1-

**Implant-supported vs. implant retained distal extension mandibular partial overdentures and residual ridge resorption.**

**Abstract**

Purpose: This retrospective study in male patients sought to examine posterior mandibular ridge resorption under implant-supported and implant-retained distal extension partial overdentures at the end of a 5-year observation period.

Materials and methods: Class I mandibular partial edentulism in 34 patients was managed with removable partial overdentures that were adjunctively supported (Group I, n=18), or retained (Group II, n=16), via resilient attachments, placed bilaterally on single implants (n=68) in the first molar areas. Posterior area indices (PAI) were calculated for each patient by digitizing the traced rotational tomograms taken immediately before treatment (T0) and after 5 years (T5). Proportional rather than actual measurements were used in an effort to minimize errors related to magnification and distortion.

Results: Residual ridge resorption associated with the implant supported partial overdentures (ISPOD) was recorded as (PAI=.012 ±.022); and as (PAI= .073 ±.044) for the implant retained group (IRPOD) . Estimated average reductions in ridge heights were .15 mm and 1.03 mm for ISPOD and IRPOD respectively. Multiple linear regression models demonstrated that prosthesis type, initial mandibular ridge height, and relining frequency were significantly correlated with PAI.

Conclusion: Implant-supported PODs appear to be associated with reduced posterior mandibular alveolar ridge resorption when compared to implant-retained ones.

2-

**resilient liner Vs. clip attachment effect on periimplant tissues of bar-implant - retained mandibular overdenture**

**Abstract**

Purpose: The aim of this study was to compare between effects of resilient liner and clip attachments of bar-implant retained mandibular overdenture on peri-implant tissues.

Materials and methods: In a randomized controlled clinical trial, thirty edentulous male patients (mean age 62.5 years) were equally assigned into two groups. In each patient, two implants were inserted in the canine area of the mandible using a two-stage surgical protocol. After 3 months, implants were connected with resilient bars. Mandibular overdentures were retained to the bars with either clips (group I) or silicone resilient liners (group II). Peri-implant tissues were evaluated clinically (with regard to plaque scores, gingival scores and probing depths) and radiographically (with regard to peri-implant vertical and horizontal alveolar bone changes). Evaluations were performed at time of overdenture insertion (T0), 6 months (T6) and 12 months (T12) after over denture insertion.

Results: After 12 months of using bar-implant retained mandibular overdenture, the resilient liner attachment had significantly decreased peri-implant plaque score, gingival score, probing depth, vertical and horizontal bone loss when compared to clip attachment.

Conclusion: Within the limitations of this study, and in terms of peri-implant tissue health of bar-implant retained mandibular overdenture we recommend resilient liner rather than clip attachment.

3-
Marginal bone loss adjacent to conventional and immediate loaded two implants supporting a ball-retained mandibular overdenture

Objectives: The aim of this study was to evaluate and compare marginal bone loss and clinical outcomes of conventionally and immediately loaded two implants supporting a ball-retained mandibular overdenture.

Materials and methods: Thirty-six completely edentulous patients (22 males and 14 females) were randomly assigned into two groups. Each patient received two implants in the canine area of the mandible after a minimal flap reflection. Implants were loaded by mandibular overdentures either 3 months (conventional loading group) or the same day (immediate loading group) after implant placement. Ball attachments were used to retain all overdentures to the implants. Vertical and horizontal alveolar bone losses were evaluated in both groups 1 year and 3 years after implant placement using Multislice Computed Tomography (Multislice CT) which allow evaluation of peri-implant buccal and lingual alveolar bone. Plaque scores, gingival scores, probing depths and periotest values were evaluated 4 months (base line), 1 year and 3 years after implant placement. Clinical and radiographic evaluations were performed at distal, labial, mesial and lingual peri-implant sites.

