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Stability Of Results in Reconstructive Bone Surgery: 18-Year Follow-Up

Fabio Luciani[1*], Ermal Pashaj[1], Carla Sgroi[2], Bora Kerpi[3], Filadelfo Coniglione[1,4], Ernesto Bruno[4]

1Department of Surgical Sciences, Catholic University "Our Lady of Good Counsel" - Tirana

[2]Catholic University "Our Lady of Good Counsel" – Tirana; Degree Course in Dentistry

[3]Department of Medical Sciences, Catholic University "Our Lady of Good Counsel" - Tirana

[4]Department of Clinical Sciences and Translational Medicine, University of Rome "Tor Vergata".

***Corresponding author:**

Fabio Luciani,
Department of Surgical Sciences, Catholic University "Our Lady of Good Counsel" - Tirana

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1. Abstract

1.1. Introduction

Regenerative periodontal tissue surgery is a series of surgical procedures aimed at creating new bone, root cementum, and periodontal ligament, as demonstrated by histological studies. Damage to these tissues results from periodontal disease, with or without associated occlusal trauma. Histologically, the new attachment differs from the long epithelial attachment.

1.2. Case Presentation

This study, presented with an 18-year follow-up, describes the clinicopathological characteristics of three patients with clinical and histopathological confirmation of periodontal disease, primarily localized in the area of two lower central incisors, which resulted in bone resorption of the bone peaks. This ultimately led to the formation of unsightly spaces between the teeth. The results of the surgical treatment performed in this case were evaluated through clinical and radiological follow-up over 18 years.

1.3. Conclusion

This occurs when the junctional epithelium migrates in place of the connective tissue. Preclinical and clinical studies have demonstrated that periodontal regeneration can be successful using surgical procedures involving the use of membranes, graft materials, combined or not with morphogenetic proteins (Amelogenins).

2. Introduction

Reconstruction of periodontal tissue involves a series of phenomena, including mitogenesis, chemotaxis, and periodontal tissue adhesion [1,2]. Surgical techniques must necessarily address the conditions for success. One option in the field of regenerative techniques involves the use of graft material, contained in resorbable or non-resorbable membranes [2,3]. It has been shown that the reduction in probing values and the gain in clinical attachment levels, using various grafting materials and amelogenins in combination, are superior to those achieved with open flap debridement alone. The purpose of using these materials is to attempt to replace the alveolar bone, periodontal ligament, and root cementum [4]. The above-mentioned materials are capable of regenerating the periodontium because they contain osteoprogenitor cells that act as a scaffold, allowing totipotent cells to migrate and replicate [5,6].

Furthermore, some of these materials contain molecules that can induce the formation of new bone (osteoinduction). Recent studies highlight how the most important prognostic factor is the depth and extent of the defect, as well as the regenerative capacity of the cells of the periodontal ligament [3,7]. According to the entire international literature, it has now been demonstrated that the regenerative potential of the ligament cells is expressed when the epithelium and the connective tissue are separated from the defect by a membrane that prevents the migration of the epithelium onto the root surface of the defect and allows the cells of the periodontal ligament to express their regenerative potential [8-10]. The major difficulties of this surgical methodology are represented by soft tissue management, which must ensure perfect suture retention, membrane stability, and procedural sterility to avoid membrane exposure and thus regeneration failure [11,12].

3. Case Report

Three clinical cases are presented, with follow-up at 18 years. The patients' ages ranged from 34 to 36. These patients came to us with severe localized periodontitis in an advanced stage (Figure 1, 2). The patients were in good health, so there were no absolute contraindications to surgery. The selected patients were nonsmokers.

Probing depth and clinical attachment level were measured at baseline (first assessment), after the causal phase, approximately 30 days (Table 1), 1 year, and 18 years after surgery (Table 2). The causal therapy included sessions dedicated to scaling and root planing combined with home antibacterial therapy, with 0.2% chlorhexidine and 3% hydrogen peroxide solutions. After a thirty-day reassessment, surgery was planned. The surgical treatment was performed under local anesthesia; intrasulcular incisions were made with a Bard-Parker No. 5 scalpel with a 15C blade, followed by flap elevation, without vertical releasing cuts [13,14].

