



PROSTHETIC REHABILITATION OF MISSING ANTERIOR TOOTH WITH A NARROW DIAMETER – CUSTOMISED ABUTMENT IMPLANT: A CASE REPORT

Dental Science

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ABSTRACT

A 54-year-old female patient reported with missing anterior front tooth since past one year and wanted its replacement. After considering all factors, she was advised for an implant supported prosthesis with respect to the missing tooth. Moreover, the anterior atrophic maxilla represents a challenge for the dentist which often require hard and soft tissue augmentation procedures. Currently custom abutments are reported in having functional and esthetic advantages over prefabricated abutments. In this case report , a maxillary anterior tooth has been replaced using a narrow diameter implant using a custom abutment followed by a DMLS prosthesis placement.

KEYWORDS

INTRODUCTION

Implant dentistry is considered to be an evolutionary treatment option for the replacement of missing teeth, providing both function and aesthetics. Implants offer patients a wonderful alternative to fixed bridges and partial dentures.

A single-tooth replacement especially maxillary central incisor is often the most difficult procedure in all implant dentistry because of the visibility of the region thereby increasing the requirement for good aesthetics. It is a highly esthetic zone of the premaxilla which requires both hard (bone and teeth) and soft tissue restoration. (1)

The limitation for dental implant placement would include- atrophy of the alveolar crest with reduced bone width and height due to denture wearing, marginal periodontitis trauma, malformation, and neoplasia which may require hard tissue augmentation. (1)

Advancements in the field of dental implant therapy have led to predictable survival rates of dental implants hence, a narrow diameter implant is a good alternative for hard and soft tissue augmentation procedures.

These augmentation procedures require increased time, cost, and proper surgical expertise to manage any post-operative complications which may not be feasible for the patient, particularly the medically compromised patients. Numerous experimental studies confirmed that osseointegration of narrow-diameter implants can be achieved and maintained. (2,3,4,5,6)

Narrow diameter implants are implants which are having a diameter <3.5mm. According to Klein et al (2014) , it is further classified into the following three categories:

- Category 1: <3.0 mm ("mini-implants")
- Category 2: 3.0–3.25 mm
- Category 3: 3.30–3.50 mm (1)

This case report illustrates a single-tooth implant placement in the maxillary anterior region using a narrow diameter implant.

Custom abutments are abutments which are manufactured patient specific with ease and can be made with different materials or their combination . They are a good restorative option for implants with excessive angulation and also provide excellent soft tissue management with optimum emergence profile and esthetics .

These abutments can be coloured by anodization or be fabricated by zirconia for esthetics. (7)

Case report-

A 54-year-old female patient reported to the department of prosthodontics, Army college of dental sciences, Secunderabad with a chief complaint of missing upper left front tooth due to trauma a year ago. On detailed intraoral examination, it was found that there was a missing tooth w.r.t 21. Patient also had missing teeth w.r.t 41 31 32 and was treated with a removable partial denture w.r.t lower anteriors and refused advanced treatment due to financial reasons and was satisfied with the provided treatment. The periodontal condition of the other teeth was healthy with pocket depth less than 3mm. The patient was then presented with various treatment modalities after discussing their advantages and disadvantages, the treatment of choice was placing an implant w.r.t 21. The aesthetic outcome was explained to the patient and informed consent was obtained.

A CBCT examination was advised in the particular area of concern to check anatomical factors for diagnostic purposes.

Proper treatment planning was done with an endo-osseous implant of dimensions – 3mm x 11.5mm (Adin implants, Toureg s).

2% lignocaine with 1:100000 Epinephrine was infiltrated at the site of the missing tooth. Then a crestal incision was given and a mucoperiosteal flap was raised followed by osteotomy as per standard guidelines of implant placement. A cover screw was placed and sutured with a 4-0 silk suture in a figure of 8 technique.

An appropriate antibiotic regimen with analgesics were advised pre and post-op that included-

- 1g Amoxicillin 1hr before the procedure and amoxicillin 500 mg post TD ,
- 400 mg metronidazole BD ,
- tab aceclofenac BD ,
- cap pan D OD in the morning before meals

The patient was recalled 1-week post-surgery for suture removal. The soft tissue healed asymptotically without any inflammatory signs.