Results: After 3 years follow up period, immediate loading group recorded significant vertical bone loss at distal and labial sites than conventional loading group and no significant differences in horizontal bone loss between groups were observed. Probing depth at distal and labial sites in immediate loading group were higher than conventional loading group, while plaque scores, gingival scores, and periotest values showed no significant differences between the two groups. A low level of positive correlation between plaque scores, gingival scores, probing depths, and vertical bone loss was noted.

Conclusion: Immediately loaded two implants supporting a ball-retained mandibular overdenture are associated with more marginal bone resorption and increased probing depths when compared to conventionally loaded implants after 3 years. The bone resorption and probing depths at distal and labial sites are significantly higher than those at mesial and lingual sites. Clinical outcomes do not differ significantly between loading protocols.

4-

The clinical and radiographic outcome of immediately loaded Miniimplants supporting a mandibular overdenture. A 3-year prospective study

This article aimed to examine the clinical and radiographic outcome of mini dental implants (MDIs) supporting a mandibular overdenture. Twenty-eight patients (16 men and 12 women) complaining from insufficient retention of their mandibular denture received a total of 112 MDIs (four per patient) in the interforaminal area of the mandible using the non-submerged flapless surgical approach. Implants were immediately loaded with mandibular overdentures after implant insertion. Each implant was evaluated at the time of initial prosthetic loading, 6, 12, 24 and 36 months thereafter. Clinical evaluation was performed using plaque index (PI), gingival index (GI), probing depth (PD) and periotest values (PTVs). Radiographic evaluation was performed in terms of vertical (VBLO) and horizontal (HBLO) alveolar bone loss. Cumulative success and survival rates were calculated using life table analysis. Plaque index, GI, PD, VBLO and HBLO increased significantly in the first year after overdenture insertion, and no significant
difference between subsequent observations was noted. Periotest values demonstrated no significant difference between observation times. The cumulative survival and success rates of MDIs were 96.4% and 92.9%, respectively. Within the limitations of this study, clinical and radiographic peri-implant tissue responses of immediately loaded MDIs supporting a mandibular overdenture were favourable after 3 years. However, randomised, controlled clinical trials are needed to compare these responses to that of conventional-diameter implants.

4. Prosthetic aspects and patient satisfaction with resilient liner and clip attachments for bar-implant retained mandibular overdenture. A 3 year randomized clinical study

Purpose: This report aimed to compare prosthetic aspects and patient satisfaction during a 3-year randomized clinical trial of bar-implant retained mandibular overdentures attached with either resilient liners or clips.

Materials and methods: Thirty edentulous male patients (mean age 62.5 years) received 2 implants in the anterior mandible after being allocated into 2 equal groups (according the attachment types they received) using balanced randomization. After 3 months, implants were connected with resilient bars. New maxillary complete dentures were then constructed and mandibular overdentures were retained to the bars with either clips (group I) or silicone resilient liners (group II). Subjects indicated satisfaction with their prosthesis using a questionnaire and a visual analogue scale (VAS). Patient satisfaction and prosthetic complications were recorded for both attachments 6 months (T1), 1 year (T2) and 3 years (T3) after overdenture insertion.

Results: Comfort and stability with maxillary denture, and ease of hygiene procedures were rated higher in group II, while ease of handling the dentures was rated higher in group I. No significant differences in other parameters of patient satisfaction between groups were noted after 3 years. The mean numbers of prosthetic adjustments and repairs in group I (11.9) were significantly higher (p=.00) compared to those in group II (4.8). The most common complication in group I was clip wear, while separation of resilient liner from the denture base was the most common problem in group II. Hyperplasia under the bar and flabby ridge in the maxilla occurred significantly more often in group I compared to group II.

Conclusion: Resilient liner retained mandibular overdentures had comparable patient satisfaction, less prosthetic maintenance and costs and less soft tissue complications when compared to clip retained ones after 3 years.

