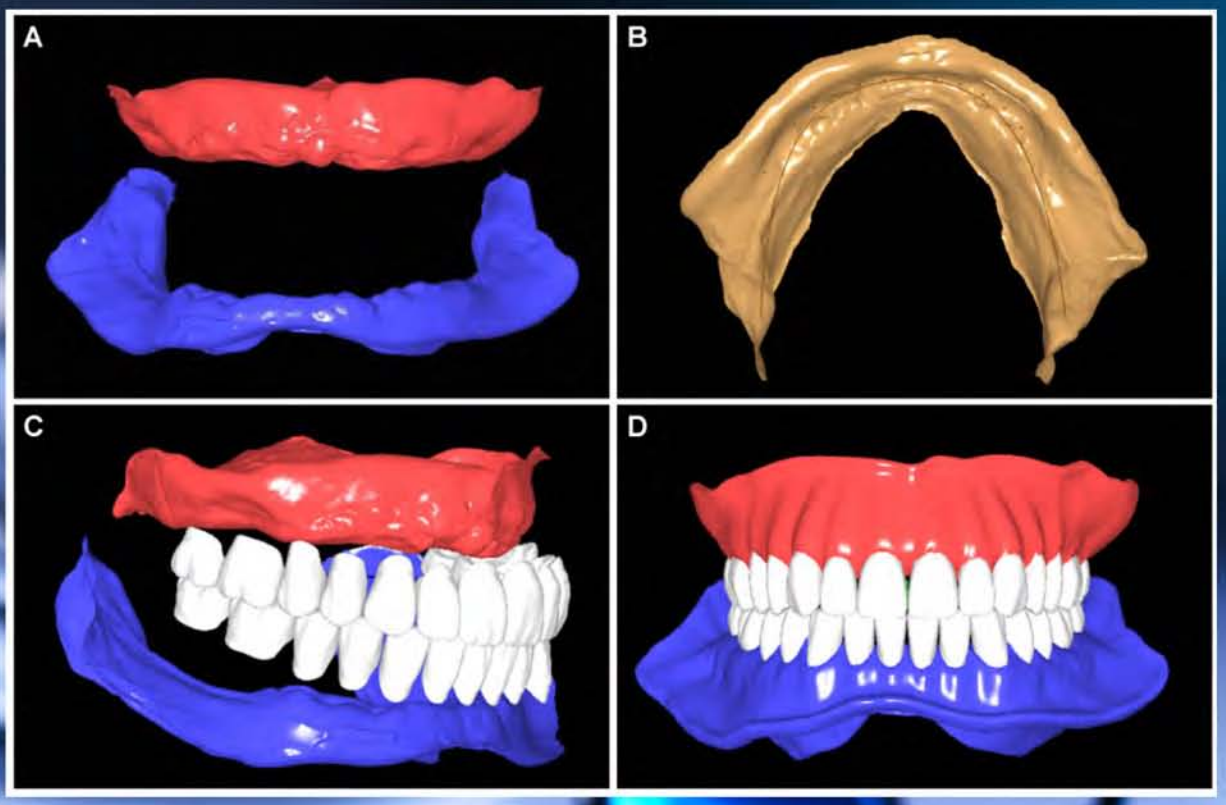
Vol. 9. Issue 1

Impressions

MARCH. 2019

Journal of Indian Dental Association
Attingal Branch



e-mail : journalidaatl@gmail.com
www.idaattingalbranch.org

BEST NATIONAL AND STATE AWARD WINNER FOR LOCAL BRANCH JOURNAL 2017

Best Journal State Award for 2013 , 2014 and 2017

ida
Indian Dental Association
ATTINGAL BRANCH

Best Journal National Award - Runner up 2013, Winner 2014 & 2017

Real solution
for **Modern Dentistry**

Garmy™
Real Solution

Garmy Healthcare Pvt. Ltd.,: MTC Building, Knowledge City Rd.
Kaithapoyil PO, Kozhikode, Kerala - 673 586 (INDIA)
A division of : Garmy Healthcare Ltd., Middle Street
Minehead, Somerset, TA245JH, (United Kingdom)

