



Differences of Annual Radiographic Alveolar Bone Loss Rates of Anterior and Posterior Teeth of Individuals Affected with Secondary Occlusal Traumatism between with and without Perioprosthodontic Therapy



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Abstract

The purpose of present study was to analysis and investigate the differences of annually radiographic alveolar bone lose (ARABL) rates between the anterior and posterior teeth affected SOT in individuals with and without periodontal therapy, respectively. The study samples consisted of a total 78 individuals, (anterior teeth: 40 and posterior teeth: 38) those present was based on some retrospective analysis from 78 individuals with secondary occlusal traumatism (SOT). In addition, the anterior teeth of 12 treated and 28 untreated individuals were assigned the test group and the control group; The 24 posterior teeth of treated individuals and 14 untreated individuals were assigned as the test group and control group, respectively.

Results showed the mean alveolar bone level gain of the mesial and distal wall in the treated group for anterior teeth with SOT, was significantly higher ($p < 0.05$) as compare to that of the untreated group got a severe alveolar bone loss using two sample t-test. The mean alveolar bone level gain of the mesial and distal wall in the treated group for posterior teeth with SOT was strong significantly higher ($p < 0.0001$) as compared to that of the untreated group using two sample t-test. The mean alveolar bone level gain of the mesial and distal walls in the treated group for posterior teeth with SOT was significantly higher ($p < 0.05$) than that of the untreated group using two sample t-test. The mean RABL gain of the mesial and distal walls in the treated group with SOT was significant higher ($p < 0.001$) than the untreated group using two sample t-test. It is concluded that the RABL gain of the mesial, distal and both mesial and distal walls in the treated group for both anterior and posterior teeth with SOT, was significantly higher as compare to that of the untreated group with a remarkable boss.

Keywords: SAP; ARABL; SOT; Treated NSPT; Untreated NSPT

Abbreviation: ARABL: Annually radiographic alveolar bone lose; SOT: Secondary occlusal traumatism; HP: Healthy periodontium; CP: Chronic periodontitis; AgP: Aggressive peri-odontitis; PI: Plaque index; GI: Gingival index; PPD: Initial probing pocket depths; CAL: Clinical attachment levels; SD: Standard deviation; TPP: Provisional prosthesis

Introduction

The cross-sectional and longitudinal studies employing techniques, relating to measuring the rate of clinical attachment lose in individuals with healthy periodontium (HP), chronic periodontitis (CP), and aggressive peri-odontitis (AgP) with secondary occlusal traumatism (SOT), were documented in the majority of investigators [1]. There is little or no reports regarding studies related to the annually radiographic periodontal bone loss rates among the individuals with periodontal health, chronic

periodontitis and aggressive periodontitis with and without SOT from using digital scanning radiographic image analysis [2-6]. The reduction in periodontal bone height with increasing age in healthy, and in those chronic periodontitis and aggressive periodontitis, however, wide variations were noted at the different grades of disease stages, and among different types of periodontitis [1,2,7,8]. Little or limited data, concerning annual alveolar bone loss rates, in the long-term studies among the teeth

of individuals with SOT, was available between the treated and untreated periodontal therapy. The purpose of present study was to analysis and investigate the differences of annually radiographic alveolar bone lose (ARABL) rates between the teeth affected SOT in individuals with and without periodontal therapy, respectively.

Materials and Methods

The study samples consisted of a total 78 individuals, (anterior teeth: 40 and posterior teeth: 38) those present was based on some retrospective analysis from 78 individuals with secondary occlusal traumatism (SOT). In addition, the anterior teeth of 12 treated individuals were assigned the test group, where anterior teeth of 28 untreated individuals were assigned as the control group (Table 1). The 24 posterior teeth of treated individuals were assigned as the test group; where 14 untreated individuals were assigned as the control group (Table 2), respectively. Proper informed consent was obtained from the patients and control individuals. All the samples, which reporting or referred to Periodontal Clinics of Dental School, Kaohsiung Medical University Hospital from 1981 to 2001 were collected in the study. A periodontal charting was performed to record oral examination of both clinical and periodontal parameters evaluation included age, sex, dental history, plaque index (PII) [9], gingival index (GI) [10], initial probing pocket depths (PPD), clinical attachment levels (CAL). Annual radiographic alveolar bone loss of teeth was also measured mesially and distally.

