STUDIU COMPARATIV AL RESTAURĂRILOR REALIZATE CU MATERIALE COMPOZITE CARE CONȚIN OXID DE ZIRCONIU ȘI MATERIALE DE UMPLUTURĂ CERAMICE ÎN LEZIUNILE DE ABRAZIUNE CERVICALĂ

COMPARATIVE STUDY OF RESTORATIONS MADE WITH COMPOSITE MATERIALS CONTAINING ZIRCONIUM OXIDE AND CERAMIC FILLERS IN CERVICAL ABRASION LESIONS

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A cervical abrasion lesion is represented by a concave surface, situated at the gum line area. The aim of this study was to compare the efficiency of three composite resins used for the rehabilitation of cervical abrasions. Cervical abrasion lesions were rehabilitated with Estelite Asteria - Tokuyama, GrandioSO x-tra Bulk Fill - Voco, and Tetric EvoCeram Bulk Fill - Ivoclar Vivadent) composite resins. 111 abrasion cervical lesions were restored with the three aesthetic dental composites in the assessed patients (26). The assessments were realized at 6 days after the insertion of the restoration material (baseline), and then 6, 12 and 18 months after, according to the modified USPHS criteria regarding the colour stability, anatomical contour, surface texture, marginal adaptation and integrity, marginal discoloration, apparition of secondary caries, postoperative sensitivity, and retention of the restoration. The restored teeth with abrasion lesions were distributed in three groups divided by the used restorative material: group G1 (EA, abrasion lesions restored with Estelite Asteria composite), group G2 (GSOx, restoration with GrandioSO x-tra Bulk Fill composite), and group G3 (TEC, restoration made with Tetric EvoCeram Bulk Fill composite). The comparative study was a split-mouth study. All three restorative dental materials presented good clinical results after 18 months, in all studied criterion, without significant differences.

O leziune de abraziune cervicală este reprezentată de o suprafață concavă situată în zona liniei gingiei. Scopul acestui studiu a fost de a evalua eficiența a trei rășini compozite utilizate pentru reabilitarea abraziunilor cervicale. Leziunile de abraziune cervicală au fost reabilitate cu rășini compozite Estelite Asteria - Tokuyama, GrandioSO x-tra Bulk Fill - Voco și Tetric EvoCeram Bulk Fill - Ivoclar Vivadent). 111 leziuni cervicale de abraziune au fost restaurate cu cele trei compozite dentare la pacienții evaluați (26). Evaluările au fost realizate la 6 zile de la inserarea materialului de restaurare (evaluare inițială), și apoi după 6, 12 și 18 luni, conform criteriilor USPHS modificate referitoare la stabilitatea culorii, conturului anatomic, textura suprafeței, adaptarea și integritatea marginală, decolorarea marginală, apariția de carii secundare, sensibilitate postoperatorie și retenția restaurării. Dinții cu leziuni de abraziune au fost restaurați și repartizați în trei grupe, conform materialului de restaurare utilizat: grupa G1 (EA, cu leziuni de abraziune restaurate cu Estelite Asteria), grupa G2 (GSOx, cu restaurări realizate din GrandioSO x-tra Bulk Fill) și grupa G3 (TEC, având restaurări realizate cu Tetric EvoCeram, compozit Bulk Fill). Studiul comparativ a fost un studiu tip "split-mouth". Toate cele trei materiale dentare de restaurare au prezentat rezultate clinice bune după 18 luni, la toate criteriile studiate, fără diferențe semnificative.

Keywords: *dental non-carious cervical abrasion, direct restorations, composites, modified USPHS criteria*

1.Introduction

Non-carious cervical lesions (NCCLs) represent irreversible damage to the hard tissues (enamel, dentin and cement layers) of the cervical area of the dental crowns, at the level of cement-enamel junction (CEJ) [1,2]. CEJ is stable over time [3], and presents three types of relationships: the dental cement overlaps the enamel (60-65%), "edge-to-edge" junction (30%), exposed dentin due to the existence of a gap between the enamel and the cement (5-10%), respectively the enamel covers the cement (1.6-2%) [4] In the CEJ area, the enamel prisms have a horizontal orientation. NCCLs are characterized by progressive loss of the tooth hard tissue in the CEJ area, and have been categorized as abrasion, attrition, erosion, abfraction, and biocorrosion. The volume and composition of enamel and dentin contributes to the apparition and development of NCCLs [5] NCCLs present a considerable prevalence at present, and have actually been related with people's and youths lifestyles [6,7] NCCLs can be asymptomatic, and the patient might not even be aware about the lesion [8,9].

A cervical abrasion lesion is represented by

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a notch with a concave surface, situated at the gum line area. An abrasion lesion can be clearly differentiated by an abfraction lesion by their cross-sectional aspect [10] Abrasion lesions present a specific appearance as a worn, shiny, yellow/brown areas, while abfraction lesions present a V-shape with clear delimitation of the internal and external angles [9,11] Abrasion lesions appear by the friction between teeth and an abrasive outer body [12,13] The management of abrasion lesions depends on the type and severity of the etiologic factor, and it is related to the adaptation of habits, including the oral hygiene habits [10].

