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Dr. Amruta Gujar
Post Graduate Student, Prosthodontics, D Y Patil University School of Dentistry, Nerul, Navi Mumbai, Maharashtra, India

Dr. Rajeev Singh
Professor, Department of Prosthodontics, D Y Patil University School of Dentistry, Navi Mumbai, Maharashtra, India

Dr. Gaurang Mistry
HoD, Professor, Department of Prosthodontics, D Y Patil University School of Dentistry, Navi Mumbai, Maharashtra, India

Corresponding Author:
Dr. Amruta Gujar
Post Graduate Student, Prosthodontics, D Y Patil University School of Dentistry, Nerul, Navi Mumbai, Maharashtra, India

Implant stents decoded

Dr. Amruta Gujar, Dr. Rajeev Singh and Dr. Gaurang Mistry

Abstract
Dental implantology is an emerging branch over the traditional prosthodontics. Since the beginning, correct placement of implants to achieve best esthetics, function according to the bone available is challenging. The planning for the future prosthetics allows prosthetically driven implant placement. There are many types of stent which can be used to achieve correct implant positioning. This articles states about few variations in different types of stents such as tooth supported stent, tissue supported stent, radiographic stent, surgical stent, prosthetic stent, etc.

Keywords: Prosthetically driven implantology, radiographic stent, implant supported stent, prosthetic stent, etc.

Introduction
Many advances are there in the techniques and devices which help in placement of dental implants, still placing an implant in correct location remains a challenge. Improperly placed implants create a problem while fabricating the superstructure over it. This may compromise the maintenance of an osseointegrated implant because of improper load distribution.
A stent is an appliance used either for radiographic evaluation during treatment planning for implant placement or during surgical procedures to provide optimum implant placement.[1] Non-parallel placement of implants is the primary cause of nonaxial loading during function. Although offset loading is not the only factor that contributes to the loss of osseointegration, axial loading of implants should be provided if possible.[2]
Stent is used at two stages which are diagnostic stage i.e. radiographic stent and surgical stent used during placement of the implant. This article discusses about the various case specific modifications made in implant stents as tooth supported, tissue supported and advantages of them over the regular stents.

Case Report
Tooth Supported Implant Surgical Stent
This has an edentulous span in mandibular right posterior region where two implants are supposed to be placed. In this case a wax mock-up was done with 45 and 46 which was converted into a stent using self-cure acrylic and extended onto the adjacent two teeth for support [fig 1(a)]. In this the radiographic stent was made using gutta percha as a radiographic marker and later the buccal portion of the acrylic was removed to make a surgical stent. [Fig 1(a), fig 1(b)]
Advantages- Entry of the drill into the bone while drilling can be observed while maintaining the position of the drill and chances of the slipping of the drill into the vestibule is avoided.
Disadvantages- This stent can be used only with the pilot drill, rest the operator has to maintain the position of the implant once created by the initial osteotomy.

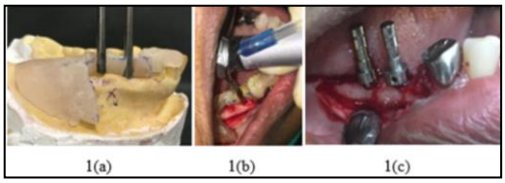

Fig 1(a): shows the stent where acrylic on the buccal portion of the stent is removed. **Fig 1(b):** shows stent used during surgery. **Fig 1(c):** shows parallelism of the osteotomy achieved by using the stent.

This shows a radiographic stent made for an edentulous patient utilising the mock up [Fig 2(a)] made after the jaw relation. The model with the mock up was duplicated in dental stone [Fig 2(b)] and a polyvinyl sheet is adapted over this model [Fig 2(b) and Fig 2(c)]. Now Barium sulphate was mixed with self cure acrylic in 1:1 ratio and teeth portion of the mock up was duplicated in a radiographic marker [Fig 2(d)]. Then the patient was made to wear this while the patient was getting CBCT done [Fig 2(e)].
Advantages- Prosthetically driven implant placement will be achieved during the planning and placement of implants.
Disadvantage- As the stent is tissue supportive. Ratio of Barium sulphate to self cure acrylic should be maintained to 1:1 to achieve proper teeth anatomy in the CBCT.

