Journal Homepage: -www.journalijar.com

INTERNATIONAL JOURNAL OF ADVANCED RESEARCH (IJAR)

Article DOI:10.21474/IJAR01/19032
DOI URL: http://dx.doi.org/10.21474/IJAR01/19032

RESEARCH ARTICLE

'COMPARATIVE EVALUATION OF PERI-IMPLANT TISSUES AROUND EARLY LOADED VERSUS DELAYED LOADEDIMPLANTS'

Dr. Mutthineni Ramesh Babu[1], Dr. Arpita Paul[2] and Dr. Srija Dadipally[3]

1. Professor Department of Periodontics Mamata Dental College Khammam Telangana-507002.
2. Professor & HOD Department of Periodontics Mamata Dental College Khammam Telangana-507002.
3. Postgraduate Trainee Department of Periodontics Mamata Dental College Khammam-Telangana-507002.

Manuscript Info

Manuscript History
Received: 05 May 2024
Final Accepted: 09 June 2024
Published: July 2024

Key words:-
Early Loading Implants, Delayed Loading Implants, Single Piece Implants

Abstract

Aims and Objectives: This study compared and evaluated the peri-implant tissue alterations in single-piece implants that were loaded early versus delayed. To evaluate the differences in radiographic results and clinical characteristics between early and delayed loaded implants.

Materials and Methods: Using radio visio graphs (RVGs), the current study aims to assess and compare the clinical and radiographic results of early loaded implants versus delayed loaded implants. Twenty sites in all, based on the kind of implant loading techniques, were randomly divided into two groups by flipping a coin, following the first screening and the patients who met the inclusion requirements. Ten sites with an early loading technique (GROUP 1) and ten sites with a delayed loading methodology (GROUP 2) were separated into two groups. In both groups, the Bioline single-piece implants were utilised.

Results: The clinical parameters probing pocket depth, clinical attachment level, and width of the keratinized peri-implant mucosa were measured at baseline, 3 & 6 months. Changes in marginal bone loss were measured using RVG. To evaluate the alterations in marginal bone level, AUTO CAD was utilised. SPSS V.23 was employed for the purpose of data analysis. Using the Mann Whitney U test for intergroup comparison and Friedman's Two-way ANOVA for intragroup comparison, groups 1 and 2 were assessed on mesial and distal surfaces.

Conclusion: Given the current study's constraints, the findings can be summed up as follows: early loaded implants performed better than delayed loaded implants in all clinical and radiographic measures from baseline to six months.

Introduction:-

The aim of contemporary dentistry is to replace missing teeth with prosthetics or to remove a disease process from a tooth in order to return the patient to normal shape, function, comfort, aesthetics, speech, and health. One well-liked course of treatment for patients who are partially or completely edentulous is dental implant therapy. Predictable success is now a reality for the rehabilitation of many difficult clinical scenarios thanks to ongoing research, diagnostic tools, treatment planning, implant designs, cutting-edge materials, and methodologies.[1]

Corresponding Author:- Mutthineni Ramesh Babu
Address:- Professor Department of Periodontics Mamata Dental College Khammam-Telangana-507002.

The original Branemark dental implant placement protocol called for 6 to 8 months of healing after extraction, sterile conditions using a mucobuccal flap, and a 2-stage process for placing machined titanium implants. It also called for 3 to 6 months of stress-free healing for osseointegration to occur and the prolonged use of a temporary removable prosthesis. There would be a substantial gap between the installation of the implants and the finished restoration because the entire treatment process would take a year or more.[2]

In order to address the structural weakness inherent in two-piece implants, one-piece implants were developed, incorporating the transmucosal abutment as an integrated element of the implant. One-piece implants, which are constructed to resemble natural teeth and have many benefits such as strong unibody design, no split parts, single-stage surgery with flap or flapless approach, and easy restorative techniques, offer a seamless transition from implant to abutment.[3]

A prospective cohort trial using early loaded single implants found that the maxillary anterior teeth had a survival rate of 94.44% after three years and a marginal bone loss of 0.42 mm, according to a comprehensive review by Pigozzo et al. A prospective clinical investigation with a 94% survival rate and a minimal bone loss of 0.97 mm for early loaded single maxillary implants reported similar outcomes. These results suggest that, in the case of single implant-supported crowns, immediate or early implant loading should be taken into consideration.[4]

In light of this, the current study used clinical and radiographic measures to evaluate the peri-implant tissue changes surrounding early-loaded and delayed-loaded implants.

