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Success Rate for Immidate & Delayed Loading Protocols

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ABSTRACT

Background: Implant placement can be done by following IL & DLP . ISQ value is used to assess stability at implant - tissue interface to assess the difference between sucess and failure.
Aim: To compare & evaluate the SR in DI loaded with IL and DLP.
Materials & method: An invivo study with 34 patients were divided in 2 groups i.e. IL & DL were assessed for MBL& ISQ at different time interval i.e.(baseline, 3rd month, 6th month and 9th month) at both the proximal sides.
Result: A significant difference seen at different follow-ups for MBL while insignificant for ISQ value for both the groups.
Conclusion: More studies are recommended in future.
Keywords: ISQ value, implant placement, IL, DLP, success, failure, MBL, SR,stability, implant - tissue interface.

INTRODUCTION

In the late 1960s, researchers in Sweden made a groundbreaking discovery in the field of implantology. They introduced the concept of osseointegration, a meticulous procedure that ensures the successful and durable functionality of implants over time.[1] When considering edentulism, the logistics of providing a provisional restoration often dictate a delay from time of implant placement(IP) at each site.[2-5] The amount of occlusal loading on the temporary restoration supports is the subject of contention with respect to definition. Full occlusal loading in at least centric occlusion is reserved for the term "immediate loading,"(IL) while restorations without centric or eccentric contacts are referred to as "immediate restorations"(IR) or "non-occlusal loading."[6,7] Furthermore, IL of DI has gained popularity owing to reduced tissue stress, reduced implant loading time, reduced implant anxiety and pain, high patient acceptance, and enhanced function and aesthetics.While, the delayed loading protocol(DLP) follows placement of implant in the edentulous sites with placement of coverscrew placed onto the implants before the surgical sites are closed. During this period, patients are not loaded with temporary prosthesis. Later, implants are exposed during a second surgical procedure; prosthetic abutments are then placed onto the implants prior to fabrication of the definitive prostheses.After implant implantation, it is related to the mechanical interlocking of an implant with the peripheral bone, while bone regeneration offers secondary osseous stability to the implant.[8] Primary stability(PS) is the absence of mobility in the implant after it has been placed in the bone with no micromovement.[9] If 50 and 150 micrometre movement occur then it negatively influence PS.[10] Resonance frequency analysis (RFA) as shown in figure 1, to monitor changes in stability at the implant-tissue interface.[11]

FIGURE 1: Penguin RFA DEVICE

This was replaced by "implant stability quotient (ISQ)" as shown in figure 2. [18-20].

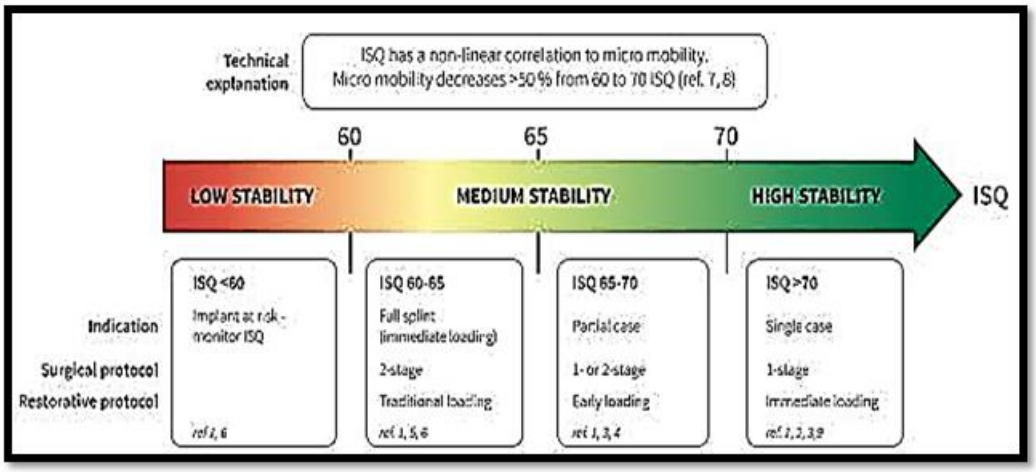

FIGURE 2: ISQ VALUES

AIM

To compare & assess the success rates(SR) in dental implants(DI) loaded with IL and DLP.

