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DIRECT AND INDIRECT DENTAL RESTORATIONS: CLINICAL STATUS AND EVALUATION

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Abstract. *To restore teeth after endodontic treatment, direct or indirect restoration is used, but no common approaches are defined.*

Objective. *Clinical evaluation of direct and indirect restoration of lateral group teeth after endodontic treatment in different follow-up periods.*

Materials and methods. *In a prospective randomized study, 79 individuals were examined in which 170 molars with class 2 cavities were restored (the Black method) after endodontic treatment. In 38 patients, 89 teeth (52.4 %) were restored by direct method from a photocomposite, in 41 patients, 81 indirect restoration from a ceramic material was performed using digital technologies. The condition of the restorations was assessed after 6 and 12 months according to clinical criteria.*

Research result*. Within 6 months, according to clinical criteria, violations were detected in 6 direct (6.7%) and 1 indirect restoration (1.2%). After 12 months, among direct restorations, 2 of them were found to be destroyed (2.2%), anatomical shape disorders were found in 6 restorations (6.7%), marginal fit was found in 5 (5.6%), marginal staining was found in 9 restorations (10.1%), and contact point defects were found in 11 cases (12.4%). These violations occurred in 13 updates (14.6%). At the same time, the anatomical shape and edge fit were violated only in 1 indirect restoration (1.2%), edge staining, as well as defects of the contact point, were detected in 2 restorations (2.5%). In General, there were 2 indirect restorations with violations (2.5%). According to the results of two*

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surveys, 19 direct restorations (21.3%) and 3 indirect restorations (3.7%) were detected with violations.

Conclusions. *After endodontic treatment, it is advisable to restore the lateral teeth with ceramic materials using an indirect method.*

Key word: *endodontically treated teeth, direct and indirect restoration, photocomposites, ceramic materials, clinical evaluation.*

Teeth damaged by caries most often require the use of photocomposites. In the current dental materials market for the renovation of anterior and posterior teeth, there is a wide selection of restoration materials and adhesive systems that can be combined with photocomposites to ensure sufficient consolidation of the material iв with hard tissues [1,2]. Renewal of teeth, apparently, can be carried out by a direct method in one step or by an indirect method with a prepared restoration on a model in a laboratory in two or more stages [3, 4]. One of the most important officials is the importance of the method of materials for renewal and the position of the rejuvenated tooth to the vocal group, posterior, frontal or posterior, and the stage of its restoration. Tooth crowns suffer the most due to the presence of advanced caries, which is subject to endodontic treatment. The method of this treatment, apparently, is a clear obturation of the root canals after their previous instrumental processing [5]. During the process of preparation of pathologically changed hard tissues, as well as during the creation of free access to the mouths of the root canals, it is necessary to remove up to half the volume of the crown of the teeth, oscrema, and femoral group. As a result of such approaches, the walls of the prepared carious lesions in the molars and premolars become thin and brittle, and are easily broken under the influx of the great chewing agent [4,6]. In addition, caries often affects the cusps, which are the supporting structures of the back teeth. In clinical practice, there are significant considerations for the treatment of teeth, including after endodontic tooth extraction, direct restoration with photocomposite materials or indirect restoration with photocomposite in other materials [7]. At the same time, the use of non-direct

upgrades made from ceramic materials using digital technologies is becoming increasingly widespread, but they are, however, quite expensive [3,8]. Nutritional stagnation of the direct or indirect method of identifying endodontically fused teeth of the butt group is quite controversial, until now there is no single point of view.

Clinical evaluation of direct and indirect restoration of teeth in the lateral group after endodontic treatment at different levels of care.

