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Stability Assessmernt with Immediate Loading Using Blx Slactive Dental Implant

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Abstract

Objective: To assess the primary and secondary stability of dental implants with immediate loading protocol. **Material and Methods**: Thirty patients between the ages of 18 and 45 years who received forty dental implants were study. These cases involved bone level x modified sand blast large grit acid etch Blx Sla active implant. After surgery, the primary stability was examined while secondary stability was evaluated 3 months later. The SPSS program was used to evaluate and analyze the results employing the paired T test and independent T test at p *<0.05*. **Results**: Thirty *patients, 20 females and 10 males, participated in this study* and had a mean age of 32 years. In comparison to the primary stability baseline value, the mean implant stability quotient values for secondary stability after three months showed a statistically significant improvement. Sex and jaws did not differ significantly in terms of stability. **Conclusion**: When compared to the initial primary stability baseline values, the study found that secondary implant stability measured values for the type of dental implant studied increased significantly.

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Introduction

Restoring missing teeth with the placement of endosseous dental implants is a popular therapeutic option for achieving good cosmetic and functional outcomes [1]. Brånemark first suggested that the implants be submerged and unloaded for three to six months [2].

Due to this lengthy duration, a different loading protocol had to be implemented to reduce time. Immediate loading is when the prosthesis is placed within three days of the implant being placed. A satisfactory level of osseointegration is anticipated following the surgical implantation of dental implants. The initial protocol called for a two-step surgical process for Branemark implants to become osseo integrated [3].

Lack of mobility is regarded as a clinical condition of implant stability [4].

It is typically separated into two categories: primary stability, or mechanical engagement, and secondary stability, or biological osseo integration. The firmness that arises from the mechanical interaction between the implant and the bone is known as primary stability. Secondary stability is the outcome of new bone cells growing around the biocompatible implant leading to osseo integration [5]. More stability has been the aim of many implant designs [6]. The Straumann BLX is one such implant design. This kind of dental implant is superior because it is entirely tapered and has strong stability, especially in low quality of bone. It is constructed using Roxolid® and the surface treatment of dental implants made with a large grit acid-etched surface with BLX modified sandblast (BLX SLActive) [7]. The titanium surface is given a macro-roughness by employing a big grit sandblasting process with corundum particles to create the SLA surface of the implant. After that, there is a vigorous acid-etching bath at a higher temperature for a few minutes. The topography that results provides the perfect framework for cell attachment [8].

Similar to SLA, the chemically modified sand-blasted, large grit, and acid etched surface (SLActive) was applied, but with the addition of washing under protective N2 conditions and packing in isotonic solution (NaCl). This produced almost 60% more bone formation than SLA implants by improving surface chemistry and significantly enhancing hydrophilic qualities [9]. By preventing infection and encouraging a quicker recovery, antibiotics administered after surgery lessen discomfort and accelerate healing. The most notable effects on pain relief and healing were shown by augmentin and azithromycin, which also successfully controlled infection and improved recovery [10].

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Materials and Methods

30 Iraqi patients between the ages of 18 and 45 years —ten men and twenty women— who met the study's eligibility requirements were enrolled. To evaluate the primary and secondary stability, these patients were contained inside a group of 40 dental implants (BLX SLActive implant). Clinical and radiographic examinations of the hard and soft tissues were conducted at the dental implant surgery site using orthopantomography (OPG).

Eligibility criteria

Good overall health free of local or systemic disorders such fibrous dysplasia, hyperparathyroidism, heavy smoking, etc. that could impair bone healing ability. Patients gender of both male and female, aged > 18 years. According to the SAC classification, straight forward cases involving partially edentulous maxilla or mandible (short span – one or two teeth loss) were handled as delayed implant implantation protocols (at least 6 months after tooth extraction).

Exclusion criteria

Patients were excluded if any of the following conditions were present: psychological disease, impractical expectations, or current pregnancy, Uncontrolled systemic disorders such as uncontrolled diabetes, head and neck radiation or chemotherapy within the last five years, or patients receiving bisphosphate treatment can all impair natural healing or make it more difficult for a patient to recover from surgery.
Local problems in the implant zone include acute or chronic infections, poor oral hygiene, and local pathological diseases. Cases that were advanced and complex based on the SAC classification, as well as any clinical or historical evidence of parafunctional behaviors (such as clenching or bruxism), were excluded.

Surgical procedure

Using the infiltration technique, local anesthetic of the intended surgical field was achieved using lidocaine 2%, starting with one tooth prior to and after the implantation site. Depending on the relevant criteria and the surgeon's evaluation, the implantation procedure was performed using either the flapped or flapless technique. The drilling procedure was carried out in compliance with the manufacturer's recommendations. As seen in Figure 1, the implant bed was prepared using spiral drills, serial drilling, and copious amounts of normal saline irrigation in accordance with the BLX implant system's recommendations until the desired diameter was reached. A surgical micro-motor hand piece with a torque of 35 Ncm and a speed of 15 rpm was used to introduce the implants, as shown in Figure 2.

