

ENDOCROWN AS A SOLUTION FOR PROSTHETIC RESTORATION OF THE LATERAL TEETH WITH ENDODONTIC TREATMENT

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ABSTRACT

Changes of the hard dental structures due to physiological processes, or pathological under the action of physical, chemical or microbiological factors through the oral liquid that performs a number of functions in maintaining a health balance of the oral cavity through the multitude of functions. Recent studies show us the changes in the oral cavity, manifested by gingivitis due to the presence of dental film, bacterial plaque, dental tartar, etc, modifying the dental structures in the lateral area quantified by the variables established for the study. In this study, we aimed to evaluate clinical changes of the hard dental structures from a dental arches influenced by changes in the microbiota of the oral cavity by comparing the two batches, mator and study. **Materials and methods.** Participants in this study consisting of people of both genders (female and male) divided in two batches according to the established selection criteria for the work group, where, the tobacco consumption of a minimum period of 4 years, the other batch being nonsmokers persons. The patients of the two batches were examined by the dentist through extraoral and intraoral clinical examination and the resulting data were entered in a database, processed and compared between the two batches. **Results.** Prosthetic restoration of teeth present on dental arches with endocrown is conditioned by the architecture of edentulous gaps, lateral teeth, especially molars, have a higher prognosis of longevity in case of carious lesions with pulp chamber damage or those with endodontic treatments, being the protagonists of this type of rehabilitation. The control group benefited from endocrown crown restorations in a percentage of 7.83% (14 teeth) compared to the 9 teeth for the study group the percentage being 5.03%.

Conclusions. Prosthetic restoration with endocrown crowns for the remaining lateral teeth on dental arches recorded a percentage of 12.88%, due to the topography of edentulous gaps, oral rehabilitation solutions discussed with the patient, according to the study, the quality of the dental hard tissues present, the very large number of extracted teeth and the small steps taken towards CAD/CAM technology.

Key words: endocrown, carious lesion, endodontically treated tooth.

INTRODUCTION

Oral cavity has a special role in communication, aesthetics, is the first segment of the digestive tract, is a cavity formed by the oral vestibule and the oral cavity itself. This delineation of the two components of the oral cavity is carried out by dental arches (deciduous, mixed or permanent) [1]. Temporary dental arch is present between 6 months and 6 years after studies Bratu E.

(1982), mixed dentition between 6 years and 12 years and permanent dentition from 12 years.

During this period around the age of 6-7 years erupting final and inferior molars and superiors in the lateral area of the dental arches posterior to the temporary molar II, playing an essential role in the second occlusion elevation.

Edward Hartley Angle (1900) first

described normal dental occlusion, as well as the necessary treatment to obtain a normal occlusion, classifying the malocclusion that led to the development of orthodontics [2]. The importance of the 6-year-old molar in positioning the occlusion relationship of the mandible to the jaw. The second upper molar plays an important role in the third occlusion elevation.

The integrity of dental arches depends on the balance of the oral cavity microbiome composed of the oral fluid and the populations of its specific microorganisms. The quality of the hard dental structures depends on the quality of the oral fluid that is valued by assessing the pH, which rebalances the level of acidity after meals, helping to restore film on tooth enamel surface [3].

Demineralization of hard dental structures can be reversed in the early stages by absorption of calcium, phosphate and fluoride. The reconstructed crystalline surface, composed of fluoridated hydroxyapatite and fluorapatite, is increasingly resistant to acid attack than the original structure [4].

Dental caries is a multifactorial disease that begins with microbiological changes within the complex bacterial biofilm and is influenced by salivary flow and composition, exposure to fluoride, and, consumption of sugars and preventive behaviors (correct dental brushing). Carious lesions result from a pathophysiological imbalance between dental mineral elements and microbial oral biofilm [5].

Teeth do not provide protective surfaces for microbial colonization and a large number of bacteria and their products accumulate in a biofilm on dental surfaces [6].

At the initial stage of carious damage, a tooth can be treated by coronary restorations, which are usually made of dental amalgam (very rarely used in current dental practice), composite, or composite, glass ionomer or inlay. When bacteria have invaded the pulp, a

dental restoration without pulpectomy will not abolish the infectious outbreak and it will continue its development, being burdened by the risks of spreading the infection to the periapical tissues. Endodontic therapy is necessary to remove infected tissues from the pulp chamber and root canals [7,8].