Infoline: +91 81 56 867 867, +91 81 56 862 862
info@garmyhealthcare.com, www.garmyhealthcare.com

Authorized Distributor

FM DENTAL & EQUIPMENTS
ONE STOP DENTAL SHOP

TC 1/1696(3), SC BHAVAN , 1 st FLOOR, NEAR CANARA BANK ATM
KUMARAPURAM ROAD MEDICAL COLLEGE, TRIVANDRUM
Customer Care : 9846867935, 8129488535
EMAIL : fmdental2@gmail.com

Impressions

Journal of Indian Dental Association Attingal Branch

March 2019
❖ Vol. 9 ❖ Issue No. 1

Indian Dental Association
Attingal Branch

Office:

The Editor-In-Chief,
Impressions-Journal of IDA
Attingal Branch,
Prathyusha Dental Care
IIIrd Floor YCDC, Opp
Vydyuthi Bhavanam, Pattom,
Thiruvananthapuram-695004.

Mobile: 9447060374

e-mail: journalidaatl@gmail.com

President's Message

Dear members,

Warm greetings from the President IDA-Attingal

I am extremely elated that our branch has been functioning exceptionally well and has successfully conducted several CDE, CDH & WDC programs. I am delighted to announce that our branch membership strength has crossed 400 members. Our's is the 4th branch in Kerala state to achieve this landmark.

One present team of Office bearers have completed six months and when we look back it was a very satisfying experience. In the future, we are planning to initiate few programmes that would enhance the confidence of our members to take up more challenging future tasks. The state executive meetings, CDE, Dentist Day, World No Tobacco day are amongst our successfully conducted programme that were all well attended and have superior ratings. Likewise discussions are going on for clinical establishment bill and standardization of Dental clinics across Kerala.

We are expecting active participation of all members of IDA Attingal for conducting the forth coming state events. Firstly on October 12th and 13th 2019, we are hosting a Kerala state students conference at Varkala which will be followed by a Kerala state Conference in the year 2021. As we grow in strength and number, we have to adapt more to embrace ourselves within the technology around us. Along with the support of an efficient team of office bearers am sure we will be able to work towards the betterment of branch.

I extend my appreciation to the editorial board headed by Dr. Pradeep Dathan for releasing the first issue of our branch journal and other members in the board who over the years have made our journal grab several prestigious awards.

Requesting all the members to extend their whole hearted support throughout the year.

Thank you

Dr. Afzal A
President
IDA Attingal Branch.

Secretary's Message

Dear member,

Season's greetings from Secretary's Desk

Our dignity and self respect filled with pride and joy has reached its peak in Calicut last year, when our own member Dr Abhilash GS taken his office as the President of IDA Kerala State. I am utilizing this opportunity to thank each and every one of our members for their support and cooperation to achieve this dream post.

The Government has started implementing CE Bill. The IDA KSB is working hard for the benefit of its members. I request all of you to keep in touch with office for any of your queries.

The National Conference is now at our door step - Kovalam in January. Don't miss this golden opportunity to attend a National Conference.

This year the total membership of our branch has crossed 400. The office would like to thank all the members for achieving this dream number. At the same time request you to make use of HOPE, HOPE MEDI, HOPE SECURE, IDA MARK etc. for our own benefits.

Thank you

Dr. Deepak S Das
Hon:Secretary
IDA Attingal Branch

ABOUT IDA ATTINGAL

IDA Attingal, symbolizes & represents, updates & educates, promotes & supports the local dental community of erstwhile Attingal, in delivering, quality dental health care to the general public. Maintenance of proper standards & ethical manner in practice, better interpersonal relations, as well as willingness to share knowledge among members has provided a high degree of respectability to the organization. Effective follow up of organizational proceedings at the state & national level by the branch executive, ensures that the members are kept abreast of all IDA activities. Regular representation at IDA events & healthy interaction with other branch members has made IDA Attingal quite popular & a force to reckon. Adding to this would be a plethora of eminent leaders from the branch, who have raised to higher echelons in IDA. Through various Scientific programmes, presentations, journals & newsletters, the branch creates awareness of the latest advancements in dentistry, among members.

