# The Use of Chlorhexidine Gel Following EDTA Root Surface Etching as an Adjunctive to Open Flap Debridement in Treating Intra-Bony Defects (Randomized Clinical Trial)

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## Abstract:

The main objective of the present study was to quantify chlorhexidine (CHX) release after the use of CHXEDTA root surface treatment as a local-delivery antimicrobial vehicle. Twenty patients with single site of vertical infra-bony defects were selected from the outpatient clinic of oral medicine, periodontology and oral diagnosis department, faculty of dentistry, Ainshams University. They were divided into two groups. Group of 10 patients having severe chronic periodontitis will receive scaling and root planning then open flap debridement and another Group of 10 patients having severe chronic periodontitis will receive scaling and root planning then open flab debridement and application of 24% EDTA etching gel and 2% chlorhexidine gel on root surface. Clinical and radiographic assessment was done after 3 months follow-up.

## Introduction:

Chronic periodontitis is regarded as an inflammatory disease that affects the supporting tissues of teeth which could lead to bone destruction. According to the pattern of bone destruction, vertical infrabony defect could occur. Several biomaterials have been used to treat infrabony defects including bone grafts, membranes, anti-microbials, growth factor & Enamel matrix proteins. CHX gel which has been widely used in the treatment of infra-bony defects.

Chemical treatment of root surfaces of teeth have been used as an adjunct with mechanical instrumentation. Among these chemical agents is EDTA which was found to be able to remove the smear layer and expose the collagen fibers on the root surface which would make the root surface biocompatible favoring fibroblast attachment and increase substantivity of CHX gel. However, studies have found that there was no clinical significance of  EDTA with chlorhexidine gel .

Recent studies revealed that signiFcant improvements could be obtained for deep intra-bony defects after EDTA root surface etching and CHX gel application after non-surgical therapy compared to control non etched treated sites. This could be attributed to the associated prolonged and higher values of CHX levels for the CHX-EDTA–treated group. However, the main target of that work is to quantify levels of CHX during the early stages of healing to determine if such clinical improvement could be attributed to prolonged and increased CHX levels after EDTA root surface preconditioning.

The aim of this study was to evaluate clinically the use of Chlorhexidine gel following root surface EDTA after open flap debridement in treating Intra-bony defects and to study the effect of EDTA bone etching on Bone Morphogenetic Protein-2 (BMP-2) in gingival crevicular fluid.

## Subjects & methods:

Twenty patients with single site of vertical infra-bony defects were selected from the outpatient clinic of oral medicine, periodontology and oral diagnosis department, faculty of dentistry, Ainshams University. They were divided into two groups. Group of 10 patients having severe chronic periodontitis will receive scaling and root planning then open flap debridement and another Group of 10 patients having severe chronic periodontitis will receive scaling and root planning then open flab debridement and application of 24% EDTA etching gel and 2% chlorhexidine gel on root surface. Clinical and radiographic assessment was done after 3 months follow-up.

## Results:

The mean and standard deviation values were calculated for each group in each test. Data were explored for normality using Kolmogorov-Smirnov and Shapiro-Wilk tests, Gingival index, Plaque index, Probing depth, CAL and Radiographic bone fill showed non-parametric (not normal) distribution while and BMP2 marker showed parametric (normal) distribution.

For non-parametric data; Mann-Whitney was used to compare between two groups in non-related samples. Wilcoxon was used to compare between two groups in related samples.

### 1.Gingival index:

**Relation between groups:**
- *Pre-groups:*

There was no statistically significant difference between (Group I) and (Group II) where (p=1). Both showed the same score.

- **After 3m groups:**

There was no statistically significant difference between (Group I) and (Group II) where (p=1). Both showed the same score.

### 2.Plaque index:

**Relation between groups:**
*Pre-groups:*

There was no statistically significant difference between (Group I) and (Group II) where ($p$=0.661).

The highest mean score was found in (Group II), while the least mean score was found in (Group I) group.

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### After 3m groups:

There was no statistically significant difference between (Group I) and (Group II) where ($p=0.661$).

The highest mean score was found in (Group II), while the least mean score was found in (Group I) group.

## 3.Probing depth:

### Relation between groups:

#### Pre-groups:

There was no statistically significant difference between (Group I) and (Group II) where ($p=0.661$).

The highest mean score was found in (Group I), while the least mean score was found in (Group II) group.

#### After 3m groups:

There was no statistically significant difference between (Group I) and (Group II) where ($p=0.538$).

The highest mean score was found in (Group I), while the least mean score was found in (Group II) group.

## 4.CAL:

### Relation between groups:

#### Pre-groups:

There was no statistically significant difference between (Group I) and (Group II) where ($p=0.680$).

The highest mean score was found in (Group I), while the least mean score was found in (Group II) group.

#### After 3m groups:

There was no statistically significant difference between (Group I) and (Group II) where ($p=0.725$).

