

# Alveolar Bone gain in Vertical Bone Defect with Nonsurgical Periodontal Therapy in the Anterior Zone of Maxilla: A Case Report

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**Abstract:** *Nonsurgical periodontal therapy, including scaling and root planing, is a fundamental approach for managing plaque induced periodontal diseases. This case report demonstrates a successful treatment of a vertical bone defect on tooth 21 through nonsurgical methods alone. Over two years, a significant reduction in probing depth, clinical attachment level gain, and alveolar bone gain were observed. The findings suggest that nonsurgical periodontal therapy can lead to measurable alveolar bone gain, contrary to conventional expectations. Further studies are needed to confirm these outcomes in similar cases.*

**Keywords:** non - surgical therapy, alveolar bone gain, angular bone defect

## 1. Introduction

Non - surgical periodontal therapy including scaling and root planing is a mandatory and extremely effective approach in the treatment of plaque - induced periodontal diseases. The main healing processes that non - surgical therapy usually leads to, are a long junctional epithelium, non - active pocket, gingival recession, a new clinical attachment [1]. Non - surgical periodontal therapy leads to a proven retrieval in clinical parameters after treatment – reduction of probing depth, clinical attachment level (CAL) gain, absence of bleeding on probing [2, 3].

## 2. Literature Survey

It is known that non - surgical therapy does not effectively affect deep periodontal pockets associated with angular (vertical) bone defects and does not lead to bone gain and regeneration of alveolar bone [4]. Angular bone defects are indicated for treatment with regenerative periodontal surgery with enamel matrix proteins [5] or guided tissue regeneration with barrier membranes and bone grafts [6, 7, 8].

Radiographic changes resulting after non - surgical therapy have not been described and studied in details. However, case reports have been reported in the literature when new bone formation and an increase in alveolar bone density as observed radiographically, resulting from nonsurgical periodontal therapy in treating periodontal inflammation [9, 10]. In some studies, the authors are used digital subtraction radiography to analyze the changes that occur in density in the tissues of the alveolar bone itself as a healing result after scaling and root planing [11, 12].

Similar studies also give proofs for the formation of new alveolar bone in vertical bone defects at natural teeth or around the previously exposed threads of the implant body in the treatment respectively of periodontitis and peri - implantitis after non - surgical therapy [13]. The additional systemic or topical antibiotic therapy during the hygienic phase may improve the clinical outcome of nonsurgical

treatment [14, 15, 16, 17]. Also, good results are reported after use of low - abrasive air - powders in combination with mechanical debridement [18, 19].

It is known that the healing process in the pocket can be affected by various local or systemic factors such as personal plaque control, residual calculus deposits, angular bone defect morphology, smoking, systemic diseases, stress [20].

According to the number of walls that surround the defect, angular bone defects can be classified as one - wall, two - wall, and three - wall or combined defects [21]. The greater is the number of walls, the better is the healing process. Better healing outcome after periodontal therapy has been demonstrated in defects where the width of the defect is 45 degrees or less [22] as well as in deeper defects [23].

## 3. Methods

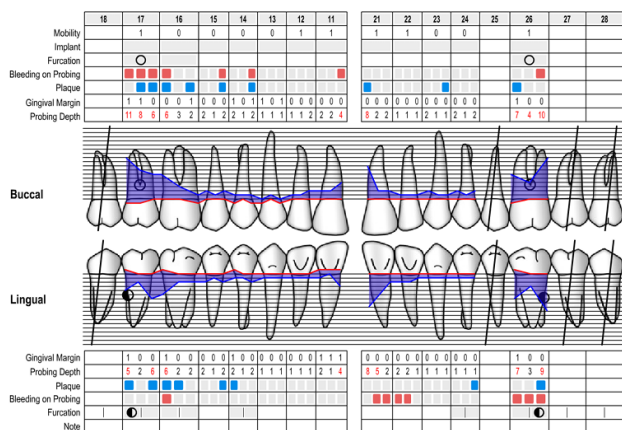
The study demonstrates the potential of nonsurgical therapy to achieve significant bone gain in vertical bone defects, challenging the conventional understanding of the limitations of such treatments. This finding may influence future therapeutic approaches to periodontal diseases.

