

Comparison of Effect of Chlorhexidine Mouthwash and Tooth Paste after Periodontal Surgery: A Case Series

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Abstract: ***Aim:** The aim of this study was to evaluate the clinical changes after the usage of chlorhexidine mouthwash and medicated tooth paste. **Materials and Methods:** 5 patients with moderate to severe plaque induced gingivitis and periodontitis were assigned to Group I- patients using toothpaste (Colgate total, Colgate Palmolive Ind.) with soft bristled tooth brush (Colgate sensitive, Colgate Palmolive Ind.) after periodontal surgery. 5 patients with moderate to severe plaque induced gingivitis and periodontitis were assigned to Group II- patients using chlorhexidine based mouthwash (Perioguard, Colgate Palmolive Ind.) after periodontal surgery. Periodontal status (OHI index), Gingival index, pocket depth and tooth mobility scores were recorded at baseline after 21 days. **Results:** Intragroup comparison in both groups showed that periodontal status (OHI index), gingival index and pocket depth scores were statistically significant after 21 days as compared to baseline. Intergroup comparison showed that periodontal status (OHI index) scores and pocket depth scores were statistically significant in Group II as compared to Group I. **Conclusion:** When compared to medicated tooth paste (Colgate total) with Colgate sensitive tooth brush, Perioguard (chlorhexidine) mouthwash effectively reduced the clinical symptoms of plaque-induced gingivitis.*

Keywords: chlorhexidinemouthwash and tooth paste

1. Introduction

Periodontics can help in improving the individual's smile by obtaining a healthy tooth to periodontium relationship. Periodontal surgery is a surgical procedure used for removal of diseased periodontal tissues creating a favorable environment for new attachment and readaptation of all soft and hard tissues, along with elimination of pockets by removal or recontouring of soft or osseous tissues. As the plaque formation is unavoidable, plaque control measures following periodontal surgery is very important for complete healing of tissues although it is difficult and uncomfortable for patients to maintain oral hygiene as the healing sites are sensitive, fragile and can easily bleed.^[1]

Methods of controlling formation and maturation of plaque include mechanical methods and chemical methods. Mechanical methods include tooth brushing, use of interdental aids such as tooth picks, interdental brushes, floss, etc. Chemical methods include use of antibiotics, quaternary ammonium compounds, sanguinarine, phenols, enzymes and bisguanides (chlorhexidine) among which bisguanides are effective. The use of chlorhexidine begun as a general disinfectant with a broad antimicrobial spectrum. Chlorhexidine is a bisbiguanide formulation with cationic properties. It is a strong base and is most stable in the form of salts. The most common preparation is the digluconate salt because of its water solubility. Its antimicrobial spectrum includes microbials such as gram positive and gram negative organism including bacterial spores, lipophilic viruses, yeasts and dermatophytes etc.^[2]

Löe and Schiott demonstrated the efficiency of a 0.2% Chlorhexidine gluconate mouthrinse to prevent plaque formation and the development of experimental gingivitis.^[3]

Briner et al. demonstrated the antimicrobial effect of a lower concentration of a (0.12%) Chlorhexidine gluconate mouth rinse in a six month clinical trial in patients with gingivitis. Burke demonstrated that bacterial contamination of a wound surface resulted in delayed healing due to an increased inflammatory response and granulation tissue formation.^[4] Usage of Medicated tooth pastes containing both fluoride and triclosan as a post- surgical adjuvant is also recommended . It prevents tooth decay, gingivitis, and plaque. Triclosan remains in the mouth after use and is an extremely potent anti-bacterial agent.^[5]

As the harmful effects of plaque formation is widely reported, the purpose of this case series is to document the periodontal status of those patients who had maintained oral hygiene with mouthwash (Perioguard-chlorhexidine) and tooth paste (Colgate total) with soft bristled tooth brush (Colgate sensitive)post surgically.

2. Materials and Methods

This study was conducted in GITAM Dental College and Hospital, Department of Periodontics, to compare the efficacy of use of mouthwash (chlorhexidine) with the trade name of Perioguard and toothpaste (Colgate total) along with soft bristled tooth brush (Colgate sensitive) in patients immediately after periodontal surgery. The study population consisted of ten patients who were systemically healthy, between 20 and 40 years of age, with moderate to severe plaque induced gingivitis and periodontitis.

