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**RESULTS OF TREATMENT OF PATIENTS WITH PERIAPICAL LESIONS USING HIGH-
INTENSITY LASERS AND A DENTAL MICROSCOPE*****Karayev Shaxboz****Samarkand State Medical University, Uzbekistan****Chaqqonov Faxriddin Xusanovich****Samarkand State Medical University, Uzbekistan***ABOUT ARTICLE****Key words:** Laser, inflammatory periodontal diseases.**Received:** 20.06.2024**Accepted:** 25.06.2024**Published:** 30.06.2024**Abstract:** The frequency and prevalence of periodontal lesions, problems of etiology, diagnosis of pathogenesis and various treatment methods indicate the importance of this problem in modern dentistry [1, 3, 6, 10]. According to the authors, chronic periodontitis ranks third among dental diseases: in the age group of 34-47 years, the proportion of this form of complicated caries reaches 50%. In 40% of cases, this condition is caused by a carious lesion, and in 60% it occurs as a complication of endodontic treatment, that is, due to the penetration of organic residues beyond the apical opening of the root and the subsequent development of periodontitis [4, 6-8].**INTRODUCTION**

Despite significant modern advances in the diagnosis and treatment of patients with chronic periodontitis and radicular cysts, cases of recurrence of the disease in the area of the periodontal ligament are often found, which is fraught with complications such as delayed bone regeneration and the formation of fistulas in the area of the periodontal ligament [5, 9, 15, 24]. An effective modern method of surgical treatment of periodontal ligament lesions is the use of high-intensity lasers under the control of an operating microscope. Laser surgery is based on the tissue-destroying action of photothermal, hydrodynamic, photochemical and plasma mechanisms [11, 16]. The advantages of laser surgery compared to traditional methods are selective removal of affected soft tissues, hemostasis, disinfection of the surgical field, reduction of bacteremia, reduction of wound field volume, reduction

of edema and mechanical injury, reduction of intra- and postoperative pain, short healing time, patient comfort during and after surgery, minimum or complete absence of sutures and wound treatment [12-14, 17, 19, 20, 21]. The use of a dental microscope allows for greater magnification, which allows you to control the volume of osteotomy, determine the lesion as clearly as possible and minimize root resection to preserve the functional stability of the causal tooth [2, 18, 22, 23]. Therefore, the aim of this study was to improve the surgical treatment of patients with periapical lesions by using laser technology in combination with dental microscopy. MATERIALS AND METHODS To achieve this goal, we conducted a comprehensive examination, treatment and follow-up of 67 patients with destructive chronic periodontitis and radicular cysts. 39 women and 28 men aged 18 to 65 years were examined; the destructive form of chronic periodontitis according to ICD-10 corresponds to codes K04.5 - chronic odontogenic periodontitis and K04.8 - odontogenic cyst. The criteria for inclusion in the study group were voluntary consent to participate in the study, the presence of chronic apical periodontitis or a root cyst with one or two roots directed into the lumen, as well as periapical lesions in a position isolated from the mandibular canal and nasal cavity. The exclusion criteria were the presence of three or more root cysts in the tooth cavity, periapical lesions extending to the maxillary sinus, nasal cavity and mandibular canal, concomitant lesions at the stage of sub- and exacerbation, allergic reactions to the drugs used and the inability to agree with the conditions of the study. The patients were divided into two groups by random sampling and had the same opportunity to receive treatment using laser technologies and optical techniques and traditional methods. The main group included 36 patients who underwent cystectomy using an erbium laser Er:YAG Deka (Italy) with a wavelength of 2940 nm (Fig. 1) and a diode laser Doctor Smile (Italy) with a wavelength of 808 nm (Fig. 1). 2) surface treatment of the root of an ablated causal tooth with the purpose of melting hydroxyapatite in dentine tubules by radiation in the infrared spectrum; in the comparison group, including 31 patients, a traditional cystectomy was performed using a scalpel and a ChiroproL physiodespenser (Switzerland). At the preclinical stage of the study, an experimental part was carried out to determine the safety of exposure of a diode laser to the area where surgical intervention was planned - the external root using a digital universal thermometer TK-1200 (Russia) to determine the degree of heating of the root surface during laser treatment of the ablated root surface. Surface temperature measurement. Scanning electron microscopy of tooth sections using the VEGA3 TESCAN device (Czech Republic) to demonstrate the use of a less powerful and less traumatic diode laser and confirm the similarity between mechanical resection of the root end and laser treatment at different power levels of 0.4 W and 1.5 W. Clinical research methods included dental examination and additional methods. The effectiveness of surgical intervention was assessed by the severity of postoperative pain syndrome, collateral edema and the

