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Grupo Ser Educacional — Gente criando o futuro

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Guided Tissue Regeneration (GTR) Using Collagen Membrane with Polylactic Acid Scaffold (PLA)

Introduction

Alveolar ridge resorption following teeth extraction is a com- mon issue due to the role of the alveolar process itself, which is to hold the teeth in place. However, the loss of this function leads to gradual resorption. Such resorption causes defects in bone height and thickness, or related problems, that impair the installation of dental implants in the ideal position. In such cases, a tissue graft might be needed. It is known that the treatment of these height defects remains a major challenge for surgeons. Different types of guided tissue regeneration barriers (GTR) are available, including non-resorbable and resorbable membranes. A wide range of materials is used to manufacture these membranes. As this kind of barrier must be removed by surgical reintervention, resorb- able membranes have increasing clinical interest. Such membranes are produced with polylactic acid, polyglactin, collagen types I and III, or other biocompatible components There is a growing emphasis on the use of resorbable mem- branes that are biocompatible with the host and that do not re- quire surgical reintervention for removal. The biological barrier composed of polylactic acid (PLA) has proven to be safe and bio- compatible and maintains tissue integrity. ePolylactic acid has been suggested as a possible substitute for metallic devices due to its resorption capacity, making unnecessary a second surgery to remove the material after the recovery of the affected tissue.

Case 1

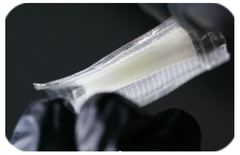
Patient LRM, 57 years old, normal tense and reactive, arrived at the clinic reporting impairment and symptoms in several maxillary implants, with peri-implant involvement, non-standard positioning and implants and Cover fully inserted into the maxillary sinus with left and right involvement.



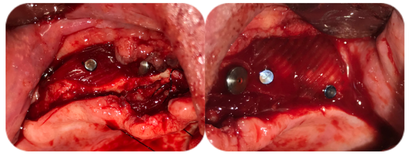
Panoramic RX Initial Condition with peri-implant involvement, non-standard positioning and implants and Cover fully inserted into the maxillary sinus with left and right involvement.



PLA Scaffold



PLA Scaffold after plasticizing at 158° Fahrenheit.



PLA scaffold on collagen membrane (Lumina Coat - Criteria Biomaterials, Brazil) fixed laterally to the left and right sides after partial synesectomy



Implant Insertion (E-Fix 3.75x11.5mm - Titanium Fix, Brazil)



Implants (E-FIX 3.75x11.5 - Titanium FIX, Brazil) inserted using the ALL ON FOUR technique.



Post operative period of 7 days in full stability with continuous technique suture.

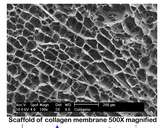


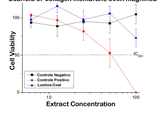
Final panoramic RX, after 6 months, showing the fixations and total resorption of the PLA scaffolds printed on collagen membrane (Lumina Coat - Critéria Biomaterials, Brazil)

Micro e Macro analisys

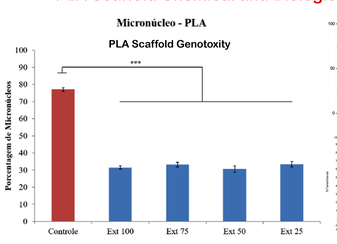
Collagen Membrane Chemical analysis and MEV

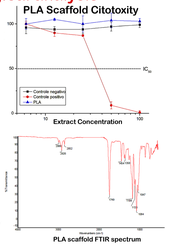
Elementos	RG 2356/13 LC 001 - Original Teor (%)
Cl	1,0±0,1
S	0,20±0,01
Na	0,17±0,02
Si	<0,09
Ca	0.008±0,002
P	0.005±0,001
Fe	0.003±0,001
Ni	0.002±0,001
K	<0.004
Zn	<0.002
$C_{12}H_{21}O_7N_3$	98,6±0,1





PLA Scaffold Chemical and Biological analysis





PLA scaffole printed on collagen membrane



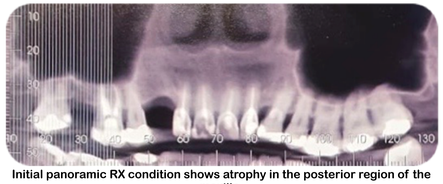
Printed Polilact Acid Scaffold - PLA



Printed Polilact Acid Scaffold + Collagen Membrane

Case 2

A 50-year-old patient, with RGC, normotensive and reactive, at- tended the dental office reporting functional impairment in the region of 13 and 14 due to the absence of early lost elements, leading to the aesthetic instability of the region. The protocol for requesting complementary tests was carried out and no changes were observed.



Initial panoramic RX condition shows atrophy in the posterior region of the maxilla.



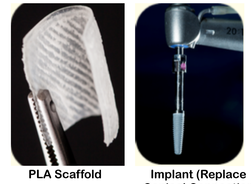
Platelet-rich fibrin using tissue engineering concept.



Xenogenic bone graft (Lumina Bone Porous Small - Criteria Biomateriais, Brazil) associated with PRF, for reconstruction of the area of severe atrophy in the posterior maxilla



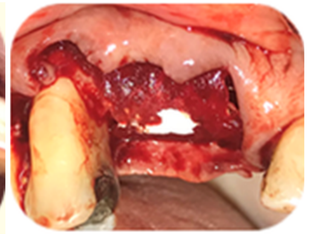
PLA Scaffold



Implant (Replace Conical Connection 3.50x13mm)



PLA scaffold on collagen membrane (Lumina Coat - Criteria Biomaterials, Brazil), applied trans-operative for stability and fixation of xenogeneic bone graft (Lumina bone Porous Small, Critéria Biomaterials, Brazil), in order to reconstruct several atrophy after implantation of the implant.







Final panoramic RX, after 6 months, showing the fixations and total resorption of the PLA scaffolds printed on collagen membrane.

References

Borges DHO-, Soares T., Ferreira LA., Braga FJC., Ortiz FAP., Martins SCR*., Sousa LLL. - "Guided Tissue Regeneration (GTR) Using Collagen Membrane with Polylactic Acid Frame (PLA): Case Report". Acta Scientific Dental Sciences 5.8 (2021): 03-08.

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