6- A New Surgical Template with a Handpiece Positioner for Use During Flapless Placement of Four Dental Implants to Retain a Mandibular Overdenture

Abstract

This article describes the fabrication of a new and inexpensive surgical template from a radiographic template for flapless placement of dental implants to retain a mandibular overdenture. A radiographic template with radiopaque metal plate markers
is constructed and used as a guide for achieving three-dimensional evaluation of bone using computed tomography (CT). The potential position and angulation of the implants are measured relative to the metal plates using the CT data. The radiographic template is converted into a surgical template by attaching rigid metal rods that guide the handpiece precisely during subsequent drilling procedures.

7-

A comparison of mandibular denture base deformation with different impression techniques for implant overdentures.

Purpose: This study aimed to evaluate mandibular denture base deformation along with three impression techniques used for implant retained overdenture.

Materials and methods: Ten edentulous patients (5 males and 5 females) received two implants in the canine region of the mandible and three duplicate mandibular overdentures which were constructed with mucostatic, selective pressure, and definitive pressure impression techniques. Ball abutments and respective gold matrices were used to connect the overdentures to the implants. Six linear strain-gauges were bonded to the lingual polished surface of each duplicate overdenture at midline and implant areas to measure strain during maximal clenching and gum chewing.

Results: The strains recorded at midline were compressive while strains at implant areas were tensile. Clenching recorded significant higher strain when compared to gum chewing for all techniques. The mucostatic technique recorded the highest strain and the definite pressure technique recorded the lowest. There was no significant difference between the strain recorded with mucostatic technique and that registered with selective pressure technique. The highest strain was recorded at the level of ball abutment’s top with the mucostatic technique during clenching.

Conclusion and recommendation: Definite pressure impression technique for implant retained mandibular overdenture is associated with minimal denture deformation during function when compared to mucostatic and selective pressure techniques. Reinforcement of the denture base over the implants may be recommended to increase resistance of fracture when mucostatic or selective pressure impression technique is used.

8-

Marginal bone loss around unsplinted mini implants supporting maxillary overdentures. A preliminary comparative study between partial and full palatal coverage.

Purpose: This study aimed to evaluate and compare marginal bone loss around mini-implants (MDIs) supporting maxillary overdentures with either partial or full palatal coverage.

Material and methods: Nineteen edentulous patients complaining from retention problems of their maxillary dentures were randomly allocated in two groups. Group I (GI, n=10) received maxillary dentures with full palatal coverage and group II (GII, n=9) received maxillary dentures with partial palatal coverage. For all patients, 114 MDIs (6 per patient) were inserted using the non-submerged flapless surgical approach and loaded immediately with maxillary overdentures. Each implant was evaluated at the time of initial prosthetic loading, 6, 12, and 24 months thereafter. Radiographic evaluation was performed in terms of vertical (VBLO) and horizontal (HBLO) bone loss. Implant mobility (PTVs) was measured using Periotest device and patient satisfaction was
evaluated with visual analog scale (VAS). The cumulative survival rate was calculated using Kaplan-Meier analysis.

Results: After 2 years, the mean VBLO was 5.38 and 6.29 mm, while the mean HBLO was 1.52 and 1.93 mm for GI and GII respectively. Most bone resorption occurred within six months after overdenture insertion in both groups. GII recorded significant higher VBLO and PTVs than GI at all observation times. The cumulative survival rates of MDIs were 78.4% and 53.8% for GI and GII respectively. All patients were satisfied with their maxillary overdentures regarding retention and chewing ability.

Conclusion: Rehabilitation of edentulous maxilla with unsplinted MDIs supporting overdentures and in particular with a combination of partial palatal coverage is not recommended due to excessive marginal bone resorption and high failure rate of MDIs than was expected.

9-

**Effect of different implant positions on strain developed around 4 implants supporting a mandibular overdenture with rigid telescopic copings.**

**Purpose:** This study aimed to evaluate and compare the effect of 3 different implant positions on strain developed around 4 implants supporting a mandibular overdenture with rigid telescopic attachments.

