were determined in all patients of the study groups (100.0%): decrease in tooth height by 1–4 mm (grade 1.2 according to the Smith-Knight index). Defects of hard tissues were detected in the frontal group (58.0%) and chewing group of teeth (42.0%). In addition to the violation of the integrity of the enamel layer on the teeth, defects of previously performed restorations were determined, such as chips in composite fillings (34.7%), violations of marginal adhesion with the development of secondary caries (8.2%).

Chips in ceramic facings of artificial crowns were detected in 23.7% of cases. In 9.2% of cases, violations of the integrity of ceramic facings in the form of defects on the occlusal surfaces with exposure of the metal framework were determined on metal-ceramic crowns. Violation of the marginal fit of crowns on chewing teeth was detected in 10.4% of cases from the oral surface and was always accompanied by recession of the marginal gingiva. It was noted that the occlusal surfaces of both composite restorations and artificial crowns made earlier were made with insufficiently expressed anatomical features of the chewing surface.

The modeling of the tubercles is incomplete, there are fissures of only the first order, which does not correspond to the normal anatomy of the tooth for this age category. The implementation of this type of restoration can be explained by the individual feature of the chewing surfaces of patients, namely: flattening of the shape of the crown part, the absence of fissure-tubercular contacts with the antagonist teeth.

Partial loss of teeth was determined in 23.7% of

cases. Among them, included defects of the dentition in the chewing section with the absence of the first/second premolar and the first molar predominated - the third class according to the Kennedy classification.

In 7.2% of cases, patients had terminal defects of the dentition (classes one and two according to Kennedy classification). In some patients (5.1%), the clinical picture of partial tooth loss is complicated by secondary deformations of the dentition, namely: inclination of teeth towards the defect and infraposition of antagonist teeth.

During examination of patients, hard light-brown dental deposits were found on the teeth in the frontal group of the lower jaw. In the gingival area, an accumulation of soft plaque was found. During external examination of the face of patients with moderate increased tooth wear, a change in its proportionality was noted due to a decrease in the height of the lower third (86.7%).

Increased severity of nasolabial folds with complete closure of the dentition (42.7%) was noted. All patients underwent bimanual palpation of the masticatory muscles and temporomandibular joint. Pain, swelling and hypertonicity during palpation of the masticatory muscles were detected in 14.2% of cases, which may be signs of parafunction in patients. Reciprocal clicks when opening and closing the mouth (7.2%), pain in the TMJ (8.1%) were indications for the appointment of additional methods of functional diagnostics.

NEUROMUSCULAR DIAGNOSTICS SET

As a result of the examination of patients, a violation of the symmetry of the masticatory muscles was determined in 28.0% of cases. In turn, in 43.2% of cases, with the help of the K7, Myotronics CMS (computerized mandibular scanning) device, deviations in the movement of the lower jaw from the midline when opening and closing the mouth were noted.

To scan the movements of the lower jaw K7 Myotronics (K7 CMS), 8 sensors are used, mounted on a special frame that is put on the patient's head. The sensors track the movement of a small magnet attached to the gum of the lower jaw. The computer program graphically transmits the movement of the lower jaw to the monitor screen.

In 17.6% of cases, with the help of K7 Myotronics ESG (electrosonography), the presence of acoustic phenomena (clicks and noises) in the area of both temporomandibular joints was noted. In 27.4% of cases, a distal position of the lower jaw was detected. These types of diagnosed disorders were combined.

Electrosonograph for recording sound vibrations in the temporomandibular joint (K7 ESG).

Highly sensitive sensors installed on the skin surface above each temporomandibular joint provide synchronous two-way recording of tissue vibrations that are a consequence of sound vibrations in the joint. The electrosonograph allows you to see the amplitude, frequency and duration of vibrations, which are graphically displayed on the monitor screen. All this provides the doctor with valuable information when assessing the position and condition of the articular disc and the function of the joint.Evaluation procedures must be accomplished in such a way that the apparatus itself does not affect the patient's function and must not impede the clinician's access to the mouth for bite registration or other procedures.

