EURASIAN JOURNAL OF ACADEMIC RESEARCH
Innovative Academy Research Support Center
UIF = 8.1 | SJIF = 7.899 www.in-academy.uz

EXPERIMENTAL USE OF XENOTRANSPLANT IN SINUS LIFT OPERATION

Shadiev Sadulla Samekhjanovich
Assistant teacher department of Maxillofacial Surgery, Samarkand State Medical University, Samarkand, Republic of Uzbekistan
https://doi.org/10.5281/zenodo.13860772

ARTICLE INFO

Received: 24th September 2024
Accepted: 29th September 2024
Online: 30th September 2024

KEYWORDS

Implantation, xenograft, sinus lifting.

ABSTRACT

An experimental study was conducted on mongrel dogs aged 1–2 years weighing 8–12 kg. A brefoxeno graft was prepared from the bone tissue of newborn lambs, demineralized according to the method of V.I. Savelyev and canned according to the method of V.F. Parfentyeva. During sinus lifting, demineralized lamb bone tissue (DLBT) was used in the form of crushed stone. After 1, 3, 6, 9 months, the animals were killed by decapitation under ether anesthesia. The material was examined under an electron microscope.

It has been experimentally established that demineralized bone tissue transplanted into the defect site undergoes restructuring and stimulates both periosteal and endosteal bone restructuring, which acquires the structure of compact lamellar bone by the end of the year.

ЭКСПЕРИМЕНТАЛЬНОЕ ПРИМЕНЕНИЕ КСЕНОТРАНСПЛАНТАТА ПРИ ОПЕРАЦИИ СИНУСЛИФТИНГ

Шадиев Саъдулла Самехжанович
Ассистент кафедра Челюстно-лицевой хирургии, Самаркандский Государственный медицинский Университет, г. Самарканд, Республика Узбекистан
https://doi.org/10.5281/zenodo.13860772

ARTICLE INFO

Received: 24th September 2024
Accepted: 29th September 2024
Online: 30th September 2024

KEYWORDS

Имплантация, ксенотрансплантат, синус лифтинг.

ABSTRACT

Проведено экспериментальное исследование на беспородных собаках в возрасте 1–2 года массой 8–12 кг. Заготовлен брефоксено-трансплантат из костной ткани новорожденных ягнят, деминерализованный по методу В.И. Савельева и консервированный по методу В.Ф. Парфентьевой. При синуслифтинге применяли деминерализованную костную ткань ягненка (ДКТЯ) в виде щебенки. Через 1, 3, 6, 9 месяцев животных забивали методом декапитации под эфирным наркозом. Материал исследовали под электронным микроскопом.

EURASIAN JOURNAL OF ACADEMIC RESEARCH
Innovative Academy Research Support Center
UIF = 8.1 | SJIF = 7.899 www.in-academy.uz

Экспериментально установлено, что пересаженная в участок дефекта деминерализованная костная ткань претерпевает перестройку и стимулирует как периостальную, так и эндостальную перестройку кости, приобретающую к концу года структуру компактной пластинчатой кости.

SINUSLIFTING OPERATSIYASIDA KSENOTRANSPLANTATNI TAJRIBA SIFATIDA QO‘LLASH

Shadiyev Sa'dulla Samexjanovich
Samarqand davlat tibbiyot universiteti Yuz-jag‘ jarrohligi kafedrasi assistenti,
Samarqand sh. O‘zbekiston Respublikasi
https://doi.org/10.5281/zenodo.13860772

ARTICLE INFO

Received: 24th September 2024
Accepted: 29th September 2024
Online: 30th September 2024

KEYWORDS

Implantatsiya, ksenotransplantat, sinus lifting.

ABSTRACT

1-2 yoshli 8–12 kg og‘irlikda bo‘lgan zotsiz itlarda tajriba tadqiqotlari o‘tkazildi. V.I. Saveleva usulida demineralizatsiya qilinib, V.F. Parfentьeva usulida konservatsiya qilingan, yangi tug‘ilgan qo‘zichok suyagidan brefokseno-transplantat tayyorlandi. Sinusliftingda demineralizatsiyalangan qo‘zichoq suyagini (DQS) shebenka shaklida qo‘llanildi. 1, 3, 6, 9 oylarda efir narkoz ostida xayvonlarni dekapitatsiya qilingan. Olingan material elektron mikroskopda tekshirilgan.