Aesthetic dental materials based on composite resins have evolved explosively since the discovery of Bowen (1960), who used a monomer named Bis GMA bisphenol-A diglycidyl methacrylate and an organosilane coupling agent, for the first time, which provides a bond between the filler particles and the resin matrix [15-17] Bis-GMA, UDMA, and the co-monomer TEGDMA, are mixed with low-viscosity monomers to acquire more desirable viscosity, handling, respectively specific features and properties [18,19] In the resin-based matrix, in generally constituted of Bis-GMA, hydroxyethylmethacrylate - HEMA, triethylene glycol dimethacrylate - TEGDMA, and urethane dimethacrylate - UDMA, inorganic fillers are introduced [16,20,21] The synthesis of dental composites successfully evolved by adding these inorganic fillers in aesthetic dental materials formulations [18,22]

Fillers are categorized by the used material, shape and size. Fillers form can be irregular or spherical, depending on the manufacture procedure [23]. Spherical particles are more facile to be added in the resin matrix and fill more space in a smaller quantity of resin. One size spherical fillers takes up more space. Adding smaller fillers in a resin matrix with bigger fillers, the space between the larger particles will be occupied. So, less resin matrix is remaining and thus, less shrinkage will appear on curing of the different sized particles, when they are used in suitable distribution. The fillers of dental resin composites can be glasses, ceramics, metals, etc. Glass fillers are currently made of crystalline silica, silicon dioxide, quartz, lithium/barium-aluminium glass, and borosilicate glass containing zinc/strontium/lithium. Ceramic fillers include zirconia-silica, or zirconium oxide [24]. Inorganic fillers can increase the hardness, the wear resistance, and the translucency of the composite resins [25].

The coupling agent system is frequently constituted of organic silane (10-MDP). The chemical functional clusters can improve the bonding strength between the filler and the resin matrix [26]. Curing of the composite is started by an initiator (camphorquinone or phenylpropanedione), after the action of an external energy (light or heat). Different types of composites demand different light energy levels for a suitable polymerization. Catalyst is added to control the polymerization speed [16]. Constituents such as dimethylglyoxime are used to improve some physical properties such as the ability to flow of resins [15] Hybrid composites presents a dimension of fillers between 0.5/1.0 μm and 10/50 nm, ideal for the aesthetic restoration of frontal teeth, since they present a lot of shades with adapted opacity and translucency [24,27].

The progress of nanotechnologies in the recent years allows their applications today in the manufacturing of dental nanocomposites, with inorganic phases of characteristic dimensions in the range of 10–100 nm [28,29]. The nanocomposite restorative materials having the filler content represented by zirconia and ceramics influence the characteristics and properties of these new types of restorative materials, including their particularly good aesthetics [16,30,31].

The aim of this study was to compare, for a period of 18 months (according to the modified United States Public Health Service - USPHS - criteria), the clinical aspect of non-carious cervical abrasion restorations finished with three types of dental materials, respectively, after the summing of results, the experimental study of the microstructure of the composite which presented the lesser deficiencies.

2. Materials and Methods

The study was realized in accordance with the Declaration of Helsinki regarding the ethical principles and of the good clinical practice. The written informed consent of patients was undersigned at the starting of the study. The authors attended calibration practices in order to provide: the correct anamneses, clinical examinations, diagnosis of cervical abrasion lesions, and selection of patients; accurate definition of cervical abrasion degree; detailed explanation for proper oral hygiene; suitable insertion of the studied filling composite resins; the accuracy of the study. The patients included in study had at least 4 teeth with cervical abrasion lesions (canines and/or premolars), out of which at least 2 teeth with cervical abrasions located on the same dental quadrant of the maxillary or mandibular dental arch. Detailed anamnesis, clinical controls, evaluation of oral hygiene, location and degree of the abrasion lesions and their difference from other types of NCCLs, X-ray exams (orthopantomograms or/and intraoral radiographs), were realized for the differential diagnosis (tooth decays, fractured tooth, apical conditions, etc.).

Selected patients presented 111 cervical abrasion lesions located on the buccal cervical area of canines and premolars. The age range of the selected patients (26 patients, 12 men and 14 women) was between 35-62 years old (on average 48.5 ± 13.5 years). Table 1 shows the samples of patients.

Table 1.

Samples of teeth included in the study, with non-various cervical abrasion lesions (*n* = 111)
Eşantioanele cu dinţii având leziuni necarioase de abraziune cervicală, incluşi în studiu (n = 111)

		EA	GSOx	TEC
No. of patients	26	8	9	9
Gender M/F	12/14	4/4	4/5	4/5
No. of cervical abrasion lesions	111	37	37	37
Localisation of cervical abrasion lesions	Upper premolars	15	16	15
	Lower premolars	12	12	12
	Upper canines	6	5	6
	Lower canines	4	4	4

The teeth with cervical abrasion lesions (111) were distributed in three groups, by the used restorative composite material: in group G1, in which the non-carious abrasion lesions were restored with Estelite Asterıa composite resin (EA); in group G2, where the restorations were made with GrandioSO x-tra Bulk Fill composite (GSOx,); in group G3, in which the non-carious abrasion lesions were restored with Tetric EvoCeram Bulk Fill (TEC).