Material and Methods:-

The goal of the current study was to assess and contrast the radiographic and clinical results of early and delayed loaded implants using radio visio graphs (RVGs) at baseline, three months, and six months following the various loading regimens. In both groups, the Bioline single-piece implants were utilised.

StudyProtocol:

Accordingtotheprotocol ofthestudy,followingphaseswerefollowed: Initialscreening, Initialtherapy, Surgicaltherapy and immediate post-operative radiograph. Re-evaluationat3 and 6 monthspost-operativefollow-upvisits.

This present study was conducted on partially edentulous subjects selected from theoutpatientswingofDepartmentofPeriodontics,MamataDentalCollegeandHospital.Approvalwasobtainedfrom theinstitutionalethicalboardofMamataEducational Society (Ethical Clearance Number: MDC_KT_20201103002D) and aninformedconsentwastakenfromalltheparticipantsbeforecommencingthestudy.A total number of 20 sites which were randomized by coin flipping into two groupsbasedonthetypeofloadingprotocolsoftheimplants.GROUP1: 10sites withearlyloading protocol.GROUP 2:10 sites with delayed loading protocol.

InitialScreening:

Patientselection wasdonebased onthefollowinginclusionand exclusion criteria:

Criteria for Inclusion:

Must be 18 years of age or older.A single lost tooth in the maxilla or mandible,Lack of diseases affecting the hard and soft tissues inside the mouth,A CBCT is used to assess the amount of accessible bone width and height at each edentulous location. Type I–Type III (D1–D3) bone quality. The natural tooth next to the edentulous gap must be free of infection and have an intact occlusal surface.

Criteria for Exclusion:

Any overall health issues, such as diabetes, osteoporosis, blood diseases, and titanium allergy, that could endanger the process of bone repairHistory of blood dyscrasias, radiation, osteoporosis, malignancies, uncontrolled diabetes, and corticosteroid therapy,extreme disparities in Maxillomandibular space,severe parafunctional behaviours, such as clenching or bruxism, mental illness,history of drug or alcohol abuse,cigarettesmoking,bone quality type IV,less than 2 mm in width of keratinized gingiva at the implant site.

The patients who fulfilled the requirements for inclusion had examinations in well-light conditions using the UNC 15 probe and mouth mirror. Every patient received a thorough explanation of the study and the potential course of treatment. Before the trial started, the patients freely signed the informed consent form. Alginate imprint material was used to record maxillary and mandibular arch impressions, and diagnostic casts were produced. Every study participant had underwentroutine blood test.

Surgical Procedure:

Using a No. 15 Bard Parker (BP) blade, a mid crestal incision was performed over the edentulous spot under local anaesthesia, and then the neighbouring teeth were incised sulcularly. A fine periosteal elevator was used to elevate the mucoperiosteal flap on the buccal/facial and palatal/lingual surfaces. A pilot drill was used to produce the implant osteotomy, and then successive implant drills were used while enough of saline irrigation was provided. The osteotomy site is correctly sized and shaped by the drills, providing early stability without subjecting the bone to heat or mechanical stress. By using a parallel pin to take a radiovisio graph, the osteotomy site was assessed. Using finger threading, the single-piece implants were inserted while gripping the plastic mount.Implants were positioned to the level of the alveolar crest using a manual rachet equipped with torque after the mount was removed. For flap closure, simple interrupted sutures were made using 3-0 black silk suture material (Figure-1,2,3,4,5,6).

Pre-operative viewi.r.t#21

FigureI:- EarlyCrownLoading Protocol.

Figure2:- Implantplacementandsuturingdone

i.r.t#21.

Figure3:Earlycrownloading done i.r.t#21

Figure4:DELAYEDCROWNLOADINGPROTOCOL

(Pre-operativeview i.r.t#36)

