

# Placement of Sticky Bone™ in Patients with Generalized Periodontitis Previously Treated with Coenzyme Q10

Ashi Chug<sup>1</sup>, Sagrika Shukla<sup>2</sup>

## ABSTRACT

**Aim:** The aim of this study was to observe the effects of coenzyme Q10 (CoQ10) in patients with localized periodontitis and place Sticky Bone™ in defects not resolved in the test or control group.

**Materials and methods:** A total of 30 patients with periodontitis of pocket depth  $\geq 5$  mm were randomly divided into test and control groups, each comprising 25 sites, where CoQ10 was placed in the test group and methyl cellulose in the control group; all the parameters were recorded, and patients were followed up for 12 months. At the end of 12 months, patients who did not respond to subgingival placement of CoQ10 were treated surgically where Sticky Bone™ was placed and further followed up for 6 months.

**Results:** There was significant difference between plaque index (PI), gingival index (GI), and probing pocket depth (PPD) at baseline and 1 month, and there was an increase in values of PI and PPD seen at 6 months and significant increase in values of GI, PI, and PPD seen at 12 months, and no significant difference in values was seen at 12 months and baseline.

**Conclusion:** Coenzyme Q10 does not aid in the treatment of periodontitis.

**Clinical significance:** Clinically, it shows that CoQ10 has no role to play in the cases of periodontitis. In such cases, without delay patients should be taken up for periodontal flap surgery after complete scaling and root planning (SRP), if the pocket does not resolve.

**Keywords:** Advanced platelet-rich fibrin, Coenzyme Q10, Growth factors, Periodontitis, Sticky Bone™.

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## INTRODUCTION

Periodontitis is one of the most common diseases, and if not treated can lead to worsening of the condition, deepening of the pocket, and bone loss, requiring a surgical procedure with or without bone graft to treat it. Before any pocket reaches the surgical phase, there are ways wherein the disease progression can be stopped and pocket deepening can be prevented. Oral prophylaxis is one such method and is a key factor in creating reattachment;<sup>1</sup> however, sometimes local drug delivery (LDD) can be used as an adjunct along with scaling and root planning (SRP) to prevent disease progression.<sup>2</sup>

There are many drugs which are used for LDD with varying degree of results,<sup>3</sup> and there is always a continuous effort to find newer medicines which can be used as LDD to improve patients' condition and heal developing pocket. Coenzyme Q10 (CoQ10) is one such material, which occurs naturally in the human body in the mitochondrial membrane,<sup>4,5</sup> where it acts as an antioxidant, membrane stabilizer, and aids in the production of adenosine triphosphate in the oxidative respiration process,<sup>6</sup> and thus this material is one of the ideal biomaterials which can be used as LDD with least side effects. The aim and objective of this study was to observe the role of CoQ10 in periodontal patients so that pocket can be resolved without undergoing the surgical procedure.

## MATERIALS AND METHODS

In the present study, after getting ethical clearance from the review board and keeping declaration of Helsinki into consideration, healthy patients more than 30 years of age who reported with chronic periodontitis and had minimum 20 teeth in their dentition were randomly divided into test and control groups comprising minimum of 25 sites each, according to inclusion and exclusion criteria.

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Inclusion criteria included systemically healthy patients without any medical problem, between the age group 20 and 60, who were ready to participate in the study. Exclusion criteria included any systemic problem, localized/generalized aggressive periodontitis, patients with allergies. Group I was the control group, where defect sites were treated with SRP followed by application of a placebo, whereas in group II or the test group the defect sites after SRP were applied with subgingival CoQ10 gel as an LDD.

All the prospect patients who were selected for the study underwent full mouth SRP, and plaque index (PI), gingival index (GI), probing pocket depth (PPD), and clinical attachment level (CAL) were recorded at baseline. Patients were then again evaluated for pocket depth after 1 month and who did not respond to SRP were randomly divided into group I or group II. Split mouth study was carried out, and each patient had a control site/pocket where subgingivally methyl cellulose gel as placebo was placed and in another test site/pocket CoQ10 gel subgingivally was placed with the help of a syringe (Fig. 1). Coe-Pak was placed, which was removed after 15 days, so that maximum time could be given to

the CoQ10 in the pocket for it to act. Patients were then recalled at 1, 3, 6, and 12 months for a follow-up, where PI, GI, PPD, and CAL were recorded at each visit.