A 68 - years old female came to our clinical practice in University Medical –Dental center, Varna, Faculty of Dental Medicine. The patient was systemically healthy. In the medical anamnesis she does not report for any allergies, no systemic diseases, no medications, no infectious diseases. This patient is a non - smoker.

The patient came with some complaints as discomfort and dull pain in the gingival tissues of upper jaw, bleeding from the gums during toothbrushing and slight feeling for tooth mobility. She was diagnosed with third stage of periodontitis – established periodontitis with risk of tooth loss [24].

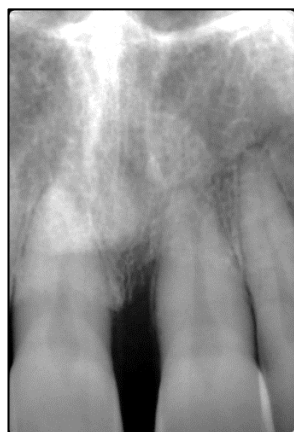
After clinical periodontal examination a deep periodontal pocket was recorded with initial probing depth 8 mm at the mesial surface of tooth #21 and CAL loss also 8 mm (pic.1). Index of BoP (Ainamo&Bay) and plaque index (O’Leary)

were recorded. There was first degree of mobility of the affected tooth. The tooth was with normal vitality 10 μA in testing of EOD.



**Pic.1:** Initial periodontal status of maxilla (vestibular and palatal view)

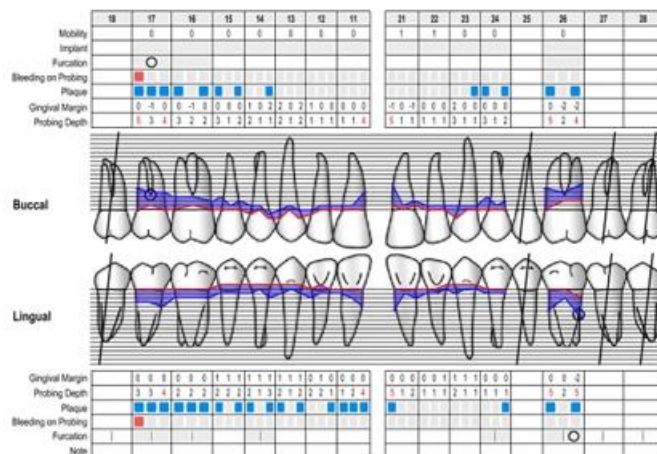
A periapical radiography before therapy was done. It was diagnosed vertical bone defect at the mesial surface of the same tooth with depth 3 mm (pic.2).



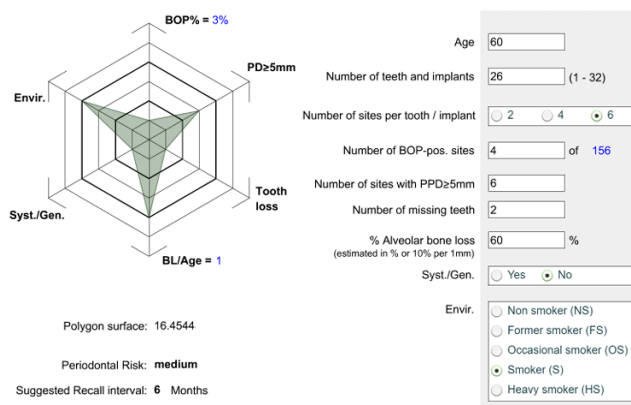
**Pic.2:** Initial X-ray view (vestibular and palatal view)

The patient was treated non-surgically with scaling and after that debridement of all the teeth affected by periodontitis. Topically subgingival irrigations with solution of metronidazole (0, 5%) and subgingival polishing low-abrasive powder on base of glycine were done. She was motivated for adequate personal oral hygiene – proper tooth brush and tooth paste (0, 12% CHX), proper method of tooth brushing (vibratory method of Charters), interdental cleaning devices and mouth rinse solution (0, 12% CHX).