**Material and methods:** Three experimental acrylic resin overdentures were fabricated on 3 edentulous mandibular acrylic models. Four implants were placed in each model. According to the implant positions, the models were classified into three groups: group I (quadrilateral design) where the implants were placed at canine and 1st molar areas, group II (curved design) where the implants were placed at canine and 2nd premolar areas and group III (linear design) where the implants were placed at lateral incisor and 1st premolar areas. Overdentures were connected to the implants with rigid telescopic attachments. Eight linear strain gauges were bonded to the acrylic resin around each implant at 2 sites (mesial and distal). Strains were measured for anterior (lateral incisor and canine) and posterior (premolar and molar) implants at both mesial and distal sites during bilateral and unilateral load applications.

**Results:** For bilateral and unilateral load applications, group II recorded the highest strain values while group I recorded the lowest. In group II and group III, strain values at distal sites were significantly higher than values at mesial sites. Strain values of posterior implants were significantly higher than values of anterior implants in all groups. The greatest strain values were recorded at loading side during unilateral load application.

**Conclusion:** Quadrilateral design showed a minimal peri-implant strain compared to curved or linear designs. This design may be recommended when rigid telescopic crowns are used to connect mandibular overdentures to four implants.

10-

**The effect of cantilevered bar length on strain around two implants supporting a mandibular overdenture.**

**Purpose:** The aim of this study was to evaluate the effect of cantilevered bar length on strain produced around 2 implants supporting a mandibular overdenture.

**Materials and methods:** Two root-form implants were placed bilaterally in the canine region of an edentulous acrylic mandibular model and connected with a resilient bar/clip attachment. Four linear strain gauges were bonded to the acrylic resin at mesial and distal
surface of each implant. Each gauge was wired separately into a ¼ Wheatstone bridge of a multichannel digital bridge amplifier. Strains were measured without cantilevered bar extensions (control group) and with the following lengths of cantilevered bars; 11mm (Group I), 9mm (Group II), and 7mm (Group III). For each cantilevered bar length, strains were measured with clips placed on the cantilevers and attached to the overdenture (bar-clip contact, CC) and without clips (bar-acrylic resin contact, AC). Strain measurements were performed under central and unilateral loading using a loading device.

Results: Bar with cantilevers (either with or without clips) demonstrated a significant increase of strains compared to bar without cantilevers. The 11mm cantilever length generated the highest peri-implant strain values, while the 7mm length recorded the lowest. For all cantilevered bar lengths, the strains significantly decreased with bar-clip contact (CC) compared to acrylic resin contact (AC). Under central loading, distal and mesial peri-implant strains were the highest and the lowest values respectively, while under unilateral loading the highest strain was recorded at distal sites of loading side and the lowest was recorded at distal sites of non loading side. A positive correlation was found between the recorded strain and the cantilevered bar length.

Conclusion: The 7mm cantilevered bar with clips placed on the cantilevers was recommended when 2 implants were used to support mandibular overdentures as it demonstrated the lowest magnitude of strains with no significant differences between peri-implant sites.

11-

**A prospective study on immediate loading of mini-implants with mandibular overdentures. Clinical and radiographical outcome**

Purpose: This article aimed to examine the clinical and radiographical out-come of Minidental implants (MDIs) supporting mandibular overdentures.

Materials and methods: 28 patients (16 males and 12 females) complaining from insufficient retention of their mandibular denture received a total of 112 MDIs (4 per patient) in the interforaminal area of the mandible using a non-submerged flapless surgical approach. Implants were immediately loaded with mandibular overdenture in the same day. Each implant was evaluated at the time of initial prosthetic loading (T0), 6 (T1), 12 (T2), 24 (T3) and 36 (T4) months thereafter. Clinical evaluation was performed using Plaque Index (PI), Gingival Index (GI), Probing depth (PD) and Periotest (PTVâ€™s). Radiographic evaluation was performed in terms of vertical (VBL) and horizontal (HBL) alveolar bone losses. Cumulative success and survival rates were calculated with life table analyses.

