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Dental Science

COMPARISON OF DELAYED VERSUS IMMEDIATE LOADING OF DENTAL IMPLANTS IN PARTIALLY EDENTULOUS MANDIBULAR POSTERIOR REGION

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ABSTRACT

Study Design: The patient's desire to shorten the treatment time and to avoid an edentulous condition immediate loading of implants has emerged as an alternative approach as compare to delayed loading implants for replacing missing natural teeth. The aim of this study is to compare the effect of immediate and delayed loading of implants in partially edentulous mandibular posterior region and to analyze outcome of both techniques

Objective: To compare and evaluate postoperative treatment outcome in mandibular posterior region clinically and radiographically.

Method: This is a Randomized controlled study, consisting of 50 patients. They were divided in two groups. Group1 (Number of patients- 25, Delayed loading implant) and Group2 (Number of patients-25, Immediate loading implant). Soft tissue examination were measured by probing depth with William probe , Hard tissue were measured and compared using OPG/CBCT and IOPAR.

Result: The difference in the bone loss between Group A and Group B was 0.02 mm. In respect to soft tissue healing of gingiva bucally, lingually and papilla the average score of mean modified sulcus bleeding index and mean modified plaque index was not more than 01, signifying mild inflammation at the most. Primary stability increases in both the groups. In delayed group mean stability was 56 and in immediate group mean stability was 57 which was adequate at the time of surgery and during healing period. The mean bone healing score was higher in delayed group than that of immediate group but the difference failed to reach the level of statistical significance.

Conclusion: Our study concludes that whether it is immediate loading or delayed loading protocol, under appropriate circumstances, medical condition and maintenance of good oral hygiene provide similar success rate.

KEYWORDS : Dental implants, immediate loading protocol, delayed loading protocol, osseointegration, primary stability

INTRODUCTION

Osseointegration of implant is the prerequisite for successful outcome. There are two procedure available for the implant placement. One is a traditional two stage surgery, delayed implant loading and another is immediate loading protocol. These methods are recommended to the patient, who needs the replacement of partially edentulous jaw or completely edentulous jaws. In the case of two stage procedure implant were placed and left for a period of 3-4 month for healing in mandible and in maxilla 6-8 month.

Successful dental implant depends upon presence of good osseointegration. In 1977 delayed loading protocol or two stage procedure concept was introduced which documented, loading of prosthesis after 3 month of implant placement [1]. Various report and clinical research have documented great survival and successful rate using immediate single tooth provisional restoration [2]. A meta- analysis confirmed neither radiological nor clinical differences in among the various loading protocols in term of aesthetic result or implant survival rate [3]. First report was published in 1990 proposing that osseointegrated implants could be loaded early or immediately in mandible [4]. Immediate loaded implants in mandible are effective as in case of 2 stage procedure [5].

The objective of this study is to evaluate and compare the effectiveness of immediate implant loading over conventional or delayed loading procedure with respect to soft tissue healing around around implant, crestal bone loss, primary stability and bone healing in partially edentulous mandibular posterior region.

MATERIAL AND METHODS

This was a randomized controlled single center study and was conducted in Department of Oral and Maxillofacial Surgery at Sardar Patel Post Graduate Institute of Dental And Medical Sciences, Lucknow. 50 patients were selected for the study. They were divided in two groups. Group 1 (Delayed loading implant) and Group 2 (Immediate loading implant). Patients were included based on, Edentulous mandibular posterior region, Residual bone height >10mm, Minimum bone width 4.5mm and Age >18 years of age and could not be treated if they had Uncontrolled diabetes, History of bisphosphonates treatment, insufficient bone width and height, Smokers,

Incomplete follow up >6 month Implant selection including diameter of implant and length of implant were based on study cast, clinical examination and radiographic evaluation of available bone using CBCT or OPG. Soft tissue clinical examinationwas done with William probe and Hard tissue with X- Ray intra oral periapical radiograph (IOPAR), (Manual/ digital method using paralleling cone technique with grid), Orthopantomogram (OPG), CBCT. Model fabrication was done for mandibular as well as maxillary arches.

Surgical protocol

An OPG was taken prior to surgery (Fig.1), and the bone profile was assessed. Pre-operative antibiotic was given to patients i.e. Amoxicillin 500 mg TDS 2 days before procedure. Prior to implant placement, patients rinsed for 1 min with 0.2% Chlorhexidine mouthwash and local anaesthesia was induced using 2% lignocain with adrenaline (1:80000). Implant length and diameter was selected based on clinical assessment and bucolingual width of bone with the help of OPG/CBCT. Implants were placed using a conventional approach: an intrasulcular and crestal incision was performed and a mucoperiosteal flap was elevated. All implants were installed with an insertion torque >35 Ncm and <45 Ncm measured with a manual torque wrench . Drilling was done as per scheduled drill sequence protocol. Implant was placed in bone. (Fig.2) Suturing done with (3-0) silk suture. Immediate post operative OPG was taken (Fig.3).

