

## **Immediate Full Occlusal Loading of Dental Implants using Intra-oral Welding Technique Versus Conventional Immediate Loading. A Comparative Split mouth Prospective Clinical Trial**

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### **Abstract:**

**Objective:** The rehabilitation of the partially edentulous arches with immediately loaded dental implants in cases when there is suitable bone volume and quality has been proposed by many authors.. The aim of the present study is to compare the clinical and radiographic outcomes of two techniques used to restore immediately loaded dental implants, both in full Occlusal loading. The first is using "Intra-oral welding" and the second is conventional loading using a conventional indexing technique for fabrication of a chair side temporary restoration.

### **Patients and Methods:**

In this split mouth study, 6 patients received 24 implants, each patient had posterior partial Edentulism on both sides of the same arch and so the right and left sides were randomly allocated to either the test or control side: The Test side received two implants immediately loaded by intra-oral welding technique and a temporary restoration in full Occlusal loading. The Control side received two implants that were immediately loaded by indexing technique and a temporary prosthesis in full Occlusal loading also. Implants placed were tested for their primary stability using Resonance Frequency

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Analysis to measure the “Implant Stability Quotient”(ISQ) values immediately after insertion, 3 and 6 months later. Cone Beam Computed Tomography (CBCT) of the implants sites were accomplished postoperatively to measure the dimensions of the ridge buccolingually and to assess the amount of crestal bone resorption at 3 and 6 months intervals. In addition, standardized periapical radiographs were done to assess the interproximal bone levels at base line, one month, three and six months..

### Results:

Results of this study showed favorable outcomes in the “Intraoral welding” test group in terms of crestal bone resorption, soft tissue response and complications rate however there was no statistically significant difference between both groups.

### Conclusion:

“Intra-oral welding” of dental implants may prove to be a recent technique to splint dental implants abutments together to allow for a safer alternative for clinicians seeking to perform immediate functional loading for their patients.

### Introduction:

The rehabilitation of the partially edentulous arches with immediately loaded dental implants in cases when there are suitable bone volume and quality, has been proposed by many authors <sup>1,2,3</sup>. Severe occlusal loads from the normal or paranormal chewing process have long threatened this treatment option and were always the fear of the surgeons choosing to work with this technique and were reported to be a main causative factor for implant failure<sup>4</sup>. However, to overcome the problem of early occlusal overload in immediate loading some authors suggested the modification of the immediate temporary restoration to avoid occlusal contact in centric and lateral excursions, thereby having a restoration to aid in chewing but with less mechanical stresses <sup>1,6,7,8,9</sup>. Using this modification, a study

by Galli et al concluded that there were no statistically significant differences between immediate loading and conventional loading of dental implants taking into consideration peri-implant bone level and soft tissue measurements <sup>3</sup>. Yet another study by Degidi et al compared between immediate loading defined as full occlusal loading and immediate restoration defined as having the temporary prosthesis out of function in posterior partial edentulism providing the abutments were welded and found out that there was no statistically significant difference between the two groups <sup>9</sup>. One technique to achieve the temporary rehabilitation of the immediately loaded implants can be the surgical indexing technique which relies on having an index prepared from the study cast to be used to transfer the position of the implant, hence creating a master cast fabricated from the study cast made before surgery. Followed by modifying it by indexing the proper position of the implant then transferring its relation to this cast for chair side construction of the temporary prosthesis <sup>10</sup>. Another technique of constructing the temporary restoration, also relying on indexing is to fabricate a stent and fill it with composite or acrylic based material after implant placement and abutment insertion and modifying the temporary restoration chair side<sup>11</sup>. Immediate full occlusal loading seems to be exceptionally appealing because it is nonnegotiable that if a patient was given a choice between receiving a restoration that is out of occlusion or given a restoration that provides for full occlusal loading, no doubt the patients would prefer to have their teeth and restorations in full occlusion since the first day of chewing after surgery. And so According to a recent study, a technique that may provide this treatment option with no statistically significant difference between it and conventional non occlusal loading is: using the intra-oral welding system, to splint immediately the implants placed, that allows for fabrication of full occlusal loading restorations <sup>9</sup>. For this reason, the use of intra-oral welding after immediate implant placement has been suggested in the literature for immediately splinting placed implants thus

reducing mechanical stresses placed over the implants and allowing the provision of a full occlusal loaded restoration with comparable results as regards to soft and hard tissue values  
9, 12-20.

