

Comparison of immediate provisionalisation of dental implants placed in healed alveolar ridges and immediate extraction socket

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Abstract

Introduction: Missing teeth and dental supporting oral tissues have replaced recently, with techniques of implants with provisional restoration have been developed. With an immediate restoration protocol, patients require no additional surgery for implant uncovering procedures, and thus benefit from not having to wear removable restorations during the treatment period.

Materials and Methods: A Prospective study involving total of 30 medically fit patients of age group 18-60yrs with missing tooth and tooth indicated for extraction, during the period of 2yrs from March 2017-March 2019.

Results and Discussion: Post-operative comparison of Inter dental papilla and vertical crest bone at first, third and sixth month showed no significant difference between immediate provisionalisation in extracted sockets compared to immediate provisionalisation in healed ridges.

Conclusions: we conclude immediate provisionalisation in extracted sockets achieved similar success rates as those reported in the immediate provisionalisation in healed ridges. Primary implant stability is a key factor to consider in immediate extracted sockets and in healed sockets.

Keywords: Dental Implants, Immediate Placement, Mobility, Radiolucency.

Introduction

Dental implants are used to replace both the form and function of missing teeth. Implant dentistry includes spectrum of loading schedules which include immediate loading, early loading, conventional loading and delayed loading. To avoid crestal bone resorption immediate implant placement in fresh extraction socket was introduced by Schulte in 1978. He was the first one to place immediate implants into fresh extraction sockets in humans. Recently, techniques in which implants are placed with provisional restoration on the day of surgery has been developed. With an immediate restoration protocol, patients require no additional surgery for implant uncovering procedures, and thus benefit from not having to wear removable restorations during the treatment period.

Immediate provisional prosthesis are given on the day of implant placement and implants are not subjected to direct functional loading. Provisional restorations are carefully relieved of both centric and eccentricocclusal contacts. Immediately restored prosthesis can act as a scaffold to support the adjacent mucosa and papillae, thus facilitating the creation and maintenance of a soft tissue profile around implants. In this study comparison was done on peri-implant bone healing after immediate provisionalisation of implants, in healed versus immediate extraction sockets along with marginal bone adaptation and soft tissue changes following immediate provisionalisation.

Materials and methods

The study included 30 medically fit patients of age group 18-60yrs with missing tooth and tooth indicated for extraction, visiting the institute .Patients were

included in the study after obtaining ethical clearance from the institution. Patients were divided into groups A and B, 15 patients in each group. Informed consent was obtained from the patients. Inclusion criteria were all patients above 18 years with a missing tooth, avulsed tooth and a tooth indicated for extraction and patient willing for follow up. Exclusion criteria were patients with untreated periodontal disease, medically compromised patients, absence of opposing dentition and patient not available for follow up.

A single operator performed the placement of implants in all the patients and also maintained a record of the soft tissue and hard tissue parameters being evaluated.If primary stability was not achieved at the time of implant placement those patients were not included in the study.Any cases with bony defect which required grafting or required bone regeneration following extraction were not included in the study.

Implants with a diameter between 3.5 to 4.5mm and length of 10to13mm were used. Implant stability was assessed clinically as absence of axial rotation or movement. Stable implants were provisionalised with titanium abutments and acrylic crowns were cemented using glass ionomer cement. Acrylic crowns were evaluated for absence of centric and eccentric contacts using articulating papers. After 8 weeks permanent crowns were fabricated and cemented.

Radiographic assessment of Crestal bone

The distance from the interproximal bone to the reference point on both the mesial and distal aspects of the implant was measured to nearest 0.1mm by an independent radiologist and the mean of these two measurements were calculated for each patient.

Soft tissue assessment around implant

Soft tissue papilla around the implant was assessed using JEMT classification (1997) of papilla around single implant in the maxilla. The index designated five different levels indicating the amount of papilla present. The assessment was measured from a reference line through the highest gingival curvatures of the crown restoration on the buccal side and adjacent permanent tooth. The distance from this line to the contact point of the natural tooth crown was measured.

Index Score 0: No papilla present

Score 1: Less than half of the height of papilla

Score 2: Half or more of the height of the papilla is present

Score 3: Papilla fills up entire proximal space and is in good harmony with adjacent

Papilla

Score 4: The Papilla are hyperplastic

The raw data was compiled, tabulated and statistically analyzed using SPSS version 19 (SPSS Inc 2008 by IBM). Student 't' test and Fischer exact test were applied for assessing significant difference between the presence of interdental papilla and vertical bone height and compared between extracted socket and healed ridges.