healing time of the postoperative wound. Radiological methods such as intraoral contact radiography (WRC), radiobiography (RVG), orthopantomography (OPTG) and volumetric dental radiography (ORT) were used to assess the timing of liamine formation and the formation of mature bone tissue 1, 3 and 6 months after surgery. In the postoperative period, the content of anti-inflammatory cytokines, lactoferrin and fibroblast growth factor in gingival fluid was also studied. To determine the content of homocysteine, a commercial AXIS kit was used, supplied by BioHimMak CJSC (Russia). To determine the content of the main fibroblast growth factor- β (oFRF- β), a commercial immunoassay kit supplied by BioCheMak CJSC (Russia) was used. To determine the lactoferrin content, a commercial set of Vector-Best CJSC (Russia) was used. Cystectomy using a combined erbium and diode laser under the control of an operating microscope was performed according to the following protocol: under local anesthesia, an incision was made using an erbium laser, a muco-periosteal flap was removed and a bone ulcer was visualized. The bone ulcer was enlarged to the diameter of the cyst using an erbium laser; the root protruding into the cyst cavity was visualized at 16x magnification; the apical 3 mm root of the causal tooth was excised, pathological tissues and removed filling material from the reverse side of the root were removed. Under the control of an operating microscope, the condition of the periapical region and the adequacy of excision of pathological tissues were assessed, retrograde preparation was performed using an ultrasonic tip and subsequent occlusion of the main channel with the Prout material, the excised root surface was treated with a 0.4 W diode laser at 16x magnification, and the mucoperiosteal flap was treated with Promilene 5-0 material and fixed with sutures. Then the condition of the wound was assessed and radiographic changes were recorded after 1, 3 and 6 months. THE RESULTS AND DISCUSSION of the thermal measurements showed that when using a diode laser to treat excised root surfaces, a lower power parameter of 0.4 W should be used. This is due to the fact that at this power parameter, unlike 1.5 W, there are no structural changes in the dentin, which in turn reduces the risk of destruction of periodontal tissues (Fig. 4). The effectiveness of laser irradiation by inorganic melting of calcium hydroxyapatite in dentine tubules with a diode laser at a power of 0.4 W was confirmed by scanning the surface of transverse root samples irradiated with 1.5 W and 0.4 W diode lasers, were investigated using SEM and showed similar images characterized by signs of melting of small dentine tubules, additional opening of lateral channels, undetectable filling the material in the lumen of the lateral channels and signs of tissue fissures (Fig. 5). As a result of the dissolution of the dentine tubules, the risk of dentine permeability to bacterial flora is reduced. An increase in the yield of bacteria is undesirable, as it can lead to destructive changes in the tissues of the periodontal ligament. Clinically, the effectiveness of surgical intervention was assessed by the severity of postoperative pain syndrome. The severity was determined by taking into account the patient's pain sensations on a digital rating

scale on the 1st, 3rd and 5th days. Thus, the patients of the comparison group who underwent cystectomy in the traditional way had a pronounced intensity of pain syndrome on day 1, while the patients of the study group who underwent laser cystectomy experienced minor pain. A similar pattern was observed in the study of collateral edema (Fig. 6). Differences in the healing time of surgical wounds were also noted, depending on the treatment method. In patients who received the laser technique, epithelialization was observed already on day 5-6, while with the traditional method - on day 7-8. The data of the postoperative X-ray examination showed that the X-ray signs of bone regeneration in patients of the study group appeared earlier, i.e. by 3-6 months. In patients of the comparison group, similar radiological signs were manifested by 6-12 months. Already on the 3rd day, oFRF- β was present in the gingival fluid lysate (J) after laser cystectomy, its amount increased significantly on the 7th day of wound healing. Judging by the traditional indicators of wound healing kinetics in the gingival fluid after cystectomy, angiogenesis in the wound defect was not observed on day 3, but oFRF- β was detected in large quantities already on the 7th day of wound healing. Changes in the concentration of lactoferrin indicated a high bactericidal potential of laser irradiation. The content of the amino acid homocysteine in the lysate of the patients of the study group and the comparison group did not significantly differ between the healing periods, which indicates the absence of damage to the vascular endothelium (Table). Conclusions Thus, the combination of high-intensity laser and intraoperative microscopy improves the effectiveness of surgical treatment of patients with lesions of the periapical tissues of the wisdom tooth, as it reduces injury, increases the accuracy of surgical intervention and reduces the volume of osteotomy and root resection. The risk of recurrence and infection of the periapical root is reduced, since resection of the affected tissues can be completely controlled. Minimal root resection allows you to maintain the functional stability of the causal tooth.

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