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**THE STUDY OF THE USE OF AN ERBIUM LASER FOR SURGICAL TREATMENT OF ROOT
CYSTS OF THE JAWS*****Tashmuhammedova Shaxnoza****Samarkand State Medical University, Uzbekistan****Sadriyev Nizom Najmiddinovich****Samarkand State Medical University, Uzbekistan***ABOUT ARTICLE**

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Abstract: The problem of surgical treatment of patients with odontogenic root cysts (periodontal ligament) remains relevant to this day. This is due to the high frequency of this disease. Periodontal root cysts account for about 86% of all odontogenic cysts and 7-15% of all diseases of the maxillofacial region. In addition, the urgency of the problem of treating patients with odontogenic jaw cysts is due to the possible development of complications of surgical treatment (cystectomy or cystotomy) using cutting or rotating tools: damage to neighboring anatomical structures, infection, suture divergence and disease recurrence - all this leads to long-term treatment [1-6]. Despite the extensive arsenal of surgical methods and medications used to treat patients with this disease, this problem is not considered to be completely solved.

INTRODUCTION

The difficulty of diagnosing and treating this condition is partly due to its proximity to anatomically significant objects. This inflammatory cyst arises from a cystic granuloma. Cyst growth does not occur due to epithelial proliferation, but as a result of increased intraluminal pressure. Thus, the volume of the cyst increases with the resorption and restructuring of the surrounding bone tissue; in 40% of cases, the cause of the development of a radial cyst is caries-affected teeth; in 60% of cases, the cyst develops

as a complication of endodontic treatment; in 60% of cases, the cyst is the result of a pulp infection. In some cases, necrotic pulp is squeezed out of the root apex with the subsequent development of periodontitis or pulp traumatization, especially when removing tartar under anesthesia [7, 8]. According to radiation studies, complications of endodontic treatment include root perforation, omission, inhomogeneous filling, excessive intake of material into the periodontal ligament and insufficient sealing of the oral cavity or crown area [8-10]. The main methods of surgical treatment, depending on the size of the jaw crest cyst, are cystotomy and cystectomy. In some cases, surgical treatment may be complicated by secondary infection, relapses and the formation of fistulas due to residual bacterial colonies in a complex branched system of lateral, triangular and root canals with additional anastomoses. The use of modern high-intensity lasers reduces the likelihood of these undesirable effects of treatment. Dental Er:YAG lasers with a wavelength of 2940 nm are capable of producing intense short pulses and are characterized by the ability to automatically adjust operating parameters (energy, duration, frequency and pulse shape) depending on the nature of the procedure by selecting them on the monitor. The energy of the laser light wave is focused into space in the form of a very narrow beam with high directivity, monochromaticity and continuous or short-pulse energy transfer. The focused laser beam acts as a very sharp and aseptic cutting tool, allowing operations to be performed without direct contact with tissues, with pronounced hemostasis and anesthesia. The erbium laser beam is capable of cutting both soft and hard tissues. Laser irradiation of tissues occurs without pressure and friction and is not accompanied by vibration. Ablation (evaporation) occurs in tissues affected by laser radiation as a result of thermomechanical processes. The chromophore of an erbium laser is water, a substance capable of absorbing laser light energy and converting it into thermal energy. It is water that evaporates from the tissue during laser irradiation. The process of ablation (tissue cutting) occurs only when a certain energy density (ablation threshold) is exceeded. This threshold is approximately 3.3 J/cm² for enamel, 2.8 J/cm² for dentin, 1.3 J/cm² for bone and 0.8 J/cm² for skin. In subablation zones (below the ablation threshold), only heating and drying of tissues occurs [2, 5, 11, 12]. In this regard, it is of interest to study the effectiveness of laser cystectomy using an Er:YAG laser. In this case, an erbium laser should be used to resect the tip of the root, remove the remnants of the shell and sterilize the walls of the resulting bone defect. In case of large cysts, it is advisable to fill the postoperative defect with bone-forming material (1). This contributes to the formation of high-quality bone regeneration products and stimulates the activity of cellular factors of local immunity [3]. The purpose of this study was to study the effectiveness of surgical treatment of patients with jaw root cysts using an Er:YAG laser.