The patient was recalled after 6months and 2nd stage implant procedure was initiated. The cover screw was removed and was replaced with a gingival former. A follow-up was done after a week where the gingival former was removed and impression posts were screwed into the implants for an open tray implant-level impression.

An impression was made using both light and heavy body polyvinylsiloxane (Dentsply Aquasil Soft Putty Regular Set) impression material using single-stage technique.

The impression along with the post was removed and sent to the laboratory for the fabrication of temporary crown and custom abutment. The patient was recalled the next week and the custom abutment was fixed onto the implant with a torque of 35N using a torque wrench.

Then a temporary crown was cemented to the abutment using a non-eugenol based temporary cement. The occlusion was verified in centric and protrusive relation with an articulating paper and excess cement was carefully removed.

A follow-up was done after 5 months of healing where the temporary crown was removed and the abutment was further cleaned and then it was replaced with a final prosthesis using glass-ionomer cement (GC Gold Label I Luting & Lining Glass Ionomer Cement).

The correction of midline diastema was also done without disturbing the adjacent healthy teeth as requested by the patient by moving the space distal to the central incisor.

Following this, oral hygiene instructions were given to the patient and she was recalled after 3 months for a regular follow-up.



Figure 1- Pre Op Maxillary Arch

Figure 2- Pre Op Frontal View



Figure 3 – Flap Reflected With Osteotomy For Implant Placement



Figure 4 – Implant Ready For Placement



Figure 5 – Implant Placed In Osteotomy



Figure 6 – Sutures Placed



Figure 7 – Radiographic Image Showing Healing Abutment And Customised Abutment In Position

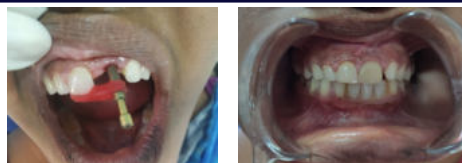


Figure 7 – Jig Trial



Figure 8 – Final Prosthesis Placed

DISCUSSION

This case report discusses the key concepts of treatment planning, implant surgery and its prosthetic rehabilitation for aesthetic results. Use of regular size implant (>4mm in diameter) is generally recommended to ensure sufficient bone-to-implant contact. A minimum of 1mm of bone thickness is required surrounding the implant for proper osseointegration.^[8]

In cases such as long-term edentulous mouth, traumatic tooth extractions, periapical pathologies etc, the bone width is inadequate for standard diameter implants. Placing regular size implants may cause dehiscence causing post-op complications and failure of implant. Hence, narrow-diameter implants can be used in patients with limited space without the need for additional augmentation procedures.^[1] Being minimally invasive, they are more accepted by the patient. Narrow diameter implants supporting single tooth replacements have shown favorable clinical results in the long-term perspective.^[9,10,11,12,13,14,15,16]

No difference in the clinical outcome between standard diameter implants and narrow implants has been observed. In an extensive review, Renouard and Nisand suggested that the survival rates for narrow implants are comparable with that of standard diameter implants when used in appropriate indications. They also reported that no relationship was found between marginal bone loss and implant diameter.^[16]

Narrow diameter implants are usually not recommended for posterior teeth due to reduced osseointegration surface, increased probability of fractures compared with the standard diameter implants, increased stress values leading to disadvantageous peri-implant crestal bone loss and high risk of prosthetic complications.^[1]

Various criteria have to be kept in mind for an implant treatment that includes- Patient factors, anatomical considerations, implant design, proper treatment planning including prosthetic rehabilitation, proper surgical approach, occlusal considerations, and healing factors.^[17]

The anatomical factors can be accessed through CBCT which provides us detailed information regarding the dimensions of the remaining bone. Ideally, 1mm of bone should be present around the implant, 1.5mm from the adjacent tooth, 3mm from an adjacent implant should be maintained.

Intra-oral examination should include bucco-lingual and mesio-distal width and contour of the ridge, inter-occlusal space and the need for pre-prosthetic rehabilitation. Ideally, 10mm space is required (3mm for soft tissue, 5mm for abutment height and 2mm for metal/ porcelain occlusally). Screw retained prosthesis require lesser crown height space as compared to cement-retained prosthesis. Periodontal examination should include assessment of hard and soft supporting structures, an adequate collar of keratinised gingiva should be present for healthy emergence profile (good aesthetic outcome) which can also resist trauma from mastication and good oral hygiene practice.