Results

Table 1: Presence of Interdental Papilla In Extracted Sockets

| Presence of interdental papilla | Length of interdental papilla | Mean | SD |
|---------------------------------|-------------------------------|------|-------|
| 1 month | 2-4 | 2.37 | 0.640 |
| 3 month | 3-4 | 3.13 | 0.352 |
| 6 month | 3-4 | 3.47 | 0.516 |

The mean interdental papilla present in 1st month is 2.87 mm, the mean interdental papilla present in 2nd month is

3.13mm, and the mean interdental papilla present at 6th month is 3.47mm

Graph 1: Presence of Interdental Papilla In Extracted Sockets

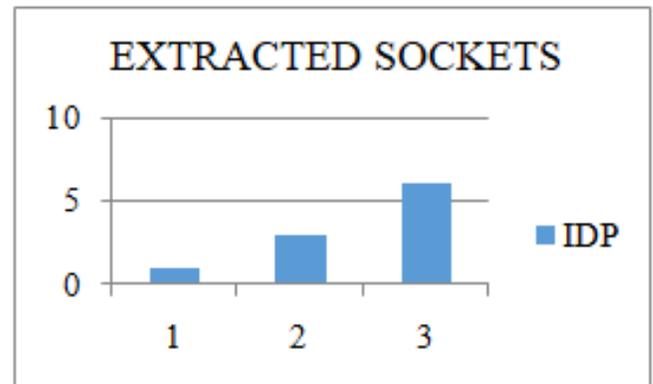


Table 2: Presence of interdental papilla in healed sockets

| Presence of interdental papilla | Min- Max | Mean | SD |
|---------------------------------|----------|------|-------|
| 1 month | 2-4 | 3.00 | 0.655 |
| 3 month | 3-4 | 3.20 | 0.414 |
| 6 month | 3-4 | 3.27 | 0.453 |

The mean interdental papilla in healed sockets at 1st month is 3.00 mm, the mean interdental papilla presence at 2nd month is 3.20 mm, and the mean interdental papilla present at 6th month is 3.27mm.

Graph 2: Presence Of Interdental Papilla In Extracted Sockets

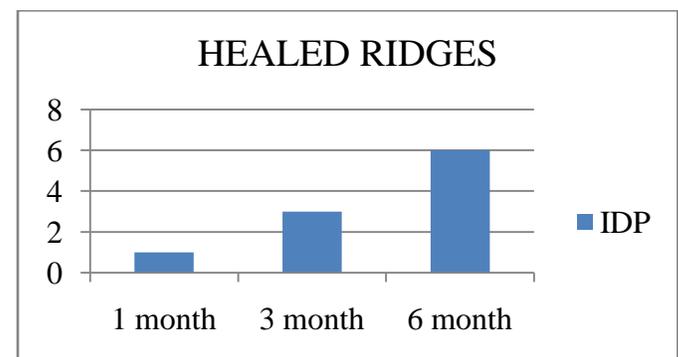


Table 3: Comparison of presence of interdental papilla: immediate provisionalization in extracted sockets vs healed ridges

| Presence of interdental papilla | Extracted sockets | Healed ridges | p-value |
|---------------------------------|-------------------|----------------|----------|
| 1 month | 2.87 (0.67) | 3.00 (0.65) | <0.001** |
| 3 month | 3.13 (0.35) | 3.20 (0.41) | <0.001** |
| 6 month | 3.47 (0.51) | 3.27 (0.45) | <0.001** |

Comparison of group 1 and group 2 post-operatively at 1st month, 3rd month, 6th month using student T test showed mean in extracted sockets 2.87mm, 3.13mm, 3.47mm and mean in healed ridges 3.00mm, 3.20mm, 3.27mm, highly significant with P-value <0.001 in immediate provisionalisation in extracted sockets compared to immediate provisionalisation in healed ridges.