Impressions
Journal of Indian Dental Association Attingal Branch
March 2019
❖ Vol. 9 ❖ Issue No. 1

Contents

Editorial

New medical education policy

The draft policy submitted by K. Kasthurirangan has some recommendations which would have far reaching effects in medical education. The first year or two of the MBBS course will be designed as a common period for all graduates after which they can take up MBBS, BDS, Nursing or other specialisations, Common foundational course based on medical pluralism will be followed by core courses focused on specific systems, and electives that encourage bridging across systems.

Graduates from other medical disciplines such as nursing, dental etc, will be allowed lateral entry into the MBBS course. A medical education qualification framework to achieve this will be developed in conjunction with the NMC (National Medical Commission).

The committee has recommended that on the lines of the NEET exam for entry to MBBS, a common exit examination should be introduced, as was also suggested in the National Medical Commission Bill. The report said the common exit exam will play a dual role as also the entrance examination for admission into postgraduate programmes. This exit examination will be administered at the end of the final year of the MBBS so that students are relieved of the burden of studying for a separate, competitive entrance examination at the end of the residency period. It has also recommended similar common exit examinations for dental education and other disciplines.

Dentistry was evolved as a distinct speciality in the graduate level and that has resulted in a duplication of instructional content in medical and dental colleges. The BDS curriculum had more of medical subjects than dental subjects. The rationale behind this was never questioned and few fingers were raised against professional equality. Usage of 'Dr.' prefix to signing of death certificate was always a matter of contention. In other countries, to gain consultant status, specialists with dental background were asked to obtain a medical degree. The revised Indian policy might address the above mentioned problems. However the lateral entry may not be accepted with ease by the medical professionals for the obvious reason of unemployment. Now it appears relevant that Dentistry should have been made a postgraduate qualification after MBBS. Super speciality (M Ch) qualifications on all dental subjects would have been a noble proposition. The policy under revision may not be fool proof but dental fraternity should whole heartedly welcome the new policy changes. Let us be positive about the future developments.

Dr. Pradeep C. Dathan
Editor, Impressions

Trigeminal Neuralgia: A collective review of treatment methods

* Shiad Salim, ** Sudeep S, ***Afreen Reffique M, * Adersh G A

*Senior Lecturer, Dept of Oral and Maxillofacial Surgey, ** Professor & HOD, Dept of Proshodontics
*** House Surgeon, PMS College of Dental Science, Vattapara, Trivandrum, Kerela

Send correspondence: Dr. Afreen Reffique Meher, E-mail: drafreenrmeher@gmail.com

Abstract

Trigeminal neuralgia also called as prosopalgia, Suicide disease or Fothergill's disease is a neurological disorder characterized by episodes of intense pain in face originating from trigeminal nerve. The first known incidence of a similar neurological condition was first reported by around 2nd century AD by *Aretaeus of Cappadocia*, a contemporary of Galen. The clinical association between trigeminal neuralgia and hemi facial spasm is called TIC DOULOUREUX. It involves the lower part of the face and jaw sometimes around the eye and nose. It is described by the patients as short stabbing pain which may progress to bouts of searing pain sometimes with an interval for longer period of time. Even mild stimulation of your face — such as from brushing teeth or putting on makeup — may trigger a jolt of excruciating pain. Although trigeminal neuralgia cannot always be cured, there are treatments available to alleviate the debilitating pain. Normally, anti-convulsive medications are the first treatment choice. Surgery can be an effective option for those who become unresponsive to medications or for those who suffer serious side effects from the medications.