Patients were excluded from the study if they suffered from non-plaque induced gingivitis or periodontitis, with history of antibiotic use, used mouthrinse within last 3 months, pregnant women, and with habit of smoking. Patients were

selected on the basis of inclusion and exclusion criteria and were divided into two groups

Group I- patients using toothpaste (Colgate total, Colgate Palmolive Ind.) with soft bristled tooth brush (Colgate sensitive, Colgate Palmolive Ind.) after periodontal surgery
 Group II- patients using chlorhexidine based mouthwash (Perioguard, Colgate Palmolive Ind.) after periodontal surgery

Post Surgically the patients were given the oral hygiene instructions and group I patients were instructed to use Colgate total tooth paste with Colgate soft bristled tooth brush twice daily for 2min. Group II patients were instructed to use 15ml of Perioguard mouthwash thrice daily for 2min.

The clinical examination included periodontal status (OHI-S Index – Debris index and Calculus Index), gingival index (Loe and Silness, 1964), tooth mobility and pocket depth which were recorded before surgery and postoperatively after 21 days.

Group 1- used Colgate total toothpaste with Colgate soft bristled tooth brush

Patient 1



Figure 1: Pre-operative status
OHI-S index: 3.2 (poor)
 (16, 11, 26, 36, 31, 46)

2	1	2	2	1	2
2	1	2	2	1	2

DI-S=1.6 CI-S=1.6
Gingival index: Score 3, severe inflammation
Tooth mobility: Grade II irt 16, 26, 36
Pocket depth: 5mm



Figure 2: Post-operative status
OHI-S index: 2.32 (fair)
 (16, 11, 26, 36, 31, 46)

1	1	2	1	1	2
1	1	1	1	1	1

DI-S=1.16 CI-S=1.6
Gingival index: Score 2, moderate inflammation
Tooth mobility: Grade I irt 16, 26, 36
Pocket depth: 3mm

Patient: 2



Figure 1: Pre-operative status
OHI-S index: 4.2 (poor)
 (16, 11, 26, 36, 31, 46)

Gingival index: Score 3, severe inflammation
Tooth mobility: Grade II irt 15, 16, 25, 26, 36
Pocket depth: 6mm



Figure 2: Post-operative status:
OHI-S index: 2.16 (fair)
 (16, 11, 26, 36, 31, 46)

2	1	1	1	1	1
1	1	1	1	1	1

DI-S=1.16 CI-S=1.0
Gingival index: Score 2, moderate inflammation
Tooth mobility: Grade II irt 15, 16, 25, 26, 36
Pocket depth: 3mm

Patient 3



Figure 1: Pre-operative status
OHI-S index: 4.0 (poor)
 (16, 11, 26, 36, 31, 46)

3	1	2	3	1	2
2	1	3	2	1	3

DI-S=2.0 CI-S=2.0
Gingival index: Score 3, severe inflammation
Tooth mobility: Grade II irt 31, 41, 32, 42
Pocket depth: 4mm



Figure 2: Post-operative status:

OHI-S index: 2.6 (fair)
(16, 11, 26, 36, 31, 46)

2	1	1
1	1	2

DI-S=1.3

2	1	1
1	1	2

CI-S=1.3

Gingival index: Score 2, moderate inflammation

Tooth mobility: Grade II irt 31, 41, 32, 42

Pocket depth: 3mm

Patient: 4



Pre-operative status:

OHI-S index: 3.2 (poor)
(16, 11, 26, 36, 31, 46)

2	1	2
2	1	2

DI-S=1.6

2	1	2
2	1	2

CI-S=1.6

Gingival index: Score 3, severe inflammation

Tooth mobility: grade III irt 48, Grade II irt 16

Pocket depth: 4mm



Figure 2: Post-operative status:

OHI-S index: 2.6 (fair)
(16, 11, 26, 36, 31, 46)

1	1	2
2	1	1

DI-S=1.16

1	1	1
2	1	1

CI-S=1.16

Gingival index: Score 2, moderate inflammation

Tooth mobility: Grade II irt 48, Grade I irt 16

Pocket depth: 3mm

Patient 5



Figure 1: Pre-operative status

OHI-S index: 3.2 (poor)
(16, 11, 26, 36, 31, 46)

2	1	2
2	1	2

DI-S=1.6

2	1	2
2	1	2

CI-S=1.6

Gingival index: Score 3, severe inflammation

Tooth mobility: Grade II irt 31, 32, 41, 42

Pocket depth: 5mm



Figure 2: Post-operative status

OHI-S index: 2.32 (fair)
(16, 11, 26, 36, 31, 46)

1	1	1
1	1	2

DI-S=1.16

1	1	1
1	1	2

CI-S=1.16

Gingival index: Score 2, moderate inflammation

Tooth mobility: Grade II irt 31, 32, 41, 42

Pocket depth: 3mm

Group 2: used Perioguard mouthrinse

Patient 1



Figure 1: Pre-operative status

OHI-S index: 3.2 (poor)
(16, 11, 26, 36, 31, 46)