Estelite Asteria constituents are represented by Bis-GMA; Bis-MPEPP; TEGDMA; UDMA. The composite filler of SiO_2-ZrO_2 is represented by 200nm supra-nano spherical filler (71vol %). This composite is manufactured by mono-dispersion synthesis of supra-nano spherical fillers through a special technology named the sol-gel method, which involves the producing of filler cores in organic solvent and allowing the filler to grow gradually, from the cores, so, the spherical fillers exhibit uniform size [32].

GrandioSO x-tra Bulk Fill aesthetic nanohybrid restorative composite material contain Bis-GMA (2.5-5%), Bis-EMA (≤ 2.5%), TEGDMA, aliphatic dimethacrylate (≤ 2.5%), and organically modified functionalized SiO_2 (≤ 2.5%). It is an aesthetic nanohybrid bulk restorative material with glass ceramic fillers, and with high filler degree (of 86 wt %). According to the company details, it is capable to exhibit a high level of hardness on the surface and in all its depth [33].

Tetric EvoCeram Bulk Fill - Ivoclar Vivadent contains Bis-GMA (2.5-10%), Bis-EMA (2.5-10%), urethane dimethacrylate (2.5-10%), ytterbium trifluoride (2.5-10%), tricyclodocane dimethanol dimethacrylate (2.5-10%), ivocerin (dibenzoyl germanium derivative) and TPO (mono-alkyl phosphine oxide) photoinitiators, for increasing the light-curing capacity of the resin. The resin matrix contains dimethacrylates (17–18 wt %). The fillers are represented by barium glass, ytterbium trifluoride, mixed oxide and copolymers (82-83 wt %). The particle sizes of the inorganic fillers range are of 40nm – 3,000 nm, with an average particle size of 550 nm. Additives, initiators, stabilizers and pigments are additional ingredients (<1.0 wt %) [34].

Oral hygiene training of the selected patients was realized 2 weeks before the insertion of the restorative dental materials. The presence/absence of dental plaque and calculus was revealed with GC Tri Plaque ID Gel - dental plaque disclosing gel, shown and noted. Proper utilization of tooth cleaning tools was demonstrated and then practiced with the selected patients. Patients brushed their teeth twice a day for three minutes, and then rinsed with about 10 ml of Pronamel Daily mouthwash, for 1 minute. Colour shade was recorded before the direct restoration. Disposable saliva ejectors attached to the suction pump and cotton rolls were used to maintain a dry operating area. The direct aesthetic restorative composite materials were applied according to manufacturer's instructions. Selective-etch bonding techniques, with etching of the mineralized enamel only, were used. The abrasion area was dried, and GC Cavity conditioner was applied in one single layer. Universal Bond adhesive from Tokuyama for Estelite Asteria was applied, respectively Futurabond U Single Dose adhesive for GrandioSO x-tra Bulk Fill, and Adhese Universal adhesive for Tetric EvoCeram composite. Pre-contoured fabricated flexible cervical matrices (Cure-Thru Clear Cervical Matrices - Premier Dental) were applied over the filled abrasion area, and on the surrounding enamel surface. Woodpecker O–Light Curing Light was used for the light-curing of all fillings, with a setting time of 20 seconds. The restored area was defined (with a diamond bur), than finished (with a rough disc), and polished (with medium and fine polishing cups, silicon carbide brushes and polishing paste). Patients were advised to avoid any masticatory pressure for 2 hours on the restored teeth.

The Modified United States Public Health Service (USPHS) criteria for direct clinical evaluation of restorations was used for scoring. These criteria were linked to colour matching, marginal discoloration, surface texture, anatomical contour/shape, marginal adaptation/integrity, secondary/recurrent caries, postoperative sensitivity, and retention of restoration/fracture. The scores are: A (Alpha) = clinically ideal; B (Bravo) = clinically acceptable and C (Charlie) = clinically unacceptable [35,36], with the exception of secondary/recurrent caries criteria, which presents only A and C score [36,37] For all assessments, the same type of dental mirror, probe, air cannula of dental unit, and magnifying glass (with 3.5X magnification) was used. Patients were unaware of the location of the specific composite dental materials inserted into their cervical non-carious