Results: PI, GI, PD, VBL and HBL increased significantly at 6 months (T1) and 12 months (T2) after overdenture insertion and no significant difference in subsequent observations was noted. PTVâ€™s demonstrated no significant difference between observation times. The cumulative survival and success rate of MDIs were 96.4% and 92.9% respectively.

Conclusion: Within the limitations of this study, clinical and radiographical peri-implant tissue responses of immediately loaded MDIs supporting mandibular overdentures were favorable and comparable to that of implants with a larger diameter after 3 year, however, long term prospective studies still needed to ensure this finding.
13. Effect of two different bar designs for mandibular implant overdenture: a cross over study of chewing efficiency and electromyographic activity

Purpose: The aim of this study was to compare within subjects, the effect of two different bar designs for mandibular implant overdenture on the chewing efficiency and masticatory muscle activity.

Material and methods: Six completely edentulous male patients received new maxillary and mandibular dentures. Four osseointegrated implants were inserted in the mandible using standardized 2-stage submerged surgical protocol 3 months thereafter. After 3 months of the osseointegration period, the four implants were connected with quadrilateral bar and new mandibular overdenture was constructed (group I). Masseter muscles activity was evaluated by electromyography during clench on the right and left side to record the interference pattern and the chewing ability was evaluated using chewing gum. After another 3 months, the quadrilateral bar was sectioned and converted to linear bar (Group II) connecting the anterior two implants and the same evaluations were repeated.

Results: The results of this study revealed a significant increase in the masseter muscle activity and chewing ability of the patients wearing implant overdenture supported by quadrilateral bar compared to their muscle activity with conventional complete denture or when the overdenture retained with linear bar.

Conclusion: the quadrilateral bar design used for implant supported mandibular overdentures may influence the retention and stability of the prosthesis and, thus, in turns improved masticatory performance.

2. Comparison of implant retained versus clasp retained maxillary obturators for unilateral maxillary defects: a study of tissue health changes of the implant and natural teeth abutments

Aim of the study: the aim of this study was to evaluate maxillary obturator retained with implants inserted in the resected side in cases of unilateral maxillary defect compared to obturator retained with soft liner engaged desirable soft tissue undercuts of the resected side regarding plaque index, gingival index, the probing depth and clinical mobility of the implant and natural teeth abutments.

Material and methods: twelve patients with unilateral maxillary defects of ages ranged from 40-50 years, and of either sex were selected for study. The patients were having completely dentulous mandibular arch. According to the retention gained from the resected side, the patient were classified into two groups as follows: Group I: The patients received clasp retained obturator and gain retention from the resected side by using soft liner utilized desirable soft tissue undercuts; and Group II: The patients received clasp retained obturator and gain retention from the resected side by using anterior and posterior implants with ball attachments. The plaque index, bleeding index, the probing depth and clinical mobility of the implant and natural teeth abutments were measured immediately after insertion, 6 month, and 12 months of obturator insertion.

Results: The results of this study showed that all abutments in GI demonstrated a statistically significant increase in plaque scores and bleeding index at all observation periods compared with GII. Probing depths and mobility demonstrated a statistically
significant difference in GI compared to GII after first six month and one year of study. Periotest values of implants demonstrated significant increase especially for distal implant after first and second observation periods.

Conclusion: The use of strategically placed implants in the remaining bone of the resected side of unilateral maxillary defects as direct retainers, can significantly maintain the health of the natural abutments in the dentulous side.

14-

Masticatory function with ball and telescopic attachments of implant retained mandibular overdentures. A cross over study

Abstract:
Purpose: The aim of this study was to evaluate masticatory function of patients wearing either ball or resilient telescopic attachments of implant retained mandibular overdentures.

