Radiographic follow up for clinical cases of mandibular implant retained overdenture MIR-OD

Raghdaa K. Jassim, B.D.S., M.Sc., Ph.D. [(1)]
Ibrahim K. Ibrahim, B.D.S., C.E.S., D.S.O. [(2)]

ABSTRACT

Background: The use of osseointegrated fixtures in dentistry has been demonstrated both histologically and clinically to be beneficial in providing long term oral rehabilitation in completely edentulous individual. Most patients suffer from denture instability; particularly with mandibular prosthesis, the use of dental implant will be benefit significantly from even a slight increase in retention. The concept of implanting two to four fixtures in a bony ridge to retain a complete denture prosthesis appealing therefore, as retention, stability and acceptable economic compromise to the expanse incurred with the multiple fixture supported fixed prosthesis .

Materials and methods in this study the sample were eight patients selected from a hospital of specialized surgery, these patient were wearing a mandibular implant retained over denture for two years these patients having MIR-OD with Bar-clip, ball-cup and O- ring attachments. Preparative radiography was obtained for this patient from the center .these radiograph was taken to the patient at time of insertion. The second radiograph image was taken to the patient after two years of function with prosthesis. .the scanned images were transfer to special folder in a computer then analysis of bone loss done using Dimax software. After that an accurate calibrations of crestal bone measurement were analyzed for both groups of Radiography .

Results it was appeared that the amount of bone loss in ball and bar designs (of mandibular Implant retained overdenture) were within the criteria of successful rate of bone loss during the period of examination, and there was statistically significant difference between both types of anchorage system.

Conclusions The amount of bone loss was 0.1 mm after two years follow up, and it was within the acceptable limits of bone lose. A significant difference appeared between both designs of MIR-OD, Ball and bar designs.

Key words: Radiograph, implant, overdenture, Dimax. (J Bagh Coll Dentistry 2014; 26(2): 7-11).

INTRODUCTION

Mandibular implant-retained overdentures are generally anchored by at least two implants placed in canine or slightly medial to it [(1,2)].The most commonest forms of anchorage system are ball attachment [(3)] and two clips on bar connecting the implants [(4)].

Early crestal bone loss around dental implant supporting mandibular implant retained overdenture is a common finding .radiographic evaluation has been made especially after a period of function with prostheses, this will provide useful information in providing dental implant and treatment. Several studies conducted to study the amount of bone loss around dental implant mesially and distally [(5- 8)].

This study aimed to radiographically evaluated bone loss after two years of function with mandibular implant retained overdenture.

MATERIALS AND METHODS

Sample

The sample was collected from the maxillofacial surgery unit at specialized surgeries hospital. There is about twenty five patient who received MIR-OD treatment from the first time starting dental implant treatment at this center (2000 till -2005).

(1)Assistant Professor (Ph.D. student during the research) Department of Prosthodontics. College of Dentistry, University of Baghdad.
(2)Retired Professor.

Since the patients did not follow their treatment only in case of pain or fracture of the attachment and with circumstance of country and difficulty of contact at that time in 2005 so our sample were eight patient only who they were wearing and functioning with MIR-OD for a period of two years. The patients were received MIR-OD with Bar-clip, ball-cup and O- ring attachments. Preparative radiography was obtained for this patient from the center; this radiograph was taken to the patient at time of insertion. The present study was designed to take another radiographic image after two year functioning with MIR-OD. Then accurate calibrations of crestal bone loss measurement were analyzed for both groups of radiography.

Methods

Radiographic procedure

In this step standardized procedure were followed in order that a high level of standardization of the radiograph will be obtained.

Panoramic Radiographic Digitization

Each radiograph was subjected to image scanning and setting using the (-ve) scanner″ these scanned radiographs were stored in a special folder in a computer for making the measurements. Dimax software version 2000 was set up in the computer for starting measurement.

Measurements

Standardization procedures are essential in any research work .An intra and inter calibration was done priors starting the measurement procedure. The results obtained from intra and inter-examination calibration study indicated acceptable measurement error, the standard deviation for radiographic examiner was non-significant.

For panoramic radiograph which had an enlarged image so It is necessary to calibrate the bone loss in actual condition from that at the radiographic measurement specially when the radiographic image have an enlarged image of landmarks particularly bone and dental implant so during measurements there must be a guide of known size of implant in actual condition to have idea about the magnification in the radiograph, then measurements of the bone loss adjacent to the dental implant at the mesial and distal sites of four dental implants supporting MIROD were done.