Tajribada aniqlandiki nuqson sohasiga ko‘chirilgan demineralizatsiyalangan suyak to‘qimasi qayta quriladi va suyakning periostal va endoossal o‘sishini rag‘batlantirib yil oxirida yetuk kompakt strukturali suyak hosil bo‘lishiga olib keladi.

Relevance. At the present stage of development of implantology, building up atrophied bone of the alveolar process with secondary adentia remains an urgent task. Recently, the need for osteoplastic materials in dental practice has been increasing, since their use is not limited to filling jaw defects during cystectomies, tumor removal, and injuries.

The need for osteoplastic operations is increasingly determined by the widespread development of implantology. To install the most popular intraosseous implants, a sufficient volume of bone tissue in the alveolar part of the jaws is required. At the same time, untimely application for prosthetics leads to significant bone atrophy at the site of tooth extraction and measures for bone augmentation of the alveolar crest become relevant.

Synthetic, allogeneic materials, as well as autologous bone, compete with each other when it comes to choosing an osteoplastic material in different clinical situations. Currently, there is no universal material that satisfies doctors in terms of ease of use, efficiency, cost, etc. A study

of the literature shows that bone auto- and alloplasty has become firmly established in the everyday practice of maxillofacial surgery [1.3].

But its widespread use in practical healthcare is limited by the small number of tissue banks, limited supplies of material, ethical and legal standards, especially in the Central Asian republics. In addition, the use of autoplastic material is fraught with complications and additional injury. In recent years, evidence has been accumulated indicating the high plastic properties of allobrefot fabrics.

However, the sources of these fabrics are limited, and ethical and legal problems arise when harvesting them [1.2.3].

According to Nikulina O.M. Closing a bone wound in the area of the angle of the lower jaw of an adult rabbit with an osteoplastic combination consisting of VSR-01, platelet-rich plasma (PRP) and Gapkol leads to activation of reparative processes [1.2.3].

As a result of the use of PRP together with the osteoplastic material VSR-01 and Gapkol, the process of resorption of damaged bone structures is activated 1 month after surgery, which coincides in time with the early activation of vascular growth at the periphery of the defect.

Bondarenko O.V. the characteristics of the bone-plastic material Bio-Oss (Geistlich, Switzerland) are given; insulating membrane Bio-Gide (Geistlich, Switzerland), OTP) [3]. The study is based on a comparative analysis of dental implantation in the field of using BIO-OSS and PRP materials for alveolar bone augmentation during traumatic extractions associated with vestibular compactosteotomy.

Analysis of osseointegration of dental implants in the area of previous alveolar bone augmentation revealed that the maximum effectiveness of dental implantation was achieved using a combination of natural hydroxyapatite Bio-Oss and PRP (100%), as well as with the isolated use of PRP (100%). In this regard, the search for new osteoplastic materials and the study of the effectiveness of different materials in dentistry will not stop. Local scientists have developed a method for replenishing bone defects in the jaws with a synthetic material based on biositall, which is widely used in practice today [1.2.3]. The biositall used is inferior in osteoinductive and antibacterial properties to brefoxenografts [2.3]. The preparation of such materials requires high technology, which limits its availability and implementation in widespread clinical practice.

The value of the method is reduced by the high cost of the material and, most importantly, by various complications, especially wound suppuration, which are observed in the postoperative period.

Materials and methods. Experiments were performed on outbred rabbits aged 3-6 months. weighing 2–3 kg. For use, we have prepared a brefoxeno graft from the bone tissue of newborn lambs, demineralized according to the method of V.I. Savelyev (1983) and canned according to the method of V.F. Parfentyeva (1986). The graft was prepared from flat and tubular bones of newborn or newborn lambs in the first 5 days from birth.