All patients of group 1 and group 2, before the dental stage of treatment, underwent a set of professional oral hygiene and periodontal treatment according to indications.

Treatment of patients of group 1 with pathological wear of hard tissues of teeth

Treatment of patients of group 1 with tooth wear without reducing the occlusal height prosthetics is not fundamentally different from the type of dental prosthetics used in the treatment of abnormal teeth, the restoration of the anatomical shape of worn teeth is performed with metal-ceramic or zirconium structures. The prognosis for treatment is generally favorable. However, it is necessary to note the possibility of relapses in patients with abnormal dullness of teeth against the background of bruxism and parafunctions, which is confirmed by the idea of the insufficiency of only orthopedic interventions without appropriate psychoneurological correction.

Fig.2,3 Patients with pathological wear of hard tissues of teeth before and after prosthetic zirconium **restoration**

Treatment of patients of group 2 with pathological wear of hard tissues of teeth complicated by a decrease in the occlusal height.

The treatment was carried out in several stages:

• restoration of the occlusal height with temporary diagnostic and treatment devices; occlusal splint or orthotic.

• adaptation period;

• permanent prosthetics.

At the first stage, the occlusal height was restored using dental caps with overlapping of the chewing surface of the worn teeth. Such restoration can be

one-stage with a decrease in the occlusal height to 10 mm from the height of physiological rest, using the J5, Myotronics device, and step-by-step - 5 mm every 1. 2 months with a decrease in the occlusal height by more than 10 mm from physiological rest. The second stage - an adaptation period lasting at least 3 weeks - is necessary for the patient to fully adapt to the "new" occlusal height, which occurs due to the restructuring of the myotatic reflex in the masticatory muscles and the temporomandibular joint. During this period, the patient should be under the dynamic supervision of the attending dentist-orthopedist (at least once a week, and if necessary: subjective unpleasant sensations, pain, discomfort, inconvenience when using medical and diagnostic devices - and more often). When installing diagnostic and diagnostic equipment and during examinations, occlusal contacts are carefully calibrated in all phases of all types of occlusion, the quality of polishing of the prosthesis, the absence of sharp protrusions and edges that can injure soft tissues are checked.

The third stage of treatment - permanent prosthetics - is fundamentally no different from the type of dental prosthetics used in the treatment of abnormal teeth, restoration of the anatomical shape of worn teeth is performed with metal-ceramic or dioxyzirconium structures. Dynamic observation of the clinical condition of the microprosthesis structure was carried out in the following periods: 1 week, 1, 6, 12, 24 months. The results of the clinical study were recorded in the medical record of the dental patient.

Fig.4.Computerized mandibular scanning using K7 Myotronics

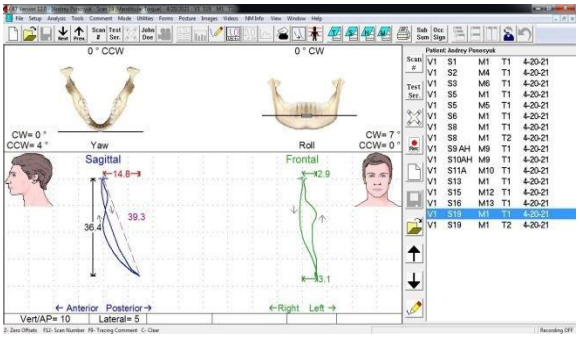

Fig.5.Scheme Computerized mandibular scanning using K7 Myotronics, 3.1mm deviation to the left side