The first step was measurement of dental implant from the apex of dental implant to the point of bone implant interface is calibrated using the known actual dental implant length ,then measurements of bone loss was performed. Vertical measurements of bone level adjacent to the implant were made at time of insertion of MIR-OD as a base line measurements were established so that any changes in bone level at next appointment can be accounted [3] as shown in Figure 1.

Statistical analysis

Statistical analysis of data were employed through the use of Mann-Whitney test which is a sensitive test in detecting true differences between especially small samples; it is mainly used for independent measures [9].

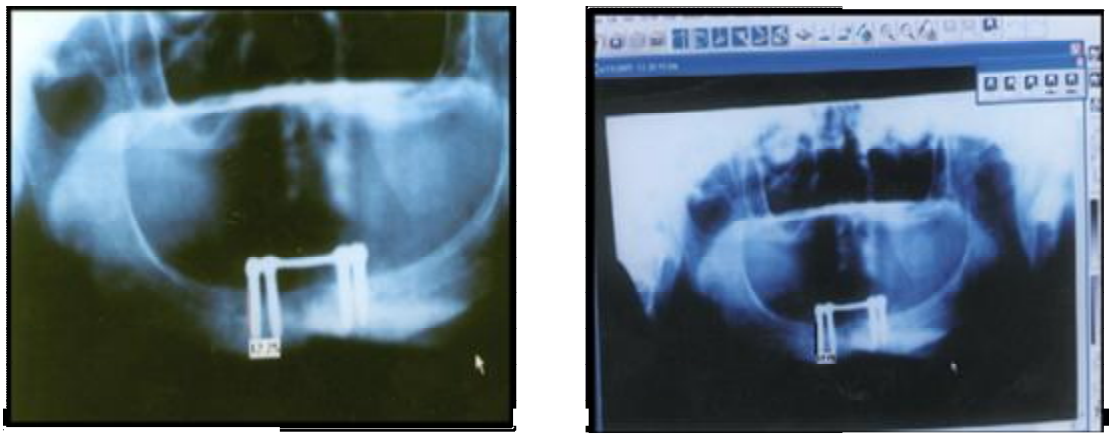

Figure 1: Picture of radiograph in Dimax program

RESULTS

Analysis of data was done using Mann-Whitney test. This test depends on listing of the measurement in an ascending order and then the median value of these measurements was selected. Descriptive statistic of patients' number and median values of bone loss measurements in mm for both ball and bar designed MIR-OD at time of insertion and functioning time was listed in table (1) and (2). In Table (1), it was appeared that the higher median value of bone loss lies at the distal side of mesial implant supporting Bar designed MIR-OD at time of insertion. The results in table (2) appeared that the higher median value of bone loss (2.5mm), this value was appeared at the distal side of the mesial implant

Statistical analysis of median bone loss value was applied, Comparison between two designed of attachments Ball and Bar was observed in Table (3) and (4). In Table (3) Mann-Whitney test result appeared that there was statistically non-significant difference between ball and bar design at time of insertion, while a significant difference affected after two years of using MIR-OD at the level ($p<0.05$) between ball and bar designs as shown in Table (4).

Mann-Whitney test was applied for comparison between two times of measurements (Time of insertion and function time) for both MIR-OD designs. In Table (5), it was appeared that there was a statistically significant difference in median value of two time of measurement. The differences between the result of bone loss at time of insertion and functions time appeared in Table (6), in this Table it was appeared that the higher value of bone loss in ball designed was 0.1mm.For bar design.

Table 1: Descriptive of patients' numbers and median of bone loss measurements in mm for Ball and bar designs MIR-OD at time of insertion

Arch Sides	Design	Distal implant				Mesial implant			
		Distal side		Mesial side		Distal side		Mesial side	
		N	Median	N	Median	N	Median	N	Median
Right	Ball	3	0.49	3	0.1	3	0.07	3	0.08
	Bar	5	2.25	5	1.9	5	1.02	5	1.38
Left	Ball	3	0.80	3	0.38	3	0.24	3	0.17
	Bar	5	1.85	5	2.00	5	1.75	5	2.32

Table 2: Descriptive of patients' numbers and median of bone loss measurements in mm for Ball and Bar designs MIR-OD after two year functions