All the patients (test and control groups) were kept under strict protocol of maintaining oral hygiene and also underwent oral prophylaxis at 6 months of subgingival placement of CoQ10 gel. At 12 months, patients (test and control groups) who did not show any signs of improvement were recalled and then taken up for surgical correction of the defect/site. Discussed here is the surgical protocol of one such patient who presented with persistent pocket depth of 5 mm in relation to (irt) 15, 16, and 17 (Fig. 2A) and in the second quad also pocket depth was 5 mm irt 25, 26, and 27 (Fig. 2B) after 12 months of subgingival placement of CoQ10 gel. Conventional flap was raised from 14 to 17 and after complete debridement and removal of all the granulation, Sticky Bone™ (Fig. 3) was placed irt 15, 16, and 17 (Fig. 4A) and 25, 26, and 27 (Fig. 4B). Sticky Bone was prepared by xenograft (Ti-Oss; Chiyewon, Guri, Korea), and advanced platelet-rich fibrin (APRF) prepared at 1,300 rpm for 8 minutes (Duo quattro, Nice, France), and after 5 minutes of mixing of both the materials a moldable bone graft material was obtained which could be cut or shaped as desired according to the size of the defect. After its placement at the defect site, sutures were given followed by postoperative instructions and medications. The same

surgical protocol was followed for the defects of second quadrant. The patient was further followed up for 6 months, and radiographs were taken at 3 and 6 months postoperative (Fig. 5).

## RESULTS

*t* test was used for statistical analysis. Results, as tabulated, showed that all the GI, PI, PPD, and CAL values showed a significant reduction at 1, 3, and 6 months, which again increases toward 12 months. Gingival index showed significant difference at 1, 3, and 6 months and a significant increase toward 12 months as compared with 1, 3, and 6 months.

Plaque index showed significant difference at 1 and 3 months from baseline; however, there is increase at 6 months and no significant difference at baseline and 12 months.

Probing pocket depth shows significant difference at 1, 3, and 6 months from baseline; however, there is increase in PPD from 3 to 6 months and significant increase between 6 and 12 months, and no significant difference at baseline and 12 months (Fig. 6).

Clinical attachment level shows significant difference at 1, 3, and 6 months from baseline; however, there is increase in CAL from 3 to 6 months and significant increase between 6 and 12 months, and no significant difference at baseline and 12 months (Fig. 7).

After the surgical protocol, there was significant improvement in the probing depth, and postoperative 6 months intra-oral periapical (IOPA) of first and second quad showed regeneration of bone at the defect site, and the pocket depth was 1 mm on both the sides (Fig. 5).

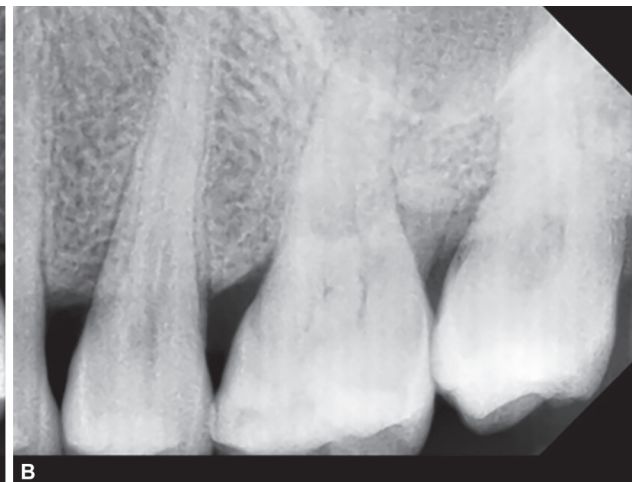
## DISCUSSION

Deposition of plaque and calculus is pathological and occurs in the mouths of all individuals, thus making periodontitis as the most common disease. However, this condition can be detected early and is reversible with proper care and healthy periodontium can be restored.

Coenzyme Q10 is a naturally occurring biomaterial found in the human body and primarily plays an essential role as an intermediate in the electron transport chain localized in mitochondrial membranes vital for aerobic cellular respiration.<sup>4,5</sup> Apart from this, it also acts as an antioxidant and protects protein membranes. Its deficiency can cause serious problems such as cerebellar ataxia, severe infantile multisystemic disease, encephalomyopathy, Leigh syndrome with growth retardation, and isolated myopathy, and all



Fig. 1: Placement of coenzyme Q10



Figs 2A and B: Intraoral periapical post 12 months of coenzyme Q10 placement in relation to: (A) 15, 16, and 17; (B) 25, 26, and 27

these problems can be corrected with the help of oral supplements. Thus, it can treat primary and secondary CoQ10 deficiencies, fibromyalgia, cardiovascular disease, male infertility, diabetes mellitus, cancer, mitochondrial diseases, neurodegenerative diseases, and periodontal disease.<sup>4</sup> It is a safe drug; most of the studies have not reported major side effects; however, its use may

cause gastrointestinal discomfort, headache, allergic reactions,<sup>4</sup> heartburn, elevated liver enzymes, insomnia, dizziness, irritability, headache, and photophobia.<sup>4</sup> Coenzyme Q10 may also increase the risk of bleeding due to its antiplatelet effect, thus only healthy patients were selected for the study.

