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EXPERIMENTAL AND CLINICAL BASIS FOR EMPLOYING OSTEOPLASTIC MATERIALS IN THE RECONSTRUCTION OF MANDIBULAR BONE DEFECTS

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Introduction

Restoration of jaw bone defects is one of the key tasks in the field of maxillofacial surgery and dentistry. Defects can occur for a variety of reasons, including trauma, tumors, congenital abnormalities, and infectious diseases. Traditional restoration methods include the use of auto-, allo- and xenografts. However, modern biomaterials, such as osteoplastic materials, offer new opportunities for bone tissue regeneration. This article discusses experimental and clinical studies that substantiate the use of osteoplastic materials for the restoration of jaw bone defects.

Biocompatibility and osseointegration

Biocompatibility of osteoplastic materials is a critical factor for their successful application. Materials must be inert, not cause inflammatory reactions, and integrate with the surrounding bone tissue. Research shows that materials based on hydroxyapatite, tricalcium phosphate and bioglass are highly biocompatible. These materials not only do not cause an immune response, but also promote active regeneration of bone tissue.

Osseointegration is the process of forming a direct structural and functional connection between bone tissue and the implanted material. Osteoplastic materials stimulate osteoblasts to produce new bone tissue, providing a strong connection to existing bone. Experimental studies in animal models have shown that osteoplastic materials promote faster and better integration compared to traditional grafts.

Research methods

Clinical trials include several stages: preliminary studies in animals, pilot studies in small groups of patients, and large-scale clinical trials. These studies evaluate parameters such as the rate of healing, the degree of restoration of functionality and aesthetics of the jaw, and the incidence of complications.

Clinical trial results

Clinical studies confirm that the use of osteoplastic materials accelerates the healing process and improves the quality of restored bone tissue. For example, studies show that the use of hydroxyapatite leads to a significant reduction in the rehabilitation time of patients after maxillofacial surgery. Restoration of jaw defects using osteoplastic materials also demonstrates high aesthetic results, which is especially important in dentistry.

Comparative analysis of materials

Synthetic osteoplastic materials such as hydroxyapatite and bioglass have high stability and predictable performance. They provide good biocompatibility and osseointegration, making them preferred for many clinical applications.

Allografts and xenografts, which are bone tissue obtained from other humans or animals, respectively, are also widely used. They have a natural structure that promotes integration, but can cause immune reactions and infections. Comparative studies show that synthetic materials are often preferred due to their stability and lower risk of complications.

Side effects and complications

Despite their high efficiency, the use of osteoplastic materials may be accompanied by some complications. Among them, the most common are inflammatory reactions, insufficient osseointegration and material resorption. These complications may require additional medical intervention and correction of the treatment process.

Prevention methods

To minimize risks, various methods for preventing complications are being developed. The inclusion of antibacterial agents in osteoplastic materials, optimization of surgical techniques and careful preoperative planning can

significantly reduce the incidence of complications and increase the overall success of treatment.

Long term results

Assessing the long-term stability of regenerated bone tissue is an important aspect to confirm the effectiveness of osteoplastic materials. Clinical observations show that bone tissue restored with their help retains its functionality and structural integrity for many years.

Long-term results also include evaluation of functionality and aesthetics. Patients treated with osteoplastic materials demonstrate improvements in chewing function, speech, and overall facial aesthetics, which contributes to an improved quality of life.

Conclusion

Experimental and clinical substantiation of the use of osteoplastic materials for the restoration of jaw bone defects confirms the significant advantages of this approach. High biocompatibility, efficiency of bone tissue regeneration, minimization of side effects and positive long-term results make osteoplastic materials a promising solution in dental and maxillofacial surgery. Continued research and development in this area will further improve treatment options and patients' quality of life.

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