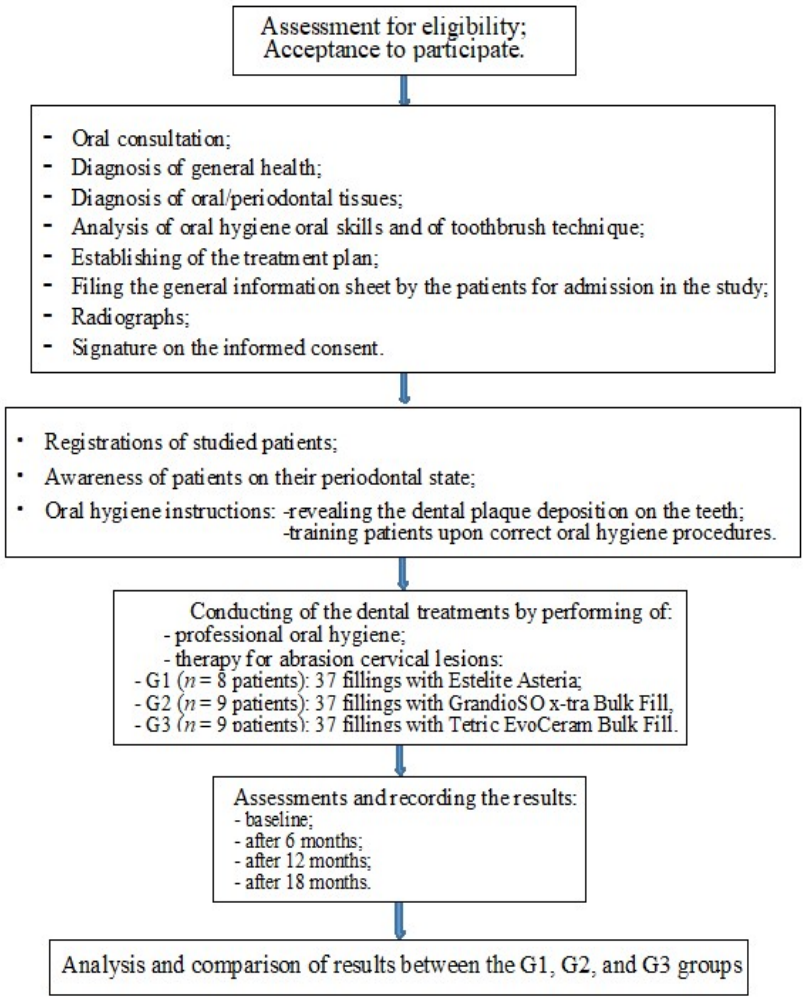


Fig. 1 - Flow diagram of the study protocol regarding the non-carious cervical abrasion lesions
Diagrama de flux a protocolului de studiu privind leziunile de necarioase cervicale abraziune

abrasion lesions. The assessments were realized at 6 days after the insertion of the restorations (baseline), and then 6, 12 and 18 months after. The evaluation forms were sent after each assessment session to a dentist which was not involved in the selection, examination of the patients, or in the insertion of the dental materials.

Figure 1 presents the flow diagram of the study protocol regarding the restoration of non-carious cervical abrasion lesions.

3. Results and Discussions

All modified USPHS criteria were observed and noted, at baseline and in follow-up sessions.

In the first and second assessments (baseline and at 6 months), the restorations did not present differences in the studied criteria, except regarding the postoperative sensitivity.

Chromatic stability and colour match of the studied restorations was good and it was maintained over time, especially in EA restorations. At the first and second assessments, no colour changes were detected in any restoration, regardless of the used dental material. At the third assessment (12 months), all used dental restorative materials presented 2.70% altered shades of colour After 18 months (fourth assessment), EA material presented 2.70% altered shades of colour, unlike GSOx (with 8.11% B degree of modifications), and TEC (with 13.51% B degree modifications and 2.70% C degree of modification). Comparatively, EA restorations presented the best chromatic stability.

Marginal discoloration criterion was detected only after 12 months, and it was found in B degree modifications in 2.70% restorations of all three dental materials (EA, GSOx and TEC). At the fourth assessment (18 months later), EA material presented in 5.40% of cases B degree of marginal discoloration, GSOx 8.11% B degree of modifications and 2.70% C degree of modifications, in contrast with TEC material, which presented B degree modifications in 13.51%, and C degree modification in 2.7% of cases.

Surface texture, anatomical contour/shape and marginal adaptation /integrity did not suffer changes in the first two assessments in all three materials. After 12 months, the determined modifications were of B degree in 2.70% of all dental restorations (EA, GSOx and TEC). After 18

Table 2

Comparative evaluation scores (modified USPHS criteria) of the restorations performed with EA, GSOx, and TEC composites, at the 4-th assessment (after 18 months) / *Scoruri de evaluare comparative (după criteriile USPHS modificate) ale restaurărilor realizate din compozitele EA, GSOx și TEC, la a 4-a evaluare (după 18 luni)*

USPHS criteria	*Score n* (%) at 1*8 months*	EA (*n*=37)	GSOx (*n*=37)	TEC (*n*=37)
Color match/ chromatic stability	A	36 (97.3%)	34 (91,89%)	31 (83.78%)
	B	1 (2.70%)	3 (8.11%)	5 (13.51%)
	C	-	-	1 (2.70%)
Marginal discoloration	A	35 (86.48%)	33 (89.18%)	31 (83.78%)
	B	2 (5.40%)	3 (8.11%)	5 (13.51%)
	C	-	1 (2.70%)	1 (2.70%)
Surface texture	A	35 (86.48%)	34 (91.89%)	33 (89.18%)
	B	2 (5.40%)	3 (8.11%)	4 (10.81%)
	C	-	-	-
Anatomical contour/shape	A	35 (86.48%)	34 (91.89%)	33 (89.18%)
	B	2 (5.40%)	3 (8.11%)	4 (10.81%)
	C	-	-	-
Marginal adaptation/ integrity	A	35 (86.48%)	34 (91.89%)	33 (89.18%)
	B	2 (5.40%)	3 (8.11%)	4 (10.81%)
	C	-	-	-
Secondary/recurrent caries	A	36 (97.3%)	35 (94.59%)	35 (94.59%)
	C	1 (2.70%)	2 (5.40%)	2 (5.40%)
Postoperative sensitivity	A	37 (100%)	37 (100%)	37 (100%)
	B	-	-	-
	C	-	-	-
Retention / fracture	A	35 86.48%)	34 (91.89%)	33 (89.18%)
	B	2 (5.40%)	3 (8.11%)	4 (10.81%)
	C	-	-	-

months, B degree modifications appeared in 5.40% of EA restorations, in 8.11% of GSOx restorations, and 10.81% of TEC restorations. We mention that no C degree modifications appeared in all of the restorations.

