



RESEARCH ARTICLE

REPLACEMENT OF MISSING 11 AND 12 WITH IMPLANT SUPPORTED CROWNS; IMMEDIATE LOADING: CASE REPORT

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ABSTRACT

A 40 years old female with missing 11 and 12 secondary to trauma seven months earlier. Intra-oral examination confirmed the missing 11 and 12 with minimal bone loss. Soft and hard tissues on the edentulous site were normal on clinical and radiological findings. Implants were placed on 11 and 21 region and immediately loaded.

KEYWORDS:

Implants,
Splinting, Immediate,
Loading, Dental,
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INTRODUCTION

One of the greatest assets a person can have is a smile that shows esthetic natural teeth. When anterior teeth are missing, there is often a conscious effort to avoid smiling as the individual tries to cover up the teeth. Correction of such dental problem can produce dramatic changes in appearance which often results in improved confidence, personality and social life. The need for immediate implant function is probably most obvious in anterior regions to restore the esthetic appearance after tooth loss. Providing the patient with an immediate solution may further shorten the treatment time and increase patient comfort. However, the immediate loading has been associated with lower survival rate compared to the conventional two stage protocol. The survival rate for the splinted restorations (98.1%) is comparable to results with two-stage procedures, whereas the survival rate for the single-tooth replacements (93.7%) is somewhat lower. This difference may be owing to the more advantageous load distribution at a bridge configuration compared with that of a

single tooth. Splinting of implants often reduces the bending moment transferred to the implants from lateral forces which may reduce force concentration at the immature crestal bone thus preventing subsequent bone loss^{1,2,3,4}. Occlusal considerations are also critical in order to reduce implant micromotion thus promoting osseointegration. It is clear that a successful, immediate loading protocol requires careful and strict patient selection aimed at maximizing primary stability.

CASE REPORT

A 40 years old lady presented with seven months history of missing 11 and 12 secondary to a road accident. This had significantly affected her appearance and her confidence in public events. She wanted an urgent solution using a fixed prosthesis. She had no chronic illnesses and was not on any medication. On examination, the face was symmetrical with no scars or obvious swellings. Lip seal was competent. The face was convex with a low smile line. Temporomandibular joint was normal.



Figure 1. Frontal view



Figure 2. Lateral view

On intra-oral examination, she had localised supragingival and supragingival calculus. Generalised plaque deposits on hard tissues. Generalized extrinsic stains on palatal aspect maxillary teeth with no periodontal pocket or gingival suppuration. She had thick gingival biotype with approximately 1.5mm mucosal thickness at the 11 and 12 region (edentulous region; bone sounding). Occlusion analysis; overbite of 60% and overjet of 2mm. She had canine guided occlusion on lateral excursions and 21,22 provided guidance on protrusion. There was posterior disclusion on protrusion. Centric relation was not coincident to the maximum intercuspation and there was freedom in centric.



Figure 3. Intra-oral view (11,12 region)

Investigations



Figure 4. O.P.G; radiopacity distal to 18, mesially tilted 47

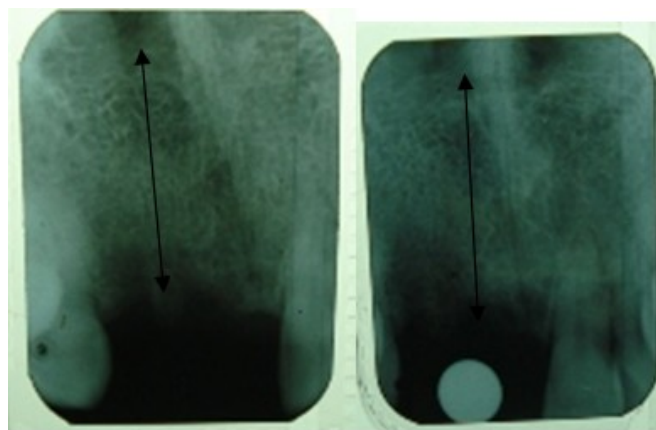


Figure 5 and 6: L.O.P.A 11, 12 No hard tissue pathology. Bone height is 15.4mm from the nasal cavity to the alveolar crest. To provide for 2mm allowance, a 13.4mm bone height is available



Figure 7: Face bow record



Figure 8. Articulated models

Study models analysis; Bone dimensions 11,12region;-Mesio-distal length 14.3mm measured from the mid-incisive papilla. Buccal palatal width 8.6mm (less 3mm of mucosal thickness). Actual bone width 5.6mm. A minimum of 1mm bone in the buccal and palatal aspect was desired.

Surgical and provisional restorative phase: Patient was reviewed, signed the consent form and pre-medicated with 2 grams of amoxicillin, 8 milligrams of dexamethasone and 800milligrams of ibuprofen per oral 1 hour prior to surgical procedure. Intra-oral disinfection was done with 0.2% chlorohexidine mouth wash.



Fig 9. Patient skin cleaned using iodine based solution, draped and local anaesthesia administered. Surgical phase; paralleling pins and surgical stent in place. Implant size 3.7mm diameter,13mm length



Figure 10. Implants after placement
Platform along alveolar crest

Implants inserted and the fixture mounts in place prior to suturing and impression taking to fabricate the temporary crowns.



Figure 11. Implants placed.

Impression during pouring of the working model.. The analogues have been screwed in to fixture mounts and soft tissue mask applied ready for pouring



Figure 12. Pouring the impression

The fixture mounts were prepared and a matrix made from the waxed-up model used to make the temporary splinted crowns in heat cured acrylic(indirect technique). Prepared fixture mounts were screwed into the implants prior to the temporary crowns cementation using TempBond cement.