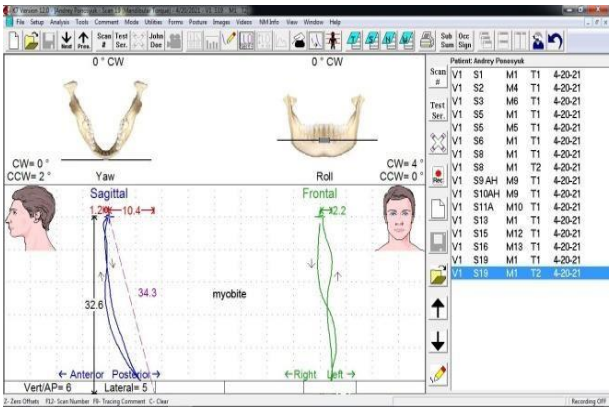

Fig.6.Scheme Computerized mandibular scanning using K7 Myotronics, decreased deviation 2.2mm

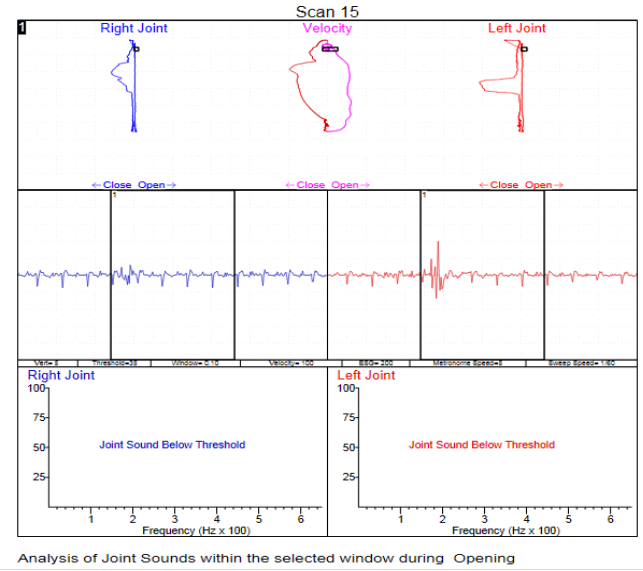

Fig.7.Scheme Electrosonography using K7 Myotronics, clicking in both joints

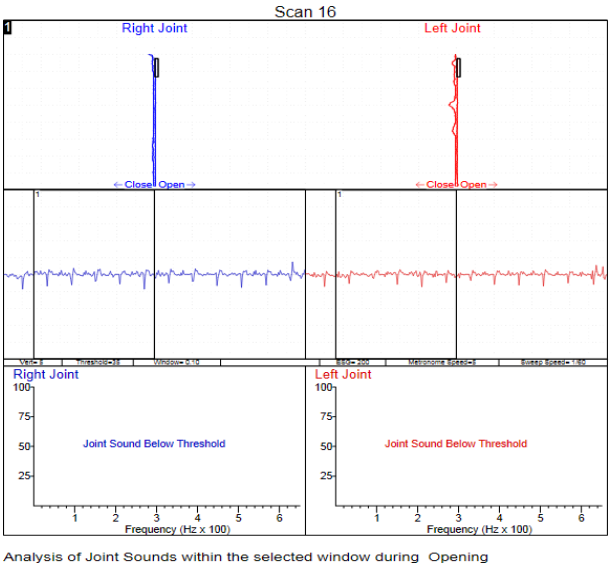

Fig.8.Scheme Electrosonography using K7 Myotronics, no noise in the joints after treatment.

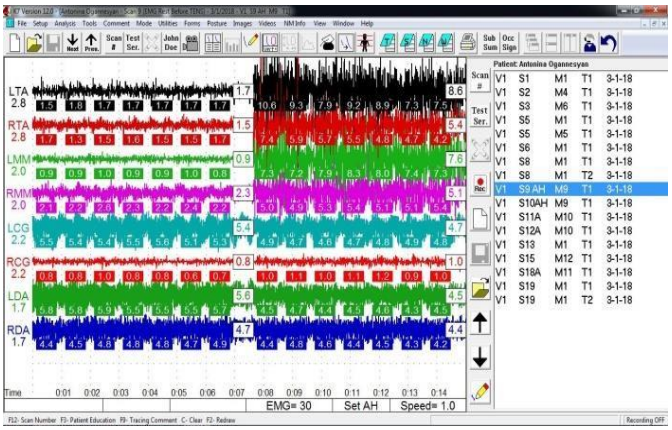

Fig.9.Scheme Electromyography using K7 Myotronics, high muscle activity before treatment