Various studies have used CoQ10 for various purposes; in dentistry, researchers have used it to treat gingivitis and periodontitis. In an experimental study by Sanadi,<sup>7</sup> CoQ10 was used in patients of aggressive periodontitis, and the author reported that there was no significant difference in the debris index score, calculus index score, bleeding index score, and reduction in gingival inflammation between the experimental and control sites; however, the gel was not injected in the pocket, but the patients were asked to brush and massage the gums with it. In rest of the following studies, it was injected in the pocket; however, these studies show a short follow-up, such as Pitale et al.<sup>8</sup> showed 2-week follow-up in gingivitis and mild periodontitis, Sale et al.<sup>9</sup> for 4 weeks, Raut-Sethi<sup>10</sup> for a period of 1 month, and Roopa et al. for 2 months.<sup>11</sup> Early studies conducted by Wilkinson et al.<sup>12,13</sup> and Hanioka et al.<sup>14</sup> stated significant improvement in pocket depth, and in these studies also patients were followed up for 3 and 6 weeks, respectively. In a clinical and microscopic study conducted by McRee<sup>15</sup> in 1993, patients were orally given 100 mg CoQ10 supplements per day for 6 months after which the authors concluded that changes in

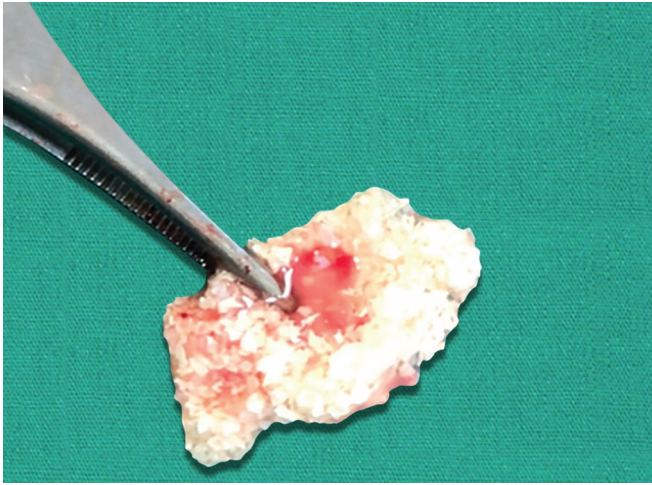
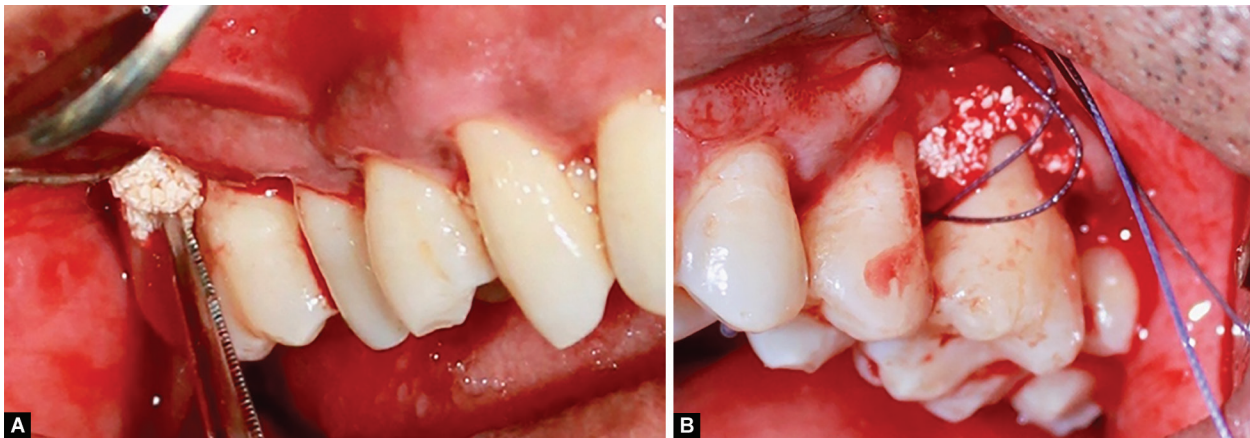
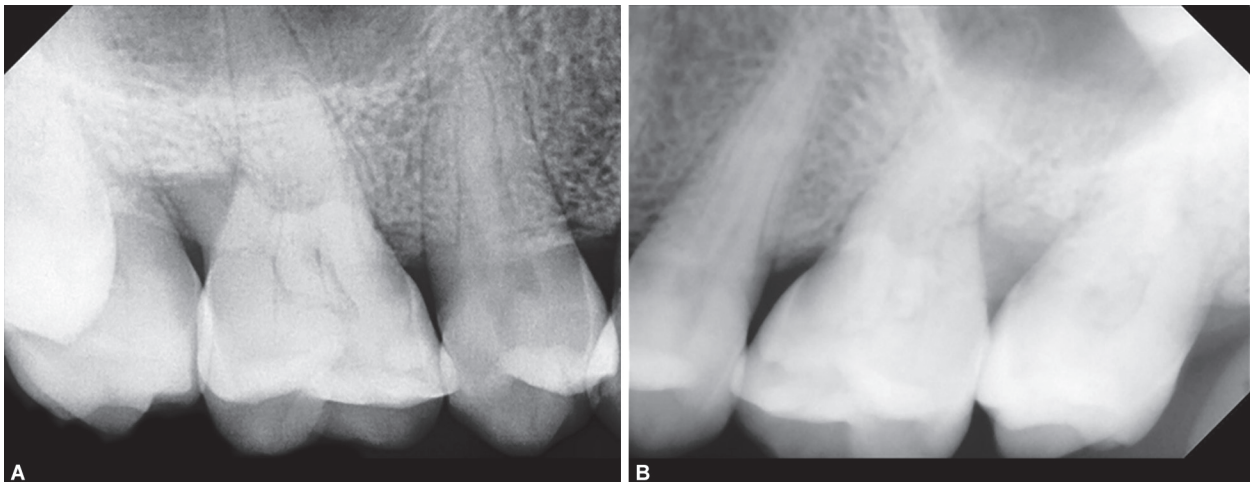


