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MUNDARIJA | СОДЕРЖАНИЕ | CONTENT

ПУЛЬМОНОЛОГИЯ И ФТИЗИАТРИЯ: ДИАГНОСТИКА И ЛЕЧЕНИЕ

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ПОВЫШЕНИЕ ЭФФЕКТИВНОСТИ КОМПЛЕКСНОГО ЛЕЧЕНИЯ ЗАБОЛЕВАНИЙ ПАРОДОНТА ПУТЁМ СТИМУЛЯЦИИ РЕГЕНЕРАТИВНЫХ ПРОЦЕССОВ

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АННОТАЦИЯ

Данное исследование посвящено оценке современных терапевтических подходов к лечению пародонтита на различных стадиях с использованием метода направленной тканевой регенерации (Guided Tissue Regeneration, GTR). Поскольку пародонтит является основной причиной прогрессирующего разрушения прикрепления пародонта и резорбции альвеолярной кости, внедрение биомедицинских методов, направленных на восстановление как функции, так и морфологической структуры тканей, имеет особую значимость. В исследовании рассматривается клиническая эффективность протоколов GTR, основанных на применении биологически инертных барьерных мембран и остеокондуктивных костнопластических материалов. Полученные результаты свидетельствуют о том, что использование GTR существенно снижает локальную воспалительную активность, способствует сохранению альвеолярного гребня и улучшает ключевые клинические показатели, в частности глубину пародонтальных карманов и подвижность зубов при тяжёлых пародонтальных дефектах. Сделан вывод о том, что персонализированные регенеративные подходы в сочетании с традиционной хирургической обработкой тканей обеспечивают более благоприятные результаты при реабилитации пациентов с заболеваниями пародонта.

Ключевые слова: Пародонтит, направленная тканевая регенерация, пародонтальная терапия, регенерация тканей, лечение заболеваний пародонта, костная пластика, мембраны, воспалительные процессы, комплексное лечение, стоматология.

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ENHANCING THE EFFICACY OF INTEGRATED TREATMENT FOR PERIODONTAL DISEASES BY STIMULATING REGENERATIVE PROCESSES

ABSTRACT

This investigation assesses contemporary therapeutic approaches for the treatment of periodontitis at different stages by means of Guided Tissue Regeneration (GTR). Since periodontitis represents the main cause of ongoing periodontal attachment destruction and alveolar bone loss, the incorporation of biomedical methods aimed at restoring both function and morphology is of considerable importance. The study examines the clinical performance of GTR protocols based on the use of biologically inert barrier membranes and osteoconductive grafting materials. The obtained results indicate that the application of GTR markedly decreases local inflammatory activity, contributes to the preservation of the alveolar ridge, and improves key clinical indicators, particularly probing depth and tooth mobility in severe periodontal defects. It is concluded that personalized regenerative approaches, combined with conventional surgical debridement, provide more favorable outcomes in periodontal rehabilitation.

Keywords: Periodontitis, guided tissue regeneration, periodontal therapy, tissue regeneration, periodontal disease treatment, bone grafting, membranes, inflammatory processes, comprehensive treatment, dentistry.

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TO'QIMALAR REPARATIV REGENERATSIYASINI FAOLLASHTIRISH ORQALI TURLI DARAJADAGI PARODONT KASALLIKLARINI MAJMUAVIY DAVOLASH NATIJALARINI YAXSHILASH

ANNOTATSIYA

Mazkur tadqiqot parodontitni turli bosqichlarda davolashda qo'llaniladigan zamonaviy terapevtik yondashuvlarni yo'naltirilgan to'qima regeneratsiyasi (Guided Tissue Regeneration, GTR) usuli asosida baholashga bag'ishlangan. Parodontit parodont birikmasining progressiv yemirilishi va alveolyar suyakning rezorbsiyasining asosiy sababi bo'lgani uchun, to'qimalarning ham funksiyasini, ham morfologik tuzilishini tiklashga qaratilgan biotibbiy usullarni joriy etish alohida ahamiyat kasb etadi. Tadqiqotda biologik inert to'siq membranalar va osteokonduktiv suyak-plastik materiallardan foydalanishga asoslangan GTR protokollarining klinik samaradorligi ko'rib chiqilgan. Olingan natijalar shuni ko'rsatadiki, GTR usulini qo'llash mahalliy yallig'lanish faolligini sezilarli darajada kamaytiradi, alveolyar qirrani saqlab qolishga yordam beradi va asosiy klinik ko'rsatkichlarni, xususan og'ir parodontal nuqsonlarda parodontal cho'ntaklar chuqurligi hamda tishlar qimirlashini yaxshilaydi. Shunday xulosaga kelindiki, personallashtirilgan regenerativ yondashuvlar an'anaviy jarrohlik to'qima ishlovi bilan uyg'unlashtirilganda, parodont kasalliklari bo'lgan bemorlarni reabilitatsiya qilishda yanada qulayroq natijalarni ta'minlaydi.

