# EFFICIENCY OF THE CORONAL MOVEMENT OPERATION WITH LYOPHILIZED HUMAN GRAFT DURA MATER "LYOPLAST" ® FOR THE MULTIPLE RECESSIONS TREATMENT

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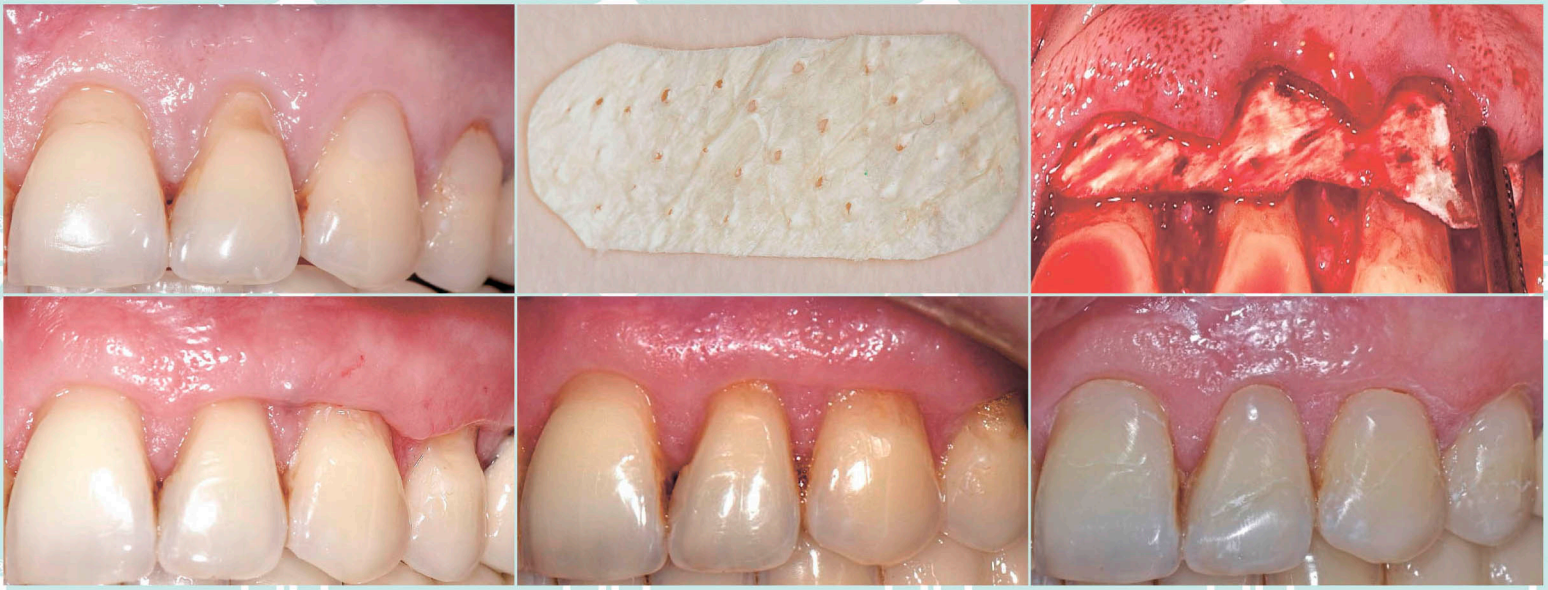
*This study analyzed the results of surgical treatment in 11 patients to eliminate 68 multiple recessions of the gums 1 and 2 according to Miller. This intervention was performed according to a two-layer technique in which the mucoperiosteal flap was displaced coronally and rotated. An allogeneic plastic material, the «Lyoplast» ® dura mater, was installed and fixed under it with complete overlapping of its mucoperiosteal flap. Thus, 68 gum recessions were operated on. Patients were monitored for a year after surgery. Quantitative evaluation of the results was carried out on a number of parameters after 6 and 12 months after surgery. One year after surgery, in 97% of cases, there was a complete closure of the roots of the teeth in the area of recessions, and an increase in the volume (thickness) of keratinized gums by 98.5% was obtained.*

**Keywords: gingival recession, Dura mater, keratinized gums, thickness of keratinized gums, autograft, coronal-rotated flap**



The present clinical study showed that the complete elimination of multiple gingival recessions and an increase in the attached gingiva in the recession area can be achieved using adequate surgical techniques in combination with the use of periodontal plastic material of allogeneic origin Dura mater, without using an autograft (free gum de-epithelialized transplant) and without creating a second surgical field.