The emergence of research related to the persistence, more than the therapeutic success (clinical and radiological), of endodontic treated teeth emphasized the importance of definitive restoration on long-term results [9].

In addition, there is growing scientific evidence that the structure of the remaining teeth and the choice of the final restoration are the main determinants of the longevity of endodontically treated dental units [10,11].

Longevity studies for endodontically treated teeth facilitate direct comparison with alternative treatment options such as implants, allow multifactorial analysis of the cause of therapeutic failure and provide meaningful information for patients in decision-making [12,13].

MATERIALS AND METHODS

The study was conducted between February 2021 - May 2024 in the medicine cabinet dental of S.C. SMILE GABI DENT S.R.L., where the two batches (witness and study) were formed, which were selected from an enlarged group of 148 patients of both genders who addressed various problems the oral cavity. Patients gave their written consent to participate in the study, being divided into two groups (witness, study) equal in number, having a gender balanced distribution (male, female) and the age of the participants is between 19-82 years.

After analyzing the two batches constituted according to the presence or absence the risk factor, in our case the tobacco consumption in different forms, but with a minimum of 4 years old, was the basic criterion in selecting the study group.

Several variables from the database of the

two batches were analyzed and compared which were collected by filling in the forms necessary for clinical and radiological evaluation for each member of the two witness and working groups.

The parameters tracked in the study were about oral health, integrity hard dental structures, establishing a viable oral rehabilitation model for restoring the basic functions of the dento-maxillary apparatus phonation, mastication and aesthetics.

RESULTS AND DISCUSSIONS

Dental arches consist of front and side teeth or diatorics. Study he focused on analyzing the groups of teeth in the lateral area on the upper and lower arches, being analyzed 100 upper and lower dental arches analyzing the integrity of the dental structures that generated several variables, integral tooth (DI), incipient cavity (CI), minor cavity (CM), etc, cavity without pulp chamber damage (CFACP), cavity with pulp chamber damage (CACAP), extracted tooth (DE), endodontic treated tooth (DTE), etc, restoration of edentulous breach (RDB) and unerupt tooth (DNE).

Following the centralization and

corroboration of data for the variables mentioned above, the following were he could observe for the study group at the upper arcade level for the extracted tooth variable, showing the highest values with a total of 264 units, compared to 154 units registered in the control group. If we deepen the research by summarizing the hemiarcade level, we can conclude the presence of slightly increased values for the studied variables that for the cavity without access to the room with an average of 3 - 6 dental units more for left hemiarcade.

This trend of minor differences between the two straight dental hemiarcades and the left met in both batches both the witness and the study batches. Exemplifying this trend is observed in the variable endodontic treated teeth, the upper right hemiarcade recorded 39 dental units for the control group versus 45 for the left hemiarcade, respectively, trend also preserved for the study group where we have 32 dental units at the right hemiarcade compared to 33 units present at the left hemiarcade.

Table 1. Values for study variables (DI, LI, CM, CFACP, CCACP, DE, DTE, DRB, DNE) upper archway

	Tooth	1.8	1.7	1.6	1.5	1.4	2.4	2.5	2.6	2.7	2.8
Upper dental arch - marior lot	DI	13	23	15	19	17	19	17	17	18	13
	LI	1	2	2	1	1	-	-	1	2	-
	CM	-	2	2	1	-	-	2	-	1	-
	CFACP	2	1	2	1	5	2	-	1	1	-
	CCACP	2	1	3	1	1	2	2	2	-	3
	DE	30	11	12	13	7	6	13	13	18	31
	DTE	-	9	9	12	9	14	12	10	8	1
	RDB	-	1	5	2	10	7	5	6	2	-
	DNE	2	-	-	-	-	-	-	-	-	2
Upper dental arch - study lot	DI	9	5	1	5	9	7	7	2	9	5
	LI	1	1	1	1	1	1	-	2	1	1
	CM	-	2	-	3	-	1	-	2	1	1
	CFACP	1	1	-	1	-	1	1	3	-	-
	CCACP	-	5	4	3	2	3	5	2	5	1
	DE	39	31	28	18	16	22	20	26	23	39
	DTE	-	5	9	10	8	6	10	6	8	3
	RDB	-	-	7	9	14	9	7	7	3	-
	Tooth	1.8	1.7	1.6	1.5	1.4	2.4	2.5	2.6	2.7	2.8