INCLUSION CRITERIA

1. Patients who all were willing to be included in our study.
2. Missing atleast 2 teeth in 1 arch.
3. Patient with history of extraction not less than 3 months before planning for implantation.
4. Adequate height & width of bone.
5. Patient who do not require bone augmentation.
6. Either male or female can be involved.
7. Age range will be above 20 years & below 60 years.

EXCLUSION CRITERIA

1. Patient with undermined systemic disorders , immunosuppressed patients & uncontrolled hypertension or Diabetes.
2. Preganant lady
3. Patient smoking more than 5 cigarettes/day.
4. History of alcohol/drug abuse in last 5 years.
5. Patient is on steroids/bisphosphate osteoradionecrosis of head , neck and bone.
6. History of chemotherapy or radiation for last 12 months.
7. Poor oral hygiene
8. Severe or uncontrolled periodontitis

MATERIAL & METHOD

MATERIALS

<u>The list of materials used were as follows & listed below:-</u>

1. Dental implants (Aktiv Genesis)
2. Silk sutures
3. Temporary prosthesis (Clear acrylic)
4. Definitive prosthesis (Metal/Porcelain fused to metal)

List of equipments used in the study was:-

1. Standard Implant Physio-dispenser
2. Standard Implant surgical kit. (Genesis Tapered Kit)
3. RVG grid (Radiopaque millimetre grid by Bluedent India Pvt. Ltd., Chennai)
4. RVG Holder (XCP Holder)
5. Resonance frequency analysis (RFA)- Penguin RFA unit
6. Surgical Instruments and Other instruments
    a) Mouth mirror
    b) Cheek retractor
    c) Lip retractors
    d) Surgical suction cannula
    e) Anesthesia syringe/needle
    f) Dental tweezers (regular)
    g) Dental probe
    h) Surgical scalpels (No. 12 and 15 blades; Microblade)
    i) Periosteal elevator
    j) Needle holder
    k) Scissors
    l) Clamp
    m) Sterile gauzes
    n) Irrigation syringe

METHOD

SURGICAL PART

A total of 34 patients, who were included into two equal groups. Each patient had two missing teeth. Patients were selected for the study if they gave their permission for dental implant placement and met the inclusion criteria. Following the established surgical protocol, all implants were implanted. According to the implant stability quotient values, 17 implants were selected for IL (Group l) and the other 17 implants were loaded using the following DLP (Group ll).

PROSTHETIC PROTOCOL

Group l implants were first fitted with temporary prostheses, and after a period of 3 months, the final prostheses were permanently attached using cement. Implants in Group II were loaded three months following placement using a delayed loading protocol. The clinical and radiographic assessment of group l and group ll implants was conducted during placement and loading, as well as at the 3rd and 6th months of follow-up.

ASSESSMENT

The implant was considered to be surviving if it performed its supporting function, was clinically stable when tested individually, and showed no signs of pain or infection throughout clinical testing as shown in figure 3.

FIGURE.3 : ISQ VALUES USING RFA DEVICE

RADIOGRAPHIC EXAMINATION

We performed it, to determine interproximal bone levels at baseline (provisional prosthesis placement for group I; implant placement for groups I and ll), as well as at 3, and 6 months follow-up consultations for both groups.To ensure reproducibility of the radiographs over time, they were produced using the long-cone paralleling technique with a unique film holder (XCP holder for periapical radiographs) as shown in figure 4,

FIGURE 4: XCP HOLDER

and a RVG grid as shown in figure 5.