Figure5:Implantplacementandsuturingdonei.r.t#36

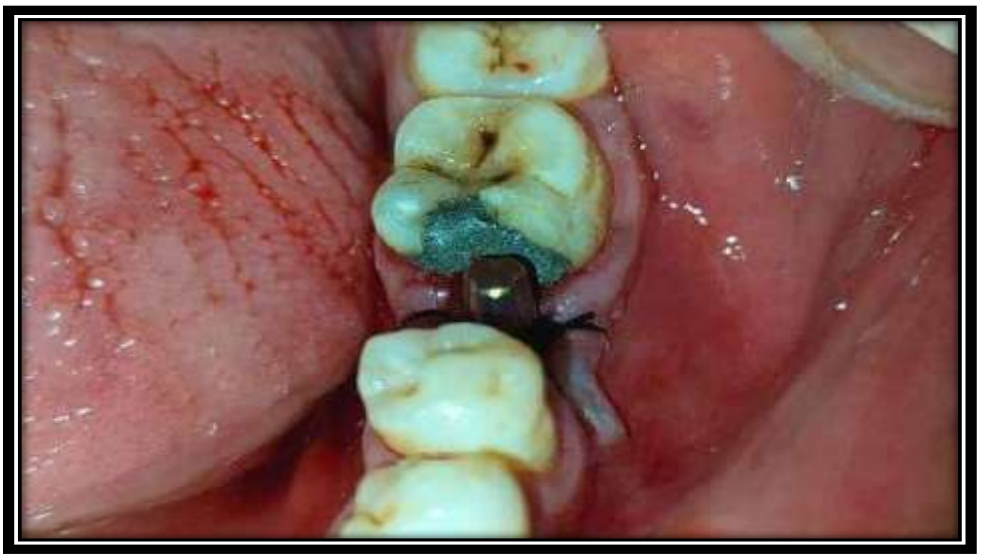


Figure 6: Delayedcrownloadingdonei.r.t#36

Figure 7: EVALUATIONOFCRESTALBONELEVELSUSINGAUTOCAD SOFTWAREIN

GROUPI

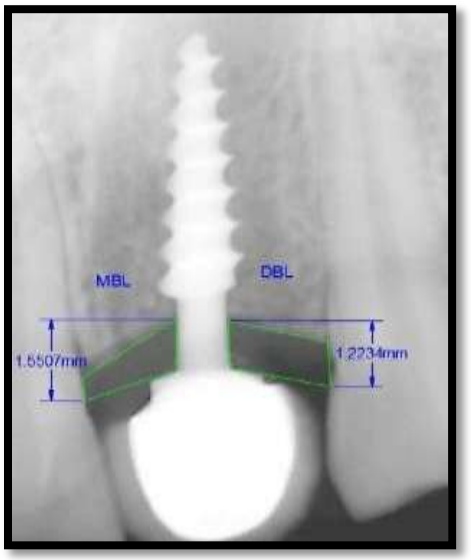
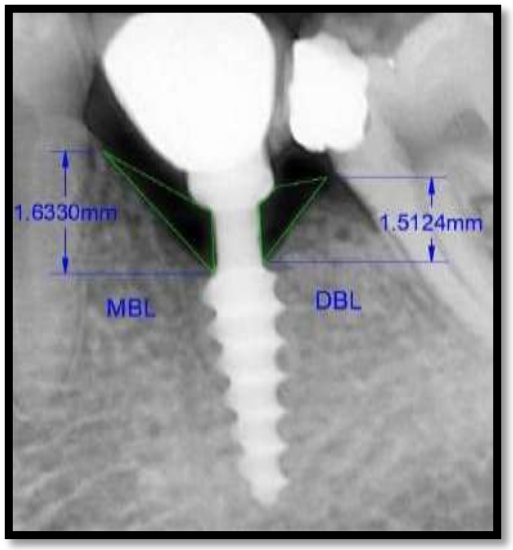


Figure 8: EVALUATIONOFCRESTALBONELEVELSUSINGAUTOCAD SOFTWAREIN

GROUPII



Results:-

STATISTICAL ANALYSIS: SPSS (Statistical Package for Social Sciences) version 23 was used to analyse the data. Groups 1 and 2 were evaluated on mesial and distal surfaces using Friedman's Two-way ANOVA for intragroup comparison and the Mann Whitney U test for intergroup comparison.P- values less than 0.05 were regarded as significant and denoted by (*), p values less than 0.001 as highly statistically significant and denoted by (**), and p values greater than 0.05 as nonsignificant and denoted by (NS). Mean PI, PPD, CAL, WKG, and Crestal Boneloss in test and control groups are compared both within and between groups. (Tables 1, 2, 3, 4, 5).

Tables

Table1:-PairwisecomparisonsofPIwithtimelineswithineachgroup-PostHocanalysis.

Comparisonbetween		Group 1		Group 2	
		Mean difference	P value	Mean difference	P value
Baseline	3months	0.117	**0.005***	0.131	**0.024***
	6months	0.454	**0.005***	0.453	**0.005***
3months	6months	0.337	**0.006***	0.322	**0.005***

Table2:-PairwisecomparisonsofPPDwithtimelineswithineachgroup- PostHocanalysis(inmm).