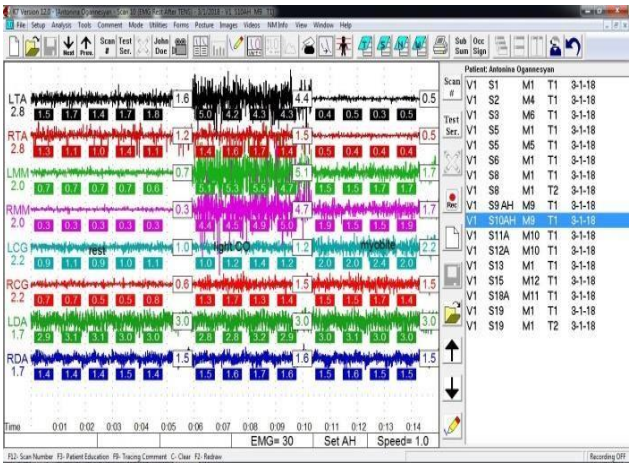

Fig.10.Scheme Electromyography using K7 Myotronics, Improvement in muscle activity after treatment.

Fig.11-14 Patients with pathological wear of hard tissues of teeth complicated by a decrease in the occlusal height before and after prosthetic zirconium restoration.

Results

Clinical radiological results showed satisfactory results and are encouraging.

At the time of seeking dental care, patients presented complaints of various nature: pain, functional, aesthetic. In 58.2% of cases, complaints of a combined nature were identified. Most often, patients complained of the presence of pain sensitivity of teeth arising from thermal, chemical and mechanical irritants (35.2%).

Patients noted the appearance of such pain during meals and when brushing their teeth. Of the total number of patients examined, 34.5% of patients with moderate increased abrasion of teeth presented functional complaints.

The most common of them were complaints of impaired chewing function (18.3%), discomfort when biting and chewing food. When analyzing the group of functional complaints, the prevalence of chewing disorders is determined.

This fact is explained by partial loss of teeth (21.3%), presence of chips and defects, previously performed restorations (14.3%), loss of fissure-tubercular contacts in the chewing group of teeth (83.4%), deformation of occlusal planes (14.3%) and decrease in the height of the lower third of the face (46.8%).

Along with painful sensations in the hard tissues of the teeth, which are described above, patients with moderately increased tooth wear complain of discomfort in the temporomandibular joint and muscles (14.2%).

We have identified several typical symptoms: pain, crunching, clicking in the joint. The mechanism of occurrence of these dangerous symptoms is explained by the fact that with distal displacement of the articular head of the lower jaw, the posterior part of the temporomandibular joint, rich in vessels and nerve receptors, is subject to compression. Compression of nerve receptors is characterized by pain. In addition, anterior dislocation of the articular disc leads to the occurrence of reciprocal clicks.

When analyzing aesthetic complaints in patients with increased abrasion, a predominance of changes associated with the appearance of teeth and changes in the lower third of the face due to a decrease in height was revealed. Patients complained about the unsatisfactory aesthetic condition of teeth in 68.3% of cases, and about the shortening of the clinical crowns of teeth - 76.3%.