## RESULTS

Sixteen patients, one of whom was a smoker, underwent treatment for 68 recessions in the area of 16 canines, 24 premolars, 3 first molars, 10 second incisors and 8 first incisors of the upper and lower jaws. Thirty-two Miller class 2 recessions, twenty-nine Miller class 1 recessions with the help of a coronally offset rotated flap using a two-layer technique combined with the use of periodontal plastic material of the dura mater perforated intraoperatively. At the end of each intervention, the wound edges were sutured with non-resorbable sutures 6.0, combining surgical nipples with deepithelized anatomical nipples, performing coronal displacement with rotation, while eliminating from 3 to 6 recessions.

One year after the operation, the initial value of the depth of recession (GR-2.65) decreased to 0.088; the depth of the periodontal pockets (ZDK-1.66) changed to 1.47 during sounding; ShKD-1.56 changed to 2.93; RRD-11.64 changed to 8.97; TKD-0.975 with up to 2.22; Pack-4,1 to 2,85.

12 months after the operation, in the area of 66 teeth of 97%, there was a complete closure of the roots in the area of recessions and an increase in the volume (thickness) of keratinized gums was obtained by a factor of 2.

# CREATING AN EXPERIMENTAL MODEL IN VIVO BY ADEQUATE SURGICAL TECHNIQUE IN A TWO-LAYER METHODOLOGY FOR THE TREATMENT OF MULTIPLE GUM RECESSIONS USING PLASTIC MATERIAL

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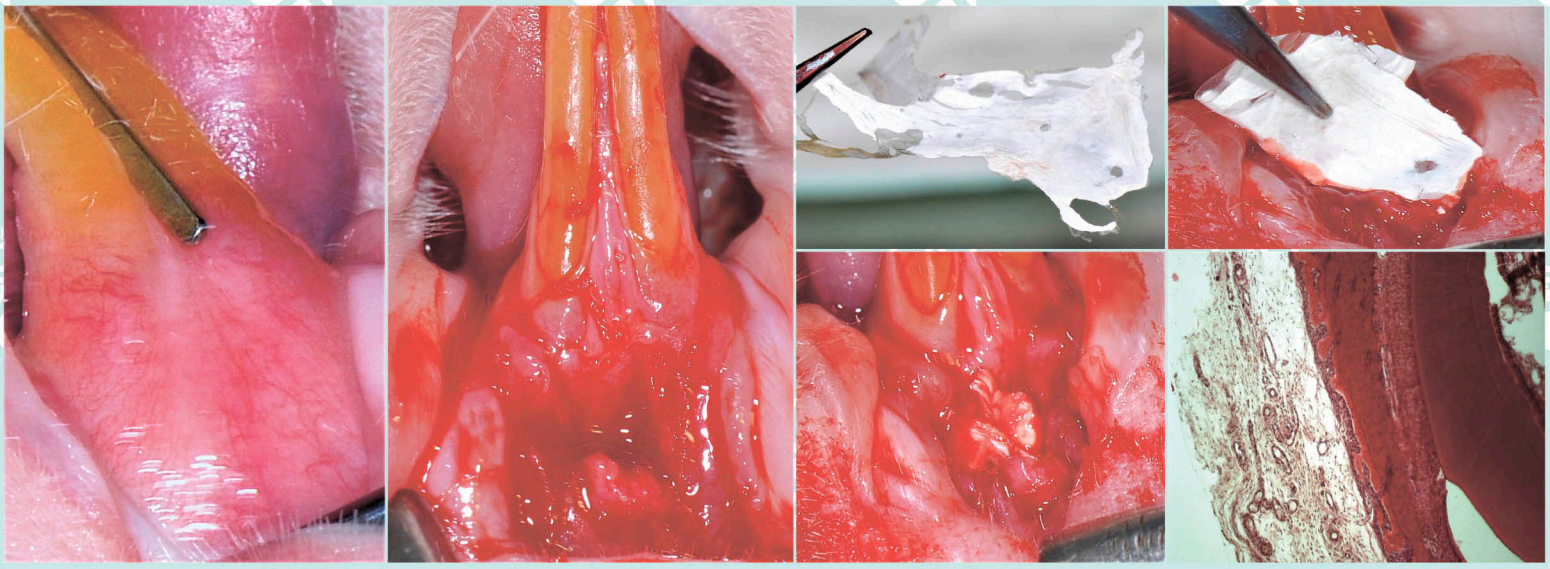
*An in vivo experimental model has been developed that is adequate to the technique of coronal displacement in a two-layer technique for the treatment of multiple gingival recessions using plastic material. Reproduced surgery on the lower jaw of rats with an assessment of the interaction of the operated tissue with plastic material. In this study, plastic material of allogeneic origin of allogenic lyophilised dura mater «Lyoplast-S»® was used. Observations of the animals were carried out for 28 days, the results were evaluated by dental status and macroscopic preparations. The experiment showed the effectiveness of allogenic lyophilised dura mater «Lyoplast-S»®. The proposed surgical model is universal for assessing the interaction of tissues with any plastic material.*