Figure 1. The BLX drill during osteotomy.

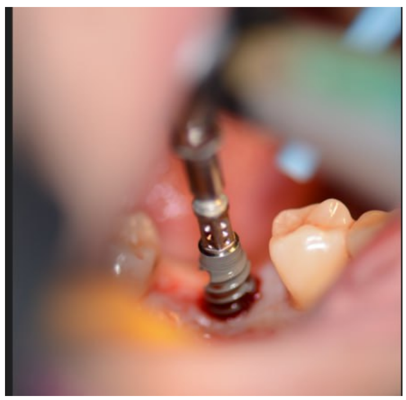

Figure 2. Installation of the BLX SLActive implant in the prepared site.

A torque ratchet up to 50 Ncm was used to manually seat dental implants into their ultimate position, and the Penguin RFA tool with smart peg type 38 was used to measure the ISQ immediately as a primary stability and secondary stability were also evaluated and recorded. As shown in Figure
3, the average of the measurements taken in the buccopalatal and mesiodistal directions was recorded.

Figure 3. Measurement of the ISQ using Penguin RFA and smart peg type 38.

For the flapping technique, the incision was closed using interrupted 3/0 braided black silk sutures. Co-amoxiclav tab 625 mg were to be taken three times daily for five days, along with a 250 mg tablet of metronidazole three times daily. When necessary, 50 mg tabs of diclofenac potassium are given as an effective pain reliever. Within 3 days after implant insertion, the patients underwent the immediate loading protocol with screw-retained restorations in non-functional occlusion shown in Figure 4.

Figure 4. Screw retained restoration.

Follow up and measurement of secondary stability

Three months after loading, the screw-retained restoration was disconnected to assess secondary stability in a manner identical to that of the primary stability, and a screwdriver and a ratchet with a torque of 35 Ncm tightened the screw-retained restoration and re inserted into its functional position. A Teflon piece was inserted into the screw hole, and the composite filling material (light cured) with functional occlusion was packed into it.

Statistical analysis

IBM SPSS (Statistical Package for Social Sciences) version 26 was used to evaluate data. These data were tested using the paired T test and independent T test. P<0.05 indicates significance.

Results

24 dental implants were placed in the mandible and 16 implants in the maxillary bone.
The average ISQ values for the implants' secondary stability three months after loading were noticeably higher than those for the primary stability (72.63 versus 81.75).
After three months, there is a statistically significant difference between primary and secondary stability (<0.05).
On the other hand, the study showed no significant differences between primary stability and secondary stability among male and female patients as noticed in Table 1.
There were no significant differences in primary and secondary stability in relation to implant site in maxillary and mandibular arches (Table 2).

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Discussion

In this study, gender and implant had no effect on stability.

But, considering additional elements including surgical technique, implant design, and bone quality, individual evaluations are still essential.

The means of secondary stability ISQ values in the current research were substantially higher than the baseline values for primary stability.

Additionally, the means of primary and secondary stability for the maxillary and mandibular arches, as well as between male and female patients, did not differ significantly [11].

The study's finding that primary and secondary stability differ significantly is consistent with previous studies showing that these two types of stability are separate.

While secondary stability is necessary for long-term success, primary stability is critical for the first post-implantation phase [12].

Gender had no effect on implant stability, which is in line with work by others [13]. However, work indicated that the ISQ value for female patients was higher than that of male patients [14], and this disagreed with men that had a greater implant stability value than women [15].

Contrary to some existing literature, the study's findings showed that implant stability is unaffected by the implant site in both arches. In general, greater primary stability is linked to the mandible's denser bone than the maxilla. The results of this study, however, could be explained by elements like implant design, surgical method, or bone quality in a particular patient. A study by Lang et al. highlighted the impact of bone density and quality by reporting variations in implant stability across the maxilla and mandible [16]. However Zhang et al. did a meta-analysis which revealed that the implant site had no significant impact on implant stability. This suggests that other parameters, including implant length and implantation time, are more important in determining stability than location [17]. Similarly, a study conducted by Abd El-Hady et al. assessed how implant materials affected the stability according to the study's findings, the material composition of the implant had a greater impact on its stability than the precise location within the maxilla or mandible [18].

Conclusions

After three months, there was a statistically significant increase in implant stability in comparison to primary stability.

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Table 1. Males vs. females using independent T-test.