Tissue detachment involves the full thickness of the gingivoperiosteal unit, exposing 3-4 mm apical to the defect, then proceeds to partial thickness, reaching the alveolar mucosa. The defects were then debrided and the roots of the teeth were smoothed using a Gracy curette and a piezoelectric device, removing plaque, calculus, granulation tissue, and necrotic cementum. The root surfaces were then conditioned using tetracyclines and 17% EDTA gel. Their decontaminating and collagenase-enhancing action prepared the root surface for contact with amelogenins and bone graft, prolonging the predictability of regeneration [15].

The defect was then filled with deproteinized heterologous bone particles, and when necessary, a resorbable membrane was placed over the defect. The membrane was then covered, and the flaps were passively repositioned. The surgical site was hermetically sealed with Monocyl 4/0 and Vicryl 5/0 using a V/5 trocar needle, with interrupted stitches, to preserve the papillae (Figures 3-8).

The flap had to be sutured as coronally as possible and had to be completely passive and free of muscle traction, to avoid recession and membrane exposure, which would certainly compromise the outcome. Patients were instructed to chemically control bacterial plaque, using mouthwashes containing 0.2% chlorhexidine digluconate and 3% hydrogen peroxide for 15 days, without brushing or flossing in the surgical area. After 15 days, the sutures were removed (Figure 9), and patients were again encouraged to maintain proper oral hygiene and underwent a re-examination 30 days after surgery (Figure 10).

It was also recommended to use a 1% chlorhexidine-based topical gel three times a day, after rinsing and maintaining a soft diet for at least four weeks, to avoid trauma to the healing tissue. The support program also included professional oral hygiene sessions at weekly intervals for six months. Probing of the defect and the use of subgingival instrumentation were avoided for a period of 12 months. Parameters were collected before surgery and again after one year, and the stability of the results was re-evaluated after 18 years of follow-up. To date, the selected patients have continued to receive regular, quarterly periodontal therapy, home use of 3% hydrogen peroxide, stabilized at 10 volumes, for 15 days a month, and have consistently used a very soft or super-soft toothbrush. During follow-up visits, one year and 18 years after surgery, we assessed:

• Probing depth, from the gingival margin to the bottom of the pocket [4,6,7].

• Clinical attachment level, measured from the cementoenamel junction to the bottom of the pocket [6,7].

Figure N 1: Case Report N.1 T=0.

Figure N 2: Case Report n.2 T=0.

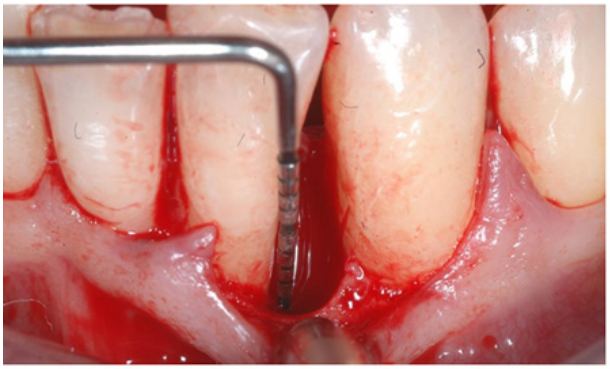

Figure N 3: Probing during Surgery.

Figure N 4: Case Report n.2 during Surgery.

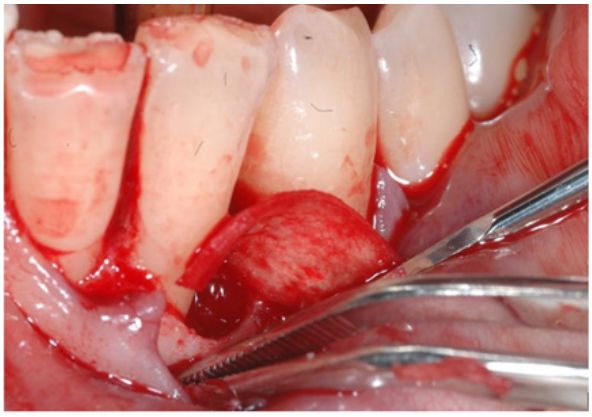

Figure N 5: Case Report n.1 intra operative action.

Figure N 6: Case Report n.2 intra operative action.

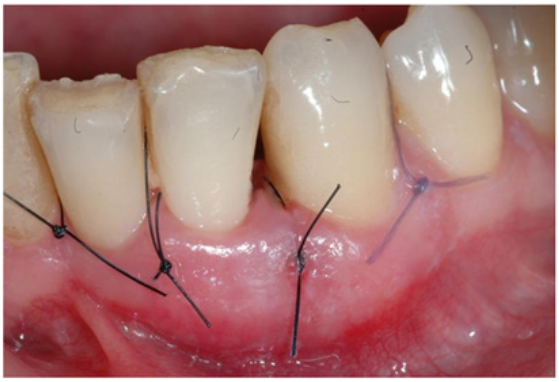

Figure N 7: Case Report n.1 suture with Monocryl and Vicryl.