Secondary/recurrent caries were detected only at the fourth assessment and appeared in 2.70% of EA restorations, respectively in 5.40% both in GSOx and TEC composite restorations.

Postoperative sensitivity was not ascertained in EA restorations. The B score of postoperative sensibility appeared at baseline in 2.70% of GSOx and in 5.40% of TEC restorations, but was not found in the other assessments, in any restored tooth, regardless of the applied dental material.

Retention / fracture of the restorations were not detected in the first three assessments in any restorations, regardless the used dental material. After 18 months, only “B” score was determined in all restorations, and the percentage was of 5.40% in EA, of 8.11% in GSOx, and of 10.81% in TEC restorations.

At the first two evaluations (baseline and after 6 months), no significant differences were found in the score evaluations according to the Modified United States Public Health Service (USPHS) criteria for direct clinical evaluation of restorations. At the third and fourth evaluations (performed after 12 months and 18 months, respectively), the EA composite material presented better scores than the GSOx and TEC materials, but with no significant differences.

The evaluation scores of the restorations performed with EA, GSOx, and TEC composite materials at the 4-th assessment (after 18 months), evaluations effectuated by the modified USPHS criteria, are presented in Table 2.

By comparing the B and C scores of the evaluation criteria in the all the three types of composite restorations (EA, GSOx and TEC), in the period of the follow-up (baseline, 6 months, 12 months and 18 months), we found that all these dental materials had good clinical behaviour, with no significant differences.

Chart 1 presents the “A” scores in percentage, of the evaluation criteria in all the three restorative materials used in the study, noted in the 3rd and 4th assessment

“B” and “C” scores in percentage, of the evaluation criteria in all the three restorative materials, noted in the 3rd and 4th assessment are presented in Chart 2.

EA restorations had the best chromatic stability, probably due to the spherical 200 nm nanosizes silica-zirconia fillers. The colour stability is due to the addition of fillers and of inorganic pigments in the resin matrix and by the creation of specific shades for the realization of refractive indices as of the natural tooth. It is necessary to underline that the spherical shape of the filler particles seems to contribute decisively to the achievement of a natural chromatic hue [32].

We should emphasise that the retention failure of restorations was greater in the mandibular than in the maxillary composite fillings, in all

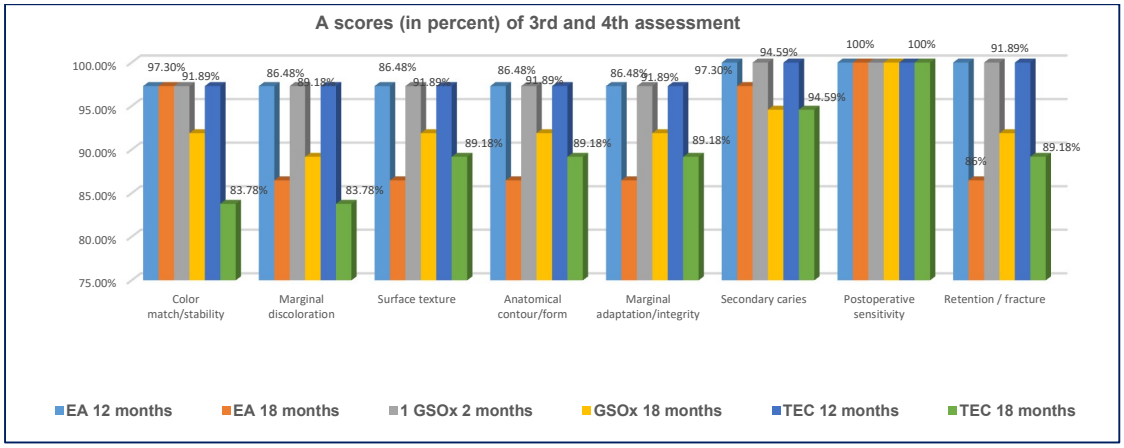


Chart 1 - A scores (in percentage) of the evaluation criteria in all the three restorative materials used in the study, noted in the 3rd and 4th assessment / *Graficul 1 - Scorurile A (în procente) ale criteriilor de evaluare în toate cele trei materiale de restaurare utilizate în studiu, notate la a 3-a și a 4-a evaluare*