Fig. 3: Sticky Bone™ prepared



Figs 4A and B: Placement of Sticky Bone™ in I and II quadrants



Figs 5A and B: Postoperative 6 months in relation to I and II quadrants

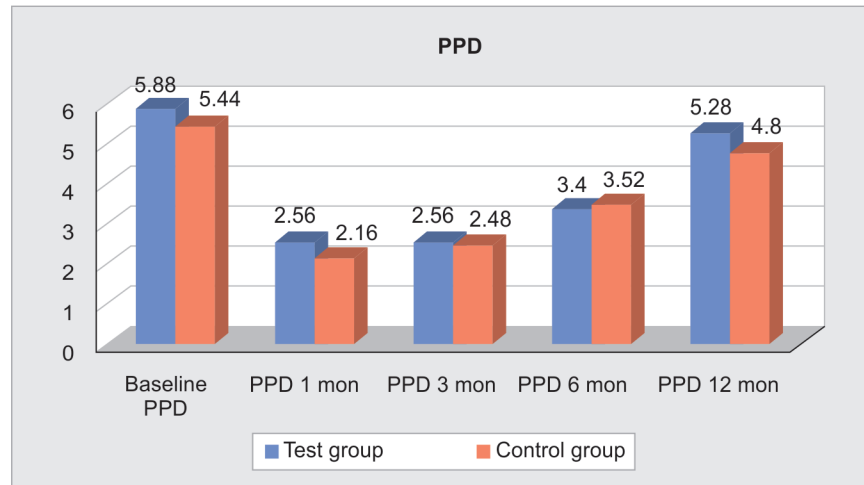


Fig. 6: Month-wise difference in probing pocket depth

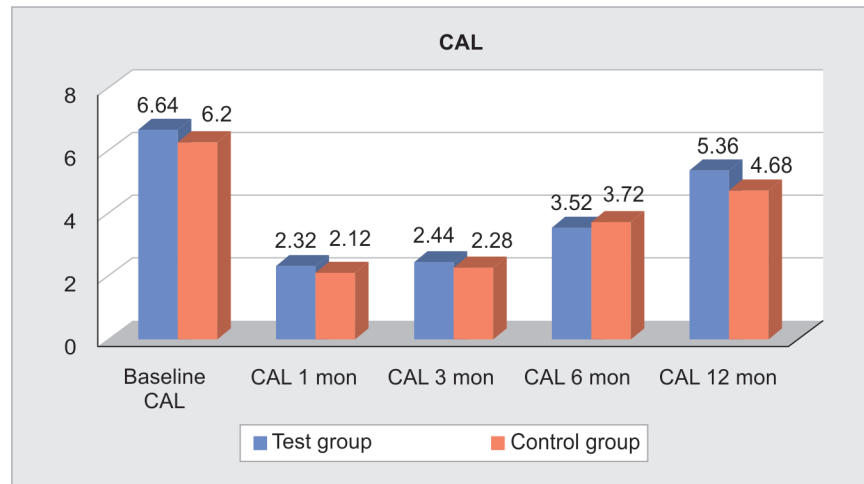


Fig. 7: Month-wise difference in clinical attachment levels

the GI, pocket depth, number of significant pockets, and score in motile rods were statistically significant in both the 2-month and the 6-month periods. In another study by Saini,<sup>16</sup> patients were followed up to 4 months where CoQ10 supplements were systemically given, with significant results between test and control groups.

As aforementioned, CoQ10 has antiplatelet effect thus, in the present study, bleeding index was not recorded for the patient on consecutive visits as it may have interfered with the results, and so it was not included in the statistical analysis. Also, bleeding from the gingival sulcus is the first sign of start of the disease;<sup>17</sup> thus, when it has advanced to periodontitis, bleeding on probing does not play a key role in the diagnosis of the disease and course of treatment which follows. Various studies<sup>7-16</sup> have reported that CoQ10 reduces periodontitis and has an adjunct effect on the pocket after SRP; however, these studies have a short follow-up period which is not sufficient to comment on the periodontal status of a patient with periodontitis. In the present study, it was observed that patients with a pocket of 5–7 mm who were treated with local delivery of CoQ10 after SRP showed beneficial effects for initial 3 months only, and at 6 months the pocket depth started to return to its previous levels. The same results were seen at the control sites which were treated with placebo. Thus, it can be argued that CoQ10 does not

have any beneficial effect in periodontitis. Transient relief in pocket depth, plaque control, and improvement in the gingival status were due to the removal of local irritants such as plaque and calculus. When patient showed slight lapse in oral hygiene maintenance, oral health returned to its previous levels. Thus, it can be stated that for short-term effects, our results are consistent with these studies quoted, but for long-term effects, CoQ10 has no role to play in treating