Review Article

SHORT IMPLANTS

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Abstract:-*For a successful surgical implant placement ,the optimum use of the armamentarium and an in depth knowledge of implant dentistry is vital especially in cases such as resorbed maxillary edentulous area due to the abundance in complicating factors such as sinus space, limited bone availability and consequently bone augmentation procedures to resolve the same[1] .In various clinical scenarios Short implants have been promoted as a treatment option with limited bone volume where long /standard implants[2] are otherwise not preferred and hence rejecting the idea of placing the implants if not for complex augmentation procedures .This article reviews the efficacy of using short implants with enhanced surface geometry and texture and implant abutment junction considering their placement in all such challenging cases .*

Key words: - Short implants, augmentation procedures, resorbed ridges

INTRODUCTION

Human mandibles with sea shells carved into tooth shapes and placed into extraction sockets date back to as far as 600 A.D.[2] In modern days, dental implants have become a predictable treatment option for the applicable patients. However not all patients with edentulism can be treated with the standard dental implants such as in posterior maxillary region with poor bone quality ,limited visibility and sinus pneumatization due to post extraction resorption .Although the solution to such problems exist with procedures such as bone graft ,bone augmentation ,sinus augmentation and guided bone regeneration ,all of these comes with a cost of increased post operative morbidity ,higher costs and higher risk of complications during rehabilitation which has direct effect on physical as well as emotional health of the patient[3] .

WHAT IS SHORT IMPLANT?

Short implant has been defined varyingly by different authors in the literature .The implant length have been defined as less than 11mm[4] ,10mm[1],8mm[5] and 7mm[6] as short implants**.** However recently with multiple studies been published short

implants are defined as an implant with less than or equal to 8mm and implants with 10mm intra bony length are considered as long or standard implants.[3]

WHY SHORT IMPLANTS?

Although Long /standard implants are more stable and long lasting because of its occlusal forces or the ideal crown implant ratio,there have been many clinical scenarios where long implants need an additional amount of complex surgical procedures for its long term success .

For eg: - In maxilla [2]

1) Posteriorly pneumatized maxilla sinus
2) Resorbed posterior alveolar ridge
3) Anteriorly nasal floor and nasopalatine canal

In mandible

1) Position of Inferior alveolar nerve and canal
2) Mental nerve foramen in relation to mandibular crest

In these cases, there is no sufficient bone height to place a long implant without additional surgeries which can be sensitive, challenging, time consuming and has increased surgical morbidity also effecting the patients financially, physically and emotionally.

And hence short implants comes in the picture as an alternative solution which offers a less invasive treatment option which can eliminate complex surgeries such as bone graft ,sinus lift etc. If used with its improved surface geometry, surface texture and strict clinical protocols.

INDICATIONS OF PLACING SHORT IMPLANTS

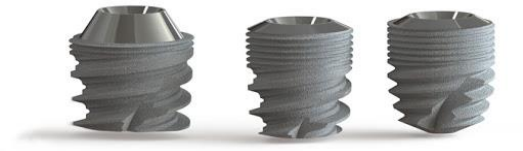
1. Single and multiple fixed prosthesis in posterior jaw.
2. In the treatment of a severely resorbed edentulous mandible with four short-length implants used to support an overdenture or six short implants used to support a fixed prosthesis.
3. In edentulous maxilla, two short-length implants are additionally placed in the distal area, together with longer implants in the premaxilla to support a maxillary overdenture or a fixed prosthesis.

CONTRIBUTING FACTORS AFFECTING SUCCESS OF SHORT IMPLANTS[7]

External Factor :-

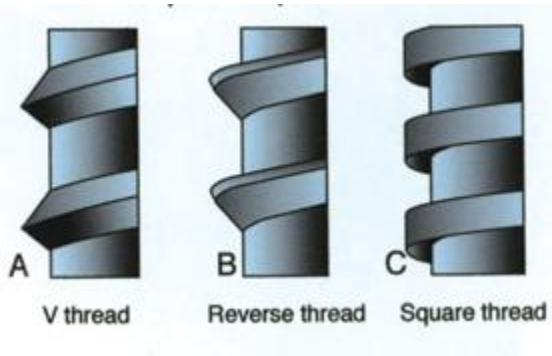
1**. Implant Design Selection** :- The implant surface area can be increased by:

a) Thread number: the number of threads per unit length in the same axial plane more is directly proportional to the implant surface area in contact with the bone.