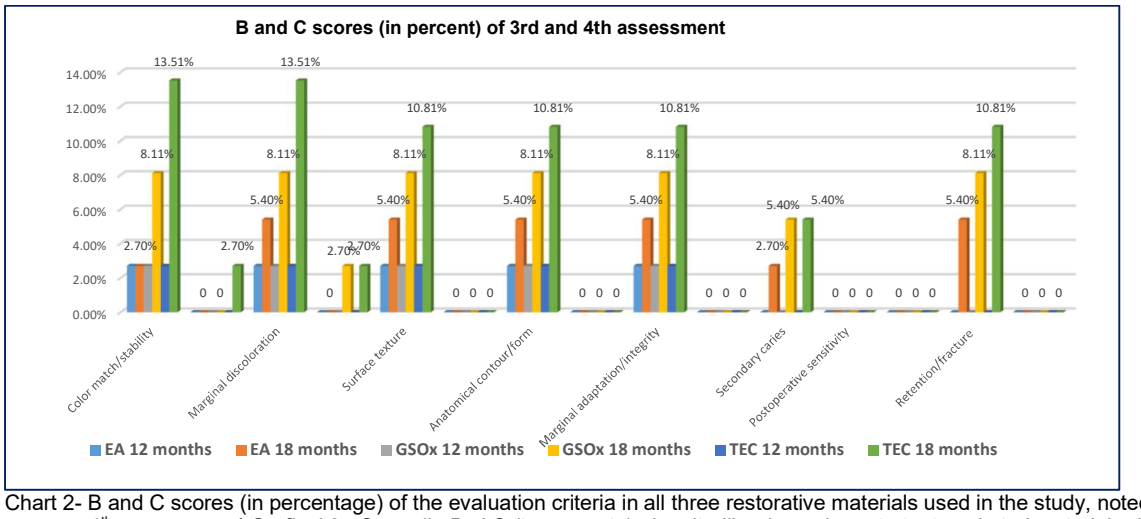


Chart 2- B and C scores (in percentage) of the evaluation criteria in all three restorative materials used in the study, noted in the 3rd and 4th assessment / *Graficul 2 - Scorurile B și C (în procente) ale criteriilor de evaluare în toate cele trei materiale de restaurare utilizate în studiu, notate la evaluarea a 3-a și a 4-a*

patients, probably due to the more significant density of bone trabeculae in the mandible compared to the maxillary bone tissue [38].

None of the restored cervical non-carious lesions, with any of the three types of dental composites, did not demand endodontic treatments.

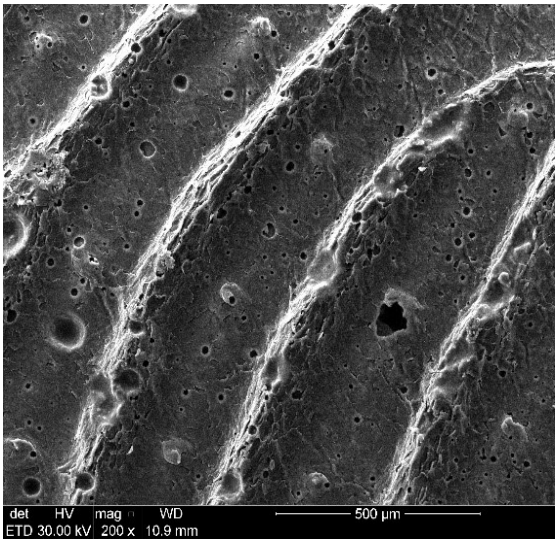
EA restorations presented better scores during the monitored period, reason for which experimental studies concerning the characteristics of this dental material were carried out. In Figures 2-4 images with EA composite resin obtained by scanning electron microscopy (BSED), are presented, concerning the microstructural aspects, respectively the SEM image corresponding to the EDS map.

The microstructural aspects of EA composite revealed the homogenous content in oxide nanofillers of this dental material.

The quantitative analysis of EA dental material is presented in Table 3.

For the technology of EA composite the original Radical Amplified Photopolymerization (RAP) catalyst technology is used. In this composite dental material, the polymerization is stable under ambient light, but it is fast under the action of the light device. EA contains monodispersing spherical nanofillers of 200 nm, from silica-zirconia, obtained by the sol-gel methodology [39].

Non-carious cervical lesions with tooth hard tissue loss is relatively frequent. Shrestha et al [40], determined an incidence of these cervical lesions of 10.4% in surveyed population. They recommended to avoid the horizontal tooth brushing technique, the use of abrasive agents, respectively of dental abrasive habits. Recent studies showed that toothpaste has an abrasive effect and can cause abrasion if the patients brush their teeth in a tempestuous manner [8,41]. Preventive measures are correlated with the avoidance of the interposition/friction of foreign bodies in between the hard dental tissue surface, of tempestuous tooth brushing, of toothbrushes with hard tufts of hair, and of tooth-pastes with pronounced abrasive components [12]. Haralur et al [14] observed that 68% of patients belonging to the non-carious cervical lesions group and 31% of subjects of the



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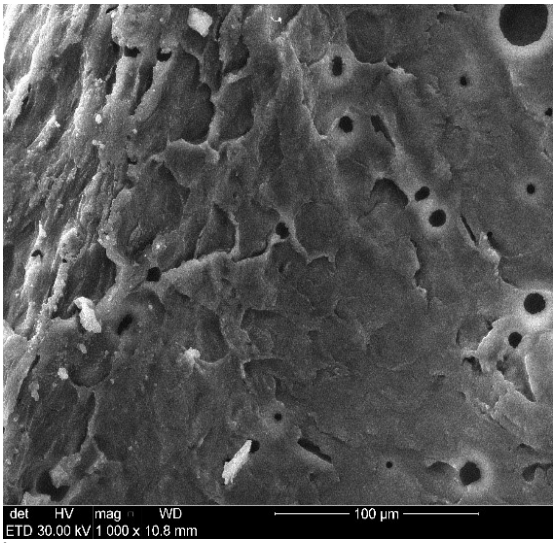