The tubular bones are sawed crosswise and the compact part of the bone is separated. The bones are placed in a demineralizing solution of hydrochloric acid suspended on a thread for 1–2 days at a temperature of +2–+50C. After softening, the bones are removed and washed

under running tap water for 1–2 hours. Then they are kept in saline or 0.1 M phosphate buffer solution for 0.5–1 hour.

For sterilization and preservation, the transplant is placed in a dark glass container without aseptic technique and filled with a 0.5% buffered formalin solution. The transplant is sterilized for 7 days at a temperature of +2 – +50C. The preservation solution is changed monthly. The day before use, the graft is transferred to an isotonic sodium chloride solution. It is preferable to use a graft in the form of crushed stone. The simplicity of preparing a xenograft under non-sterile conditions and an unlimited amount of raw materials gives access to use by a wide range of practitioners.

Under intraperitoneal anesthesia (Calipsol 4–6 mg/kg) in combination with local anesthesia (3–4 ml of 1% novocaine solution), after treating the surgical field with a 5% alcohol solution of iodine, a trapezoidal incision was made in the mucous membrane of the upper jaw. In the jaw, exposed from the periosteum, using a drill (1000 rpm), a compact plate of the anterior wall of the maxillary sinus with a diameter of 1.5 cm is removed. The mucous membrane of the sinus is carefully peeled off and lifted upward. The created cavity was filled with brefoxenograft crushed into crushed stone. The wound was sutured tightly in layers.

In the postoperative period, in all animals the wound healed by primary intention. After 1, 3, 6, 9 months, the animals were killed by decapitation under ether anesthesia. A fragment of the upper jaw, including the hamorous sinus and adjacent bone, was isolated, placed in a 5–7.5% nitric acid solution for 2 weeks for decalcification, then the bone pieces were washed for several hours in running water. Pieces of bone tissue from the defect area were dehydrated, compacted, and embedded in Araldite-Epon synthetic resins. Sections 1 μm thick were prepared using an LKB 2088 ultramicrotome, which were stained with basic fuchsin and methylene blue according to the Lily method.

Results of the study: After 7 days from the start of the experiment in the field of surgical intervention over the bone defect, a decrease in the intensity of vascular reactions and edema was noted. At the bone edges of the defects, a strip of osteocyte lysis and the phenomenon of lacunar resorption were observed. In the cortical plate, resorption phenomena were also detected slightly away from the edge of the defect, which in some places led to its significant.

On days 10–15, an active periosteal reaction was detected in the area of the bone wound. The periosteal callus had a narrowly looped nature. However, in the middle zone of the bone defect, the regenerate was represented by cellular fibrous tissue with an increase in collagenogenesis in the centrifugal direction. The products of tissue destruction in the wound area and the interaction of cells play an important role in the first stage of connective tissue growth. At the second stage, functionally active fibroblasts form bundles of collagen fibers that seal the bone tissue defect, scar the wound, reducing infiltration by lymphocytes and macrophages. The proportion of capillaries also decreases.

In dynamics, fibroblasts turn into fibrocytes, which are in close contact with collagen fibers. The “contact” interaction of fibrocytes and collagen fibers, as well as cells present in the wound area, remodel the resulting scar tissue into fibrous tissue. 1 month after the formation of the defect, a restructuring of the bone callus is observed, gradually spreading from the

periphery to the central zone. Although even by this time the bone callus still does not completely compensate for the defects of the defect.

Three months after the start of the experiment, a defect arose along the perimeter of the surrounding network of bone beams, alternating with areas of osteonecrosis and sequestration. The compact plate formed here is thinner than outside the defect, and quickly penetrates into the spongy structures.

By 6–9 months, the reparant in the bone defect acquires the character of a loose, wide-looped spongy substance, built of thin bone crossbars, the wide spaces between which are filled with fatty tissue. As for the outer cortical plate, it is only beginning to form, representing a thickening of the trabeculae located distally in the bone callus. The degree of differentiation of the bone substance remains low.