GRAPH -1

GRAPH -2

GRAPH -3

Fig . 1. Preoperative OPG
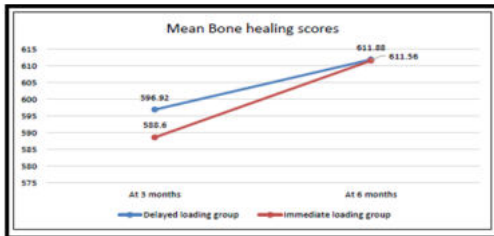

Fig. 2. Placement of implant
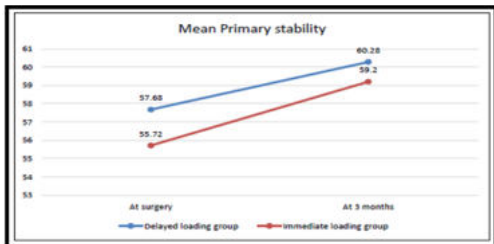

Fig.3.Post operative OPG

Prosthetic protocol

A impression was then taken, an acrylic crown was fabricated and was placed the day after surgery in the immediate loading protocol, Care was taken that provisional crowns did not have any static or dynamic occlusion contacts (Fig.4).
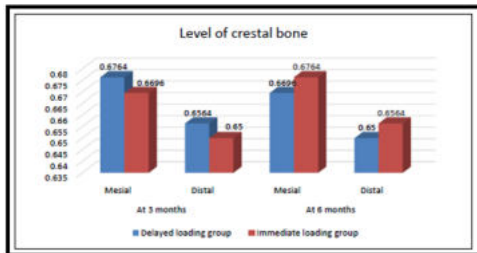

Fig.4. Intraoral occlusion after prosthesis placement immediately

The patients were scheduled for routine follow up visits after surgery. At the 6 month appointment, fabrication of the definitive prosthesis was initiated. While a healing abutment was inserted on the delayed loading protocol and crown were placed after 3 month in maximal intercuspal position. Implants were checked by visual observation for plaque and bleeding on probing at the follow-up intervals. Periapical radiographs, opg, plaque and bleeding indices are checked at various follow-up intervals are part of routine care for and also for the analysis in this study.

Evaluation criteria

1. Healing of gingiva buccally, lingually after 3 and 6 months of implant loading by modified plaque index and modified sulcus bleeding index. 2. Healing of papilla after 3 and 6 months of implant loading by modified plaque index and modified sulcus bleeding. 3. Bone healing pre-operative & post-operative IOPAR/OPG/CBCT after one month, three month and six (Hounsfield unit). 4. Primary implant stability by Implant Stability Quotient (ISQ) device at the time of surgery and after three months. 5. Level of crestal bone in relation to implant after three months and after six months

RESULT

The mean MSBI (Mean sulcus bleeding index) score at 3 months follow up, in 'Delayed loading' group was found to be higher than that among 'Immediate loading' group. The mean MSBI score at 6 months follow up, in 'Delayed healing' group was found to be similar to that among 'Immediate loading' group. The mean MPI (Mean plaque index) score at 3 months follow up, in 'Delayed healing' group was found to be higher than that among 'Immediate loading' group. On the contrary, the mean MPI score at 6 months follow up, in 'Delayed healing' group was found to be lower than that among 'Immediate loading' group.

The mean MSBI score (healing of papilla) at 3 months follow up, in 'Delayed healing' group was found to be higher than

that among 'Immediate loading' group. On the contrary, the mean MSBI score at 6 months follow up, in 'Delayed healing' group was found to be lower than that among 'Immediate loading' group. The mean MPI score (healing of papilla) at 3 months & 6 months follow up, in 'Delayed healing' group was found to be higher than that among 'Immediate loading' group.

The mean Bone healing scores at 3 months follow up, in 'Delayed healing' group was found to be higher than that among 'Immediate loading' group. The mean Bone healing scores at 6 months follow up, in 'Delayed healing' group was found to be similar to that among 'Immediate loading' group (Graph 1). The mean Primary stability scores at 3 months & 6 months follow up, in 'Delayed healing' group was found to be higher than that among 'Immediate loading' group (Graph 2). The mean level of crestal bone scores at 3 months & 6 months follow up, in 'Delayed healing' group was found to be higher than that among 'Immediate loading' group (Graph 3). But the difference failed to reach the level of statistical significance in any of the above mentioned data.