**Keywords: Experimental model, plastic material, dura mater - dura mater,multiple recessions, two-layer technique.**



The results were evaluated microscopically at 3, 7, 14, 28 days. On day 3, after the implantation of the dura mater material under a mucoperiosteal flap, a moderate inflammatory reaction was observed, similar to the control group. When microscopic assessment of the implantation zone on day 7, it was noted that allogenic lyophilised dura mater was significantly fragmented (discomplexed). On the 14th day, complete biodegradation of the plastic material and filling of the defect with loose unformed connective tissue was noted in the allogenic lyophilised dura mater implantation zone. In the control group for 14 knocks of the phenomenon of pronounced edema of all tissues of paradont. 28 days after the implantation of allogenic lyophilised dura mater, the absence of material in the implantation zone was noted due to its complete resorption. No pathological changes in the epithelial layer of the mucous membrane were detected. By 28 days, histological specimens of the control group show signs of pronounced edema. In rats, a deep periodontal pocket is formed with the decomposition of the collagen fibers of the periodontal ligament.

## RESULTS

A visual inspection and macroscopic examination of the dentition in the rats in the control period for 3, 7, 14, 28 days showed that in the area of the intervention the mucosa retains its color and consistency. On day 3, the sutures are consistent, no detachable, no signs of inflammation were found. The visible swelling of the mandible mucosa in all animals of the experimental series reached a maximum at 4-5 days, and by 7-8 days it was completely resolved. The same dynamics of the wound process was in the control group.In addition, in animals of this group, the formation of deep paradontal pockets and the mobility of the two lower incisors, in the projection of which surgery was performed, were noted. Similar pathological processes in the experimental group were not observed. By day 28, animals with allogenic lyophilised dura mater plastics, the mucosa in the postoperative region had normal color and tissue turgor, compacted and enlarged, edema and hyperemia were not detected

# FEATURES OF APPLICATION OF AUTOGENOUS BONE TRANSPLANTATES AND INDIVIDUAL ALLOGENIC BONE IMPLANTS IN THE TREATMENT OF PATIENTS WITH THE ATROPHY OF THE ALVEOLAR PART OF THE LOWER JAW