Figure N 8: Case Report n.2 Suture with Monocryl.

Figure N 9: Case Report n.2 control of 15 days.

Figure N 10: Case Report n.2 control of 30 days.

Figure N11a: Case Report n. 1 Periapical Rx preoperatory.

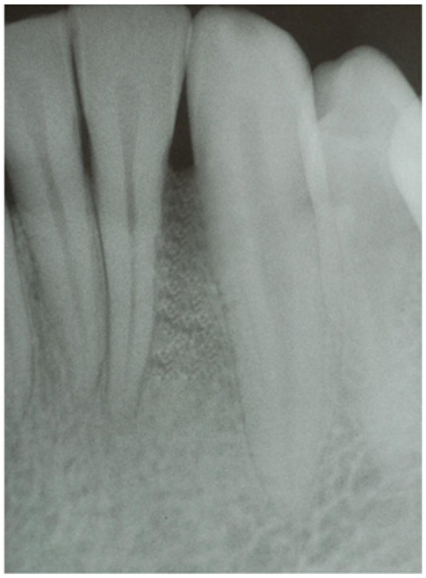

Figure N 11b: Case Report n. 1 Rx after 1 year.

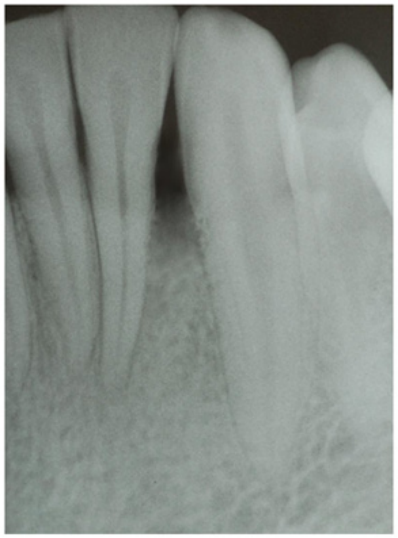

Figure N.11b: Case Report n. 1 Rx after 1 year.

Figure N 11c: Case Report n. 1 Rx after 18 years

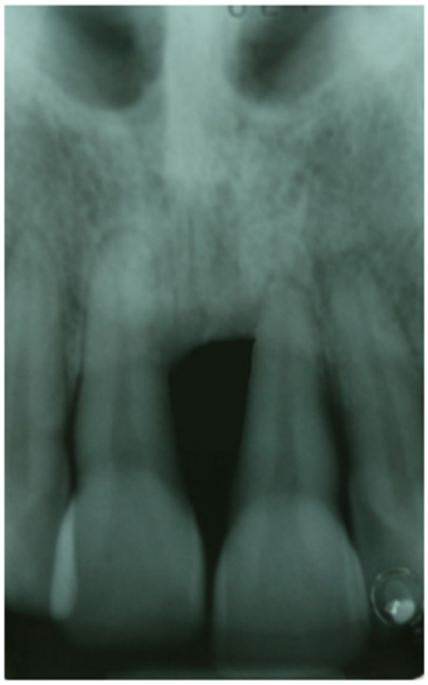

Figure N 12a: Case Report n. 2 Periapical Rx preoperatory.

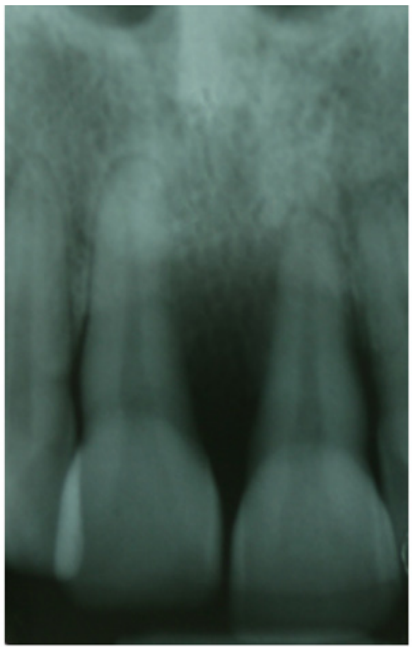

Figure N 12b: Case Report n. 2 Periapical Rx after 1 year.