Materials and methods. In a prospective randomized study, 79 individuals were exposed to the disease from 25 to 50 patients, of which 36 men (45.6% of the total population) and 43 women (54.4%). The type of skin patient was separated according to the informed consent to participate in the investigation. In a group of patients, 170 molars were renovated, sealed, and 170 molars were renovated using different approaches, in which endodontic treatment was carried out in order to reduce caries. In the teeth there was a 2^{nd} grade birth after Black. Before renewal, patients were assessed for empty mouth hygiene using the simplified hygiene index OHI-S and underwent occupational hygiene tests [9]. The patients were divided into two groups: in 38 individuals (48.1% of the total number of cases), the first group had 89 molars (52.4% of the total number of hundred teeth) were renewed by the direct method using additional photocomposite material, in 41 individuals (51.9%) of the other group, in 81 molars (47.6%) the renewal was prepared by the indirect method from ceramic material.

After cleaning the teeth, which encouraged laziness, the color shades of future restorations were determined using a standard scale. In patients of the first group, after extensive approaches to endodontically treated molars, empty parts were prepared that were suitable for direct restoration under photo composite material [2,4]. Then, a total etching of the hard fabrics of the walls and bottom of the empty tanks was carried out with 37% phosphoric acid gel, and a 5th generation adhesive system was applied with a light infusion for its hardening.

The photocomposite material was introduced into balls with light polymerization of the skin in the “soft start” mode, the contact surface of the teeth was replenished using the cured matrix system. Next, the occlusal contacts were checked, finishing and polishing were carried out. In patients of the other group, the molars after endodontic treatment were prepared for indirect restoration of the molars, such as: thickness of the walls of the empty is not less than 1 mm, overhanging edges day, cut between the bottom and walls of the vines are close to straight [3] .

After this, the patient’s dental rows were simultaneously scanned using a high-precision intraoral optoelectronic scanner CEREC AC Connect Omnicam, Dentsply Sirona, to capture a digital image and model an indirect ceramic restoration. ï. The prepared empty space near the tooth was covered with a time-sensitive onlay made from a besacrylic composite with the help of a silicone template for the model, which was made on a Formlabs Form 2 3D printer, Formlabs, with photopolymer resin. The extracted scans were analyzed using the Exocad software product, a permanent ceramic model was modeled and it was produced from a ceramic CAD block based on lithium disilicate on an inLab MC X5 milling bench, Dentsply Sirona. The technical stages of processing and pre-clinical preparation of the prepared update were carried out in the laboratory. At the next tooth, which had undergone restoration, the time pad was removed, the hard tissues of the walls and bottom were completely etched with 37% orthophosphoric acid gel, the surface of the indirect ceramic restoration, which may adhere to hard tissues were etched with 9% hydrofluoric acid gel, then silane was applied to the surface and, with the help of universal self-adhesive composite cement, the indirect ceramic restoration was fixed with with the exhaust stream of a light-emitting diode photopolymerizer, directed between the lines outside its perimeter . They thoroughly polished between the indirect contacts and checked the occlusal contacts.

The body of direct and indirect restorations was assessed on the day after preparation for a period of 6 and 12 months according to clinical criteria,

including “the integrity of the renewal”, “anatomical shape”, “shape” Prilyagannya", "Crajove Zabarvlennya", "Stan Contact Point" , as well as according to aesthetic criteria, texture, “color consistency” and “surface roughness”. Using the visual-instrumental method, the severity or presence of impairments was identified and recorded according to specified criteria. The contact point site was assessed for the stagnation of flocs. Considering that in one update there could be a decal damage, the skin term recorded a number of damage according to the skin clinical criterion and a number of restorations with identified damage. They also meant that there would be a lot of renewal without water damage, so that at the administrative station. In cases where damage was detected based on clinical criteria, over the course of the patient’s life, restoration defects were corrected or other renovations were carried out, but precautions were taken for these updates. Since the damage to the updated one was determined by aesthetic criteria, it was corrected and followed by caution.

For statistical processing of the results of the index assessment of empty hygiene, we used variation statistics in the MS Excel XP program with a significant difference for $p<0.05$. Indicators of clear signs that will become renewed presented absolute and definitive meanings.

