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One of the current problems in dentistry is the rational use of endodontically treated teeth. The use of anchors is also debatable. Some authors refer to a large number of complications after using anchors [1–4], others prove an increase in the strength and durability of the restoration when restoring the coronal part of the tooth [5,6]. According to S.M. Sorin (1979), unsealing the root canal in connection with the placement of a pin in the long term is a complex medical manipulation [7], which can lead to complications such as perforation, change in direction and thinning of the root wall, violation of the seal in the root canal, insufficient or excessive depth of root canal filling [8]. These complications can be prevented by the use of intraradicular pins immediately after endodontic treatment, which will strengthen the therapeutic restoration, eliminate subsequent complications and serve as a preliminary preparation of the tooth for future orthopedic treatment. The objects of observation were 146 patients aged from 16 to 68 years with pulpless teeth of all functional groups restored with anchors. The treatment plan involved restoring the tooth with an anchor and a therapeutic restoration (filling only), anchor and filling, followed by covering with an artificial crown; the purpose of the crown (restorative or supporting) was indicated. Restoration of teeth that underwent endodontic treatment was carried out taking into account the recommendations of a number of authors [13–24]. The main requirements for the restored tooth were stability, reliable obturation of the root canal, absence of inflammation in the periodontium, and the presence of solid, non-thinned root walls. The method of clinical use of anchors involved several stages: unfilling the root canal and its calibration, fixing the pin, and restoring the coronal part of the tooth. Unsealing of the root canal was carried out taking into account radiological data and with the condition that the length of the root part of the pin is equal to or greater than the height of the clinical crown of the tooth, but with the obligatory preservation of 4–5 mm of root sealant apically. Gutta-percha was removed using a Miller or Gates-Gliden bur. Restoring teeth using standard root pins included the selection of three basic elements: an anchor pin, cement for fixing the pin, and a filling material for restoring the coronal or core part of the tooth. In our practice, we used titanium and steel anchors and fiberglass pins. To restore the crown or core part of the tooth, the following materials were used: GIC (Ketac Molar/3M ESPE); GIC reinforced with silver (Fuji IX/GC, Ketac Silver/3M ESPE); GIC modified with composite (Vitremer/3M ESPE), photo-composites (Herculite/Kerr, Charisma/Kulzer, Filtek Z

210/3M ESPE). The method of preparing a tooth for a pin structure depended on the preservation of hard tissues, the group affiliation of the tooth, the planned orthopedic structure (crown, bridge), and the aesthetic needs of the patient. If the hard tissues were well preserved and the tooth belonged to the frontal group, preference was given to passive titanium pins (Fig. 1); if a high level of aesthetics was required, fiberglass pins were given. In cases where the teeth were not used for supporting crowns, their restoration was carried out with composite materials. In case of large destruction of hard tooth tissues, active titanium and steel anchors were advantageous, provided they were inserted into the root canal without effort (Fig. 2). Composite cement (Relyx™ ARC/3M ESPE) was used as a fixation material for fiberglass pins, and GIC (Fuji I/GC and Ketac Cem/3M ESPE) was used for fixation of titanium and steel posts. An analysis was made of the restoration of 315 teeth with anchors (473 cases of anchor placement) in 146 patients, of which 228 teeth (72.38%) in women and 87 (27.62%) in men. For a more in-depth analysis of the condition of teeth restored with anchors, we have developed a special grouping of teeth according to the degree of destruction. Three clinical groups were formed (according to V.Yu. Kurlyandsky). Group 1 included teeth with a slight degree of destruction (one surface) - type 1. The second group includes teeth with destruction of two surfaces - type 2, the third - teeth with destruction of three or more tooth surfaces - type 3. An analysis of the type of dental restoration using anchors was carried out. Of all 315 cases of tooth restoration using an anchor, teeth were most often restored in preparation for orthopedic treatment: in 44.1% of cases - before placing a bridge and covering with an abutment crown, in 28.9% of cases - before covering a tooth with an artificial restorative crown, in total in 73% of all cases of dental restoration. Only in 27.0% of cases where anchors were used, teeth were restored with a filling. We analyzed the structure of dental restorations depending on the degree of destruction (Fig. 3). With type 1 destruction, 61 teeth (82.4%) were restored for orthopedic structures (single artificial crowns and bridges), and 13 (17.6%) for fillings. With type 2 destruction - 134 teeth (65.0%), 72 (35.0%) for filling; with type 3 destruction, all teeth were prepared for covering with artificial crowns. Active anchors were used in 227 cases (72.1%) and passive anchors in 88 (27.9%). Restoration of the frontal group of teeth with passive anchors was carried out somewhat more often than with active anchors - 46 and 35 cases of use, re-

spectively. In the chewing group of teeth, the use of active anchors predominated 5 times. Among restorations using passive anchors, titanium anchors accounted for the most cases compared to fiberglass anchors, at 89.0% and 11.0%, respectively. All cases of restoration with fiberglass pins were on the frontal group of teeth for the sake of aesthetics of the restoration. In multi-rooted teeth (molars), two or three anchors were used. The follow-up period for patients was 5 years. During this period, 15 (4.76%) cases of complications were noted in 7 patients, of which 13 (5.65%) cases occurred when restoring teeth with anchors for orthopedic structures. Among orthopedic restorations, complications occurred in teeth limiting the end defect during prosthetics with removable or conditionally removable dentures ("Brooklyn" bridges). Complications among therapeutic restorations occurred in 2 cases (2.35%). Due to the fact that complications were rare, it is not possible to calculate indicators of their structure. Therefore, we provide a description of each of them (table). Disintegration of the anchor together with the orthopedic structure occurred in 10 cases in two patients during restoration with "Brooklyn" bridges (after 6 months and 2 years). An anchor fracture occurred in two cases during restoration with orthopedic structures with locking fastenings (after 6–7 months). A fracture of the tooth stump together with an artificial restorative single crown was noted during the restoration of tooth (11) with an artificial restorative single crown, while the supra-root part of the anchor was noted to be insufficiently high - 1/3 of the height of the clinical crown. The filling chipped two years after the restoration of the 46th tooth. Fracture of the tooth wall 3 years after restoration of the 14th tooth with a filling. Thus, among all therapeutic restorations with anchors, complications were observed extremely rarely, only in 2 clinical cases (2.35%) - chipping of the filling and tooth wall - occurred after 2-3 years. Moreover, after this type of complications, teeth were restored with artificial crowns without replacing the pin structure. Thus, we can only talk about delaying the stage of prosthetics for a given period, and not about a serious complication. All complications occurred when using active anchors. No

cases of complications were reported with the use of passive pins.

CONCLUSIONS

1. Follow-up data and clinical study of the results of restoration of pulpless teeth suggest the advisability of using anchors to increase the effectiveness of restoration due to the low percentage of complications (4.76%).

2. Clinical studies of passive anchors allow us to recommend them as the most appropriate choice for restoring pulpless teeth. The advantages of passive anchors include minimal grinding of the remaining tissues of the supra-root part of the tooth, ease of use and the absence of stress in the root dentin.

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