Graph 3

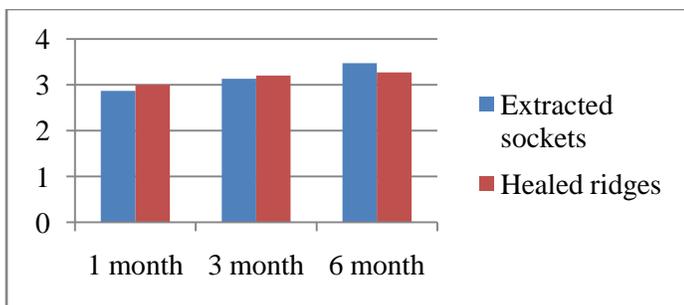


Table 4: Vertical Crestal Bone Loss (Mm)-Immediate Provisionalization In Extracted Sockets

| Vertical crestal bone loss (mm) | Min- Max | Mean | SD |
|---------------------------------|----------|-------|--------|
| 1 month | 0-0.3 | 0.140 | 0.1242 |
| 3 month | 0-0.5 | 0.333 | 0.1234 |
| 6 month | 0.5-1 | 0.707 | 0.1592 |

Graph 4: Vertical Crestal Bone Loss (Mm)-Immediate Provisionalization In Extracted Sockets

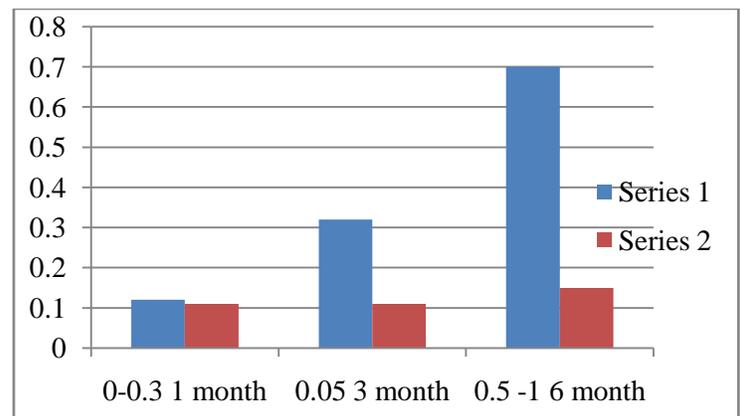


Table 5: Vertical Crestal Bone Loss In Immediate Provisionalization In Healed Ridges

| Vertical crestal bone loss (mm) | Min- Max | Mean | SD |
|---------------------------------|----------|-------|--------|
| 1 month | 0-0.3 | 0.140 | 0.1242 |
| 3 month | 0-0.5 | 0.333 | 0.1234 |
| 6 month | 0.5-1 | 0.707 | 0.1592 |

Graph 5: Vertical Crestal Bone Loss-Immediate Provisionalization In Healed Ridges

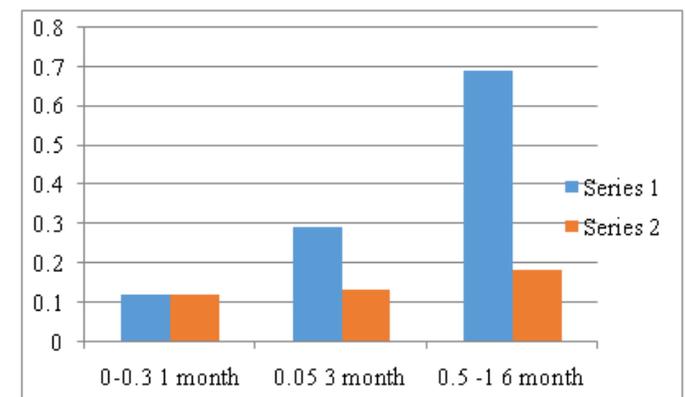
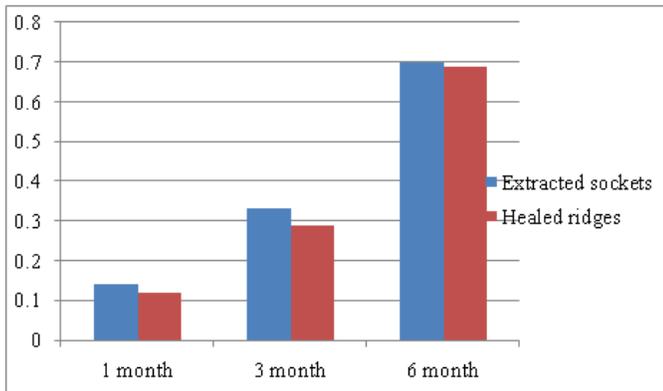