Test	Comparison	Mean ± SD	T-Statistic	P-Value	Significance
Independent T-Test	Primary Stability (Male)	72.00 ± 3.30	-0.69	0.50	Not Significant
Independent T-Test	Primary Stability (Female)	72.83 ± 3.40	-	-	-
Independent T-Test	Secondary Stability (Male)	81.70 ± 2.83	-0.07	0.95	Not Significant
Independent T-Test	Secondary Stability (Female)	81.77 ± 2.37	-	-	-

Table 2. Maxilla vs. mandible using independent T- test.

Test	Comparison	Mean ± SD	T-Statistic	P-Value	Significance
Independent T-Test	Primary Stability (Maxilla)	71.93 ± 3.63	-0.81	0.42	Not Significant
Independent T-Test	Primary Stability (Mandible)	72.88 ± 3.15	-	-	-
Independent T-Test	Secondary Stability (Maxilla)	82.07 ± 2.64	0.19	0.85	Not Significant
Independent T-Test	Secondary Stability (Mandible)	81.92 ± 2.10	-	-	-

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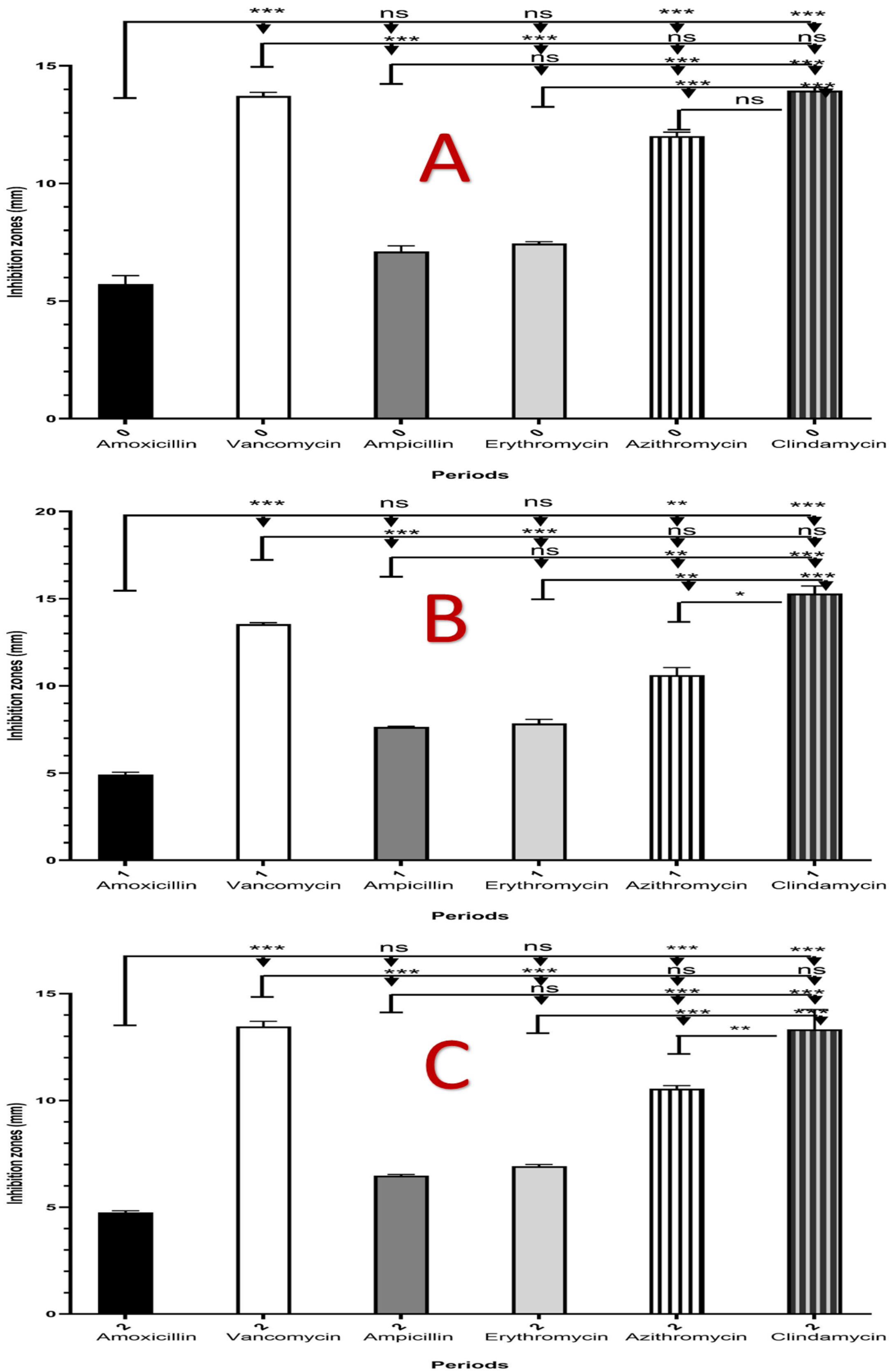

Figure 1. The bar graph illustrates the inhibition zones (mm) for Staphylococcus aureus isolates at three-time intervals (T0 (A), T1 (B), T2 (C)), when exposed to six different antibiotics: Amoxicillin, Vancomycin, Ampicillin, Erythromycin, Azithromycin, and Clindamycin. Statistical comparisons between groups are indicated with asterisks (* for $p < 0.05$, ** for $p < 0.01$, *** for $p < 0.001$) and "ns" for non-significant differences.