Measurements of ARABL using DSRIA [11-13]

Proximal RABL was defined as bone defects of at least 2 mm distance between the CEJ (point A) and the alveolar bone crest (point B). Deeper defects were recorded as the % of the ratio

of RABL to root length. The radiographic CEJ (point A), alveolar bone crest (point B) and root apex (point C) were used as three reference points for calculating RABL (Figure 1).

Results

Table 1 indicated the mean and standard deviation (SD) of RABL (mm) in the mesial wall of anterior teeth with secondary occlusal traumatism (SOT) with and without periodontal therapy. Results showed that the mean (SD) on the anterior teeth with SOT of the mesial wall in the treated group (6) was gain (+0.65±1.09 mm), where the untreated group (14) were alveolar bone loss (-1.56±0.72 mm), respectively. The mean alveolar bone level gain, for anterior teeth with SOT of the mesial wall in the treated group, was non-significantly as compare to that of the untreated group got a severe alveolar bone loss (f value = 2.8774, p> 0.05) using two sample t-test. Also, results indicated that the mean (SD) on the anterior teeth with SOT of the distal wall in the treated group(6) was gain (+0.17±0.88 mm), where the untreated group (14) were alveolar bone loss (-1.62±0.57 mm), respectively. The mean alveolar bone level gain, for anterior teeth with SOT of the distal wall in the treated group, was non-significantly as compare to that of the untreated group got a severe alveolar bone loss (f value = 0.1044, p> 0.05) using two sample t-test. Results showed that the mean (SD) of RABL (mm) on the anterior teeth with SOT of the mesial and distal wall in the treated group (12) was gain (+0.41±0.59 mm), where the untreated group (28) were alveolar bone loss (-1.59±0.47 mm), respectively. The mean alveolar bone level gain of the mesial and distal wall in the treated group for anterior teeth with SOT, was significantly higher (f value = 6.0262, p<0.05) as compare to that of the untreated group got a severe alveolar bone loss using two sample t-test (Table 1).

Table 1: Mean and standard errors of RABL in the mesial & distal walls of maxillary and mandibular anterior teeth (40) affected secondary occlusal traumatism (SOT) with (12 test groups) and without (28 control groups) periodontal therapy.

Anterior teeth with SOT (n= 40)	Mean(SE) (mm)	F value	t-test significance
Mesial wall			
Treated Groups(TG)(12)	+0.65(1.09)	2.874	p>0.05
Untreated Groups(CG)(28)	-1.56(0.72)		
Distal wall			
Treated Groups(TG) (12)	+0.17(0.88)	0.1044	p>0.05
Untreated Groups(CG)(28)	-1.62(0.57)		
Mesial& Distal walls			
Treated Groups (TG)(12)	+0.41(0.59)	6.0262	P<0.05
Untreated Groups (CG)(28)	-1.59(0.47)		

n: number of treated sites (study groups) examined; statistical analysis using two sample t-test; SD: standard deviations; Maxi Ant Teeth with SOT: 12 teeth (TG); 28 teeth (CG).

Table 2 demonstrated that the mean and standard deviation (SD) of RABL (mm) in the mesial wall of posterior teeth with SOT with and without periodontal therapy. Results showed that the mean (SD) on the posterior teeth with SOT of the mesial wall in the

treated group (12) was gain (+1.21±1.08 mm), where the untreated group (7) was alveolar bone loss (-3.15±1.42 mm), respectively. The mean alveolar bone level gain of the mesial wall in the treated group for anterior teeth with SOT, was significantly higher (f value

= 5.9928, p<0.05) as compare to that of the untreated group got a severe alveolar bone loss using two sample t-test. Results indicated that the mean(SD) of RABL (mm) on the posterior teeth with SOT of the distal wall in the treated group (12) was gain (+0.78±0.57 mm), where the untreated group (7) was alveolar bone loss (-3.31±0.75 mm), respectively. The mean alveolar bone level gain of the distal wall in the treated group for posterior teeth with SOT, was significantly higher (f value =18.6869, p<0.001) as compare to that of the untreated group using two sample t-test (Table 2).