Arch Sides	Designs	Distal implant				Mesial implant			
		Distal side		Mesial side		Distal side		Mesial side	
		N	Median	N	Median	N	Median	N	Median
Right	Ball	3	0.59	3	0.26	3	0.13	3	0.11
	Bar	5	2.40	5	2.20	5	2.5	5	2.40
Left	Ball	3	0.90	3	0.48	3	0.23	3	0.18
	Bar	5	2.31	5	2.05	5	2.00	5	2.40

Table 3: Mann-Whitney Test for the Comparison between Ball & Bar designs of MIR-OD at time of insertion

Sites	Right				Left			
	Distal		Mesial		Distal		Mesial	
	P-value	Sig	P-value	Sig	P-value	Sig	P-value	Sig
Distal	0.662	NS	0.381	NS	0.664	NS	0.660	NS
Mesial	0.382	NS	0.384	NS	0.662	NS	0.661	NS

***P>0.05 Non Significant**

Table 4: Mann-Whitney Test for the Comparison between Ball & Bar designs of MIR-OD after two years functions

Sites	Right				Left			
	Distal		Mesial		Distal		Mesial	
	P-value	Sig	P-value	Sig	P-value	Sig	P-value	Sig
Distal	0.047	S	0.046	S	0.042	S	0.047	S
Mesial	0.036	S	0.034	S	0.035	S	0.039	S

***P<0.05 Significant**

Table 5: Mann-Whitney Test for the Comparison between Two times of measurements (time of insertion and functions times) for Ball & Bar designs of MIR-OD

Designs	Distal implant				Mesial implant			
	Distal side		Mesial side		Distal side		Mesial side	
	P-value	Sig	P-value	Sig	P-value	Sig	P-value	Sig
Ball	0.296	NS	0.601	NS	0.296	NS	0.110	NS
Bar	0.530	NS	0.100	NS	0.110	NS	0.111	NS

***P>0.05 Non Significant**

Table 6: Bone loss (mm) differences between Time of insertion and two years functions for both designs of MIR-OD

Designs	Right				Left			
	Distal		Mesial		Distal		Mesial	
	Distal side	Mesial side	Distal side	Mesial side	Distal side	Mesial side	Distal side	Mesial side
Ball	0.10	0.03	0.04	0.03	0.01	0.01	0.01	0.01
Bar	0.10	0.08	0.10	0.10	0.10	0.10	0.10	0.05

DISCUSSION

X-rays have been used to investigate or measure the amount of bone support around osseointegrated dental implant i.e. verifying osseointegration of oral implant after installation and the longitudinal control in their function and it can also be used for the identification of implant types is unknown in patient [10]. The predictability and high success rate of implant treatment have averted attention for factors affecting fixtures loss and bone loss around implant. The successful maintenance of crestal bone surrounding dental implant is imperative for long-term implant success. The patients should be recalled every three months for evaluation of the prostheses and home care, with radiographs obtained every six months to detect any osseous changes. The survival rate for implant placed into loaded ridge and fresh extraction socket were 90.4 % [11]. Radiographic bone levels measured mesially and distally to short implant at 5 years were comparable to that around long implant [12].

In the present study radiographs were taken to patients wearing MIR-OD for two years, since those most important changes, and the effects of dental plaque with other factors appeared after one year. [13,14]

The median values of bone loss in two different intervals are displayed. The value displayed are the calibrated median value using the known implant length to measured implant length, bone measurement was done from the apex of dental implant to the radiography visualized bone. The result of the present study revealed that the difference in median value of both designs MIR –OD at time of insertion and functions time was 0.1 mm this was coincident the result obtained by Good acre et al and Wismeijer et al [15,16], This results of bone loss gives indication of successful dental implant treatments as Alberketson et al and Smith and Zarb reported that the annual bone loss was less than 0.2 mm considered a successful criteria of dental implantology [17,18].

Since the results appeared that there was statistically non-significant difference between median values of bone loss at the time of insertion and after two year functions, so the results appeared to be coincide with Fartash et al results of follow up examination from the first year, second year up to twelve years of follow up [19]. The result of comparison between two designs of MIR-OD appeared that there was a significant difference between two designs of anchorage system. On the other hand, the results obtained by Karadabuda appeared that there was no significant difference between the two anchorage system used for MIR-OD with respect to the soft tissue health status or patient satisfaction [20].