This fact can be explained by the fact that with increased abrasion of teeth of a moderate degree, a visible shortening of the length of the crowns of the teeth is determined.Complaints about a decrease in the height of the lower third of the face and an increase in the severity of nasolabial folds were noted in 81.2% of patients. Aesthetic complaints associated with the appearance and configuration of the face were presented mainly by women.After treatment, patients of all groups, according to the analysis of lateral teleroentgenograms of the head, an increase in the height of the lower third of the face and an

increase in the basal angle are noted. These changes indicate posterior rotation of the lower jaw due to an increase in the bite height. Restoration with orthopedic structures is relevant for normalizing the occlusal relationships of the jaws and this complex method of treatment ensures a good aesthetic and functional result.

Discussion

Dental hard tissue wear is a common physiological condition that occurs throughout the life of patients, however, excessive tooth wear that causes functional and aesthetic problems is considered pathological dental hard tissue wear[25-27].

Pathological dental hard tissue wear is the destruction of tooth structure by mechanical forces. If this force begins at the cementoenamel junction, the progression of tooth loss can be rapid because the enamel in this area of the tooth is very thin. Once past the enamel, the abrasive action quickly destroys the softer structures of dentin and cementum[28,29].

In mild cases without functional and aesthetic problems, preventive measurements and regular monitoring will help to control and prevent further destruction.Treatment of excessive tooth wear is a challenging task for the dental practitioner[30].

In orthopedic treatment of patients with increased abrasion, it is necessary to eliminate the causes and restore the lost hard tissues of the teeth, breaking the vicious pathogenetic circle[31-36].

If possible, it is necessary to slow down or stop the abrasion process, relieve increased tooth sensitivity.In modern therapy, a number of materials and methods for treating worn teeth are described, but there are no clear recommendations for the most effective methods.

The purpose of this article is to evaluate the results of treating patients with worn teeth using various treatment methods.Clinical studies are based on the treatment and observation of the condition of fixed orthopedic structures of 82 patients with moderate increased abrasion.Prosthetic treatment methods are determined by the form of increased tooth abrasion, the degree of tooth abrasion, the presence of concomitant complications: distal displacement of the lower jaw, partial loss of teeth, dysfunction of the temporomandibular joints (TMJ). It is only important to note the need to use structural materials that guarantee the stability of the established occlusal height. It is unacceptable to use plastic on the chewing surface of bridge prostheses. In removable dentures, it is preferable to use porcelain teeth, cast occlusal onlays. To stabilize the occlusal height, counter-rotor inlays and crowns are used. An important condition for achieving good results of permanent prosthetics is the manufacture of prostheses under the control of temporary treatment and diagnostic caps. It is possible to manufacture permanent prostheses in stages. When installing permanent prostheses, temporary caps allow you to accurately set the occlusal height and optimal occlusal contacts in different phases of all types of occlusion to which the patient is adapted.

The K7 system allows the clinician or researcher to measure, visualize and store objective information about the anatomical and physiological characteristics and functions of the dental system using three methods - computer gnathography, electromyography and joint sonography. The availability of objective data improves diagnostics and provides the physician with the ability to plan treatment based on factual data that was not available until recently. The ability to assess the function of the mandible,masticatory muscles and temporomandibular joint (TMJ) by measuring objective parameters and recording them significantly improves diagnostics and is an integral component of treatment in accordance with the principles of neuromuscular dentistry.The results of the study showed that a comprehensive method of treating teeth with increased abrasion allows you to increase the effectiveness of restoring tooth defects and reduce the risk of complications, provides a good aesthetic and functional result. Dentists must be aware of the etiology of tooth wear to ensure successful diagnosis, management and treatment. The results of the study showed that treatment using occlusal splints at the preparatory stage in patients of group 2 with occlusion disorders due to pathological abrasion of hard dental tissues and restoration with orthopedic structures is relevant for normalizing the occlusal relationships of the jaws and this complex treatment method provides a good aesthetic and functional result.

Declarations

Ethics approval and consent to participate

Not applicable

Consent for publication Not Applicable.

Availability of data and materials

Not Applicable.

Competing interests No conflict of interest.

Funding This research received no external funding

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