Table 2 showed that the mean(SD) of RABL (mm) on the posterior teeth with SOT of the mesial and distal wall in the treated group (24) was gain (+1.00±0.46 mm), where the untreated group (7) was alveolar bone loss (-3.23±1.03 mm). The mean alveolar bone level gain of the mesial and distal wall in the treated group for posterior teeth with SOT was strong significantly higher (f value =18.4995, p<0.0001) as compare to that of the untreated group using two sample t-test.

Table 2: Mean and standard errors of RABL (mm) in the mesial & distal walls of maxillary and mandibular posterior teeth (38) affected secondary occlusal traumatism (SOT) with (24 test groups) and without (14 control groups) periodontal therapy.

Posterior Teeth with SOT (n=38)	Mean(SE) (mm)	F value	t-test significance
Medial wall			
Treated groups (TG) (12)	+1.21(1.08)	5.992	P<0.05
Untreated groups (CG) (7)	-3.15(1.42)		
Distal wall			
Treated groups (TG)(12)	+0.78(0.57)	18.6869	P<0.001
Untreated groups (CG)(7)	-3.31(0.75)		
Mesial& Distal walls			
Treated groups (CG)(24)	+1.00(0.46)	18.4995	P<0.0001
Untreated groups (CG)(14)	-3.23(1.03)		

n: number of teeth examined; statistical analysis using two sample t-test; SD: standard deviations; Maxi Ant Teeth with SOT: 12 teeth (TG); 28 teeth (CG).

Table 3 illustrated that the mean(SD) of RABL (%) on the anterior teeth with SOT of the mesial wall in the treated group (6) was gain (+4.43±7.81 %), where the untreated group (14) was alveolar bone loss (-10.74±5.12 %). The mean alveolar bone level gain of the mesial wall in the treated group for anterior teeth with SOT was non-significantly (f value =2.6410, p>0.05) as compare to that of the untreated group using two sample t-test. Results indicated that the mean(SD) of RABL (%) on the anterior teeth with SOT of the distal wall in the treated group (6) was gain (+1.24±6.01 mm), where the untreated group (14) was alveolar bone loss (-10.65±0.75 mm), respectively. The mean RABL of the

distal wall in the treated group for anterior teeth with SOT, was non-significant (f value =10.5379, p>0.05) as compare to that of the untreated group using two sample t-test (Table 2). Table 3 indicated that the mean(SD) of RABL (%) on the anterior teeth with SOT of the mesial and distal wall in the treated group (12) was gain (+2.84±4.30 %), where the untreated group (28) was alveolar bone loss (-10.69±3.27 %). The mean alveolar bone level gain of the mesial and distal wall in the treated group for posterior teeth with SOT was significantly higher (f value =5.5540, p<0.05) than that of the untreated group using two sample t-test.

Table 3: Mean and standard errors of RABL (%) in the mesial & distal walls of maxillary and mandibular anterior teeth of individuals (40) affected secondary occlusal traumatism (SOT) with (12 test groups) and without (28 control groups) periodontal therapy.

Anterior teeth with SOT(n=40)	Mean(SE) (mm)	F value	t-test significance
Medial wall			
Treated groups(6)	+4.43(7.81)	2.641	P>0.05
Untreated groups(14)	-10.74(5.12)		
Distal wall			
Treated groups(6)	+1.24(6.01)	10.5379	P>0.05
Untreated groups(14)	-10.65(3.93)		
Mesial & Distal walls			
Treated groups(12)	+2.84(4.30)	5.554	P< 0.05
Untreated groups(28)	-10.69(3.27)		

n: number of teeth examined; statistical analysis using two sample t-test; SD: standard deviations; Maxi Ant Teeth with SOT: 12 teeth (TG); 28 teeth (CG).