REFERENCES

1. Engquist B, Bergendal T, Kallus T, Linden U. A retrospective multicenter evaluation of osseointegrated implant supporting overdenture. Int J Oral Maxillofac Implant 1988; 3:129-34.
2. Donatsky O. Osseointegrated dental implants with ball attachments supporting overdentures in patients with mandibular alveolar ridge atrophy. Int J Oral Maxillofac Implant 1993; 8:162-66.
3. Jeffcoat MK, Reddy MS, Van Borg HR. Quantitative digital subtractions radiography for the assessment of peri-implant bone change. Clin Oral Impl Res 1992; 3: 22-7.
4. Stevens PI, Fredrickson EJ, Gress ML, et al. Implant prosthodontics clinical and laboratory procedures. 2nd. ed. Mosby; 2000.
5. Goodacre CJ, Bernal G, Rungcharassaeny K, Kan JK. Clinical complications with implants and implants prostheses. J Prosth Dent 2003; 90: 121-32.
6. Rasouli Ghahroudi AAR, Talaeepour AR, Rokn AR, Akorsand A, Mesgarzadel NN, Kharazifard MJ. Radiographic vertical bone loss evaluation around dental implants following one year of functional loading. J Dent Tehran University Medical Sci 2010; 7: 289-97.
7. Karousis LK, Bragger U, Salvi GE, Burgin W, Lang NP. The effect of implant design on survival and success rates of titanium oral implants a10 year prospective studies of the ITI dental implant system. Clin Oral Implants Res 2004; 15(1):847.
8. Naert I, Dky J, Hanky F, Quirynen M, Vansteenbergher D. Free standing and tooth implant connected prosthesis in the treatment of partially edentulous patient part II. An up to 15 years radiographic evaluation. Clin Impl Res 2001; 12: 245-51.
9. Guilford JP. Fundamental statistics in psychology and education. 5th ed. USA: 1973.
10. Sewerin IP. Comparison of radiographic image characteristics of branmark and IMZ implant. Clin Oral Impl Res 1991; 2: 151-5.
11. Cavallaro JS Jr. Implant survival and radiographic analysis of proximal bone levels surrounding a contemporary implant. Impl Dent 2011; 20(2):146-152. (IVSL)
12. Tqwil G, Mawla M, Gottlow J. Clinical and radiographic evaluation of the 5mm diameter regular plateform Branmark fixture: 2 to 5 years follow up. Clin Imp Dent Rel Res 2002; 4(1):16-26.
13. Becker W, Becker EE, Newman MG, Nyman S. Clinical and microbial finding that may contribute to dental implant failure. Int J Oral Maxillofacial Impl 1990; 5: 31-8.
14. Meijer HGJ, Raghobar GM, Van't Hof MA,Visser AA. Controlled clinical trial of implant –retained mandibular overdenture:10 years clinical aspects and aftercare of IMZ implants and Branmark implant. Clin Oral Impl 2004; 15: 427-31.
15. Venuleo C, Chuang SK,Weed M, Dibart S. Long term bone level stability on short implants A radiographic follow up study. J Maxillofac & Oral Surg 2008; 7(3): 340-5. (IVSL).

16. Wismeijer D, Vanwass MAJ, Vermeeren KW. Clinical and radiographical results of patients treated with three treatment modalities for overdentures or implant of the ITI Dental implant system. A randomized controlled clinical trial. J Clin Oral Impl Res 1999; 10: 297-306.
17. Alberktsson T, Zarb G, Worthington R, Eriksson AR. The long term efficacy of currently used dental implant; a review and proposed criteria of success, Int J Oral Maxillofac Implants 1986; 1: 11-25.
18. Smith D, Zard G. Criteria for success of osseointegrated endosseauos implants. J Prosthet Dent 1989; 62: 567-72.
19. Fartash B, Tangrrud T, Silness J, Arvidson K. Rehabilitation of mandibular edentulism by Single crystal sapphire implants and overdentures: 3-12 year results in 86 patients A dual centre international study. Clin Oral Impl Res 1996; 7: 220-9.
20. Karabuda C, Tosun T, Ermis E, Ozdemir T. Comparison of 2 retentive systems for implant-supported overdenures: Soft tissue management and evaluation of patient satisfaction. J Periodont 2002; 73: 1067-70.