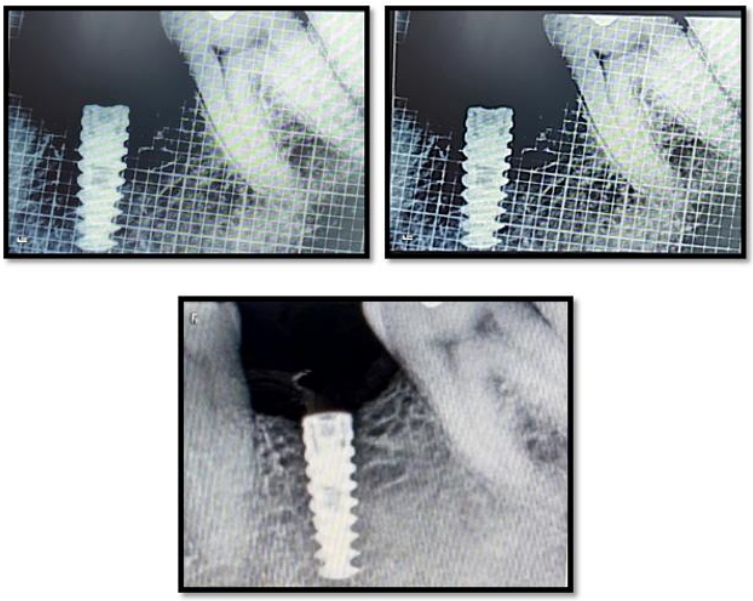

FIGURE 5: RVG OF IMPLANT SITES AT 36 REGION AT 3,6 9 MONTHS

To ensure reproducibility and accuracy, care was taken to ensure that the implant threads on both sides of the implants were visible in each radiograph.The implant-abutment contact functioned as a reference point for determining bone level at the ridge crest. Interproximal bone levels were measured between these reference points and the most coronal bone levels on each implant's mesial and distal surfaces.

CLINICAL IMPLICATION

a) Whichever LP proves to be better should be used.

b) Short treatment time

c) Early restoration of function or esthetic

d) Reduced post-operative complication

STASTISTICAL ANALYSIS

We have used independent t-test , if ANOVA result is significant then post HOC test was
done.All data ws entered in MS excel 2010 using SPSS version 19. P value was considered to be significant when it is <.0.05.

RESULT

Repeated measures ANOVA p<0.001*			
Bonferroni's hoc test.	**Baseline**	**3 months**	**6 months**
Baseline			
3 months	**<0.001***		
6 months	**<0.001***	**<0.001***	

TABLE 1: MEAN BONE LOSS (MBL) (MEDSIAL) (GROUP I)

In our research, in table 1 we have found that , a statistically significant difference was seen for bone (baseline, 3rd month & 6 month) and p value was <0.001.

Repeated measures ANOVA p<0.001*			
Bonferroni's hoc test.	**Baseline**	**3 months**	**6 months**
Baseline			
3 months	**<0.001***		
6 months	**<0.001***	**<0.001***	

TABLE 2: MBL (DISTAL)(GROUP I)

In our research, in table 2 we have found that , a statistically significant difference was seen for bone (baseline, 3rd month & 6 month) and p value was <0.001.

Repeated measures ANOVA p<0.001*				
Bonferroni's hoc test.	**Baseline**	**3 months**	**6 months**	**9 months**
Baseline				
3 months	**<0.001***			
6 months	**<0.001***	**<0.001***		
9 months	**<0.001***	**<0.001***	**<0.001***	

TABLE 3: MBL (MESIAL)(GROUP II)

In our research, in table 3 we have found that , a statistically significant difference was seen for bone (baseline, 3rd month , 6 month & 9th month) and p value was <0.001.

Repeated measures ANOVA p<0.001*				
Bonferroni's hoc test.	**Baseline**	**3 months**	**6 months**	**9 months**
Baseline				
3 months	**<0.001***			
6 months	**<0.001***	**<0.001***		
9 months	**<0.001***	**<0.001***	**<0.001***	

TABLE 4: MBL (DISTAL)(GROUP II)

In our research, in table 4 we have found that , a statistically significant difference was seen for bone (baseline, 3rd month , 6 month & 9th month) and p value was <0.001.

Correlations[a]			
		ISQ value	RBL (Mesial) At 3 months
ISQ value	Pearson Correlation	1	.194
	Sig. (2-tailed)		.455

	N	17	17
RBL (Mesial) At 3 months	Pearson Correlation	.194	1
	Sig. (2-tailed)	.455	
	N	17	17
a. Group = Group I Immediate Loading			

TABLE 5: GROUP-I RELATION

In our research, in table 5 we have found that , a statistically insignificant correlation was seen between the 2 variables as p value was 0.455and r=0.194.

