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ANALYSIS OF THE MANUFACTURING QUALITY OF PINS ON THE ROOT SURFACE IN THE MANUFACTURE OF CHEWING DENTAL INLAYS

Xojimurodov Burxon Ravshanovich
Samarkand State Medical University, Uzbekistan

ABOUT ARTICLE

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Abstract: X-ray examinations were used to analyze compliance with the basic requirements of clinical guidelines for modeling pin inlays on the root surface. For this purpose, the X-ray assessment of CBCT studies of maxillary and mandibular teeth and the conclusions of the forensic medical examination were analyzed. The results of the forensic medical examination in cases related to the poor-quality manufacture of this type of prosthesis in the period from 2013 to 2022 were analyzed. The results showed that in 10% of lawsuits related to non-removable prostheses, there were claims about the quality of the prosthesis. This share has not decreased over the past 10 years, and the lawsuits concerned the quality of manufacture of root canal tabs. At the same time, errors and complications when using tabs in root canals were identified in 50% of cases, and in 50% of cases they were associated not with poor-quality materials or imperfect treatment techniques, but with incorrect dental technique. An X-ray assessment of the quality of the formation of root canal inlays by dentists showed very low compliance with clinical recommendations. Compliance with clinical guidelines is very low. The correct residual wall thickness of the root canal was determined only in the following cases, the correct residual wall thickness of the root canal was determined only in 37% of cases. The recommended ratio of the tab pin length (2/3 of the root length) was determined only in 2% of cases. Compliance with the ratio of crown and root length for restored teeth was

required only in 2% of all studied cases. The ratio of crown height to inlay pin length was 1:2 or 1:3 in only 2% of cases.

INTRODUCTION

The restoration of defects in the hard tissues of teeth using root canal inlays (RCI) is a widespread prosthetics procedure. Various improvements have been made to the classic design of the RCS, including restoration in case of lack of space or severe destruction of the crown, improved fixation of inlays, veneers and crowns, equalization of chewing pressure and strengthening of the remaining teeth and periodontal tissues. Despite methodologically sound theoretical and clinical studies, including extensive documentation on the manufacture of this type of dentures, the number of complications in prosthetics using CSF has not decreased, and the list of major errors and complications in the restoration of defects in hard tissues of teeth using this type of prostheses has not changed In practice, this is not confirmed. According to various authors, complications with CSF use range from 8 to 16%. The main complications include inadequate cementation of the structure due to improper modeling of the inlay, cracking or perforation of the root of the abutment, as well as poor-quality preparation of the lumen of the channel for FGF. At the same time, the authors note that errors are often caused by poor-quality tab manufacturing techniques.

The purpose of this study was to study the main errors and complications in the manufacture of CSF by analyzing the quality of modeling in dental practice.

METHOD

A meta-analysis of the literature found in PubMed and eLaibrary was carried out., to summarize the results of previous research on CSR prosthetics over the past 15 years. The choice of sources took into account the availability of evidence-based information, including the results of clinical trials and laboratory studies, as well as the status of official textbooks on the specialty. The analysis of errors and complications in dental practice is based on the results of 1731 forensic medical examinations (CME) appointed by the courts in the processes related to the shortcomings of dental practice for the period 2013-2022. The assessment was carried out using X-ray methods to obtain objective indicators of the main evaluation criteria: using the RadiAnt program to view DICOM PACS standard medical images, the

cerebrospinal fluid of 80 cases received by dentists from different practices in Samarkand was analyzed. The analysis in Samarkand (50 - v/h and 30 - n/h) determined the ratio of the length of the pin part of the inlay to the root, the ratio of the length of the pin part of the inlay to the height of the crown part, as well as the residual wall thickness of the root canal of the supporting tooth. These criteria were chosen, on the one hand, because they can be objectively measured and evaluated, on the other hand, because the ratio of the intra-root part to the crown part of the CSV ranges from 1:2 to 1:3, and because these criteria prohibit thinning of the root canal wall below 1.0-2.0 mm, which is fixed in each criteria. All the research results were processed using statistical methods.

RESULTS

Review and systematic analysis of 73 sources of information about CSR found in search engines allowed us to calculate the main advantages and disadvantages characteristic of the designs of pins and CSR used in cavity restoration. According to the literature analysis, 87.5% of the adverse effects of dental restoration using postconstructions are due to the characteristics of tissues and materials used by the dentist, which determine the adhesive properties of the system, the amount of polymerization stresses, shrinkage of the material, deformation and microinfiltration processes. In other words, this is a decrease in the frequency of complications during dental restoration using postconstructive F. 50% of the adverse effects of using RFC are due to the quality of the treatment method, and not the properties of the material itself. In other words, it is possible to reduce the number of errors and complications during restoration using CSF by developing a prosthetics technique and objectively assessing its quality compliance with the basic requirements. This is due to the fact that, as our research has shown, the use of CSF from various materials remains relevant in all regions of the country, and the number of errors and complications has remained approximately at the same level for decades. According to our research, in the period from 2013 to 2023, 50% of poor-quality dental treatment will be associated with the evaluation of various types of dentures. The share of CME with claims related to non-removable prosthetics in these years amounted to 77% of all cases of deficiencies in the provision of orthopedic dental care. It is obvious that the composition of complaints about non-removable prosthetics has changed over the years, and the emphasis has shifted towards prosthetics on implants (the most complex, expensive and rapidly developing type of prosthetics). However, the number of complaints about FCS does not decrease from year to year: complaints about the preparation of teeth for FCS prostheses, the manufacture of inlays and the fixation of FCS prostheses accounted for 8.8% of all complaints about non-removable orthopedic structures, and this proportion did not change significantly during the study period. The main complaints of patients concerned the poor fixation of