Thus, after damage to bone tissue and filling of the defect with blood, damage, inflammation, scarring with formation of fibrous tissue are observed sequentially. New formation of connective tissue includes phagocytosis of erythrocyte mass of damaged tissues, proliferation and activation of fibroblasts, fibrillogenesis, remodeling due to interaction of cells, reduction of the number of connective tissue cells and capillaries.

In the animals of the experimental group, in which the jaw defect was replaced with a xenograft, in the early stages after transplantation, a thin fibrous capsule is formed around it, the basis of which is young connective tissue. It limits the graft from the surrounding tissue. The fibrous capsule contains spindle-shaped fibroblasts and round lymphoid cells, bundles of collagen fibers having a mainly longitudinal direction. After 2 weeks, the fibrous capsule with a thickness of 700–1000 μm consists of mature connective tissue, including bundles of oriented collagen fibers and elongated flattened fibrocytes, fibroblasts, located between them.

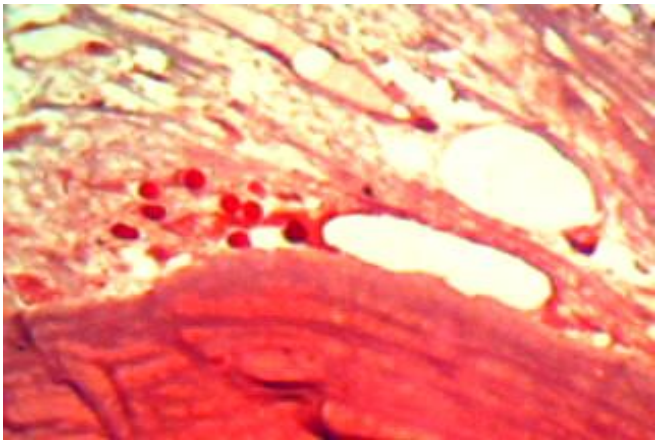
Layers of loose connective tissue and blood capillaries are rare in it. The architecture of the graft has not undergone any visible changes. 20–30 days after replacing the defect with a graft, the first signs of bone tissue regeneration are determined. Along the periphery of the graft, in the immediate vicinity of it, osteoblasts stand out, in some places stretching out into a chain. The graft is stained with methylene blue - fuchsin in different ways: bluish-violet along the periphery, pink in the center. The capsule around the graft is flattened to 120–150 microns and consists of denser connective tissue.

After 3 months, at the border with the soft tissue, layers of dense connective tissue are found, consisting of bundles of oriented collagen fibers, fibrocytes and fibroblasts. There are few blood capillaries in the capsule, however, their number increases near the graft (Fig. 1). This leads to the formation of bone plates, differentiation and an increase in the number of osteoblasts with basophilic cytoplasm. Electron microscopically, they contain a developed network of granular cytoplasmic membranes. Near the nucleus there is an enlarged Golgi complex, consisting of cisterns, vacuoles and vesicles.

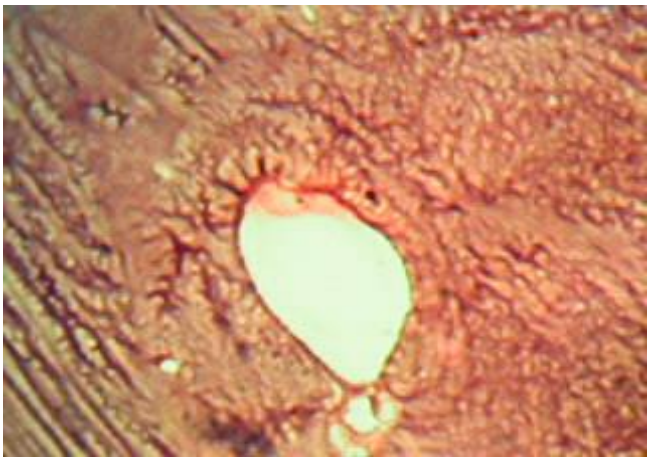
Bone trabeculae form 6–9 months after implantation. In the defect area along the periphery, thin bone plates are detected layering on top of each other; in some areas there are signs of osteon formation: channels containing blood vessels are formed, and 1 or 2 bone plates are concentrically located around one or two (Fig. 2). Forming along the periphery or around a