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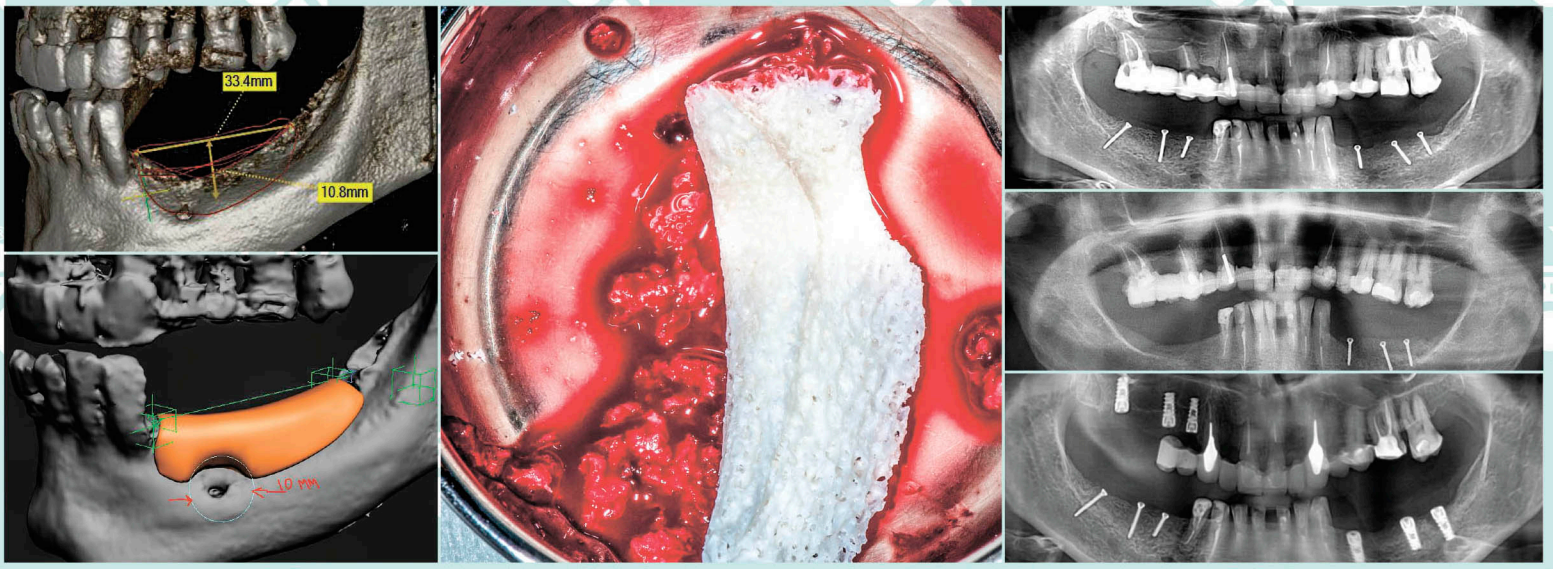
*The use of dental implants in the treatment of patients with partial / complete adentia is the main and most qualitative method in modern dentistry. Every year the number of dental implants installed by dental surgeons and oral surgeons is steadily increasing. One of the contraindications that indicate the impossibility of installing a dental implant in patients is resorption of the alveolar process / part of the jaw. In this situation, the doctor must first restore the volume of bone tissue, sufficient for subsequent dental implantation. In this article, a comparison of the traditional method of bone tissue volume restoration using autogenous grafts with an innovative technique of using individual allogeneic bone implants with a description of the advantages of the latter is considered.*

**Keywords: allograft, autograft, individual bone implant, edentulous, dental implant**




## RESULTS

The mean operative time for using autologous bone blocks was 1 hour 30 minutes; About 40% of the duration of the operation was spent by the surgeon to collect and model the autograft form, after which stability was achieved in the area planned for further dental implantation. It was noted the need to create two operating zones in the oral cavity, the inaccessibility of the site of the fence and the limited volume of the graft. In clinical cases, when treating patients with atrophy of the alveolar part of the mandible with the use of individual lyophilized allogeneic bone implants “Lyoplast-S”®, the average surgery time was 30 minutes. According to the main aspects of the applied bioimplants manufacturing technology, the maximum size of individual allogeneic blocks is 3x3x2 cm. This allows you to reduce the time of treatment of patients in the most difficult clinical situations with significant resorption of the alveolar part of the mandible in height and width. In this category of patients, not only was there no need to create a second operating zone in the oral cavity for taking a graft, but also due to the “tunnel” method, it reduced the length of the incision line and therefore significantly reduced the operative trauma of the patient.