periodontitis and it all depends upon the oral hygiene of the patient. Our results are consistent with the report of Watts,<sup>18</sup> who stated that CoQ10 has no place in periodontal treatment. Thus, the patients who did not show relief from subgingival placement of CoQ10 were then taken up for flap surgery with or without bone graft. As it can be seen in the figures, in the case discussed here, probing depth returned to previous levels, and there was bleeding on probing as well after 12 months of CoQ10 placement. During the surgical procedure, a convention flap was raised and thoroughly debridement of the defect was done. Sticky Bone™ was placed in 15, 16, 17, 25, 26, and 27, which was prepared with a xenograft (Ti-Oss; Chiyewon, Guri, Korea) and APRF. The advantage of using Sticky Bone™ is that it is a compound graft which can be molded as desired and cut according to the size of the defect, also APRF secretes growth factors and leukocytes necessary for regeneration.<sup>19</sup>

As each patient comprised test and control groups, it is understood that if the patient as a whole was taken up for the surgery, both the test and control defects/sites were treated; however, placement of Sticky Bone™ in relation to the control group has not been discussed as it composed of routine periodontal flap surgery with or without bone graft, and the study discusses more about the effects of CoQ10 and their management in cases of unhealed defects/sites.

### Limitations

Limitations of this study include small sample size and patient selection.

### CONCLUSION

Keeping all the scientific data into consideration at this point, it can be concluded that CoQ10 has no role to play in the treatment of periodontitis. However, further long-term studies, where it can also be given orally, are required to state CoQ10's usefulness toward treatment of periodontitis.

### CLINICAL SIGNIFICANCE

Clinically, it shows that CoQ10 has no role to play in the cases of periodontitis. In such cases, without delay patients should be taken up for periodontal flap surgery after complete SRP, if the pocket does not resolve. Coenzyme Q10 can be used for gingivitis; however, it is an accepted fact that cases of gingivitis can be treated with SRP only and application of any LDD is usually not required.

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