MATERIALS AND METHODS

Examination and surgical treatment of patients with root cysts of the jaws of various localization (n=55; 33 women and 22 men, age 21-62 years) were performed. Of these, 19 mandibular and 36 maxillary; heterogeneous osteogenic material "Osteodent" was used to replace the formed bone defects in 22 patients; 29 patients underwent traditional cystectomy, 16 of them with the use of "Osteodent"; 26 patients underwent Er:YAG laser laser cystectomy using an Er:YAG laser, 16 of them also used Osteodent. The erbium Er:YAG laser (DECA Smart 2940D plu, Italy) is characterized by a wavelength of 2940 nm, an energy of 50-500 MJ and a pulse frequency of 10-30 Hz. The pulse duration is 230-700 microseconds (see Fig. 1). Laser cystectomy is based on traditional cystectomy methods. Using an erbium laser with an energy of 100 MJ and a pulse frequency of 10 Hz, a vertical incision is made at the location of the cyst or inside the bone, with a trapezoidal arcuate incision in the area of the transitional fold. Then, at an energy of 150 MJ, a pulse frequency of 10 Hz, in the mode of ultrashort pulses (short pulse - 230 microseconds), the cyst expanded to its diameter, and the bone molar expanded or the bone was perforated in the projection of the cyst. For resection of the root part of the cyst, the energy was increased to 200 MJ, and the pulse frequency was increased to 20 Hz. Sterilization of the wall surface of the formed postoperative bone defect was performed using a defocused laser beam (fiber at a distance of 1.5 cm from the wall surface) with an energy of 100 MJ and a pulse frequency of 10 Hz. Then the laser was irradiated on the ablated surface of the root with energy for 15 seconds.

RESULTS AND DISCUSSION

The use of a high-intensity erbium laser has increased the effectiveness of treatment of patients with root cysts of the jaws. Clinical research data revealed a significant difference in performance depending on the method of surgical treatment. The results showed a pronounced postoperative pain syndrome requiring the use of analgesics in all patients who underwent traditional cyst removal. Moreover, the pain persisted for up to 4-5 days after surgery, while using laser technology, less intense pain, which did not require the use of analgesics, was observed for 1-1.5 days. This may be due to the fact that the laser energy is absorbed by the cellular fluid, and not by the nerve endings, therefore, when using a laser, there is no stress effect on nerve cells. In addition, when using a laser, tissues are less injured. With a conventional cystectomy, collateral edema of soft tissues was observed for 3-5 days, with the use of an Er:YAG laser, collateral edema was less pronounced and was detected within 2-3 days. This is probably due to the short duration, accuracy and selectivity of laser irradiation, the absence of intraoperative pressure on tissues, friction and vibration, as well as minimal traumatization of surrounding tissues. The healing process of laser wounds is not accompanied by neutrophil infiltration, which is characteristic of "scalpel wounds" with traditional methods. With conventional cystectomy,

epithelialization was observed on day 7-8, whereas with surgical laser surgery - on day 5-6, and the sutures could be removed faster (Fig. 3). It is noteworthy that 19 patients were treated for single or double recurrences of radial cysts. Relapses and fistula formation were not observed for 1-2 years after laser removal of cysts. The data of the radiation method studies conducted 1, 3 and 6 months after surgery determined the activation of bone regeneration processes in postoperative defects in patients after laser cystectomy. When bone beams filled the entire cavity of the bone defect after laser surgery, only a small number of beams were observed in patients after traditional cystectomy. 12 months after laser cystectomy, the osteogenic process was completed in all patients. With traditional treatment, bone formation was slow in more than half of the patients, and alternation of young and mature bone tissue was observed. Besides, there was less mature bone. Radiation studies have revealed the specifics of bone tissue restoration in postoperative defects after laser treatment. Early formation of the cortical layer along the periphery of the defect was observed, followed by restoration from the periphery to the center. In the case of the usual restoration of a bone defect after cystectomy, there was a uniform delay in bone restoration through a soft-tissue corn along the entire length of the defect. The data obtained are consistent with experimental studies of bone regeneration in rabbits using irradiation methods. Thus, according to microfocus radiography, the authors revealed the same specifics of healing of laser defects applied to the mandibular angle of rabbits with an erbium laser [13]. In short, an analysis of clinical research methods has shown that the use of erbium:YAG laser helps to reduce pain reactions, postoperative edema and epithelialization time. These irradiation techniques determined that the formation of dense bone regenerate in the postoperative period occurred faster than with traditional treatment.

CONCLUSIONS

Analysis of the results of clinical and X-ray studies has shown that the consistent use of erbium and neodymium lasers in the surgical treatment of excision of the mandibular root cyst effectively reduces intraoperative tissue injury, shortens treatment time, reduces the risk of infection of the periodontal ligament from the canal system and contributes to the prevention of disease recurrence, thus the results of this study showed that it can be used for

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