

Review Article

Criteria for selection of implant abutment: An overview

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ABSTRACT:

Selection process of appropriate implant abutment is confusing and complex process. A variety of abutments are available in the market which puts the clinician in a dilemma to select a scientifically based appropriate abutment for his case. Criteria discussed include implant-abutment interface geometry, implant restorative platform, profile of healing/interim abutment, implant position, angulation, interocclusal space, depth of peri-implant soft tissue, emergence profile, retrievability. This paper aims to integrate information about the criteria of selection of implant abutment.

Keywords: Implant abutment connection, Platform switching, Interocclusal space

Received: 11 January, 2022

Accepted: 16 February, 2022

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This article may be cited as: Sharmila, Priyanka. Criteria for selection of implant abutment: An overview. J Adv Med Dent Scie Res 2022;10(3):7-9.

INTRODUCTION

Dental implants are commonly used to restore completely edentulous jaws as well as single and multiple missing teeth. Implant abutments play an important role in the long term success/prognosis of the treatment. They are the key to the functional and esthetic aspects of implant treatment.

The clinician should consider the type of abutment prior to Stage I surgery during initial treatment planning because it has an impact on the surgical placement of proposed implant, as well as expense associated with purchasing and fabricating pre-machined and custom-designed abutment vary significantly.[1] This paper aims at giving an overview to select the implant abutment from the wide array of implant abutment available in the market.

ABUTMENT SELECTION IS BASED ON FOLLOWING CRITERIA

- **Implant-abutment interface geometry:** External hex served the purpose of a torque transfer coupling device during the placement of the implant into the bone and have high prevalence of rotational misfit, screw loosening, inadequate microbial seal and less esthetic.[2, 3] To overcome these complications internal implant abutment connection was introduced. Advantages of internal connection are improved microbial seal, better esthetic and less screw

loosening. The prosthetic component is more stable and dissipated the forces when compared with external hex design.[4]

- **Implant restorative platform (diameter in mm):** Implant restorative platforms are the interfaces for implant-abutment connections. The selection is based on the size, of the teeth that are being replaced, and diameter may be same as, or narrower than the implants. Platform switching was developed to control bone loss after implant placement; it refers to the use of an abutment of smaller diameter connected to an implant neck of larger diameter. This connection shifts the perimeter of the implant-abutment junction inwards towards the central axis improving the distribution of forces.[5]

Platform switching reduces crestal bone loss by Shifting of inflammatory cell away from the adjacent crestal bone, by maintaining biological width improve the biological seal around implant, decrease the stress on Peri-implant bone.

- **Profile of healing/interim abutment:** Healing abutment placement is based on the surgical technique followed i.e., immediately placed or later at two-stage surgical protocol to guide the healing of soft tissue to replicate the contours and dimensions of natural tooth that is being replaced.[6]

Area without esthetic concerns such as maxillary and mandibular molars, 6 mm and 7.5 mm diameter of

healing abutment may be selected, edentulous area that corresponds to smaller-sized teeth, 4 mm or 5 mm healing abutment may be used. In the area with optimum esthetic requirement, provisional abutments can be used to contour the peri-implant soft tissue to develop optimal, anatomic, emergence profile.[7]

- **Orientation**

Implant position: It is related to the final prosthesis and the adjacent teeth. When malposition occur in planned restoration either in buccolingual or mesiodistal boundaries may result in incorrect biological contour, incorrect position of screw channel, non-axial loading of the implant.[6]

Ideally the implant placed close to the long axis of the missing tooth crown and adjacent clinical crowns. Implant placement with the long axis of the implant through the incisal tip or just to the palatal surface is easiest to restore.

Angulation: The angulation of the implant relative to the adjacent teeth or other implants. When angulation discrepancy greater than 15 degrees, angulated, cementable, or custom abutment can be used instead of screw retained abutment. Because using a cement retained abutment, the angulation is not as critical since there is no screw-access opening.[6] In angulated implant stress on implant can be increased within the physiological limit.[7]

- **Interocclusal space:** Interocclusal space corresponds to the vertical distance between the superior surface of the implant and the opposing dentition in maximum intercuspation. This interocclusal space is the total height available for the abutment plus the restoration. According to Misch, the interocclusal space should be at least 8–12 mm in vertical distance.[8] A minimum of 5 mm from the implant head to the opposing tooth is advised for adequate retention of a cement-retained restoration.[9] A screw-retained prosthesis may be provided with 4 mm of interocclusal space.[10]

- **Depth of peri-implant soft tissue:** Tissue height or peri-implant sulcular depth is the distance from the superior surface of the implant to the gingival margin. This is measured 6-8 weeks following stage 2 surgery. Ideally, in esthetically important areas the margin of the restoration is 1-2 mm subgingival.[11] The tissue height is not as critical if the restoration is not in the esthetic zone and a supragingival margin is planned.