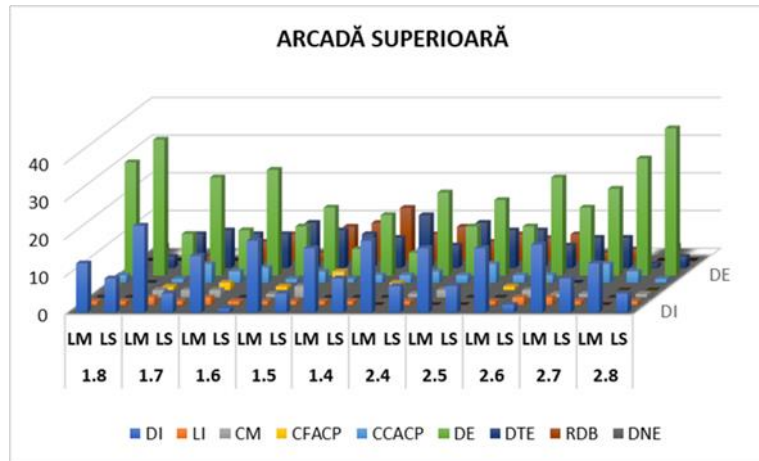


Figure 1. Graphical representation of the health status of integrity hard dental tissues for upper arch

In figure 1 we have the graphical representation of the values of the variables set for assessing the health of teeth in order to optimize the oral rehabilitation of masticatory units with the restoration of basic functions, and establishing viable models of fixed prosthetics by endocrown crowns.

Analyzing the data in Table 2 where the data of the set of variables are represented

describing the health of the dental masticatory units for the two halves of the lower dental arches for both the control and study groups. The analysis of the data in this table confirms the higher values for the study group and the significant differences between the two right hemiarcade and the left hemiarcade.

Table 2. Values for study variables (DI, LI, CM, CFACP, CCACP, DE, DTE, DRB, DNE) lower arch

		4.8	4.7	4.6	4.5	4.4	3.4	3.5	3.6	3.7	3.8
Lower dental arch - lot marlor	Tooth										
	DI	14	12	9	23	31	31	19	12	17	20
	LI	1	1	4	2	1	1	1	2	1	1
	CM	-	1	1	2	-	1	1	-	2	-
	CFACP	-	2	2	1	2	-	1	2	-	-
	CCACP	2	2	2	2	1	-	5	4	3	1
	DE	22	15	12	3	3	5	5	12	16	20
	DTE	8	11	7	13	11	10	16	9	8	5
	DRB	3	6	13	4	1	2	2	9	3	3
Lower dental arch- study lot	DI	5	4	1	11	16	24	13	3	4	7
	LI	-	1	1	1	1	-	-	1	2	-
	CM	-	1	1	1	1	1	3	-	2	-
	CFACP	1	1	1	1	4	5	1	-	2	-
	CCACP	1	4	4	1	3	5	7	5	5	5
	DE	40	32	27	16	11	8	12	29	25	36
	DTE	2	5	7	10	11	2	12	4	9	2
	DRB	1	2	8	9	3	-	2	8	1	-
Tooth		4.8	4.7	4.6	4.5	4.4	3.4	3.5	3.6	3.7	3.8

Analyzing the graph in figure 2, the variables in table 2 are represented, observing for premolar teeth values for the integra tooth variable within the control lot 54 teeth for the right hemiarcade and with 50 teeth for the left

hemiarcade, compared to study batch values lower by 62% recording 27 integral premolar teeth for right hemiarcade and 37 teeth for left hemiarcade.