the upper prosthesis to the abutment teeth and the FCS itself. To manage the quality of CSF modeling in dental practice, an analysis of the compliance of specialists with the requirements of clinical recommendations was carried out using a retrospective assessment of radiographs of teeth restored using CSF. In this study, the most difficult cases were those with CSCs on the teeth of the chewing group; The second most common group in terms of the composition of patient complaints about the quality of CSC manufacturing was the group of complaints about the quality of root canal fillings on teeth repaired with tabs. Clinical recommendations establish the following criteria for the quality of root canal formation: - Uniform density of filling material throughout the root canal - Density of root canal closure - The presence of root canal closure to the anatomical tip of the root, the most common complaint of patients about the quality of FGF was poor fixation, and complaints in every fourth case of FGF were associated with modeling. However, the number of complaints about CSF did not decrease from year to year: complaints about the preparation of teeth for CSF prostheses, the manufacture of inlays and the fixation of CSF prostheses accounted for 8.8% of all complaints about non-removable orthopedic structures, and this proportion did not change significantly during the study period. The main complaints of patients concerned the poor fixation of the upper prosthesis on the abutment teeth and the CSF itself. To manage the quality of CSF modeling in dental practice, an analysis of the compliance of specialists with the requirements of clinical recommendations was carried out using a retrospective assessment of radiographs of teeth restored using CSF. The most difficult cases in the study were cases with FGM on the teeth of the chewing group; the second largest group in terms of patient complaints about the quality of FGM manufacturing was the group of complaints about the quality of canal fillings on teeth restored with tabs. Clinical recommendations establish the following criteria for the quality of root canal formation: - uniform density of filling material throughout the root canal - density of root canal closure - the presence of root canal closure to the anatomical tip of the root, the most common complaint of patients about the quality of CSF was poor fixation, and in every fourth case of complaints is associated with CS modeling. However, CBCT can be used to determine compliance with the CSF pin and crown modeling guidelines; Almost identical results were observed when determining the ratio between the length of the CSF pin and the length of the root. According to clinical guidelines and textbooks on orthopedic dentistry, the length of the pin, which is 2/3 of the length of the root, is crucial for uniform pressure distribution and good pulp retention. During treatment, this condition was met only in 1.25% of cases, and in 51.25% (42.50% + 8.75%) of cases, the length of the pin was less than 30% of the root length. The ratio of crown height to pin length cannot always be maintained due to clinical conditions such as large interalveolar distance, short roots and alveolar bone resorption. However, violation of the requirement for the ratio of the length of the pin and the length of the root is

a deliberate violation by the doctor of the technique of preparing an abutment tooth for a prosthesis. If, during orthopedic preparation of a destroyed tooth, it is established that the root canal cannot be opened for 2/3 of the root length due to root curvature, closure of the root canal or other reasons, then the use of this root should be considered contraindicated. In such cases, treatment with a predictably more favorable outcome is recommended - removal of the destroyed tooth and replacement of the defect with an implant. The quality of endodontic treatment directly affects the life expectancy of the tooth. On average, the residual thickness of the root wall of the chewing teeth (i/h) was 0.8 mm, and the chewing teeth (i/h) was 0.6 mm, which is lower than the recommended minimum value of 1.0 mm In 7.5% of cases, the pin part of the CSF was glued to the outside of the root wall. In all these cases, inflammatory and destructive changes were observed in periodontal tissues around the tooth.

CONCLUSION

During the study, it was found that 50% of errors and complications when using SWR are associated with improper performance of the procedure by the dentist, and not with poor quality of materials or imperfect treatment techniques. This provokes a significant number of patient complaints about the quality of SWR, including litigation. According to our data, 8.8% of lawsuits related to non-removable orthopedic structures in the period from 2013 to 2022 were related to poor manufacturing quality of FGOS. An X-ray assessment of the quality of CSF modeling by practitioners showed that the requirements of clinical recommendations, national guidelines and textbooks on orthopedic dentistry were met: - in 36.25% of cases with respect to maintaining the residual thickness of the root canal wall; - in 40.0% of cases with respect to the quality of root canal filling; - in restored teeth with respect to compliance with the ratio of 1:2 or 1:3 between the height of the crown of the restored tooth and the length of the pin part of the inlay; - in any of the studied cases; - in relation to the fact that the length of the pin part of the tab is 2/3 of the length of the root; - in 1.25% of cases. Most errors and complications in CSF prosthetics can be attributed to doctors' neglect of basic requirements. However, there are still many methodological questions regarding the advantages of making tabs with one, two or three pins on the teeth of the chewing group.

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