2	1	2
2	1	2

DI-S=1.6

2	1	2
2	1	2

CI-S=1.6

Gingival index: Score 3, severe inflammation

Tooth mobility: Grade I irt 15, 16, 26, 36, 37

Pocket depth: 5mm



Figure 2: Post-operative status

OHI-S index: 0.9 (good)
(16, 11, 26, 36, 31, 46)

1	0	1
1	0	1

DI-S=0.6

1	0	0
0	0	1

CI-S=0.3

Gingival index: Score 1, mild inflammation
Tooth mobility: Grade I irt 15, 16, 26, 36, 37
Pocket depth: 3mm

Patient 2



Figure 1: Pre-operative status

OHI-S index: 4.2 (poor)
(16, 11, 26, 36, 31, 46)

3	2	3
3	2	3

DI-S=2.6

2	1	2
2	1	2

CI-S=1.6

Gingival index: Score 2, moderate inflammation
Tooth mobility: Grade II irt 16, 31, 32, 41, 42
Pocket depth: 4mm



Figure 2: Post-operative status:

OHI-S index: 1.4 (fair)
(16, 11, 26, 36, 31, 46)

1	0	1
2	0	1

DI-S=0.8

1	0	0
2	0	1

CI-S=0.6

Gingival index: Score 1, mild inflammation
Tooth mobility: Grade I irt 16, 31, 32, 41, 42
Pocket depth: 3mm

Patient: 3



Figure 1: Pre-operative status:

OHI-S index: 4.0 (poor)
(16, 11, 26, 36, 31, 46)

3	1	2
2	1	3

DI-S=2.0

3	1	2
2	1	3

CI-S=2.0

Gingival index: Score 2, moderate inflammation
Tooth mobility: grade II irt 11, 21, 12, 22;
Grade I irt 24, 25, 26, 31, 32, 41, 42
Pocket depth: 3mm



Figure 2: Post-operative status:

OHI-S index: 1.2 (good)
(16, 11, 26, 36, 31, 46)

2	0	1
1	0	1

DI-S=0.6

2	0	0
1	0	1

CI-S=0.6

Gingival index: Score 1, mild inflammation
Tooth mobility: Grade II irt 11, 21, 12, 22;
Grade I irt 24, 25, 26, 31, 32, 41, 42
Pocket depth: 3mm

Patient: 4



Figure 1: Pre-operative status

OHI-S index: 4.2 (poor)
(16, 11, 26, 36, 31, 46)

3	2	3
3	2	3

DI-S=2.6

2	1	2
2	1	2

CI-S=1.6

Gingival index: Score 2, moderate inflammation
Tooth mobility: Grade II irt 21
Pocket depth: 5mm



Figure 2: Post-operative status

OHI-S index: 1.2 (good)

(16, 11, 26, 36, 31, 46)

1	0	1
1	0	1

DI-S=0.6

2	0	0
1	0	1

CI-S=0.6

Gingival index: Score 1, mild inflammation

Tooth mobility: Grade I irt 21

Pocket depth: 3mm

Patient: 5



Figure 2: Post-operative status:

OHI-S index: 1.2 (good)

(16, 11, 26, 36, 31, 46)

1	0	1
1	0	1

DI-S=0.6

2	0	1
1	0	1

CI-S=0.6

Gingival index: Score 1, mild inflammation

Tooth mobility: Grade I irt 17, 37, 46, 47, 26, 36

Pocket depth: 3mm



Figure 1: Pre-operative status

OHI-S index: 4.0 (poor)

(16, 11, 26, 36, 31, 46)

3	1	2
2	1	3

DI-S=2.0

3	1	2
2	1	3

CI-S=2.0

Gingival index: Score 2, moderate inflammation

Tooth mobility: Grade II irt 17, 37, 46, 47; Grade I irt 26, 36

Pocket depth: 6mm

Table 1: Tabulation of Group 1 patients who used Colgate total toothpaste with Colgate soft bristled tooth brush

Patient No	OHI Index		Gingival Index		Tooth Mobility		Pocket Depth	
	Pre OP	Post OP	Pre OP	Post OP	Pre OP	Post OP	Pre OP	Post OP
1	3.2	2.32	Score 3	Score 2	Grade 2	Grade 1	5mm	3mm
2	4.2	2.16	Score 3	Score 2	Grade 2	Grade 2	6mm	3mm
3	4.0	2.6	Score 3	Score 2	Grade 2	Grade 2	4mm	3mm
4	3.2	2.6	Score 3	Score 2	Grade 3	Grade 2	4mm	3mm
5	3.2	2.32	Score 3	Score 2	Grade 2	Grade 2	5mm	3mm