Introduction

It is defined by the *International Association for Study of Pain* (IASP) as "a sudden and usually unilateral severe brief stabbing, recurrent pain in the distribution of one or more branches of 5th cranial nerve".[3] Having that mentioned it is also an excruciating, short lasting pain (<2mins) with a paroxysmal nature. Abrupt onset and termination of each paroxysm are un-mistakable with a distinct refractory period of stability or with continuous pain.[14-16]

Although there are various ways for classification of TN, here for the diagnostic simplicity we classify TN as: classical, secondary and idiopathic. Trigeminal nerve is the Vth cranial nerve with 3 divisions in which almost only 1 division is affected in most cases. However only 3% of patients get bilateral pain and it is mostly rare with such inclusion at the same time. Certain studies shows that males age more affected than females by the ratio of 3:2 with right side of the face involved in most cases.[5]

- PAIN DISTRIBUTION

The territory of pain is limited to the regions of mandibular, maxillary division innervation mostly, rarely to the ophthalmic region. However, sometimes the pain may radiate to V2, V3 branches in case of a secondary neuralgia.[4]

- PAIN CHARACTER:

Typically described as a sudden electric shock-like or jabbing/stabbing pain, that lasts for sometime,[17] but may recur and last for days/weeks/months at a time and then disappear for months/years.[14-16]

- TRIGGER AREA:

These are sites innervated by trigeminal nerve and are responsible for transmitting pain[5] upon the application of any stimuli such as:

- o Touching skin of affected side
- o Cold air on face
- o Shaving/ washing
- o Eating

- o Talking
- o Brushing

Diagnosis

A clinical diagnosis can be made by asking the patient a questionnaire pattern that includes onset, duration, frequency, site, radiation to other sites, aggravating/relieving factors, severity &other associated symptoms.

Sweets Diagnostic Criteria for TN 28 (White and Sweet) is also considered while diagnosing TN

- ✓ Pain should be paroxysmal in nature
- ✓ Pain must be triggered by a trigger zone
- ✓ Pain must be confined to Trigeminal distribution
- ✓ Unilateral nature of pain
- ✓ Clinical sensory examination is normal

Neuroimaging is a better method to detect trigeminal neuralgia secondary to vascular compression.[6] However, the implemented guidelines published by AAN and EFNS has failed to establish the correlation of trigeminal neuralgia with neurovascular compression.[7] MRI demonstrates the micro vascular decompression[6] along with morphologic changes in the nerve root. Nevertheless using specific imaging techniques with 3-D reconstruction provides a reliable method. A newer method which may become an essential diagnostic aid is the Diffusion Tensor Imaging (DTI).[8] Visual Analogue Scale (VAS)[9] along with McGill pain questionnaire is also useful for assessing pain intensity and quality.

Treatment protocol

Here in this article we would like to discuss about various methods used for the treatment of trigeminal neuralgia starting from the basics to the most complex modality of approach.

Pharmacological management

Phenytoin, a hydantoin is one of the first described drug by Bergouignan in 1942, was found to be effective in preventing pain paroxysms.[10]

Carbamazepine (200-1, 200mg/day) and oxcarbazepine (600-1, 800mg/day) are the first line drugs recommended as they increase the action potential refractory period.[29]

Other drugs that have been used for management of the neuropathic pain: baclofen a CNS depressant and skeletal muscle relaxant, superiorly used placebo that aids in reducing pain attack. Lamotrigine, pimozide, tocainide, tizanidine also showed better efficacy for pain control.[20]

With the scope of emerging pharmacological management at present, the therapeutic efficacy and safety of injecting botulinum toxin type A has been systematically reviewed by HU et al. On the basis of studies conducted with BTX A[30], it was concluded that it may be effective for reducing mean pain intensity and frequency. The results were in agreement with CRUCCU AND TRUINI whose review on literature based on management of refractory TN provided an evidence BTXA are efficient in pts before surgery or is unwilling to undergo surgery.[21,27]

Surgical approach

Micro vascular decompression MVD

The theory as suggested by Dandy[11] in 1925, fully recognised and popularised by Jannetta[12], is one of the most popular surgical treatment until today. In MVD the target area lies at the nerve- pons junction, where a piece of shredded Teflon felt is placed between vessel and nerve to separate it to correct decompression[21]. Adams has recommended deliberate bruising of nerve in addition to decompression[13] for a better prognosis but it remains invalidated.