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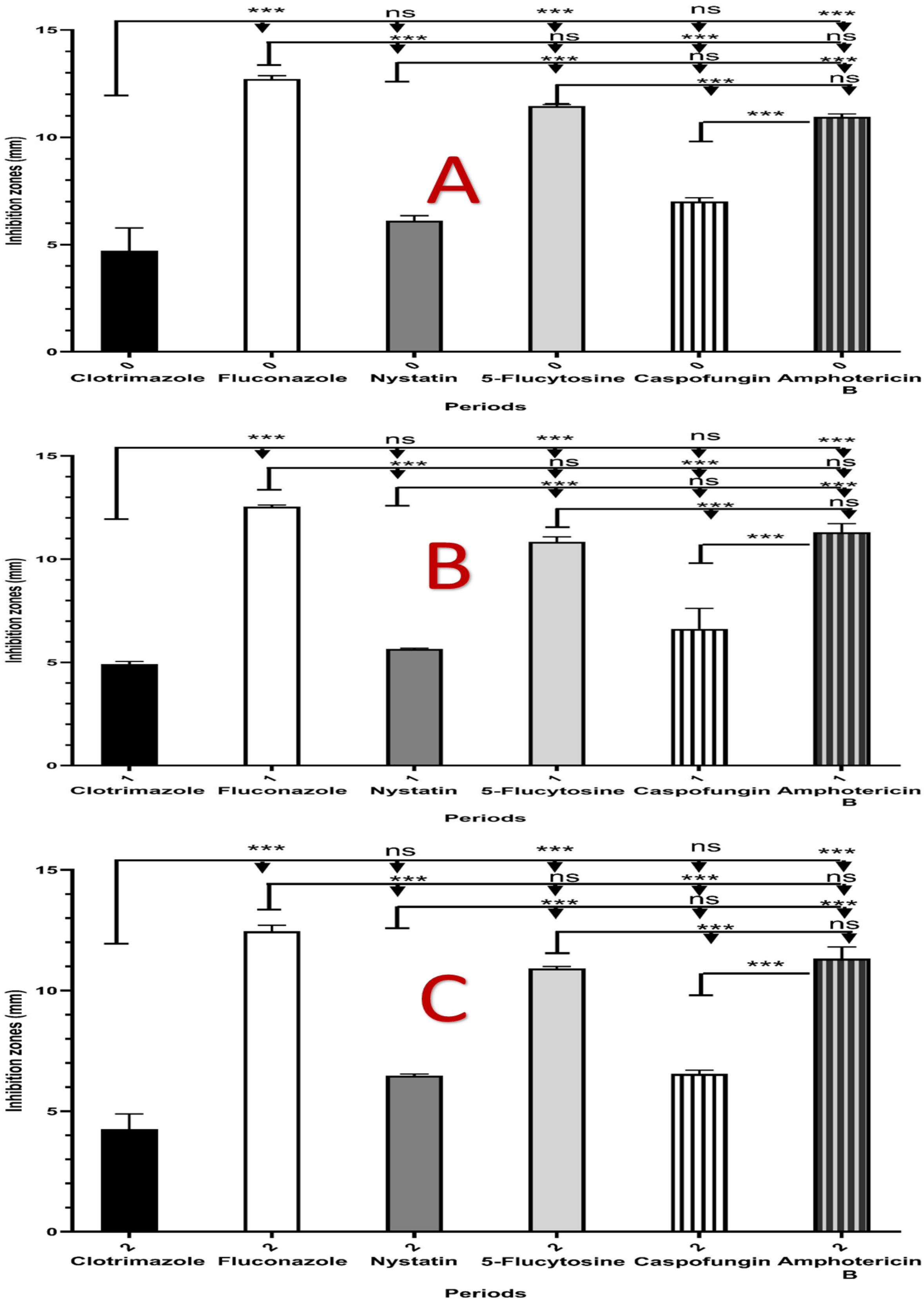

Figure 2. The bar graph illustrates the inhibition zones (mm) for *Candida albicans* isolates at three-time intervals (T0 (A), T1 (B), T2 (C)), when exposed to six antifungal agents: **Clotrimazole**, **Fluconazole**, **Nystatin**, **5-Flucytosine**, **Caspofungin**, and **Amphotericin B**. Statistical comparisons between groups are annotated with *** for $p < 0.001$ and "ns" for non-significant differences.