Due to the conformity of the allogeneic implant to the shape of the bone section of the lower jaw, which is planned for subsequent dental implantation, all patients achieved primary stability before fixation with mini-screws. In both groups of patients, the contiguity of bone implants / transplants with a portion of the alveolar part of the mandible was assessed by the distance [mm] between the surfaces of the latter according to the data of sections of a conical beam computed tomography. In the first group of patients, the diastasis between the surface of the mandible bone tissue and the autogenous graft was in the range of 0.4 - 1 mm. In the second group of patients, the distance between the cortical plate of the alveolar part of the mandible and the individual allogeneic implant was 0.1 - 0.4 mm.

# OPTICAL ANALYSIS OF IMPLANTS FROM THE DURA MATER

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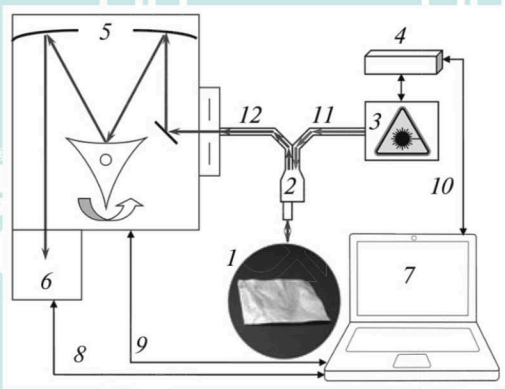
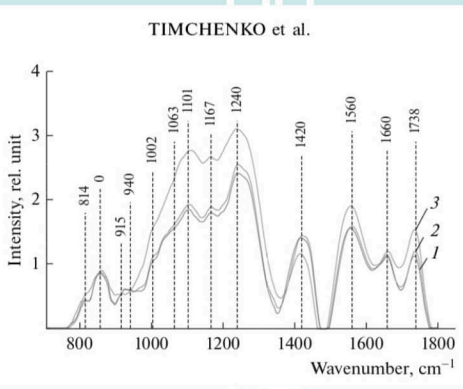
*Presents the results of the spectral analysis using the method of Raman scattering spectros- copy (RS) of dura mater (DM) samples, manufactured by technology "Lioplast" practised in the clinic in the area of atrophic processes at multiple gum recessions. The method of Fourier deconvolu- tion and selection of the spectral profile by the method of least squares is used to increase the resolution and informativity of the spectrum. With the help of mathematical methods of separation of over- lapping spectral contours, the main bands corresponding to the main components of the implants were found: amides, proteins, glycosaminoglycans, DNA/RNA. On the basis of the two-dimensional spectral analysis, the coefficients reflecting the composition of the dura mater with different methods of its treatment were introduced. It has been established that Raman spectroscopy can be used to eval- uate implants from the dura mater.*

**Keywords: Raman spectroscopy, dura mater, biomaterial, spectral analysis, Fourier deconvolution, modeling of the spectral contour**