Radiofrequency thermo coagulation

Also known as radiofrequency gangliolysis, this idea was pioneered by Kirchner[21] and published his work in 1942. Mostly used technique was put forward by Sweet in 1974[21] where selective partial lesioning of affected ganglion or retrogasserian gangilion is done.[20] This technique had been modified twice by White and Sweet[22,23] and also by Tew, van Loveren and Keller group.[23,24] Sweet and Wespic suggested that such a procedure resulted in selective loss of pain mediating thinly myelinated or non mylinated fibres which affects all sensory functions.[21]

Glycerol gangliolysis

Also termed as glycerol rhizotomy, It is the most widely done peripheral procedure[25] which was conceptualized by Hakansson[25], which involves mixing of tantalum powder with glycerol for pain management.[21,26] In this technique a small test dose of sterile anhydrous glycerol is injected in sitting position. A total of 0.2-0.4 ml is administered in increments

which manifests a tingling/burning sensation as the solution is deposited near the affected divisions.[26] This is done under the fluoroscopic control while the patient is fully awake sometimes in association of a mild sedation. The patient must mandatorily maintain a 2 hr sitting posture after the injections.[21,26] Goodwin et al[30] performed a MVD with inj of glycerol to the inferior third of the cisternal portion of the nerve anterior to the entry zone without the presence of a compressive vessel, in 14 patients without a neurovascular conflict on pre op MRI with a good response of 80% at 3 month follow up.

Percutaneous Balloon compression

The concept of PBC was introduced by Mullan and Litchor in 1983.[28] It was done in a set of 50 patients under general anesthesia where a Fogarthy type balloons were used for compression.[27]

This type of a treatment protocol can be followed even in patients with multiple sclerosis with previous history of treatment for trigeminal neuralgia.[21,27]

Gamma knife radiosurgery

Gamma knife, a steriotactic radio surgical tool which contains a focused array of 201 intercepting beams of gamma radiation produced by separate cobalt sources, was developed by LARS LEKSELL 50 yrs ago. The dose used is 70-90 Gy and requires local anesthesia to secure the frame of the collimator helmet and for irradiation purpose.[29,30,31]

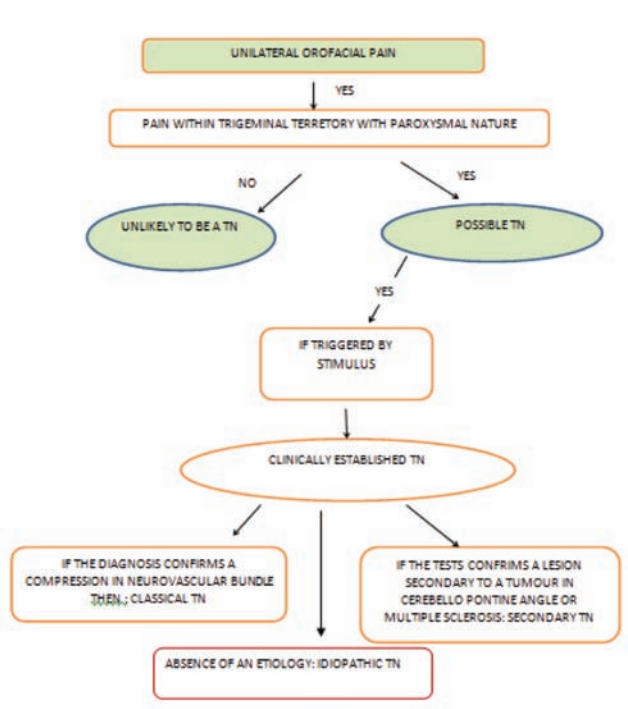


Figure 1 (process of classification with etiology)

Beyond the maximum dosage of 80 Gy, the effect of radiation shifts from treatment to a no of complication like facial numbness, permanent dysesthesia and anesthesia dolerosa has also been reported [2-149]

Conclusion

There are no guidelines for preventing the development of trigeminal neuralgia. However, the following steps may help prevent attacks once diagnosed:

- eating soft foods
- avoiding foods that are too cold or hot
- washing your face with lukewarm water
- using cotton pads when washing your face
- if tooth brushing triggers an attack, rinsing your mouth with lukewarm water after eating
- as far as possible, avoiding known triggers

Trigeminal neuralgia can be debilitating, but managing the symptoms can drastically improve the quality of life.