CAD CAM Stent

This case with partially edentulous mandible where where a CAD CAM stent was planned for "All on 4" implant placement. In this case, the implant placement was planned digitally on the provided CBCT of the patient on a software Blue Sky Bio and 3D printed to use during the surgery. Fig 3(a) shows placement of the stent during surgery and fig 3(b) shows final implant placement.
Advantages- This is one of the most accurate way of implant placement with least error margin.
Disadvantage- Its not cost effective.

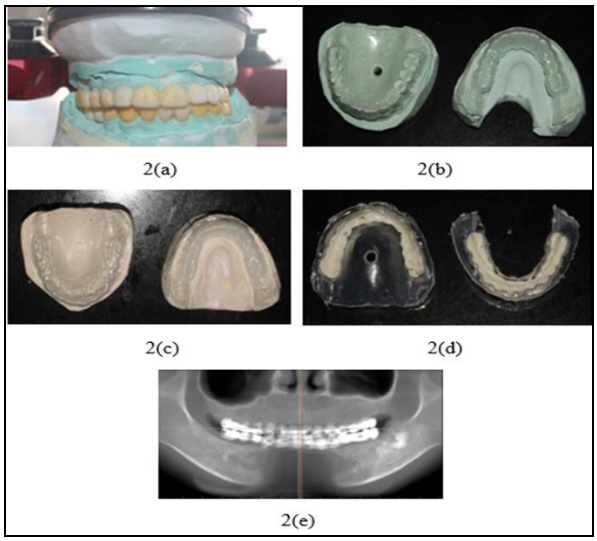

Fig 2(a): shows mock up done on the maxillary and mandibular models after jaw relation.
Fig 2(b): shows duplication of mock up models into dental stone and adaptation of thermoplastic sheet on it.
Fig 2(c): shows adaptation of vacuum formed thermoplastic sheet on edentulous models.
Fig 2(d): shows transfer of mock up into 1:1 mixed Barium sulphate and self cure acrylic mixture which will act as a radiographic marker.
Fig 2(e): shows CBCT achieved using this radiographic stent.

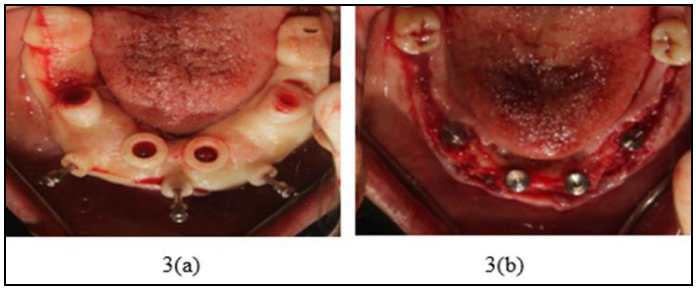

Fig 3(a): shows CAD CAM surgical guide placed in the mandible before the surgery.
Fig 3(b): shows final implant placement using CAD CAM guide after the surgery.

Tissue Supported Implant Stent

Transitional denture made for the denture was used with the radiographic markers during the CBCT and later same denture is used as a stent for the implant placement according to the occlusal planning. Fig 4(a) shows a stent made on the model with the occlusal access openings for pilot drills and Fig 4(b) shows intra-oral placement of stent during surgery.
Advantage: It is cost effective and can be easily made and converted.

Disadvantage: It is not the best option when accuracy is considered. Instability of the stent might create challenges during the surgery as this is the tissue supported stent.

Implant Supported Stent

In cases where one or few implants are already placed in patient's mouth and a clinician needs to plan more implants in the same jaw then the present implants can be used as a reference and a stent can be made to place the remaining implants. This stent can be verified by using IOPA or CBCT.
In this an implant level impression is made and a model is poured as shown in Fig 5(a) and the remaining implants can be planned using CBCT and other measurements as shown in Fig 5(b).

Advantage: This stent is more accurate than tissue or tooth supported implant stent.