Correlations[a]			
		ISQ value	RBL (Mesial) At 3 months
ISQ value	Pearson Correlation	1	.185
	Sig. (2-tailed)		.478
	N	17	17
RBL (Mesial) At 3 months	Pearson Correlation	.185	1
	Sig. (2-tailed)	.478	
	N	17	17
a. Group = Group II Delayed Loading			

TABLE 6: GROUP-II RELATION

In our research, in table 6 we have found that , a statistically insignificant correlation was seen between the 2 variables as p value was 0.478 and r=0.185.

Correlations[a]			
		ISQ value	RBL (Mesial) at 6 month
ISQ value	Pearson Correlation	1	.156
	Sig. (2-tailed)		.550
	N	17	17
RBL (Mesial) at 6 month	Pearson Correlation	.156	1
	Sig. (2-tailed)	.550	
	N	17	17
a. Group = Group I Immediate Loading			

TABLE 7: GROUP-I RELATION

In our research, in table 7 we have found that , a statistically insignificant correlation was seen between the 2 variables as p value was 0.550 and r=0.156.

Correlations[a]			
		ISQ value	RBL (Mesial) at 6 month
ISQ value	Pearson Correlation	1	.185
	Sig. (2-tailed)		.478
	N	17	17
RBL (Mesial) at 6 month	Pearson Correlation	.185	1
	Sig. (2-tailed)	.478	
	N	17	17
a. Group = Group II Delayed Loading			

TABLE 8: GROUP-II RELATION

In our research, in table 8 we have found that , a statistically insignificant correlation was seen between the 2 variables as p value was 0.478 and r=0.185.

Correlations[a]			
		ISQ value	RBL (Mesial) at 9 month
ISQ value	Pearson Correlation	1	.185
	Sig. (2-tailed)		.476
	N	17	17
RBL (Mesial) at 9 month	Pearson Correlation	.185	1
	Sig. (2-tailed)	.476	
	N	17	17
a. Group = Group II Delayed Loading			

TABLE 9: GROUP-II RELATION

In our research, in table 9 we have found that , a statistically insignificant correlation was seen between the 2 variables as p value was 0.476 and r=0.185.

Correlations[a]			
		ISQ value	RBL(Distal) at 3 months
ISQ value	Pearson Correlation	1	.166
	Sig. (2-tailed)		.524
	N	17	17
RBL (Distal)3months	Pearson Correlation	.166	1

	Sig. (2-tailed)	.524	
	N	17	17
a. Group = Group I Immediate Loading			

TABLE 10: GROUP-I RELATION

In our research, in table 10 we have found that , a statistically insignificant correlation was seen between the 2 variables as p value was 0.524 and r=0.166.

Correlations[a]			
		ISQ value	RBL (Distal) At 3 months
ISQ value	Pearson Correlation	1	.243
	Sig. (2-tailed)		.346
	N	17	17
RBL (Distal)3months	Pearson Correlation	.243	1
	Sig. (2-tailed)	.346	
	N	17	17
a. Group = Group II Delayed Loading			

TABLE 11: GROUP-II RELATION

In our research, in table 11 we have found that , a statistically insignificant correlation was seen between the 2 variables as p value was 0.346 and r=0.243.

Correlations[a]			
		ISQ value	RBL (Distal) At 6 months
ISQ value	Pearson Correlation	1	.078
	Sig. (2-tailed)		.767
	N	17	17
RBL (Distal)6 months	Pearson Correlation	.078	1
	Sig. (2-tailed)	.767	
	N	17	17
a. Group = Group I Immediate Loading			

TABLE 12: GROUP-I RELATION

In our research, in table 12 we have found that , a statistically insignificant correlation was seen between the 2 variables as p value was 0.767 and r=0.078.

Correlations[a]			
		ISQ value	RBL (Distal)6 months
ISQ value	Pearson Correlation	1	.216
	Sig. (2-tailed)		.405
	N	17	17
RBL (Distal)6 months	Pearson Correlation	.216	1
	Sig. (2-tailed)	.405	
	N	17	17
a. Group = Group II Delayed Loading			

TABLE 13: GROUP-II RELATION

In our research, in table 13 we have found that , a statistically insignificant correlation was seen between the 2 variables as p value was 0.405 and r=0.216.