The highest mean score was found in (Group I), while the least mean score was found in (Group II) group.

## 5.Radiographic bone fill:

### Relation between groups:

#### Pre-groups:

There was no statistically significant difference between (Group I) and (Group II) where ($p=0.161$).

The highest mean score was found in (Group I), while the least mean score was found in (Group II) group.

#### After 3m groups:

There was no statistically significant difference between (Group I) and (Group II) where ($p=0.904$).

The highest mean score was found in (Group I), while the least mean score was found in (Group II) group.

## 6.Biochemical assessment:

### Relation between groups:

1. Day 0:

There was a statistically significant difference between (Group I) and (Group II) where ($p=0.014$).

2. Day 3:

There was no statistically significant difference between (Group I) and (Group II) where ($p=0.593$).
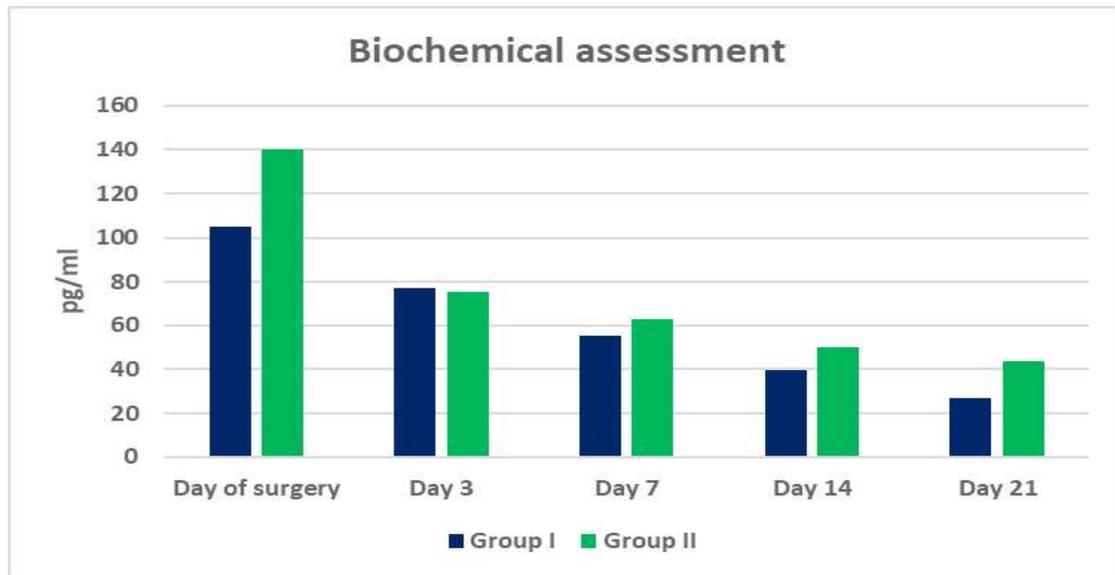
3. Day 7:

There was no statistically significant difference between (Group I) and (Group II) where ($p=0.064$).

4. Day 14:

There was a statistically significant difference between (Group I) and (Group II) where ($p<0.001$).

5. Day 21:

There was a statistically significant difference between (Group I) and (Group II) where ($p<0.001$).

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**Biochemical assessment**

*(Bar chart representing Biochemical assessment for different groups)*

## Discussion:

The non-significant differences in all the baseline parameters between the two groups reflect samples homogeneity. Also the non-significant differences in GI and PI between baseline and all follow-up periods reflect patient compliance with oral hygiene instruction and no inflammatory interference with the healing events during the entire period of evaluation. Vertical bony defects is regarded as one of the consequence that can occur due to chronic periodontitis which could result due to the pattern of destruction of the alveolar bone supporting the teeth.

The initial 48 hour slow release of CHX could be a factor that improves the clinical and microbiologic effects of CHX application. ***Cetin et al.*** found that 96% of CHX was released from CHX in a gelatin matrix during the First 6 hours of application. ***Grisi et al.*** reported that after 9 months, the CHX chip did not provide any clinical or microbiologic beneft beyond that achieved with conventional scaling and root planning. They attributed that to the release of most of the CHX during the First 6 hours of application which reflect the increase in BMP-2 in the day of surgery. ***(Grisi et al, 2007)***

Results showed that there was a significant difference between the two groups regarding the BMP-2 level in days one, fourteen and twenty one with group I being the higher value while there was no significant difference in days three & seven.

Regarding the clinical and radiographic parameters, there was no significant difference between the two groups.

## Conclusion

This study shows that 2% chlorhexdine gel conditioning is a safe procedure that could enhance periodontal regeneration and the use of 24% EDTA then application of 2% chlorhexidine gel to treat bone surface was associated with increased BMP-2 level in the GCF which could increase bone formation during healing of infra-bony defects.

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