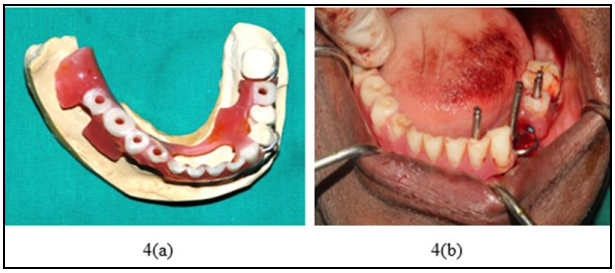

Fig 4(a): shows a stent made on the model with occlusal access openings for pilot drill during surgery.
Fig 4(b) shows intra-oral placement of stent during surgery

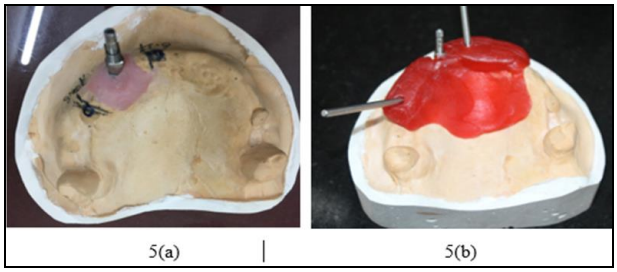

Fig 5(a): shows a model poured with an implant level impression.
Fig 5(b): shows a stent made using the implant impression coping as a support and planning of the remaining implant.

Prosthetic Stent

When a surgical stent or a occlusal planning followed during surgical planning of the implants, it gives the best prosthetic result. Fig 6 shows an "all on 4" case where the multiunit abutments angles were confirmed using the occlusal outline of the pre-decided occlusal plan for the respective patient.

Fig 6: shows a replication of a prosthetic planning in self-cure acrylic and multiunit abutments placed within the outline of the pre-decided occlusal planning for the final prosthesis.

Discussion

For a successful implant supported definitive restoration the implant must be placed at a correct and pre-planned position and angulation. The mesiodistal placement of the implant should aid in preservation of papilla and provide an esthetic implant restoration profile[3]. The implant should be placed at least 1.5 mm from the adjacent teeth with a minimum 3 mm interimplant distance. The distance of implant from buccal and lingual cortical plates should be greater than 0.5 mm. In the buccolingual plane the angle between the implant trajectory and residual bone trajectory should be less than 20° to prevent unfavorable bending moment[4,5,6]. In multiple implant situations non parallel implant placement is the primary cause of non axial loading and subsequent failure[7].

To achieve the above mentioned objectives use of stent has been suggested. It has been well documented in literature that the implants placed using stents are more accurately positioned than those without the stent[8,9]. Ever since the introduction of stents in implant dentistry various designs have been suggested.

Conclusion

This article states importance of the stents and its significance in prosthetically driven implant placement.

References

1. Verde MA, Morgano SM. A dual-purpose stent for the implant-supported prosthesis. J Prosthet Dent. 1993; 69:276-80.
2. Rangert B, Krogh PH, Langer B, Van Roekel N. Bending overload and implant fracture: a retrospective clinical analysis. Int J Oral Maxillofac Implants. 1995; 10:326-34.
3. Lazzara RJ. Effect of implant position on implant restoration design. J Esthet Dent. 1993; 5:265-269. doi: 10.1111/j.1708-8240.1993.tb00791.
4. Almong DM, Torrado E, Meitner SW. Fabrication of imaging and surgical guides for dental implants. J Prosthet Dent. 2001; 85:504-508.
5. Horiuchi M, Ichikawa T, Kanitani H *et al*. Pilot-hole preparation for proper implant positioning and the enhancement of bone formation. J Oral Implantol. 1995; 21:318-324.
6. Almog DM, Onufrak JM, Hebel K *et al*. Comparison between planned prosthetic trajectory and residual bone trajectory using surgical guides and tomography—a pilot study. J Oral Implantol. 1995; 21:275-280.
7. Taylor TD, Agar JR. Voigiatzi Implant prosthodontics: current perspective and future directions. Int J Maxillofac Implants. 2000; 15:66-75.
8. Engelman MJ, Sorenson JA, Moy P. Optimum Placement of Osseointegrated implants. J Prosthet Dent. 1988; 59:467-473.
9. Modica F, Fava C, Benech A *et al*. Radiologic-prosthetic planning of the surgical phase of the treatment of edentulism by osseointegrated implants: an *in vitro* study. J Prosthet Dent. 1991; 65:541-546.