Material and methods: Ten edentulous patients (5 males and 5 females) received new maxillary and mandibular dentures (control, CD) before implant placement. After using the dentures for 3 months, two implants were inserted in the canine region of the mandible. Following osseointegration period, new duplicate mandibular overdentures were constructed for all patients. In a quasi-random method five subjects were first given the ball retained mandibular overdenture (BOD) and the other five received the resilient telescopic retained mandibular overdenture (TOD). At the end of testing of these prostheses, the first group was given the TOD, while the second group received the BOD. Masticatory functions were measured in terms of the chewing efficiency and electromyographic activity (EMG) of masseter muscle. Chewing efficiency was measured using chewing gum and EMG was recorded during clenching without food, clenching hard food and clenching soft food. Evaluations were made 3 months after using each of the following prostheses: CD, BOD, and TOD.

Results: All implant supported overdentures showed a significant increase in chewing efficiency and EMG values when compared to CD. These values increased significantly with TOD when compared to BOD prosthesis.

Conclusion: The resilient telescopic retained mandibular overdenture improves masticatory functions when compared ball retained overdentures. Such improvement may be related to the increased retention and stability of such prosthesis.

15-

Clinical evaluation of mini implants used to retain maxillary palateless complete overdenture

Abstract
This article aimed to examine the clinical outcome of mini dental implants (MDIs) retaining palateless maxillary overdenture. Six completely edentulous male patients complaining from discomfort due to palatal coverage of their maxillary denture were selected for this study. For all patients, acrylic palateless complete dentures were constructed against to mandibular conventional ones. A total of 30 MDIs (five per patient) were inserted in their edentulous maxilla (two at canine area, two at second premolar area and one at incisors area) using the non-submerged flapless surgical approach. Implants were progressively loaded 3 weeks thereafter, and then female housings were picked up to the fitting surface of maxillary palateless overdenture. Clinical evaluation
was performed using modified plaque index (MPI), Modified gingival index (MGI), Modified bleeding index (MBI), probing depth (PD) and implant mobility was assessed using Periotest instrument. Each implant was evaluated at the time of initial prosthetic loading and six months after loading. No significant differences between different implant locations at both evaluation times was observed for MPI, MGI and MBI, but significant increase in peri-implant PD and periotest values after six months was noted. The survival rates of MDIs were 73%. Within the limitations of this study, MDIs retaining palateless maxillary overdenture were founded to be associated with low survival rate, increased periimplant pocket depth and implant mobility.

Marginal bone loss adjacent to conventional and immediate loaded two implants supporting a ball-retained mandibular overdenture

Abstract

Objectives: The aim of this study was to evaluate and compare marginal bone loss and clinical outcomes of conventionally and immediately loaded two implants supporting a ball-retained mandibular overdenture.

Materials and methods: Thirty six completely edentulous patients (22 males and 14 females) were randomly assigned into two groups. Each patient received two implants in the canine area of the mandible after a minimal flap reflection. Implants were loaded by mandibular overdentures either 3 months (conventional loading group) or the same day (immediate loading group) after implant placement. Ball attachments were used to retain all overdentures to the implants. Vertical and horizontal alveolar bone losses were evaluated in both groups 1 and 3 years after implant placement using multislice computed tomography, which allow evaluation of peri-implant buccal and lingual alveolar bone. Plaque scores, gingival scores, probing depths and periotest values (PTVs) were evaluated at 4 months (baseline), 1 and 3 years after implant placement. Clinical and radiographic evaluations were performed at distal, labial, mesial and lingual peri-implant sites.

Results: After 3 years of follow-up period, the immediate loading group recorded significant vertical bone loss at distal and labial sites than the conventional loading group and no significant differences in horizontal bone loss between groups were observed. Probing depth at distal and labial sites in the immediate loading group were higher than the conventional loading group, while plaque scores, gingival scores and PTVs showed no significant differences between the two groups. A low level
of positive correlation between plaque scores, gingival scores, probing depths and vertical bone loss was noted.

Conclusion: Immediately loaded two implants supporting a ball-retained mandibular overdenture are associated with more marginal bone resorption and increased probing depths when compared with conventionally loaded implants after 3 years. The bone resorption and probing depths at distal and labial sites are significantly higher than those at mesial and lingual sites. Clinical outcomes do not differ significantly between loading protocols.