Table 2: Tabulation of Group II patients who used Perioguard (chlorhexidine) mouthwash

Patient No	OHI Index		Gingival Index		Tooth Mobility		Pocket Depth	
	Pre OP	Post OP	Pre OP	Post OP	Pre OP	Post OP	Pre OP	Post OP
1	3.2	0.9	Score 3	Score 1	Grade 1	Grade 1	5mm	3mm
2	4.2	1.4	Score 2	Score 1	Grade 2	Grade 1	4mm	3mm
3	4.0	1.2	Score 2	Score 1	Grade 2	Grade 2	3mm	3mm
4	4.2	1.2	Score 2	Score 1	Grade 2	Grade 1	5mm	3mm
5	4.0	1.2	Score 2	Score 1	Grade 2	Grade 1	6mm	3mm

Table 3: A intra-group comparison of the pre-operative and post-operative values of oral hygiene index and pocket depth between Group I and Group II by using Paired t-test

Group	Parameter	Type	Mean	SD	P-value	Inference
Group I	OHI INDEX	Pre	3.56	0.50	<0.01	HS
		Post	2.40	0.19		
	POCKET DEPTH	Pre	4.80	0.84	<0.01	HS
		Post	3.00	0.00		
Group II	OHI INDEX	Pre	3.92	0.41	<0.01	HS
		Post	1.18	0.18		
	POCKET DEPTH	Pre	4.60	1.14	<0.05	S
		Post	3.00	0.00		

The above table shows significant improvement in OHI index and effective reduction of pocket depth post-operatively compared to pre-operative status

Table 4: A inter-group comparison of the pre-operative and post-operative values of oral hygiene index and pocket depth between Group I and Group II by using Independent t-test

Parameter	Diff	Groups	Mean	SD	P-value	Inference
OHI INDEX	Pre & Post	Group 1	1.16	0.57	<0.01	HS
	Pre & Post	Group 2	2.74	0.26		
POCKET DEPTH	Pre & Post	Group 1	1.8	0.84	0.76	NS
	Pre & Post	Group 2	1.6	1.14		

The above table shows significant improvement in OHI index post operatively in Group II patients who used Perioguard (chlorhexidine) mouthwash compared to Group I patients who used Colgate total toothpaste with Colgate soft bristled tooth brush

Table 5: A comparison of the pre- and post- values of tooth mobility in Group I by using Chi-square test

TOOTH MOBILITY Group I			
Pre test	Post		
	Grade 1	Grade 2	Total
Grade 1	1 10.00%	0 0.00%	1 20.00%
Grade 2	0 0.00%	3 75.00%	3 60.00%
Grade 3	0 0.00%	1 25.00%	1 20.00%
Total	1 10.00%	4 10.00%	5 10.00%
Chi-square=5.0 P-value=0.08 NS			

This shows no significant change in tooth mobility pre-operatively and post-operatively in Group I patients

Table 6: A comparison of the pre- and post- values of tooth mobility in Group II by chi square test

TOOTH MOBILITY Group II			
Pre test	Post		
	Grade 1	Grade 2	Total
Grade 1	1 25.00%	0 0.00%	1 20.00%
Grade 2	3 75.00%	1 100.00%	4 80.00%
Total	4 100.00%	1 100.00%	5 100.00%
Chi-square=0.31 P-value=0.58 NS			

This shows no significant change in tooth mobility pre-operatively and post-operatively in Group I patients

3. Results

Table 1 and table 2 shows the pre-operative and post-operative periodontal status, pocket depth of Group 1 patients who used Colgate total toothpaste with Colgate soft bristled tooth brush and Group II patients who used Perioguard (chlorhexidine) mouthwash

Table 3 shows a intra-group comparison of the pre-operative and post-operative values of oral hygiene index and pocket depth between Group I patients who used Colgate total toothpaste with Colgate soft bristled tooth brush and Group II patients who used Perioguard (chlorhexidine) mouthwash by using Paired t-test which is statistically significant (P < 0.01). There was statistically significant difference in both the scores indicating the significant improvement in periodontal status post-operatively in both Group I and Group II patients.