Comparisonbetween		Group 1		Group 2	
		Mean difference	P value	Mean difference	P value
Baseline	3months	0.445	0.257	0.027	0.593
	6months	0.065	0.336	0.047	0.593
3months	6months	0.020	0.593	0.020	0.317

Table3:- Pair wise comparisons of CAL with timelines within each group -PostHocanalysis(inmm).

Comparisonbetween		Group 1		Group 2	
		Mean difference	P value	Mean difference	P value

Baseline	3months	0.053	0.498	0.027	0.593
	6months	0.065	0.336	0.047	0.593
3months	6months	0.012	0.715	0.020	0.317

Table4:- Pair wise comparisons of width of Keratinized Gingiva with timelineswithineach group -Post Hoc analysis(inmm).

Comparisonbetween		Group 1		Group 2	
		Mean difference	P value	Mean difference	P value
Baseline	3months	-0.300	0.083	-0.200	0.157
	6months	-0.400	**0.046***	-0.100	0.705
3months	6months	-0.100	0.317	0.100	0.655

Table 5:-PairwisecomparisonsofCrestalbonelosswithtimelineswithineachgroup -Post Hoc analysis(in mm).

Side	Comparisonbetween		Group 1		Group 2	
			Mean difference	P value	Mean difference	P value
Mesial	Baseline	3months	-0.036	0.605	-0.042	0.810
		6months	-0.043	0.280	-0.086	0.077
	3months	6months	-0.007	1.000	-0.044	**0.000***
Distal	Baseline	3months	-0.041	0.729	-0.057	**0.017***
		6months	-0.043	0.185	-0.043	0.226
	3months	6months	-0.002	1.000	0.014	1.000

Discussion:-

The process of implanting entails inserting a foreign or native tissue or substance into bodily tissues. Restored dental function and aesthetics are the goals of dental implantation. In dentistry, patients expressing a wish for a "screw-in" tooth replacement have long been commonplace. The notion of "osseointegration" in implants and the hope of stable, predictable prostheses were made possible by the groundbreaking research of Schroeder and colleagues in Switzerland in the mid-1970s and Brånemark and colleagues in Sweden starting in the mid-1960s.[5]

There are hundreds of implant systems on the market today, made of different materials and designs, the majority of which fall into the one-(OPI) or two-piece implant categories (TPI). An endosseous implant and a transmucosal abutment make up a two-piece implant, often known as a bone-level implant (BLI) since the implant neck is positioned at the crucial level of the alveolar ridge. A healing abutment may be inserted during a second stage of surgery or concurrently with ~~implant~~ implantation. There are many abutment designs and alterations available to improve the prosthesis' cosmetic results. People are concerned about its lengthy treatment times, high expense, and possible negative impact on marginal bone loss (MBL) during abutment connection.

A one-piece implant that includes the transmucosal abutment as an integrated component of the implant has been introduced to address the shortcomings of TPI. Whether an extra supragingival abutment is required depends on the heights of the transmucosal components. An additional abutment is not required when using a one-piece monoblock implant since the prosthesis is attached directly to the supragingival section of the implant. Another tactic is to position the abutment-implant connection at the tissue level, or tissue-level implant. They both shorten the length of therapy and associated costs by streamlining the surgical process into a single step. Furthermore, it is anticipated that removing the microgap at the alveolar ridge crest may lessen the chance of infection and bacterial colonisation.[6]

The third ITI Consensus Conference, which took place in Gstaad, Switzerland in 2003, established the implant loading protocols based on the prosthesis loading time, and they are as follows: Quick loading After 48 hours of implantation, a restoration is positioned in occlusion with the opposing dentition. Early loading: A restoration implanted at least 48 hours after implantation but no later than three months later, in contact with the opposing dentition, Delayed loading: Following a three to six month healing time, the prosthesis is mounted during a second procedure.[7]

The crestal bone loss at the mesial and distal sides of the implant site using RVG was the radiographic parameter investigated in this study (Figure 7, 8). These images were acquired immediately after implant placement (baseline), three months, and six months later. The distance between the implant shoulder and the most coronal bone to implant contact (DIB) was measured at both the mesial and distal aspect of each implant and expressed in millimetres (mm) in order to evaluate the changes at the interproximal alveolar crestal bone height. Similar to the methodology employed in the Verma A et al. study, AUTO CAD software was used to evaluate the bone levels at baseline, three months, and six months (2019).[8]

The mean PI scores in both groups dropped statistically significantly from baseline to three and six months, in line with earlier research by Verma A et al. (2019)[8], Sekar S et al. (2019)[9]. Because the patients in this trial were given oral hygiene instructions during their initial therapy, both groups' dental hygiene maintenance was good, and there was no evidence of Plaque irritation.