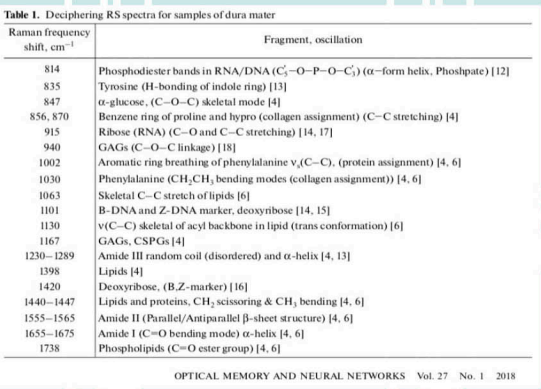



**Table 1.** Deciphering RS spectra for samples of dura mater

| Raman frequency shift, $cm^{-1}$ | Fragment, oscillation |
|---|---|
| 814 | Phosphodiester bands in RNA/DNA ($C_5'-O-P-O-C_3'$) (α–form helix, Phoshpate) [12] |
| 835 | Tyrosine (H-bonding of indole ring) [13] |
| 847 | α-glucose, (C–O–C) skeletal mode [4] |
| 856, 870 | Benzene ring of proline and hypro (collagen assignment) (C–C stretching) [4] |
| 915 | Ribose (RNA) (C–O and C–C stretching) [14, 17] |
| 940 | GAGs (C–O–C linkage) [18] |
| 1002 | Aromatic ring breathing of phenylalanine $\nu_s$(C–C), (protein assignment) [4, 6] |
| 1030 | Phenylalanine ($CH_2CH_3$ bending modes (collagen assignment)) [4, 6] |
| 1063 | Skeletal C–C stretch of lipids [6] |
| 1101 | B-DNA and Z-DNA marker, deoxyribose [14, 15] |
| 1130 | ν(C–C) skeletal of acyl backbone in lipid (trans conformation) [6] |
| 1167 | GAGs, CSPGs [4] |
| 1230–1289 | Amide III random coil (disordered) and α-helix [4, 13] |
| 1398 | Lipids [4] |
| 1420 | Deoxyribose, (B,Z-marker) [16] |
| 1440–1447 | Lipids and proteins, $CH_2$ scissoring & $CH_3$ bending [4, 6] |
| 1555–1565 | Amide II (Parallel/Antiparallel β-sheet structure) [4, 6] |
| 1655–1675 | Amide I (C=O bending mode) α-helix [4, 6] |
| 1738 | Phospholipids (C=O ester group) [4, 6] |

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## EXPERIMENTAL RESULTS AND DISCUSSION

Figure 2 shows the characteristic averaged Raman spectra of groups of samples of the dura mater. Anal- ysis of the Raman spectra is presented in Table 1. The differences appear in the Raman lines 814, 1002, 1101, 1167, 1240, 1420 and 1560 cm–1, Molecular vibrations of glycosaminoglycans, proteoglycans, phenyl assignment, deoxyribose (B, Z-marker), amide III and amide II (C–N–H valence) (deformation vibra- tion of N–H) [4, 6, 12–16].

It can be seen from Fig. 2 that during processing, the line at the wave number of 1167 cm–1 is preserved in the samples, which indicates the preservation of glycosaminoglycans and proteoglycans (GAGs, 1 CSPGs) during processing that play an important role in implant engraftment.

The collagen component, in addition to the CP lines of proline and hydroxyproline, is represented by amide III groups (in the 1230–1289 cm–1 region), amide II (in the 1555–1565 cm–1 region) and amide I (in the 1655–1675 cm–1 region), As well as a 1030 cm–1 Raman line corresponding to the CH2-CH3 vibrations of phenylalanine.

In addition, in all groups of samples, there is a Raman line at a wavenumber of 814 cm–1 corresponding to the phosphodiester linkage of DNA/RNA, which, possibly, indicates the destruction of nuclei and incomplete removal of DNA/RNA residues from the samples.

For sterile and non-sterile samples, the average correlation coefficient between the two groups is R12 = 99.42%, indicating that there is no noticeable destructive effect of sterilization by the radiation method on the implant. The calculated correlation coefficient between the group of native samples and samples of the first, second group was R3 = 70.95%, which indicates a significant difference in the quantitative com- ponent of the composition.

For more details read full text of article: ISSN 1060-992X, Optical Memory and Neural Networks, 2018, Vol. 27, No. 1, pp. 46–52. 