Table 4 shows a inter-group comparison of the pre-operative and post-operative values of oral hygiene index and pocket depth between Group I patients who used Colgate total toothpaste with Colgate soft bristled tooth brush and Group II patients who used Perioguard (chlorhexidine) mouthwash by using Independent t-test which is statistically significant (P < 0.01). There was statistically significant difference in OHI scores indicating the significant improvement in periodontal status of Group II patients who used Perioguard (chlorhexidine) mouth wash compared to Group I patients who used Colgate total toothpaste with Colgate soft bristled tooth brush.

Table 5 and Table 6 shows no statistical significance indicating that the pre-operative and post-operative mean values of tooth mobility were almost the same in both the groups. The gingival index showed an improvement in both the groups post-operatively.

4. Discussion

Esthetical demand in today's dental practice is not only limited to restorative treatment procedure but also extended to treatment procedure. Disruption of tooth to periodontal contact may be due to several factors, among which plaque induced periodontitis is important.^{[6],[7]} The purpose of the case series is to document the periodontal status of those patients who are undergoing oral hygiene using chlorhexidine mouthwash and Colgate total tooth paste with sensitive tooth brush after periodontal surgery.

In the present study results of group I patients who used Colgate total tooth paste with Colgate soft bristled tooth brush immediately after periodontal surgery showed improvement in periodontal status, gingival index, and reduction in tooth mobility and pocket depth. As an adjuvant, regular brushing following initial healing showed marked reduction in gingivitis and subsequent benefit to periodontal health due to the anti-inflammatory and antimicrobial action of Colgate Total® toothpaste. Renvert S et al conducted study on efficacy triclosan containing dentifrices against plaque and microflora concluded that triclosan containing dentifrices are effective in plaque control under normal conditions.^[9] Gunsolley concluded that there was insufficient evidence to demonstrate efficacy for other triclosan toothpaste systems containing soluble pyrophosphate or zinc citrate.^[10] There is limited literature available about the effect of medicated tooth paste on gingival tissues immediately after periodontal surgery.

Group II patients who used perioguard (chlorhexidine) mouthwash immediately after surgery showed significant improvement in periodontal status, gingival index, and reduction in pocket depth although there was no significant change in tooth mobility. Almas et al compared the antibacterial effect of chlorhexidine and a dentifrice extract and concluded that chlorhexidine mouthwash has maximum antibacterial activity.^[11] Newman et al; compared chlorhexidine with periodontal pack on healing during the first week after periodontal surgery. In 15 patients who required comparable bilateral flap procedures they found less inflammation in the chlorhexidine treated sides. In addition most of the patients preferred the mouth rinse.^[12] Vaughan, Nassar et al in their studies observed proper maintenance of oral hygiene and desirable wound healing of gingival tissues after periodontal surgery.^{[13],[14]} Bhate et al compared efficacy of chlorhexidine mouthwash and a herbal oral rinse and found that chlorhexidine decreases the binding capacity of microorganisms thereby enhancing the oral hygiene.^[2] Asboe Jogersen et al examined the effect of chlorhexidine immediately after periodontal surgery and observed that chlorhexidine-dressing showed less gingival exudate and decreased tendency to bleeding.^[15] The results indicate that the chlorhexidine dressing increased the healing rate of tissues at surgical site.

On comparison between two groups, chlorhexidine is satisfactory because patients followed meticulous oral hygiene and brushing causes mechanical trauma healing tissues post-surgically. Patients were advised to practice gentle oral hygiene methods with soft bristled tooth brush until healing is satisfactory.

5. Conclusion

Extensive literature is available about the anti-plaque effect of chlorhexidine mouth wash, and some of the studies have reported the treatment of periodontal pocket with chlorhexidine irrigation as an adjunct to scaling and root planning, provides a significant improvement in probing depth and reduces the microbial load. Colgate Total tooth paste provides protection against plaque and gingivitis, cavities, oral malodor, and calculus compared to regular fluoride toothpaste. It also provides protection against the progression of periodontal disease. Aggressive regular brushing is not indicated immediately after surgery.

Within the limitations, results of present study showed significant improvement in the periodontal status with the use of Periogard mouthwash (chlorhexidine) thrice daily after periodontal surgery compared to that with the use of medicated tooth paste (Colgate Total). This indicates that Periogard (chlorhexidine) increases the healing rate of tissues subjected to periodontal surgery compared to use of medicated toothpaste (Colgate total) with Colgate soft bristled tooth brush which can cause mechanical trauma and impairs healing of tissues at surgical site immediately after surgery.

6. Recommendations

It is recommended to use chlorhexidine (Periogard) mouthwash thrice daily immediately after periodontal surgery with mild tooth brushing using triclosan base tooth paste (Colgate Total and Colgate sensitive Brush) for few days followed by regular kind of tooth brushing with same tooth paste and tooth brush in modified bass method.

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