In both the test and control groups, the mean PPD and mean CAL decreased from the baseline to the three and six-month follow-ups, respectively, although this decrease was not statistically significant. This was in line with earlier research conducted by Sekar S et al. (2019)[9] and Verma A et al. (2019)[8]. A reduction had been achieved with supragingival and subgingival scaling, root planing, and suitable home care directed towards sufficient supragingival plaque control.

In the test group, the width of keratinized gingiva (WKG) incresedconsiderably between baseline and the 6-month follow-up; in the control group, this increase was not statistically significant. This was comparable to research conducted by Capelli M et al (2010)[11] and Galli F et al (2008)[10].

From baseline to the three and six-month follow-ups, there was a gradual rise in the crestal bone loss, which was assessed on the mesial and distal sides in both groups. Comparable to the research conducted by Sekar S et al. (2019), the control group saw significantly more bone loss from baseline to the 6-month follow-up on both theMesial and Distal sides.[9]
Therefore, single-piece implants may be loaded using an early crown loading approach with predictable results provided there is sufficient bone present. To assess the clinical performance of single-piece implants in a periodontally stable setting, more extensive studies with a larger study population, enhanced methods, alternative crown loading protocols, and an extended follow-up time will be necessary in the future.

Conclusion:-

Thus, within the constraints of the investigation, the findings of this study demonstrated that, although bone loss was observed from baseline to follow-up periods in both the early and delayed crown loading protocols, the early crown loading protocol caused less bone loss than the delayed crown loading protocol., Early loading of single-piece implants shortens the duration of therapy while improving patient comfort and aesthetics without sacrificing clinical results or reducing bone loss.

References:-

1. **RandolphR.Resnik,CarlE.Misch.**RationaleforDentalImplants.In:**Misch CE**. Contemporary implant dentistry. Fourth edition. Elsevier HealthSciences; 2020.P.2-19.
2. **Koh RU, Rudek I, Wang HL**. Immediate implant placement: positives andnegatives.JImplantDent. 2010;19(2):98-108.
3. **PrithvirajDR,GuptaV,MuleyN,SandhuP**.One-pieceimplants:placement timing, surgical technique, loading protocol, and marginal boneloss.JProsthodont:ImplantEsthetReconstructDent.2013;22(3):237-44.
4. **Pigozzo MN, da Costa TR, Sesma N, Laganá DC**. Immediate versus earlyloading of single dental implants: A systematic review and meta-analysis. JProsthetDent.2018;120(1):25-34.
5. **GerardByrne.**IntroductiontoDentalImplants.In:**ByrneG**.Fundamentalsofimplantdentistry.JohnWiley &Sons;2014.P.1-21.
6. **Liu M, He L, Wang H**. Clinical and radiographic performance of one-pieceand two-piece implant: a systematic review and meta-analysis. Journal ofProsthodonticResearch.2021:JPOR_2019_436.
7. **Weber HP, Morton D, Gallucci GO, Roccuzzo M, Cordaro L, Grutter L**.Consensusstatementsandrecommendedclinicalproceduresregardingloadingprotocols.IntJOralMaxillofacImplants.2009;24:180-3.

8. **VermaA,HudaI,NabiAT,BhongadeML**.Ashorttermcomparativeevaluationofeffectivenessofearlyloadedversus delayedloadedsingletooth implants aclinical study. IP Int J PeriodontolImplantol. 2019;4(3):79-87.
9. **SekarS,SuthanthiranT,ThangaveluA,KarupannanSK,PremF,RajendranD**.Clinicalandradiologicalevaluatio nofdelayedandearlyloadingofsingle-toothimplantplacement:A6-month,prospective,randomized,follow-upclinical study.J PharmBioall Sci2019;11:S278-84.
10. **GalliF,CapelliM,ZuffettiF,TestoriT,EspositoM**.Immediatenon-occlusal vs. early loading of dental implants in partially edentulous patients: amulticentre randomized clinical trial. Peri-implant bone and soft-tissue levels.ClinOralImplantsRes.2008;19(6):546-52.
11. **Capelli M, Esposito M, Zuffetti F, Galli F, Del Fabbro M, Testroi TA**. 5-yearreportfromamulticentrerandomisedclinicaltrial:immediatenon-occlusalversusearlyloadingofdentalimplantsinpartiallyedentulouspatients.EurJOralImplantol.2010;3(3):209-19.