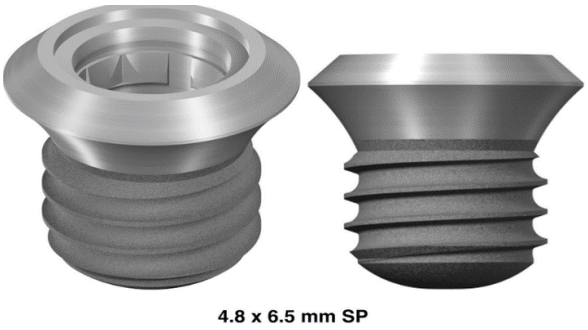
b) Thread depth: Deeper threads provide more implant surface area.

c) Thread shape: The square thread design has a higher bone implant contact percent as compared to V-shape and reverse buttress thread designs.



d) Implant surface: rough micro topography of implant surface is preferred over turned/smooth surface as it increases the bone-implant contact surface area and accelerates Osseo integration. It also compensates for inadequate crown/implant ratio.

2**. Implant Diameter**:- An increased length only improves the primary stability but wider implant would not only increase the primary stability but also the functional surface area at the crestal bone level leading to better distribution of occlusal forces.



3. **No. of Implants**: - Number of implants: Use of multiple implants will increase the functional surface area to resist occlusal forces.

4. **Crown/Implant Ratio**: Increased crown/implant ratio can act as a vertical cantilever leading to crestal bone loss and implant failure. However, improvements of surfaces and implant systems along with proper force orientation and load distribution have allowed high crown/implant ratios to be applied with success.

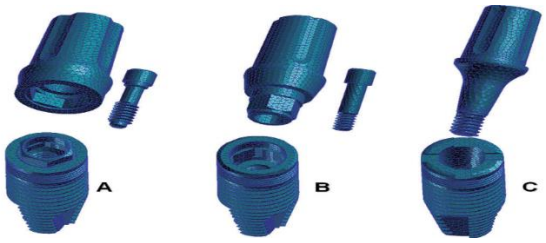
SURGICAL PROTOCOL/FACTORS:-

a) Two step surgical protocol: A two stage surgery is advocated for short implants as it provides good primary stability during healing phase. The time elapsed between the surgical and load stage should be 4-6months for maxilla and 2-4months for mandible[8]

b) Adapted surgical protocol: Soft bone drilling protocol should be followed in poor quality bone whereas, the final bone drilling is done with narrow drills rather than standard size drills.

PROSTHETIC FACTORS :-

a) Implant abutment connection:- Morse taper connection induces less marginal bone loss as compared to external hex abutment connection and also promotes bone growth over the implant shoulder. Fig c[9] represents Morse taper connection



b) Occlusal table: Small occlusal table reduces the offset loads on the implant.

ADVANTAGES:-

1. Decreased contact possibility with adjacent tooth roots.
2. Lower risk of surgical paresthesia
3. Time and cost reduction and hence less patient discomfort
4. No need of CT scan, since CT scans are usually invested for >10mm long implants or sinus augmentation surgery[3]
5. No bone graft required
6. Osteotomy procedure is simplified.
7. Easier implant insertion.
8. Angulation of load is improved with short osteotomy site since basal bone below the original alveolar ridge is not always placed in the long axis of missing tooth.
9. Post-operative complications such as bleeding, perforation of Schneiderian membrane, transient or permanent alteration of mandibular sensation ,increased peri implant bone loss or infection can be avoided to a great extent.[7]

LIMITATIONS OF SHORT IMPLANTS

The two most critical factors for failure of short implants is:-

1) Poor bone quality
2) Machined surface of Implants

CONCLUSION

With the growing advances in Implant dentistry, short implants can be considered as a good alternative to long/standard implants requiring complex surgical procedures such as bone graft, sinus lift, bone augmentation procedures in case of resorbed ridges of maxilla and mandible making it highly beneficial for indicative patients both physically and financially. However short implants should be placed considering all biomechanical factors and must also be done under strict clinical protocols.

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