DISSCUSSION
The ultimate goal of an immediate loading protocol is to reduce the number of surgical interventions and shorten the interval between surgery and prosthesis delivery, without compromising the success rate of the procedure [6]. Rao and Benzi in their study on single, mandibular first-molar implant placed with flapless less surgery and right away loaded with pre-manufactured personalized abutments and crowns. All 51 tapered implants positioned were stable and triumphant in function after 1 year, providing a 100% survival rate [7].

The quantity of peri-implant bone on every side of the implant plays a key role in the prosperity of the implant. The bone disoriented during the implant amenity bring down the total osseointegrated facet area of the implant leading to increase in the tension build up all over the peri-implant region which additionally leads to the non success of implant. Success of an implant is defined as less than 1.5mm of marginal bone loss during first year after insertion of the prosthesis and less than 0.2mm annual bone loss afterwards. Therefore, it is salient to minimize bone loss from the initial stage [8].

Danza M et al in study showed no notable differences for marginal bone deprivation between immediately and conventionally loaded implants, except for slight significant difference in mandible [9]. The results of our study appears less quantity of peri-implant bone loss in Group A (Patients for Delayed implant loading protocol) than Group B (Patients for immediate implant loading protocol) in 6 months after positioning of the implants. The mean bone loss for Group A was 0.65 mm although for Group B it was 0.66 mm. The difference in the bone loss between Group A and Group B was 0.02 mm. But the difference was statistically not significant.

Soft tissue assessment was done by recruiting Modified Plaque Index (mPI) and Modified Sulcus Bleeding Index (mBI). Since one of the etiologic component of alveolar bone loss all over implant appers to be plaque related gingival inflammation, significance of continuing the good oral hygiene was emphasize prior to implant surgery as a necessary precondition for successful osseointegration and conservation of implants. Patients were also inspired for maintaining the oral hygiene. The soft tissue health was rationally good during the whole period of assessment[10]. In our study the mean result for these two indices was not more than 01, marking lenient inflammation at the most.

Implant primary stability was initially evaluated by finger constraint applied on the implant climb. If clinically firm,

implant strength was additionally calculated by resonance frequency. The ISQ value at implant positioning was blindly noted and did not control the surgical or prosthetic treatment.

Bischof M et al showed data are in score with those come by with Branemark implants, where implant solidity was elevated in the mandible than in the maxilla. The average ISQ in the mandible was still soaring than in the maxilla.. After 3 months, the effect of bone was leveled out but still the ISQ in the mandible was significantly higher. Over a 3-month period, the RFA (Resonance frequency analysis) method did not let out any decrease in implant stability besides in the delayed loading or the immediate loading groups. This might describe why immediate loading protocols may be as foreseeable as delayed loading ones. The mean ISQ persist stable or slightly increased in the course of the first 4–6 weeks and then increased more distinctly [11]. In our study we measured primary stability at the time of surgery and after three months. According to our study primary stability increases in both the groups.in delayed group mean stability was 56 and in immediate group mean stability was 57 which was adequate at the time of surgery and during healing period.

Turkyilmaz I et al in their study showed bone density recordings were 846 ± 234 HU, 526 ± 107 HU, 591 ± 176 HU, 403 ± 95 HU in the anterior mandible, posterior mandible, anterior maxilla, and posterior maxilla respectively, which are similar with those in the preceding studies[12]. Norton and Gamble66 revealed that the mean bone densities were 970 HU, 669 HU, 696 HU, and 417 HU in the anterior mandible, the posterior mandible, the anterior maxilla and the posterior maxilla respectively[13]. In our study the average bone density in delayed group was 596.2 HU (after three month) and 611.66 (after six month). The average bone density in immediate group was 588.6 (after three month) and 611.66 (after six month). The mean bone healing score was higher in delayed group than that of immediate group but the difference failed to reach the level of statistical significance.

CONCLUSION
According to literature immediately and conventionally loaded implants showed equally successful clinical results regarding soft tissue healing, implant survival rate, marginal bone loss.

In addition to the benefits that an immediate loading protocol can provide long-term outcomes that have been reported to be favorable even in areas where bone quality is not adequate. The overall implant survival rate of immediately loaded implants is similar to the conventional 2-stage implant loading protocol. Our study concludes that whether it is immediate loading or delayed loading protocol, under appropriate circumstances, medical condition and maintenance of good oral hygiene provide similar success rate. Apart from better success rate in both the loading protocols showed in various literature more data and study are required.

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