After 2 months (8 weeks) a re-evaluation was done. The pocket depth is reduced to 5 mm with negative BoP (pic.3). In re-evaluation the periodontal risk assessment demonstrated medium level of risk [25, 26] (pic.4).



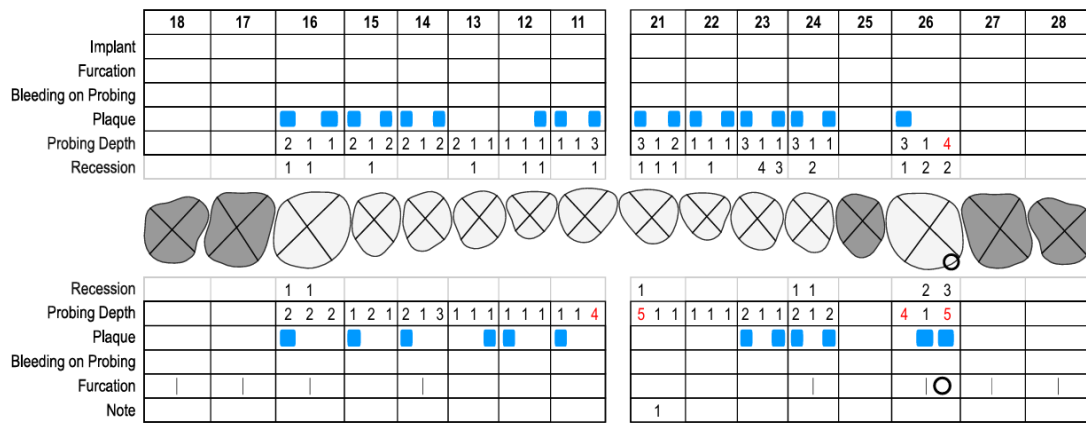
**Pic.3:** Re-evaluation periodontal status



**Pic.4:** Individual periodontal risk assessment in re-evaluation

The patient is enrolled in supportive therapy on every 6 months follow-ups for scaling, polishing, re-motivation for personal oral hygiene, periodontal status and if it is necessary - debridement in the sites where there are any indications for that (pic.4).

After 2 years of supportive periodontal therapy (regular check-ups on every 6 months for regular cleaning of dental plaque and calculus) a new periodontal status was recorded again (pic.5) and a new intraoral periapical X-ray was done of tooth #21 (pic.6). On the X-ray image was measured again the depth of the vertical bone defect, and were analyzed the changes in height and density of the alveolar bone proper on the mesial side of tooth #21. For measuring the depth of the bone defect as referent points were used the level of alveolar ridge and the bottom of the bone defect (the most apical point with normal width of periodontal ligament). The depth of the bone defect is just 1 mm 2 years post therapy.



Pic.5: Periodontal status in supportive therapy (after 2 years)



Pic 6: X - ray image 2 years after therapy

CAL - clinical attachment level  
 CEJ – cemento - enamel junction  
 EOD - electroodontodiagnostic

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4. Results

The results in the supportive phase of treatment sequence showed that 2 years after non - surgical periodontal therapy there is stable reduction in the periodontal pocket depth and CAL gain on mesial surface of tooth #21.

The reduction in the pocket depth is facially with 5 mm less and orally with 3 mm less.

The CAL gain is 4 mm buccally and 2 mm orally.

The results from the X - ray examination showed reduction in the depth of the bone defect - the alveolar bone gain on the mesial surface of tooth #21 is approximately 2 mm.

5. Conclusion

Nonsurgical periodontal therapy, including scaling and root planing, can lead to significant reductions in periodontal pocket depth and measurable alveolar bone gain. This case report illustrates a successful example of such therapy in a patient with periodontitis and a vertical bone defect. Further research is needed to validate these findings and explore the broader implications for nonsurgical treatments in periodontal care.

Conflict of interest

The author has declared no conflict of interest.

Abbreviations:

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