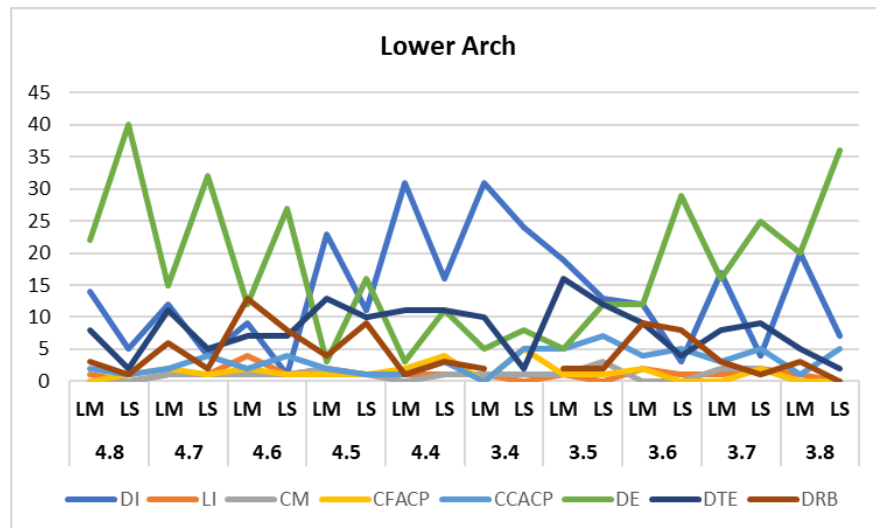


Figure 2. Graphical representation of the health status of integrity dental hard tissues for lower arch

The values represented for extracted teeth are higher for molars than premolars, data showing an average of $16,2 \pm 0,7$ for molar side teeth blank lot compared to the study batch which recorded an average of $31,5 \pm 0,5$, respectively, and for the premolar side teeth, the control lot returned an average of $4 \pm 1,4$ compared to $11,8 \pm 2,5$ for the same variable.

Centralization of data in tables 1,2 and processed with the statistics software SPSS 17 returned different values for the calculation of the average and standard deviation for each maxillary or mandibular dental arch where the quantitative values for integer or absent tooth

variables, incipient lesion, were cumulatively centralized on each tooth, minor cavity, cavity without pulp chamber damage, cavity with pulp chamber damage, endodontic treated tooth, extracted tooth and tooth restored breach according to table 3.

The quality of hard dental structures decreases in the work group on average 10-15% compared to the control group thus in the case of lateral teeth 8.8% of the total dioritic teeth of the control lot can be included for rehabilitation with endocrown crowns compared to 9.1% in the case of the study lot.

Table 3. Mean values and standard deviation for side teeth
(U.D.A. - upper dental arch, L.D.A. - lower dental arch)

Dinte		1.8	1.7	1.6	1.5	1.4	2.4	2.5	2.6	2.7	2.8
U.D.A.	Mean±	4,62	3,58	4,46	4,22	4,58	4,54	4,60	4,58	4,18	4,78
Lot martor	STDEV	±2,36	±2,67	±2,65	±2,73	±2,89	±2,92	±2,77	±2,78	±2,65	±2,35
U.D.A.	Mean±	4,98	5,36	6,2	5,7	5,7	5,54	5,64	6,2	5,14	5,64
Lot Studiu	STDEV	±1,98	±1,79	±1,27	±2,1	±2,48	±2,2	±2,1	±1,27	±2,2	±1,66
Dinte		4.8	4.7	4.6	4.5	4.4	3.4	3.5	3.6	3.7	3.8
L.D.A.	Mean±	4,82	5,00	5,26	3,76	2,98	3,04	4,22	5,06	4,32	4,18
Lot martor	STDEV	±2,6	±2,55	±2,63	±2,89	±2,7	±2,78	±2,76	±2,59	±2,63	±2,79
L.D.A.	Mean±	5,54	5,52	6,1	5,26	4,38	3,42	4,66	5,92	5,38	5,24
Lot studiu	STDEV	±1,63	±1,65	±1,4	±2,57	±2,61	±2,53	±2,44	±1,63	±1,81	±1,76

The study focused on the oral rehabilitation of the lateral teeth represented by molars of 6 and 12 years for both the upper and lower arch of the participants of the two batches and the variables considered for a possible endocrown crown prosthesis solution were teeth that had cavities that opened the pulp chamber and teeth treated endodontically, the minimum condition for the study being the presence of hard dental tissue with a height of 2 mm supragingival and be adjoined by teeth present on the arch.