Table 4 showed the mean(SD) of RABL (%) on the posterior teeth with SOT of the mesial wall in the treated group (12) was gain (+8.60±7.11%), where the untreated group (7) was alveolar bone loss (-21.38±9.31 %). The mean RABL gain of the mesial wall in the treated group with SOT was significantly higher (f value =6.5478, p<0.05) than that of the untreated group using two sample t-test. Results indicated that the mean(SD) of RABL (%) on the posterior teeth with SOT of the distal wall in the treated group (12) was gain (+7.04±5.20 %), where the untreated group (7) was alveolar bone loss (-28.24±6.81 %). The mean RABL of the distal wall in the

treated group with SOT was remarkably significant higher (f value =16.9685, p<0.001) than that of the untreated group using two sample t-test (Table 2). Table 4 illustrated that the mean(SD) of RABL (%) on the posterior teeth with SOT of the mesial and distal wall in the treated group (24) was gain (+7.82±3.26 %), where the untreated group (14) was alveolar bone loss (-24.81±7.46 %). The mean RABL gain of the mesial and distal wall in the treated group with SOT was significant higher (f value =21.1699, p<0.001) than the untreated group using two sample t-test.

Table 4: Mean and standard errors of RABL (%) in the mesial & distal walls of maxillary and mandibular posterior teeth of individuals (38) affected secondary occlusal traumatism (SOT) with (24 test groups) and without (14 control groups) periodontal therapy.

Posterior teeth with SOT(n=38)	Mean(SE) (mm)	F value	t-test significance
Medial wall			
Treated groups(12)	+8.60(7.11)	6.5478	P<0.05
Untreated groups(7)	-21.38(9.31)		
Distal wall			
Treated groups(12)	+7.04(5.20)	10.5379	P<0.001
Untreated groups(7)	-28.24(6.81)		
Mesial& Distal walls			
Treated groups(24)	+7.82(3.26)	21.1699	P< 0.001
Untreated groups(14)	-24.81(7.46)		

n: number of teeth examined; statistical analysis using two sample t-test; SD: standard deviations; Maxi Ant Teeth with SOT: 12 teeth (TG); 28 teeth (CG).

Discussion

The pilot study from our earlier report indicated that DSRIA showed in higher values of correlation coefficients for the intra-examiner (r=0.994, p<0.001) and inter examiner (r=0.995, p<0.001) reliability tests to measure alveolar bone loss. Therefore, the present study also uses the DSRIA to assess proximal RABL [11]. Primary trauma from occlusion is possibly first caused by alteration of occlusal forces and /or over loading periodontium to withstand occlusal forces [14]. Polson et al. [15] reported that no change of above reasons probably because the supra-crestal gingivals are not affected and therefore prevent the apical migration of the junction epithelium. Secondary cause of periodontal defects of alveolar bone loss is common reason of SOT because of the burden force increasing on the less remaining tissues and heavy leverage on the weaken periodontium [16-18]. Present study showed that the mean RABL on the anterior teeth with SOT of the mesial and distal wall in the treated group was gain in contrast to the untreated group were alveolar bone loss, respectively. The RABL gain in the treated group for anterior teeth with SOT was significantly higher as compared to that of the untreated group got a severe alveolar bone loss. Therefore, present data revealed that the teeth with SOT in the treated group remarkably bone gain as compared to that of untreated cases with SOT [11-13].

The posterior teeth with SOT of both with and without periodontal therapies revealed remarkable difference of mean RABL among mesial, distal and both walls. Results also showed that the mean of the posterior teeth with SOT for the mesial wall in the treated group was gain, in contrast to that of the untreated group with alveolar bone loss. The gain of RABL of the mesial wall in the treated group for anterior teeth with SOT was significantly higher as compared to that of the untreated group got a severe alveolar bone loss. The mean RABL in the treated group with SOT was remarkable bone gain with strong significant higher (p<0.001) than that of the untreated group using two sample t-test, irrespective of both anterior, posterior, or both groups and mesial, distal wall and both walls (Figure1 & 2).