Correlations[a]			
		ISQ value	RBL (Distal)9 months
ISQ value	Pearson Correlation	1	-.059
	Sig. (2-tailed)		.821
	N	17	17
RBL (Distal)9 months	Pearson Correlation	-.059	1
	Sig. (2-tailed)	.821	
	N	17	17
a. Group = Group II Delayed Loading			

TABLE 14: GROUP-II RELATION

In our research, in table 14 we have found that , a statistically insignificant correlation was seen between the 2 variables as p value was 0.821 and r=0.059.

DISCUSSION

As a result of bone remodeling, initial bone loss occurs during the surgical healing phase; however, this may be avoided with delayed loading. During this phase, a biologic seal is also formed around the implant's top to protect the healing site from bacteria. Following the placement of the implant and its prosthetic connection, the crestal bone undergoes processes of resorption and remodeling.[12] In our study, Group II on mesial and distal implants showed a significant increase in the mean side bone resorption from baseline at 3 months, 6 months, and 9 months, which was consistent with a study done in 2003 by Cardaropoli et al.,[13] showing that the majority of bone resorption after implant surgery occurs within the first few weeks, if not months, after implantation.There was no significant change in mean radiographic bone loss from 1 month to 3 months and 6 months, or from 3 months to 6 months. This may be because bone remodeling, which is particularly

active after 8 weeks after healing and presents a variable degree of bone maturation.[14] The mean radiographic bone loss did not differ significantly between Group I and Group II, which is consistent with Güncü et al.'s 2008 study, which discovered that immediate loading had no negative impact on implant stability, marginal bone levels, and peri-implant health when compared to Delayed Loading.[15] Schingalia et al. (2008) concluded that traditionally loaded implants suffered from more peri-implant bone loss than implants that were loaded quickly. They concluded that a significant factor in the regulation of bone remodeling is mechanical bone strain stimulation.[16]

In both the delayed and immediate loading conditions, the current research demonstrates early bone loss that stabilizes after approximately one month of loading. In the initial month following loading, bone remodeling commences as implants are subjected to occlusal pressures. Additional research did not reveal any statistically significant distinction between immediate and delayed loading in terms of crestal bone loss. Because rapid loading is a less intrusive, less intricate, and shorter treatment option for edentulism, it may be advantageous for patients. This reduces pain and enhances psychological well-being.[17] The marginal bone loss was seen progressively in both Group l and Group ll . Whereas in Group I the Bone Loss significantly more than in Group ll which is not accordance to the other studies which shows statically insignificant boneloss. The reason for boneloss maybe because the people who are included in our study belongs to rural population where people are poorly compliant of oral hygiene practices which would have led to food lodgement around the crowns which were loaded for Group l and this could have been the reason for more boneless. Also, the sample size for this present study is too small to confirm the results and concretely conclude the above reasons so, a bigger sample size with same parameters and same target population with long term follow ups to check the status of bone loss, gender, type of bone, oral hygiene maintenance, occlusal forces on definitive prosthesis for more accurate results is needed to confirm the conclusions drawn from the current study. For Group l, the correlation between ISQ score and RBL both mesially and distally at 3 and 6 months was statistically insignificant For Group ll, the correlation between ISQ score and RBL both mesially and distally at 3, 6 and 9 months was statistically insignificant. For Group l, the comparison of mean bone loss both mesially and distally at baseline,3 and 6 months interval was statistically significant within the group and for Group ll, the comparison of mean bone loss both mesially and distally among for at 3, 6 and 9 months interval was statistically significant within the group respectively.

CONCLUSION

Evaluations were carried out at baseline, 3, and 6 months for both Group l and at baseline, 3 months, 6 months and 9 months for Group ll. Both immediate and delayed loading protocols showed radiographic bone loss, at both mesial and distal sides which was not found to be statistically significant.

Further, more studies should be conducted with long term follow ups to check the status of bone loss, gender, type of bone, oral hygiene maintenance, occlusal forces on definitive prosthesis for more accurate results.

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