Figure 3. Radiological aspect of the right upper first molar (1.6)

For the upper dental arch, for the variable the opening of the pulp chamber cavity, the control group presents 6 dental units superior towards 16 dental units registered in the study group, compared to the lower dental arch showed 11 teeth for the control group, and for the study group gathered 18 teeth with this condition.

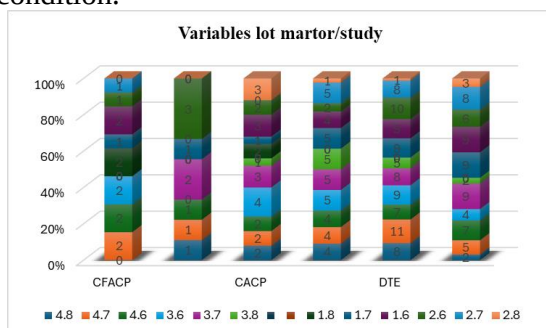


Figure 4. Graphical representation of the CFACP variables (cavity without affecting the pulp chamber), CACP (cavity with pulp chamber involvement), DTE (Tooth with endodontic treatment) for martor and study lots

The upper and lower arch has accumulated a number of 71 dental units that have presented endodontic treatment, 36 teeth for the upper arch and 35 teeth for the lower arch, and the study group recorded for the variable tooth treated endodontic 91 dental units compared to 57 teeth for the work lot.

The teeth of the witness batch that met the optimal rehabilitation conditions with crowns of endocrown type is 14 teeth that have an open pulp chamber cavity and endodontic treatment of a total of 88 dental units, and for the study group a number of 9 teeth out of a total of 91 teeth that showed the same variables.



Figure 5. Rebuilt 6-year-old upper right molar the crown part prepared for fingerprinting

There were rehabilitated with endocrown crowns a number of 23 teeth for both lots of teeth that were endodontically treated or were treated endodontically due to the opening of the pulp chamber were restored 14 teeth for the control group representing a percentage of 7.83% compared to 9 teeth for the study group the percentage is 5.03%.



Figure 6. Endocrown crown final appearance for right upper first molar

Recent literature shows lower cases of total failure with oral rehabilitations with endocrown with 1 mm of dental hard matter present showed a high proportion of failures at higher loads than those reported under normal masticatory function [14].

Endocrowns require degradation-oriented training, taking so much advantage of adhesion, as well as retaining from the walls of the pulp chamber, they are strongly indicated in endodontically treated molars in cases where minimal interocclusal space and curved or narrow root canals are present and must be made of materials that can be glued to the tooth structure.

Endocrowns are a reliable alternative to traditional restorative choices, given that clinicians comply with the requirements and indications describing this technique [15].

CONCLUSIONS

Oral rehabilitation of the remaining teeth with endocrown-type crowns records a small number of prosthetics, due to the fact that molars of 6 and 12 years old, when in the vicinity of an edentulous breach is included in a dental bridge as a concept of oral rehabilitation.

Small percentage recorded with fixed endocrown prosthesis for teeth that have carious lesions with open pulp chamber or endodontic treated teeth recorded a percentage of 12.85% of the total teeth with open pulp chamber or endodontic treated, a decisive factor being the topography of edentulous gaps, the capacity of the dental medicine cabinet to propose diversified treatment solutions corroborated the financial possibilities of the patient.

In the literature following systematic reviews showed that endocrowns exhibit a similar or higher biomechanical performance than crown restorations for posterior teeth treated endodontically with severe structural injury [16].

Endocrowns are a reliable alternative to reconstructed coronary restorations for molars, a certain preparation design and a rigorous adhesion protocol must be observed [17,18].

Endocrown offers a less invasive treatment option, which may be a method better for endodontically treated mandibular molars. With contemporary CAD/CAM technology and new materials, the clinical dental time and aesthetics have improved optimally, bringing patient satisfaction [19,20].

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