Figure 13. Splinted provisional crowns

Occlusion; no centric or eccentric contacts on the crowns. The crowns were put off the anterior guidance and lateral excursive contact. The patient was reviewed weekly, put on chlorohexidine mouth rinse for plaque control and light diet. The provisional crowns promoted peri-implant soft tissue development. Osseointegration was monitored using intra-oral periapicals.

Definitive restorative phase: Access was made through the temporary crowns and the screws loosened to allow the removal of temporary crowns. Fixture mounts were screwed to the implants for impression making.



Figure 14. Access holes to remove the temporary to place fixture mounts for impression for making



Figure 15. Fixture mounts in place prior to impression making



Figure 16. Radiograph for the fixture mounts in place to check for the fitting



Figure 17. Impression with the fixture mounts



Figure 18. Prosthetic range tightening abutment screw to achieve 30Ncm preload before cementation of the glazed crowns. Angled abutments (17°) 3.5mm by 4.5mm after modification in the laboratory



Figure 19. Frontal view post-operatively



Figure 20. Baseline intra-oral periapical

Figure 19 shows the frontal view after crowns cementation with temp-bond NE and restoration of 21 with resin composite. Patient motivated on oral hygiene and put on a regular review schedule (2 weeks interval)

DISCUSSION

One of the most emphasized requirements for implant success is a stress-free healing period of 3–6 months. It was asserted that too early loading may lead to interfacial formation of fibrous tissue instead of bone-implant contact. Osseointegration in the maxillary region may take up to 6 months. Immediate loading has been associated with fibrous tissue formation with resultant implant failure. Such outcome was controlled by implant stabilization and implant protection from occlusal forces. However, it now appears premature loading per se does not lead to fibrous tissue encapsulation. Rather, it is a result of an excessive amount of micromotion at the bone-implant interface during the healing phase^{1, 2, 3}. Recently, the immediate loading of implants on placement has drawn the attention of researchers. It has been reported that when multiple implants are placed and immediately loaded while splinted, favorable results were obtained^{2, 4}.

Immediate loading has been associated with several benefits which includes;

- Immediate Prosthetic rehabilitation

- Immediate function
- Typically only one surgery reducing time and cost of treatment
- Soft tissue healing with prosthesis as a guide to enhance aesthetics and support proper papilla contour. Immediate placement of the provisional crown provided an opportunity for papilla formation and peri-implant mucosal adaptation to anatomic form.

Demand for optimal esthetic outcome makes implant treatment in the maxillary anterior region a challenge. A major concern from the esthetic point of view is the peri-implant soft tissue. The stability of dental papilla between a tooth and implant and also between implants has been associated with bone length and distance from the contact to the proximal bone crest. An inter-implant distance of 3mm and an inter implant-tooth distance of 4mm were provided to ensure the presence of interproximal papilla. The crestal bone between the implants and between the 12 and 13 was preserved during osteotomy in order to maintain stability of interdental papilla. Peri-implant gingival biotype has been reported to influence the peri-implant soft tissue stability. Thin biotype is usually prone to recession exposing the implant abutment. In such cases, ceramic abutment may be required^{5,6}. When two adjacent teeth are to receive full veneers, it is advisable to prepare separate crowns. Single crowns have a lower caries risk compared to the splinted crowns. In addition, the splinted crowns have higher risk of endodontic complications compared to the single crowns. Single dental units are easier to replace and repair without interference with the adjacent unit. However, in implant supported crowns, there are more biological and biomechanical benefits in splinting the adjacent implants.

Implants unlike natural teeth are not prone to decay and therefore independent units would not be needed to address that complication. However, they are prone to biological complications such as peri-implant mucositis and peri-implantitis which may be attributed to poor plaque control. Periodontopathogenic bacterial plaque has been associated with long term implants complications such as peri-implantitis. Hence, where implants are splinted, the patient must adhere to interproximal hygiene measures using special aids such as floss threader or proxy brush². Splinted crowns have lower risk of porcelain fracture and decementation. The crown marginal ridges are supported by metal connectors hence the porcelain is placed under compression as opposed to independent units where the porcelain is under shear load increasing the risk of fracture. Splinted restoration transfers less force to the cement interface which is more significant where the abutments are short and prosthesis is subjected to lateral forces particularly in the anterior region. In addition, splinted implants are reported to have lower risk of abutment screw loosening.

Implants splinting increases the functional surface area of support providing better resistance to lateral loads with subsequent reduction in the risk of marginal bone loss and reduced risk of implant component fracture. Marginal bone loss increases the risk of implant fracture by exposing the weakest coronal portion of the implant to bending forces⁵. The initial bone loss provides an enabling environment for further bone loss probably sustained by the periodontopathogenic microbes such as anaerobes which proliferate under low oxygen tension in developed peri-implant pocket. In a one year prospective study of implants placed and immediately loaded in the aesthetic region, the implants loss rate was higher for the single crowns compared to the splinted implants¹. In addition to biomechanical reasons, if an independent implant fails over time, the implant is removed, the site bone is grafted, the site is reimplanted and the new crown is fabricated. When multiple splinted implants have an implant that fails, the affected implant may be cut below the crown and the implant or crown site converted to a pontic using the same prosthesis. Hence, rather than several surgical and prosthetic procedures over an extended period when independent units are restored, the problem may be solved in one relatively short appointment when the crowns are splinted together².

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