**Aim of the study :** This study was conducted to compare the clinical and radiographic outcomes of two techniques used to restore immediately loaded dental implants, both of which will implement the concept of full occlusal loading. The first is using “Intra-oral welding” and the second is conventional loading

**Patients and methods:** In this split mouth study after patients were proven to be eligible for this study, Six patients received 24 implants, each patient had posterior partial edentulism on both sides of the same arch and so, the right and left sides were randomly selected to enter either in the test or control side. The test side received two implants to restore the edentulous area (Figure 1) that was immediately loaded by intra-oral welding technique (Figure 2) and restored with a temporary prosthesis in full occlusal loading(Figure 3). The control side received two implants to the restore the edentulous site and immediately loaded by indexing technique and restored with a temporary prosthesis in full occlusal loading (Figure 4). Implant stability by Resonance frequency analysis and Radiographic assessment through CBCT and periapical radiographs in order to measure bone loss and bone dimensions, were done at baseline, 3 and 6 months intervals. Numerical data were explored for normality by checking the distribution of data and using tests of normality (Kolmogorov-Smirnov and Shapiro-Wilk tests). ISQ data showed normal (parametric) distribution while bone width and bone loss data showed non-parametric distribution. Data were presented as mean, standard deviation (SD), 95% Confidence Interval for the mean (95% CI), median and range values. For parametric data; two-way repeated measures ANOVA test was used to compare between the groups as well as to study the changes by time within each group. Bonferroni’s post-hic test was used for

pair-wise comparisons. For non-parametric data, Wilcoxon signed-rank test was used to compare between the two groups as well as to study the changes by time in bone width measurements within each group. Friedman’s test was used to study the changes by time in bone loss. The significance level was set at  $P \leq 0.05$ . Statistical analysis was performed with IBM SPSS Statistics for Windows, Version 23.0. Armonk, NY: IBM Corp.

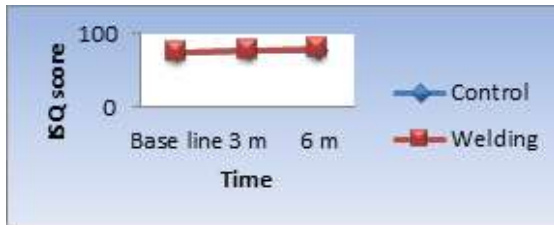


**Figure 1: Intra-oral Welding technique for the Test group**

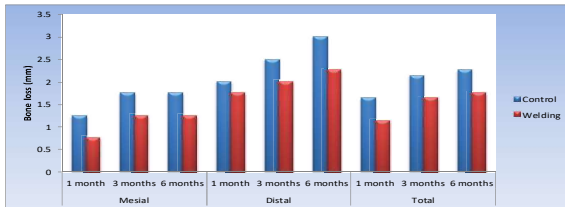


**Figure 2: Final Restoration on both sides**

**Results:** ISQ values at the baseline, 3 and 6 months of follow up, showed no statistical significant difference between both techniques(Figure 5) In regards to the assessment of amount of bone loss and bone dimensions; the CBCT evaluation showed that there was no statistically significant difference in the bone width dimension, bucco-lingually, between both tested groups. Similarly, , the peri-apical radiograph showed no statistical significant difference in the amount of bone loss or bone dimension in the mesio-distal dimension.(Figure 6)



**Figure 5: Line Chart representing changes by time in mean ISQ scores.**



**Figure 6: Bar Chart Representing Median Values for amounts of bone loss in the two groups.**

## Discussion | :

Immediate full occlusal loading had already been discussed previously in the literature , and proven to be a success and would not harm the implants nor the loading protocol. As proven by Degidi M et al in 2010 <sup>9</sup> when he compared immediate loading with immediate restoration , defined as only having restoration without occlusal contacts , and in his study the results he came up with showed no statistically significant difference . That implies that there is no difference between having full occlusal contacts or not so that favours the technique of occlusal loading, because this is in favour of the patient as no doubt if the patient was given the option to have restorations in full function since the first day that would definitely be the choice the patient chooses. In one of our cases placing implants in the posterior maxilla, the implants were spinners, however this was chosen randomly to be the welding side even before the study commences . And so since these implants had high ISQ values of 70 -80 , we decided to continue the study as planned . This also was in accordance with other authors in the literature whom claimed that this could be made possible due to the rigid fixation of

the suprastructure , let alone we are performing welding procedure . <sup>20</sup> However these authors recommended the urge for having rigid stabilisation of the implants , which was exactly what we had , in addition to high ISQ values which was also a factor present in our case .

Occlusal jigs were used in our cases to standardize the bite wing radiographs for every patient for each follow up visit . this was also recommended by Nandal S et al in 2014, in their study about radiographic assessment of marginal bone surrounding implants.

## Conclusion:

### Under the limitations of this study,

Immediate loading can be a predictable procedure , even in posterior bilateral partial edentulism , even in posterior maxilla .

Full occlusal loading is not a hazard and can give successful results both clinically and radiographically.

1. There was no statistically significant difference between both groups in all assessed methods including CBCT and Peri-apical radiographs and ISQ measurements .

2. Even though there was no statistical significant difference between the groups , however intra-oral welding proved to be especially beneficial in cases of spinner implants.

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