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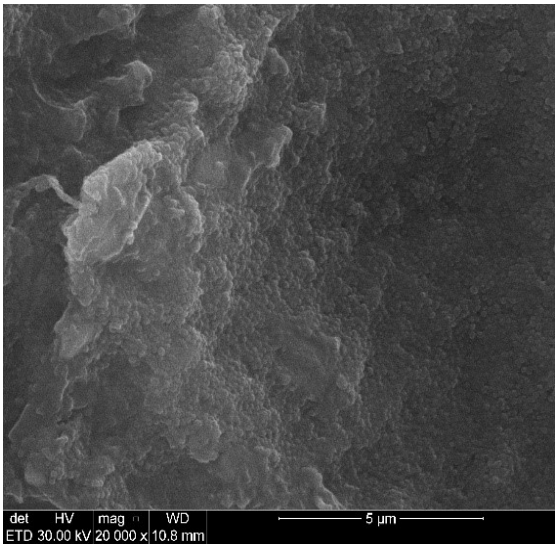

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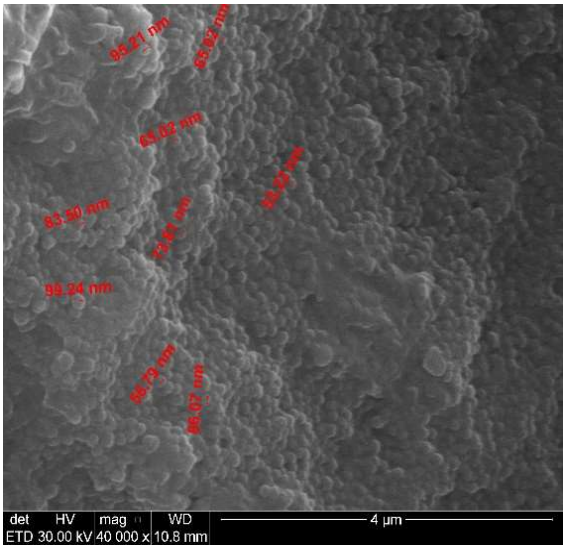
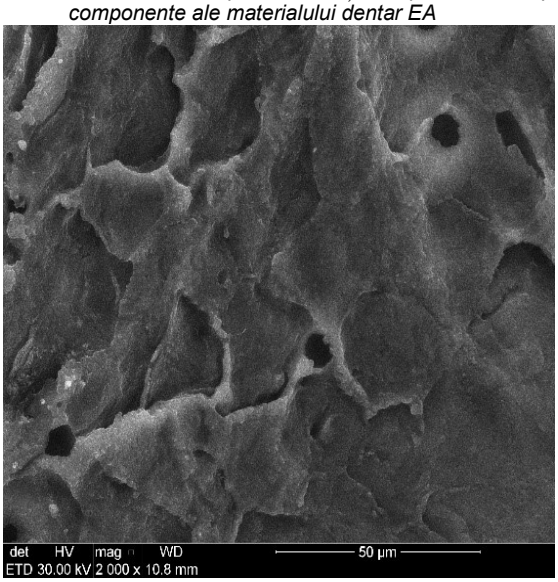


d

Fig. 2.a, b and c present microstructural aspects of EA composite material obtained by scanning electron microscopy (BSED); Figure 2.d presents the dimensions of component particles of the EA dental material / *Fig. 2.a, b și c prezintă aspecte microstructurale ale materialului compozit EA obținute prin microscopie electronică de baleiaj (BSED); Fig. 2.d prezintă dimensiunile particulelor componente ale materialului dentar EA*



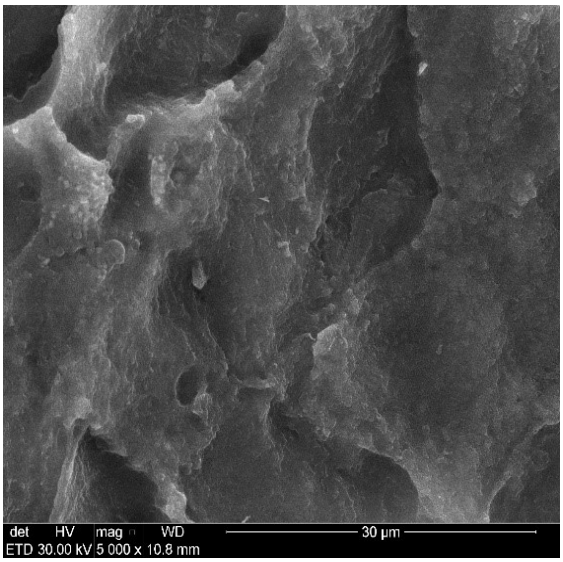
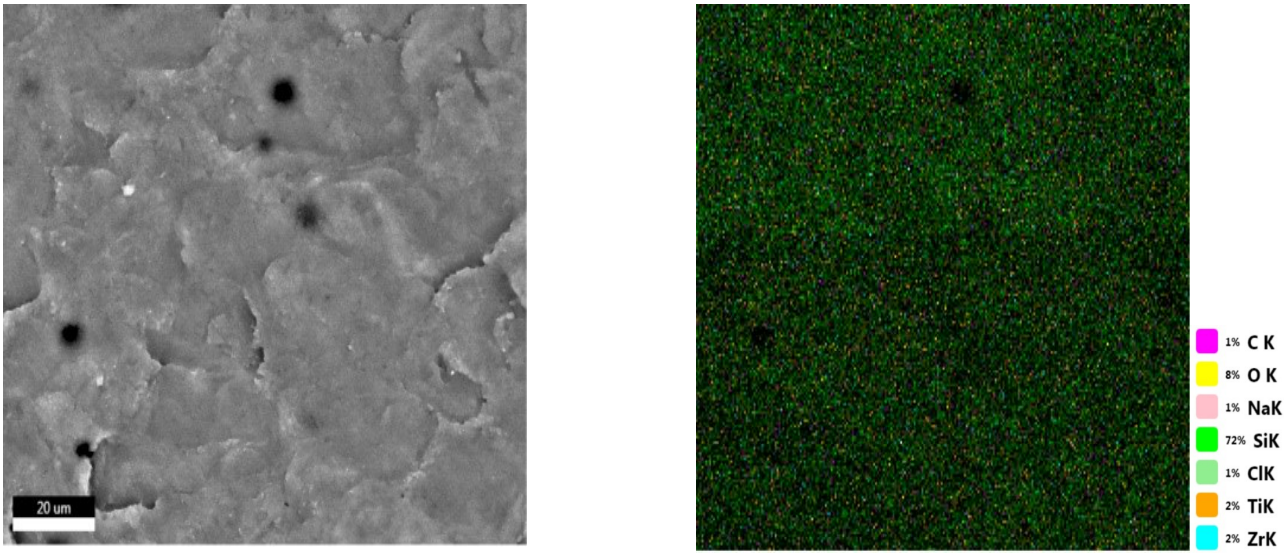