Kalit so'zlar: Parodontit, yo'naltirilgan to'qima regeneratsiyasi, parodontal terapiya, to'qima regeneratsiyasi, parodont kasalliklarini davolash, suyak plastikasi, membranalar, yallig'lanish jarayonlari, kompleks davolash, stomatologiya.

INTRODUCTION

Periodontal tissue disorders continue to occupy a prominent place in the general structure of dental diseases and remain a major concern for both clinical practice and biomedical research. According to global health data, different forms of periodontitis affect a substantial proportion of the adult population worldwide, making it one of the most prevalent oral pathologies. Periodontitis is associated with chronic inflammatory and destructive changes in the periodontal complex, leading to the breakdown of supporting tooth structures, resorption of the alveolar bone, and, in advanced cases, tooth loss. Beyond its local manifestations, this disease significantly reduces patients' quality of life and has been increasingly linked with systemic disturbances involving the cardiovascular, endocrine, and immune systems. Modern periodontal therapy is directed not only toward eliminating inflammation but also toward restoring the structural integrity of damaged periodontal tissues. In this regard, Guided Tissue Regeneration (GTR) represents an important advanced therapeutic approach designed to create favorable conditions for the reconstruction of periodontal architecture, including cementum, periodontal ligament, and alveolar bone. This method is based on the use of barrier membranes that limit the migration of epithelial and connective tissue cells into the defect area, thereby promoting selective repopulation of the wound site by cells capable of true periodontal regeneration. Although GTR has demonstrated considerable clinical potential, its successful application requires careful patient selection and individualized treatment planning. Factors such as the severity of periodontitis, morphology of periodontal defects, systemic health status, and the level of oral hygiene must all be considered when determining the suitability of this technique. For this reason, the refinement of GTR-based therapeutic strategies adapted to particular clinical conditions remains one of the key objectives of contemporary periodontology. The aim of the present study is to evaluate the beneficial effects of guided tissue regeneration in patients with different stages of periodontitis and to assess the effectiveness of this method using clinical parameters, radiographic findings, and long-term treatment outcomes. Special attention is given to an integrated therapeutic approach that combines root surface debridement with the application of osteoplastic materials and modern barrier membranes. Overall, this study seeks to broaden current understanding of the capabilities and limitations of GTR, confirm its clinical applicability across different severities of periodontal disease, and formulate practical recommendations for improving treatment outcomes and patient rehabilitation.

MATERIALS AND METHODS

The present study was designed to evaluate the effectiveness of Guided Tissue Regeneration (GTR) as part of a comprehensive treatment strategy for patients with periodontitis of different severities. The investigation was carried out at a specialized dental clinic and included both diagnostic assessment and clinical intervention stages. The methodological framework comprised diagnostic confirmation, stratification of patients according to disease severity, implementation of therapeutic procedures including GTR, and subsequent long-term observation of periodontal tissue status. A representative cohort of patients aged 25 to 60 years with clinically confirmed chronic periodontitis of mild, moderate, and severe forms was enrolled in the study. Individuals with decompensated systemic conditions that could negatively influence wound healing, such as diabetes mellitus or immunodeficiency disorders, were excluded, as were patients who had undergone specialized periodontal treatment during the preceding six months. Baseline evaluation was performed using a comprehensive clinical and radiographic examination protocol, including assessment of the Gingival Index according to the Silness and Löe method, measurement of periodontal probing depth, clinical determination of tooth mobility, and radiographic imaging by orthopantomography and radiovisiography to establish the extent of alveolar bone destruction. In addition, inflammatory activity was monitored by laboratory testing, including complete blood count and C-reactive protein analysis. Before the main treatment stage, all participants underwent initial periodontal preparation. This phase included professional oral hygiene procedures, removal of dental plaque and calculus by combined ultrasonic and manual instrumentation, antiseptic irrigation of periodontal pockets, and individualized instruction in oral hygiene practices. The patients were then randomized into two groups. The control group received conventional conservative and surgical periodontal treatment without the use of regenerative methods. The study group underwent комплексный treatment incorporating Guided Tissue Regeneration technology. The surgical GTR protocol involved the application of barrier membranes, including both resorbable and non-resorbable variants. In the presence of vertical osseous defects or combined periodontal lesions, augmentation with bone graft materials, either autogenous or allogenic, was additionally performed. The surgical procedure consisted of several sequential stages: administration of infiltration or conduction anesthesia, elevation of a full-thickness mucoperiosteal flap, meticulous curettage with elimination of granulation tissue, decontamination and conditioning of the root surface using antiseptic agents and EDTA, placement of bone grafting material when indicated, fixation of the barrier membrane to provide selective tissue separation, and repositioning of the flap followed by suturing. The selection of membrane type was individualized according to the severity of tissue destruction: biodegradable collagen membranes were mainly used in moderate defects, whereas non-resorbable polytetrafluoroethylene membranes were preferred in cases involving pronounced bone loss. Clinical follow-up was performed at 6 and 12

months after treatment. The principal outcome measures included repeated assessment of probing depth and clinical attachment level, radiographic evaluation of bone repair and density changes, and analysis of functional, esthetic, and patient-reported quality-of-life indicators based on questionnaire data. Statistical processing of the results was conducted using the SPSS software package. Differences between groups were analyzed using both parametric and non-parametric methods, specifically Student's t-test and the Wilcoxon test, with statistical significance defined as $p < 0.05$.