EURASIAN JOURNAL OF ACADEMIC RESEARCH
Innovative Academy Research Support Center
UIF = 8.1 | SJIF = 7.899 www.in-academy.uz

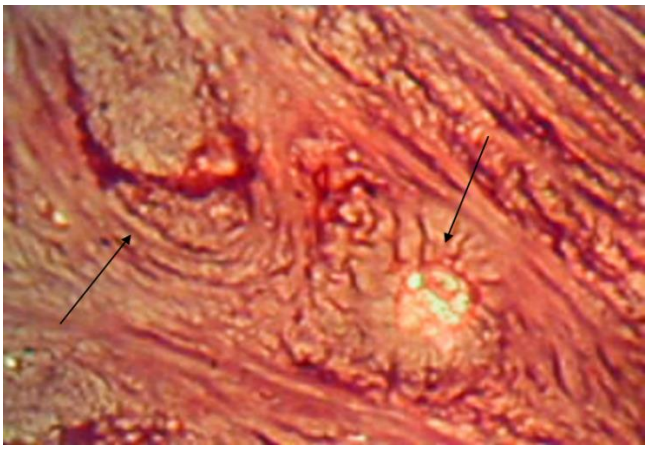
growing vessel, they gradually enclose osteoblasts, which acquire the characteristics of osteocytes (Fig. 3).



Drawing. 1. DCT transplant after 3 months. after implantation. Increase. × 200. Forming bone plates under the periosteum



Drawing. 2. DCT graft after 6 months Enlargement. x 200. Formation of concentrically located bone plates



Drawing. 3. DCT graft 9 months after implantation. Increase. x 200. Formation of osteons in the area of bone defect.

Electron microscopically, the granular endoplasmic reticulum and the Golgi complex are less developed in them. The processes become longer and penetrate the bone plates on both

sides. After 1 year, typical bone tissue is formed at the graft site, represented by osteons and parallel plates. In the center of the osteons there is a canal containing a blood vessel.

Thus, over the course of about one year, the graft rebuilt itself and acquired the structure of a compact lamellar bone. It must be assumed that the brefoxenograft realizes its stimulating effect on the processes of bone formation, first through the periosteal, and later through the endosseous elements.

Conclusions.

1. It has been experimentally established that demineralized bone tissue transplanted into the defect site undergoes restructuring and stimulates both periosteal and endosteal bone restructuring, acquiring the structure of compact lamellar bone by the end of the year.

2. The results of morphological and radiological studies provide justification for the use of demineralized lamb bone tissue as a highly effective material in sinus lift surgery.

Referenes:

1. Ибрагимов Д.Д. и др. Использование остеопластического материала для заполнения дефекта при радикулярных кистах челюстей // Достижения науки и образования, 2019. № 11 (52).
2. Shodiev S.S. Method of plasty of the lateral wall of themaxillary sins in sinus lifting/ Shodiev S.S., K.D. Olimjonovna //Science and innovation international scientific journal V.1. (D3).2022.-P. 189-192 SCINCE AND INNOVATION
3. Shodiyev S.S. Comparative evaluation of the use of various materials after tooth extraction in the preimplantation period /S.S. Shodiyev, B. Kodirova // International Bulletin of Medical Sciences and Clinical Research №3. (2)-P. 23-27.
4. Мусурманов Ф.И. Микробиологическая оценка эффективности фитотерапии при флегмонах челюстно-лицевой области/ Ф.И. Мусурманов, С.С. Шодиев// Проблемы биологии и медицины 2 (94).- 2020.-С.143
5. Шадиев С.С. Микробиологическая оценка эффективности фитотерапии при флегмонах челюстно-лицевой области у детей. С.С. Шадиев, Ф.И. Мусурманов. Журнал проблемы биологии и медицины.-2017.-С.-139-141
6. Shadiev S.S. Relationship of the parameters of endogenous intoxication with fatty acids in patients with phlegmons of the maxillofacial region/ SS Shadiev, MI Azimov// Украинский журнал хирургии.-2013-С.-102-105
7. Хамитова Ф. Совершенствование методов лечения одонтогенных кист челюстей/ Ф Хамитова, Ф.И. Мусурманов, С.С. Шадиев// Журнал проблемы биологии и медицины.-2017.-С.-132-134
8. Shadiev S.S. Endogenous intoxication level, contain fatty acids and their relationship in children with chronic osteomyelitis of the jaws/ S.S. Shadiev, D.U. Fozilova// Int. J. Med. Health Res 2 (12).- 2016.-P.-9-12 .
9. Мусурманов Ф.И. Способ лечения хронических синуситов с ороантральным сообщением путем свободной пересадки костного трансплантата/ Ф Мусурманов, С.С. Шадиев, Д.Д. Ибрагимов// Журнал вестник врача 1 (3).-2014.-С.-157-157.