Results. In the first group, the hygiene index OHI-S increased to 1.4±0.15 points, in the other group – 1.28±0.17 points, then the level of oral hygiene In patients of both groups, the results were not statistically significantly different from each other ($p>0.05$). The day after the restoration was completed in patients of both groups, no damage was discovered. After 6 months, 79 patients were treated (100%), of which there were 170 new cases (100%). At the time of clinical evaluation, it was established that 2 updates (2.2% of the total number of patients in this group) were frequent daily, The ruins of the bathtub stuck to about half the volume of skin renewal . In another 2 restorations (2.2%), the anatomical shape was damaged, there were defects in the areas of the contact surface of the restorations, and the contact points between the restorations and the existing teeth were damaged. According to Zagal, according to the current situation, damage to

contact points was detected in 4 cases (4.5%). It was also recorded that the marginal fit to the enamel of the renewed teeth was damaged down to the enamel-dentin interface in 2 renovations (2.2%), and in 4 restorations (4.5%) there was evidence of marginal wear at the enamel interface. Also, according to the current clinical criteria, 6 direct renewals (6.7%) of the damaged teeth were revealed. According to aesthetic criteria, 3 restorations (3.4%) did not match the hard tissues of the teeth behind the color between the acceptable ones, and 4 restorations (4.5%) had increased surface roughness.

In patients of the other group, all indirect teeth retained their integrity and anatomical shape, all contact points between the new and adjacent teeth were still valuable and functional , less than 1 restoration cost (1.2% of the cost per of this group) it was revealed that the regional adhesion between the enamel and the regional fermentation was damaged. Thus, the present damage was observed in 1 direct update (1.2%). Due to the aesthetic criteria, only a discrepancy in color was established between the acceptable limits in 2 restorations (2.5%).

In the term of 12 months, the total percentage was 79 percent (100%), but the overall total amount of the total amount was 163 (95.9% of the total amount). The number of direct renewals in the first group changed to 83 (93.3% of the output rate in patients of this group). Frequently, 2 renovations (2.2% of the total number of quilted restorations), 6 renovations (6.7%) of small damage to the anatomical shape were found. In 11 cases (12.4 %) there were other defects of contact points, including the loss of renewal, hairiness and damage to the anatomical shape. The defective edge fitting of the photocomposite was installed in 5 restorations (5.6%), Significantly less damage in this term was detected in indirect restorations, of which 80 were stitched (98.8% of the cob bone), in patients of the other group. All restorations were less frequent, with less than 1 (1.2% of the total restoration) damage to the anatomical shape of the contact surface. Contact points between the new and existing teeth were inferior in 2 cases (2.5%). At the perimeter of the 1st restoration (1.2%), defects in the edge fit of the enamel were revealed; beyond the perimeter of the 2nd restoration (2.5%), the

presence of marginal burr was detected. All damages according to the established criteria were observed only in 2 indirect restorations (2.5%). Overall, there were more aesthetic damages, wrinkles, lack of consistency in color between acceptable boundaries - in 5 renovations (6.2%), the hair was moved up - in 2 restorations (2.5%).

During the follow-up of 6 and 12 months in patients of the first group, 19 teeth renewal (21.3% of the cob) with damage due to the passage of teeth were identified. final criteria, especially in another group - only 3 (3.7 %), then 6.3 times less. Subject to current criteria, indirect ceramic restorations also overcame direct photocompositing restorations. Without damage, then, according to the results of the river investigation, in the first group there were 70 direct restorations (78.7% of the cob volume), in patients of the other group - 78 indirect restorations renewal (96.3%). Such indicators coincide, incredibly, with the crust of indirect ceramic restorations of endodontically annealed primary teeth.

Natural teeth after edodontic treatment are completely restored with ceramic materials using the indirect method using digital technologies. For such approaches, damage is considered lower than for direct renewal from photocomposite materials.

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