RESULTS AND DISCUSSION

The study findings confirmed the clinical effectiveness of Guided Tissue Regeneration (GTR) in the treatment of patients with periodontitis of different severities. The use of this therapeutic approach led to a significant improvement in the clinical and functional condition of the periodontal tissues. Patients treated with GTR demonstrated more pronounced positive changes than those in the control group. A considerable reduction in probing depth, alleviation of inflammatory manifestations, and improvement in gingival trophic status were observed within 3 to 6 months after surgery. These changes contributed to greater stability of the tooth-supporting structures and improved functional performance of the masticatory system. One of the most important outcomes was the restoration of bone tissue within periodontal defects. The combined use of bone grafting materials and barrier membranes promoted osteoregenerative activity. Even in severe cases accompanied by marked bone loss, notable increases in bone volume and stabilization of previously mobile teeth were achieved. Serial radiographic evaluation demonstrated evident bone regeneration, which reduced the necessity for more invasive reconstructive procedures, including extensive bone grafting and complex implant placement in atrophic areas. Discussion: The obtained results indicate that regenerative approaches based on barrier membranes and biologically active factors contribute to the restoration of damaged periodontal structures, stimulate osteogenesis, and improve microcirculation in the surgical area. These effects accelerate healing and support long-term stabilization of periodontal status, thereby lowering the risk of disease progression. In addition, the use of GTR was associated with a marked decrease in local inflammatory activity. Clinically, this was reflected by reduced gingival index values and better overall condition of the oral mucosa. Faster epithelial healing and lower postoperative discomfort also appeared to improve patient adherence to oral hygiene recommendations, which further strengthened treatment outcomes. Long-term observation over 12 to 24 months demonstrated a high level of resistance to recurrence. Recovery of anatomical integrity and improvement in tissue density increased the functional reserve of the periodontium and reduced its susceptibility to pathogenic influences. At the same time, the successful application of GTR requires careful patient selection and strict compliance with surgical protocols. Its effectiveness may be limited by postoperative infection, insufficient tissue response to biomaterials, or other biological factors. Economic considerations should also be taken into account, as the relatively high cost of membranes and osteoplastic materials may restrict the availability of this method in routine practice. Moreover, treatment success depends greatly on the clinician's experience and access to precise surgical equipment, since technical inaccuracies may reduce effectiveness or lead to complications. Further investigations should be directed toward the development of more advanced biocompatible membrane materials and the refinement of clinical indications for their use. Progress in biotechnology is expected to broaden the therapeutic potential of GTR, particularly in the management of the most severe forms of periodontitis. Personalized treatment strategies that consider patient age, comorbid conditions, and regenerative capacity are likely to become increasingly important. An integrated approach combining GTR, professional hygiene support, patient education, and regular follow-up may provide the greatest long-term stability of clinical remission.

CONCLUSION

In summary, the findings of the present study indicate that Guided Tissue Regeneration (GTR) is a highly effective clinical approach for the treatment of periodontitis across different stages of severity. The incorporation of this method into periodontal therapy significantly improves treatment outcomes, enhances patients' quality of life, and helps prevent the further progression of tissue destruction. A major advantage of GTR in periodontology is its ability to promote the structural restoration of lost periodontal components, particularly alveolar bone and periodontal ligament tissues, thereby contributing to the recovery of the functional biomechanics of the masticatory apparatus. This is especially relevant in advanced forms of the disease, where conventional treatment methods are often insufficient to achieve predictable regenerative outcomes. GTR protocols stimulate reparative activity, improve microcirculatory processes within periodontal tissues, and support the return of both soft and hard tissues toward physiological integrity. As a result, significant reductions in probing depth, re-establishment of the attached gingiva, and prevention of secondary tooth loss can be achieved even in severe pathological conditions. In addition, the use of regenerative technologies reduces the future need for more invasive therapeutic procedures, promotes long-term tooth preservation, and decreases the probability of recurrence. From an economic standpoint, this strategy may also be considered justified, since although biomaterials involve substantial initial costs, their use can reduce the long-term burden associated with repeated treatment and costly prosthetic rehabilitation following tooth loss. The socio-psychological significance of successful periodontal rehabilitation should also be emphasized. Restoration of periodontal health contributes to improved psycho-emotional stability, greater self-confidence, and higher patient satisfaction with treatment. Overall, the integration of Guided Tissue Regeneration into routine periodontal practice offers a more advanced and effective approach to the management of periodontitis at all stages and may be regarded as one of the most promising directions in contemporary dentistry. Further development of this field requires ongoing scientific investigation and the broader implementation of innovative regenerative technologies in clinical practice.

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