10. Мусурманов Ф.И, Анализ заболеваемости гнойно-воспалительными процесами челюстно-лицевой области с метаболическим синдромом/ Ф.И. Мусурманов, Б.Ж. Пулатова, С.С. Шодиев, Ф. Файзуллаев// Материалы Международной учебно-методической конференции Оргкомитет конференции Председатель Алексеенко Сергей Николаевич–доктор … 2020
11. Гаффаров У.Б. Влияние препарата «холисал гель» на послеоперационное течение у пациентов после удаления ретинированных третьих моляров/ У.Б. Гаффаров, С.С. Шодиев, Ф.А. Исматов// СОВРЕМЕННЫЕ ДОСТИЖЕНИЯ СТОМАТОЛОГИИ: сборник, 2018-ББК 56.6 С.- 56
12. Олимжонова Ф.О. Прогностическое значение спектра цитокинов слюны и их изменения при острых и хронических рецидивирующих стоматитах у детей./ Ф.О. Олимжонова Г.У. Самиева, С.С. Шадиев. КОНЦЕПЦИИ ФУНДАМЕНТАЛЬНЫХ И ПРИКЛАДНЫХ НАУЧНЫХ ИССЛЕДОВАНИЙ: Агентство международных исследований. Международная научно практическая конференция. Уфа 09.12.2017г. часть 6.стр 83-85
13. Шадиев С.С. Bolalarda og’iz bo’shlig’idagi o’sma va o'smasimon xosilalar strukturasi va lokalizatsiyasi/ Шадиев С.С.// Journal of biomedicine and practice 9 (1).2024.-С. 307-314
14. Шадиев С.С. Изучение жирнокислотного состава крови при остеомиелитах челюстей у детей на фоне озонотерапии/ С.С. Шадиев, Д.У. Фозилова// Стоматология 1 (3 (68)).-2017.-С.61-64
15. Азимов М.И. Оценка эффективности озонотерапии у больных с флегмонами челюстно-лицевой области по маркерам эндогенной интоксикации/ М.И. Азимов С.С. Шадиев// Stomatologiya 1 (2 (67)).- 2017.-С. 85-87.
16. Shadiev S.S. The effectiveness of ozone therapy in treatment of acute osteomyelitis of jaws in children/ S.S. Shadiev. F.D. Ulugbekovna// European science review.2017.- P.-148-150.
17. Хамидова Г. Фитотерапия при лечении гингивитов/ Г Хамидова, С. Шадиев, А. Облокулов// Журнал проблемы биологии и медицины.-2016.-С. 107-110
18. Шадиев С.С. Некоторые аспекты лечения флегмон чло у детей/ С.С. Шадиев, С.Ш. Саидмурадова// Актуальные вопросы гигиенической науки: -2024.-С.414.
19. Шадиев С.С. Комплексное лечение периимплантитов с применением настойки аниса/ С.С. Шадиев, С.У. Назарова// Стоматология-наука и практика, перспективы развития.-2021.-С.238-240
20. Шадиев С.С. Применение фитотерапии при комплексном лечении флегмон челюстно-лицевой области у детей/ С.С.Шадиев //Евразийский журнал академических исследований 4 (5 Part 3).2024.-С. 7-13.