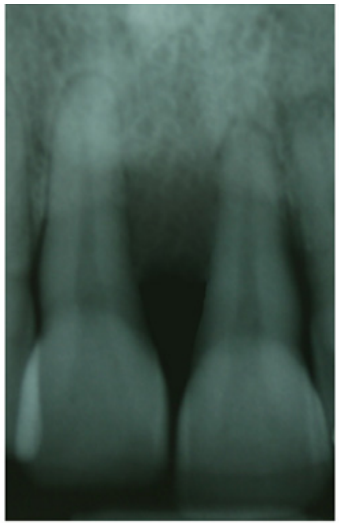

Figure N 12c: Case Report n. 2 Periapical Rx after 18 years.

Figure N13: Clinical Follow-up after 18 years.

Table 1.

	Probing T=0	Probing dopo 30 gg	C.A. T=0	C.A. after 30 gg
CASE 1	8 mm	7 mm	5 mm	5 mm
CASE 2	10 mm	9 mm	7 mm	7 mm
CASE 3	12 mm	11 mm	8 mm	8 mm

Table 2.

	Probing after 1 year	Probing after 18 years	C.A. after 1 year	C.A. after 18 years
CASE 1	3 mm	4 mm	2 mm	5 mm
CASE 2	3 mm	4 mm	2 mm	5 mm
CASE 3	4 mm	5 mm	3 mm	5 mm

4. Discussion

In case no. 1, the defect depth before treatment was 8 mm, the clinical attachment level was 5 mm, with spontaneous bleeding. After the first periodontal phase, 30 days after the start of treatment, the defect depth had reduced to 7 mm, while the clinical attachment level remained unchanged (5 mm). After the first year after surgery, the patient showed no signs or symptoms of a periodontal disease flare-up. The probing level in the surgically treated area was 3 mm with an improvement of 4 mm; the clinical attachment level was 2 mm with an improvement of 3 mm. 18 years after the procedure, we observed a periodontal probing depth of 5 mm and the clinical attachment level passed to 5 mm. Radiographs performed after 18 years demonstrated the restoration of the physiological bone anatomy (Figure 11a, 11b, 11c).

In case no. 2, the defect depth before treatment was 10 mm, the clinical attachment level was 7 mm, with bleeding on probing. After the first causal phase, 30 days after the start of treatment, the defect depth had reduced to 9 mm, while the clinical attachment level remained unchanged. After the first year following the regeneration procedure, the patient showed no signs of periodontal disease recurrence; the probing level in the surgically treated area was 3 mm with an improvement of 7 mm; the clinical attachment level was 2 mm with an improvement of 5 mm. 18 years later, we observed a periodontal probing depth of 5 mm. Radiographs performed after 18 years confirmed the clinical results obtained with regenerative periodontal surgery (Figure 12a, 12b, 12c).

In case no. 3, the defect depth before treatment was 12 mm, the clinical attachment level was 8 mm, with bleeding on probing. After the first causal phase, 30 days after the start of treatment, the defect depth had reduced to 11 mm, while the clinical attachment level remained unchanged (8 mm). After the first year following the regeneration procedure, the patient showed no signs of periodontal disease recurrence; the probing level in the surgically treated area was 4 mm with an improvement of 8 mm; the clinical attachment level was 3 mm with an improvement of 5 mm. 18 years after surgery, we observed a periodontal probing depth of 5 mm, and the clinical attachment level had changed to 5 mm. Radiographs performed after 18 years confirmed the clinical results obtained with regenerative periodontal surgery.

5. Conclusion

After evaluating and analyzing the results of our study, we can conclude that regenerative periodontal surgery, if correctly implemented through careful patient selection, and with proper diagnosis and treatment planning that takes into account all the factors that influence the medium- and long-term outcome, combined with adequate patient compliance, which must be maintained over time to ensure the stability of the results obtained, proves, as easily deduced from the figure (Figure 13), to be an extremely valid and predictable treatment for controlling and eliminating the acute phase of periodontal disease and restoring the correct anatomy and physiology of the supporting tissues [11,12,15]. In our opinion, given the success and stability of the results obtained, and based on our school's experience, the use of 3% hydrogen peroxide stabilized at 10 volumes should be strongly emphasized as an adjunct in maintaining periodontal health, especially considering that all patients who use it long-term have never experienced any adverse effects, with plaque and bleeding rates significantly and on average lower than those who use chlorhexidine alone for plaque control [3,11].

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