Little or limited reports was presented regarding changes of RABL of anterior and posterior teeth affected SOT between the treated and untreated groups. According to the present results, we can concluded that the mean of RABL in either both anterior and posterior teeth with SOT in the treated group revealed bone gain, or where the untreated group revealed alveolar bone loss, respectively. The RABL gain of the mesial, distal and both mesial and distal walls in the treated group for both anterior and posterior teeth with SOT, was significantly higher bone gain as compare to that of the untreated group with a remarkable boss.

Lindhe & Nyman [19] and Rosling [20] reported that the employment of proper periodontal therapy did not diminish the decreased tooth mobility. Teeth affected SOT might still exhibit a progressively increased mobility and splinting of these teeth might necessary using therapeutic provisional prosthesis (TPP) either unilaterally or bilaterally cross-arch design. Our recent two studies also documented and revealed that a more long-term follow-up case series of preservation of similarly compromised teeth affected SAP with SOT using the strategies of non-surgical

periodontal therapy, TPP, and crown and sleeve- coping telescopic denture were made to resolve SOT. The conclusions from former and recent studies for stabilizing the teeth affected SAP with SOT seem to be a valuable and better suggestion. The present results were in consistent with therapeutic outcomes of the former studies and showed that remarkable improvement periodontal parameters and radiographic bone fills of angular bony defects (Figure 1 & 2) [21, 22].

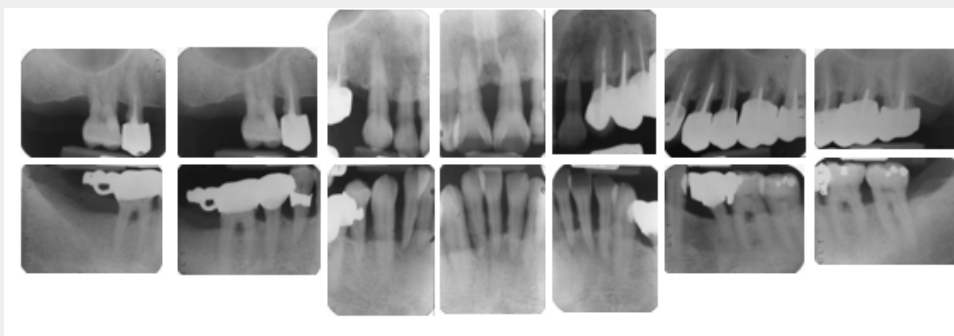


Figure 1: The patient affected severe advanced periodontitis with secondary occlusal traumatism (SOT) via full mouth radiographic x-ray before treatment (4/19/1994).

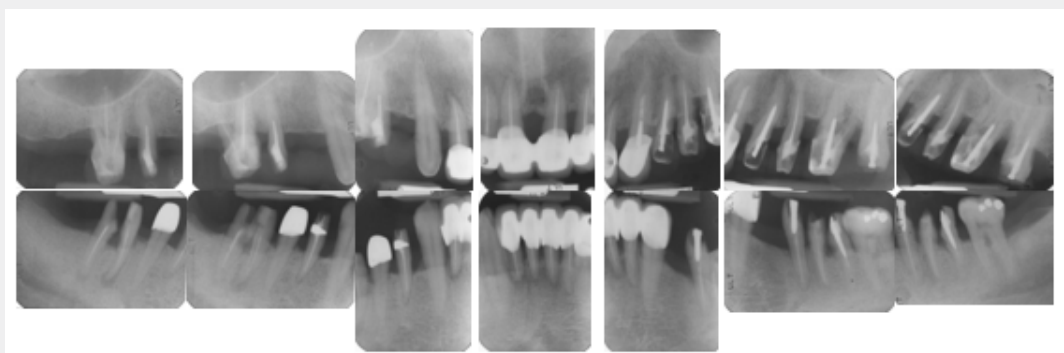


Figure 2: The full mouth radiographic alveolar bone and periodontal parameters of patient revealed remarkable periodontal bone regeneration treated using combined periodontal, prosthetic and SOT treatments after two years (9/16/ 1996).

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