Custom abutments are used for implants with excessive angulation and provide excellent soft tissue management with optimum emergence profile and esthetics.^[18]

The other factors for treatment implant planning should include assessment of pathological changes, inclination of adjacent teeth, safety margins and anatomical landmarks and occlusion. Along with this effective communication between the clinician and the patient is of paramount importance with an Informed consent from the patient.^[19]

CONCLUSION

Placing implants in anterior maxilla requires precise planning along with proper surgery and prosthetic rehabilitation.

The presented case report discussed about single-tooth implant restorations in patients with limited space without the need for additional time-consuming augmentation procedures, especially where a high aesthetics is required like- anterior maxilla.

Proper comprehensive and precise treatment planning along with surgery and prosthetic rehabilitation are the key determinants for the success of the treatment.

The aesthetic outcome of the implant treatment resulted in good patient and clinician satisfaction.

REFERENCES

1. Schiegnitz E et al. Narrow- diameter implants: A systematic review and meta- analysis. Clinical oral implants research. 2018 Oct;29:21-40.
2. Mazor Z, et al. Mini-implants to reconstruct missing teeth in severe ridge deficiency and small interdental space: a 5-year case series. Implant Dent 2004;13:336-41.
3. Fromm SJ et al. Narrow diameter implants: a restorative option for limited interdental space. Int J Periodontics Restorative Dent 2007;27:449-55.
4. Andersen E et al A prospective clinical study evaluating the safety and effectiveness of narrow-diameter threaded implants in the anterior region of the maxilla. Int J Oral Maxillofac Implants 2001;16:217-24.
5. Zinsli B et al Clinical evaluation of small-diameter ITI implants: a prospective study. Int J Oral Maxillofac Implants 2004;19:92-9.
6. Polizzi G, Fabbro S et al Clinical application on narrow Branemark system implants for single-tooth restorations. Int J Oral Maxillofac Implants 1999;14:496-503.
7. Bagis B (2018) What About a 'Custom Abutment'? Dent Oral Craniofac Res 4: DOI:10.15761/DOCR.1000269
8. Goiato MC et al Influence of length, diameter and position of the implant in its fracture incidence: A Systematic Review. Journal of dental research, dental clinics, dental prospects. 2019;13(2):109.
9. Degidi M et al. Clinical Outcome of Narrow Diameter Implants: A Retrospective Study of 510 Implants. J Periodontol 2008;79:49-54.
10. Andersen E et al. A prospective clinical study evaluating the safety and effectiveness of narrow-diameter threaded implants in the anterior region of the maxilla. Int J Oral Maxillofac Implants 2001;16:217-24.
11. Cordaro L et al. Retrospective evaluation of mandibular incisor replacement with narrow neck implants. Clin Oral Implants Res 2006;17:730-5.
12. Mericskeet al. Clinical evaluation and prosthetic complications of single tooth replacements by non-submerged implants. Clin Oral Implants Res 2001;12:309-18.
13. Polizzi G et al. Clinical application of narrow Branemark System implants for single-tooth restorations. Int J Oral Maxillofac Implants 1999;14:496-503.
14. Vigolo P et al. Clinical evaluation of single-tooth mini-implant restorations: a five-year retrospective study. J Prosthet Dent 2000;84:50-4.
15. Zarone F et al . Prosthetic treatment of maxillary lateral incisor agenesis with osseointegrated implants: A 24-39-month prospective clinical study. Clin Oral Implants Res 2006;17:94-101.
16. Zembic A, et al Systematic review of the survival rate and incidence of biologic, technical, and esthetic complications of single implant abutments supporting fixed prostheses. International journal of oral & maxillofacial implants. 2014 Jan 2;29.
17. Romeo E, Lops D et al. Clinical and radiographic evaluation of small-diameter (3.3-mm) implants followed for 1-7 years: A longitudinal study. Clin Oral Implants Res 2006;17:139-48.
18. Renouard F et al Impact of implant length and diameter on survival rates. Clin Oral Implants Res 2006;17 Suppl 2:35-51.
19. Gowd MS et al. Prosthetic consideration in implant-supported prosthesis: A review of literature. Journal of International Society of Preventive & Community Dentistry. 2017 Jun;7(Suppl 1):S1.