Fig. 3- Microstructural aspects of the analyzed area in the EA composite material/ *Aspecte microstructurale ale zonei analizate a materialului compozit EA*



a b

Fig. 4 - a. Microstructural aspects of the analyzed area; b. SEM image corresponding to the EDS map / *a. Aspect microstructural al zonei analizate; b. Imagine SEM corespunzătoare hărții EDS*

Table 3

Quantitative analysis of the elemental composition / *Analiza cantitativă a compoziției elementare*

Element	Weight %	Atomic %	Error %	Net. Int.	K Ratio	Z	R	A	F
C K	22.82	35.82	11.82	84.19	0.0379	1.0796	0.9394	0.1538	1
O K	36.94	43.53	10.13	392.77	0.0584	1.0429	0.9618	0.1517	1
Na K	1.34	1.1	13.65	41.31	0.0032	0.957	0.9895	0.2483	1.002
Si K	24.6	16.51	4.18	3083.81	0.1623	0.9653	1.0127	0.6821	1.0024
Cl K	0.13	0.07	46.08	10.6	0.0007	0.905	1.0329	0.5641	1.0083
Ti K	0.23	0.09	28.19	21.86	0.0018	0.839	1.0614	0.916	1.0427
Zr K	13.95	2.88	12.76	60.58	0.1342	0.7148	1.0792	1.0123	1.3297

control group used the horizontal brushing method, respectively 46% brush hard, against 7% of subjects of the control group.

Clinical trials are indispensable for assessing the qualities of dental fillings. The researches in reference with the biocompatibility and the specific properties of dental restorative materials, including the proper composite resin characteristics, the filler particles features, their surface changes, antimicrobial properties, remineralization, wear, individual comportment in the patients oral medium, etc., are demands which should be developed in future [16]. The shape, rate, and type of filler particles significantly influence their properties, including their light transmittance [42,43]. The filler sizes and ratios of the composites used in the study were different from each other [32,33,34].

The limits of the study are represented by relatively reduced duration of evaluation (18 months), and of the number of studied restorations (111 composite restorations of non-carious cervical abrasion lesions).

4. Conclusions

The studied cervical non-carious abrasion lesions were restored with Estelite Asteria (EA), GrandioSO x-tra Bulk Fill (GSOx) respectively Tetric EvoCeram Bulk Fill (TEC) composites, and the modified USPHS criteria for direct clinical evaluation of restorations were used for the comparative clinical analysis of scores, in the 18 months of follow-up.

The comparative clinical analysis of scores for each investigated criterion of restorations (colour match, marginal discoloration, surface texture, anatomical contour/form, marginal adaptation/integrity, secondary/recurrent caries, postoperative sensitivity, and retention of restoration/fracture) proved good clinical performance in all three type of restorative materials used for the rehabilitation of non-carious cervical abrasion lesions.

It should be acknowledged that the clinical results of the research suggested that the group of restorations performed with EA aesthetic composite dental material presented the fewest B and C scores after 18 months of follow-up. These results suggest the fact that the homogenous content in oxide nanofillers of EA composite material, observed in carried out of experimental investigations, influenced these scores.

The importance of the research clinical relevance regarding the use of these types of dental materials for the restoration of non-carious cervical abrasion lesions is given by the fact that all three investigated aesthetic composites showed proper clinical performance.

In perspective, further research regarding the indicated dental material type for the restoration of NCCLs, their clinical performances, respectively the risk prediction in the restoration of these type of

lesions, will improve the longevity of the restorations performed with dental composites, will increase the patients' beneficial oral health-associated experiences and the quality of dental assistance, with the increasing of the patients' quality of life.

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