- **Emergence profile**

The emergence profile is the portion of the prosthesis that allows the implant to turn into a natural-looking tooth. An excellent emergence profile gives a smooth transition from the circular implant platform to the natural shape of the tooth at the gingival level. The gingival level is determined by many factors, such as thickness of underlying bone, mucosa thickness, implant position and the contour of the abutment and/or prosthesis.[12, 13] Alveolar bone crest

thickness of at least 2.0 mm is required for a stable mucosal margin.[14]

- A thick tissue biotype is more resistant to recession and better masks the color of titanium. Thin tissue biotype and a long papilla tend to recede more after surgical procedures, resulting in unesthetic outcomes.[15,16] It is easier to create a good emergence profile if there is at least 3 mm of vertical space from implant head to gingival margin. This allows a transition from an implant head, which is often at least 2–3 mm less in diameter than the cervical margin of the proposed restoration.

- **Retrievability:** A screw-retained restoration will be easier to remove at a later stage if it is envisaged that this will be required. A cemented crown, even placed on a standard abutment with temporary cement, can be very difficult to remove.[10] In general, a restoration can only be made screw retained if the path of insertion for the screw will be on the palatal or occlusal aspect.

Screw retention can be useful in situations where there is limited space between adjacent teeth. Access for the cementation process can be limited and the space needed for the abutment, cement lute and crown takes up more space than a one-piece screw-retained restoration.[17]

CONCLUSION

A variety of abutment designs are available to the clinician to satisfactorily complete his case. Decisions regarding dental implant abutments are essential aspects of clinical dental implant excellence. These wide varieties of abutment design help the clinician for accomplishing his case satisfactorily.

REFERENCES

1. Rathee M., M. Bhoria and P. Boora, 2014. An insight into dental implant abutment selection criteria: an overview. *J. Adv. Oral Res.* 5:1-4.
2. Levine RA, Clem DS 3rd, Wilson TG Jr, Higginbottom F, Solnit G. Multicenter retrospective analysis of the ITI implant system used for single-tooth replacements: results of loading for 2 or more years. *Int J Oral Maxillofac Implants.* 1999;14(4):516-20.
3. Pardal-Peláez B, Montero J. Preload loss of abutment screws after dynamic fatigue in single implant-supported restorations. A systematic review. *J Clin Exp Dent.* 2017;9(11):1355-61.
4. Maeda Y, Satoh T, Sogo M. In vitro differences of stress concentrations for internal and external hex implant-abutment connections: a short communication. *J Oral Rehabil.* 2006;33(1):75-78.
5. Lazzara RJ, Porter SS. Platform switching: a new concept in implant dentistry for controlling postrestorative crestal bone levels. *Int J Periodontics Restorative Dent.* 2006;26(1):9-17.
6. Giglio GD. Abutment selection in implant-supported fixed prosthodontics. *Int J Periodontics Restorative Dent.* 1999;19(3):233-41.
7. Cavallaro J Jr, Greenstein G. Angled implant abutments: a practical application of available knowledge. *J Am Dent Assoc.* 2011;142(2):150-58.

8. Misch C. Dental Implant Prosthetics. 2nd ed. Elsevier Health Sciences; 2008.
9. Marker VA, Miller AW, Miller BH, Swepston JH. Factors affecting the retention and fit of gold castings. *J Prosthet Dent.* 1987;57(4):425-30.
10. Chee W, Jivraj S. Screw versus cemented implant supported restorations. *Br Dent J.* 2006;201(8):501-07.
11. Jemt T, Pettersson P. A 3-year follow-up study on single implant treatment. *J Dent.* 1993;21(4):203-08.
12. La Rocca AP, Alemany AS, Levi P Jr, Juan MV, Molina JN, Weisgold AS. Anterior maxillary and mandibular biotype: relationship between gingival thickness and width with respect to underlying bone thickness. *Implant Dent.* 2012;21(6):507-15.
13. Fu JH, Lee A, Wang HL. Influence of tissue biotype on implant esthetics. *Int J Oral Maxillofac Implants.* 2011;26(3):499-08.
14. Grunder U, Gracis S, Capelli M. Influence of the 3-D bone-to-implant relationship on esthetics. *Int J Periodontics Restorative Dent.* 2005;25(2):113-19.
15. Kao RT, Fagan MC, Conte GJ. Thick vs. thin gingival biotypes: a key determinant in treatment planning for dental implants. *J Calif Dent Assoc.* 2008;36(3):193-98.
16. Jung RE, Sailer I, Hämmerle CH, Attin T, Schmidlin P. In vitro color changes of soft tissues caused by restorative materials. *Int J Periodontics Restorative Dent.* 2007;27(3):251-57.
17. Jivraj S. Screw versus cemented implant restorations: The decision-making process. *J Dent Implant* 2018;8:9-19.