Table 6: Comparison of Vertical Bone Measurement: Immediate Provisionalisation In Extracted Sockets Vs Healed Ridges

| Vertical crestal bone measurement: Distal (mm) | Extracted sockets | Healed ridges | p-value |
|--|-------------------|---------------|---------|
| | | | |

| | | | |
|---------|------------|------------|----------|
| 1 month | 0.14(0.12) | 0.12(0.12) | <0.001** |
| 3 month | 0.33(0.12) | 0.29(0.14) | <0.001** |
| 6 month | 0.7(0.15) | 0.69(0.17) | <0.001** |

Graph 6: Table 6: Comparison of Vertical Bone Measurement: Immediate Provisionalisation in Extracted Sockets Vs Healed Ridges



Discussion

In the modern days missing teeth and supporting tissues are replaced by bridges, dentures that help in normal functioning of the teeth. The introduction of dental implants for replacement of missing teeth without using the adjacent teeth as support was introduced by Branemark. In the current study, dental implants were placed in immediate extraction socket and healed ridges. Clinical evaluation of soft tissue and radiographic evaluation of the bone was done following immediate provisionalisation. There are several factors that influence the results of immediate implant provisionalisation which include surgical factors, host, implant and occlusion related factors.

Surgical factors consists of primary stability and surgical technique. Host factors include the quality and quantity of cortical and trabecular bone, wound healing and remodeling activity. Implant factors include the design, surface texture and dimension of the implant. Occlusal factors include the quality and quantity of force.

In the current study immediate implant placement and provisionalisation did not show any implant losses which could be attributed to adherence to the strict inclusion protocol of including only implants with good primary stability and favorable host factors. Favorable implant survival was also achieved by Branemark et al and E Jung R et al.

The process of immediate provisionalisation also involves the process of mucosal integration with dental implant and related crown, The 8 week healing period corresponds to the period necessary for soft tissue integration with titanium abutment. In our study, the inter dental papilla (IDP) was evaluated at the end of 1st, 3rd and 6th month respectively. Generally interproximal tissue levels are related to adjacent connective tissue contacts and bone levels. It was seen in our study that Presence of Interdental papilla in healed ridges is highly significant with P-value <0.001 when compared with presence of interdental papilla in extracted sockets. The radiographic bone level at the mesial and distal aspects remained more or less unaltered. Botticelli et al. (2008) stated that during a 5-year observation period, the mesial and distal aspects of “immediate” implant sites facing tooth surfaces showed a “higher degree of bone gain (gain 0.39 - 0.59 mm) than implant sites that faced adjacent implants (gain 0.04 - 0.59 mm)” or edentulous sites (loss 0.17 - 0.44 mm). The current findings of this study are not in agreement with data by Botticelli et al. (2008)⁵, it was observed that implant sites (mesial and distal) that were located adjacent to teeth gained some bone (Rx bone gain % 0.39) during the initial period (6-12 months).

Donati et al demonstrated minimal changes in marginal bone in 5 years and continued stability was seen in a 10 year prospective report. In the current study, the vertical

bone loss in immediate extraction and healed ridge group was less than 1mm at the end of 6 months. There is no significant difference in vertical bone loss between the two groups.

Conclusion

Immediate Provisionalisation in extracted sockets achieved similar success rates as those reported in the immediate provisionalisation in healed ridges. Primary implant stability is a key factor to consider in immediate extracted sockets and in healed sockets.

Surgery, host, implant and occlusion related factors influence the outcomes. Long-term prospective studies are still needed to evaluate other potential determining factors for immediate provisionalisation.

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Legend Figures

Case Photos



Figure 1



Figure 2



Figure 3

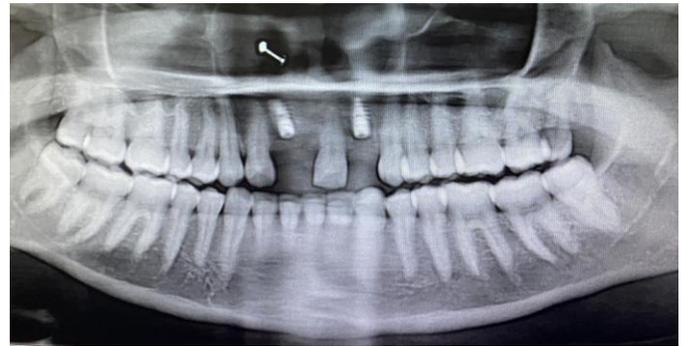


Figure 4



Figure 5