References

1. Rapini, R.P.;Bolognia, JL; Jorizzo, JL(2007) Dermatology. 1&2. St.Louis Moshy.P.701.ISBN 1-4160-2999-0.
2. Rose FC. Trigeminal neuralgia.Arch Neurol1999;56: 1163-4.
3. Marlon S. Mathews, Devin K. Binder, Mark E. Linskey. Trigeminal Neuralgia: Diagnosis and Non-operative Management. Winn text book. Chapter 163,PP 163-169.
4. Shulev Y, Trashin A, Gordienko K. Secondary Trigeminal Neuralgia in Cerebropontine Angle Tumours. Skull Base. 2011; 21(5):287-294.
5. Shah SA, Murad N, Salaar A, Iqbal N. Trigeminal Neuralgia: Analysis of Pain Distribution and Nerve Involvement. Pakistan Oral & Dental Journal. 2008; 28(1):37 -41.
6. Marion A. Hughes, Andrew M. Frederickson, Barton F. Branstetter, Xiao Zhu, and Raymond F. Sekula, Jr. MRI of the Trigeminal Nerve in Patients With Trigeminal Neuralgia Secondary to Vascular Compression. American Journal of Roentgenology 2016 206:3, 595-60
7. Cruccu G, Gronseth G, Alksne J, Argoff C, Brainin M,Burchiel K, Nurmikko T, Zakerzecska JM. AAN-EFNS guidelines on trigeminal neuralgia management. Europian Journal of Neurology 2008;15(10)1013-1028.
8. N L, JH M, J L, G B, R S, et al. Diffusion tensor imaging of the trigeminal nerve in patients with trigeminal neuralgia due to multiple sclerosis. Neuroradiology. 2015 March; 57(3):259-67.
9. Langley GB, Sheppeard H. The visual analog scale. Rheumatol Int. 1985;5:145–148.
10. Bergouignan M, d'Aulnay N. Effects of sodium diphenylhydantoin in essential trigeminal neuralgia. Rev Otoneuroopthal (Paris) 1951;23:427–431.
11. Dandy WE(1934) Concerning the cause of trigeminal neuralgia. Am J Surg. 24:447–455.
12. Jannetta PJ(1967) Arterial compression of the trigeminal

nerve at the pons in patients with trigeminal neuralgia. J Neurosurg 26:159–162.
13. Adams CBT. Trigeminal neuralgia: pathogenesis and treatment. Br J Neurosurg1997; 11:493-5
14. Potter J. Trigeminal neuralgia. Lancet 1984; 1:1249.
15. Maarbjerg S, Wolfram F, Gozalov A, et al. Significance of neurovascular contact in classical trigeminal neuralgia. Brain 2015; 138:311–319.
16. Lazzara BM, Ortiz O, Bordia R, et al. Cyberknife radiosurgery in treating trigeminal neuralgia. J NeurointervSurg 2013; 5:81–85
17. Eller JL, Raslan AM, Burcheil KJ. Trigeminal neuralgia: definition and classification. Neurosurg Focus. 2005 April; 18(5):1-3.
18. Sweet WG. Proceedings: analgesia dolorosa after differential retrogasserian thermal or mechanical rhizotomy: tactics employed to decrease its influence. J NeurolNeurosurg Psychiatry. 1975;38(4):407.
19. Liu JK, Apfelbaum RI. Treatment of trigeminal neuralgia. NeurosurgClin N Am. 2004;15(3):319–334.
20. Montano N, Conforti G, Bonaventura RD, Meglio M, Fernandez E, et al. Advances in diagnosis and treatment of trigeminal neuralgia. Theraputics and Clinical Risk Management. 2015; (11):289-298.
21. Nurmikko TJ, Elridge PR. Trigeminal neuralgia - pathophysiology, diagnosis and current treatment. British Journal of Anasthesia. 2001; 87(1):117-132.
22. White JC, Sweet WH. Pain and the Neurosurgeon. Springfield: Charles C Thomas; 1969. pp. 594–621.
23. Son B, Kim H, Kim I, Yang S, Lee S. Percutaneous Radiofrequency Thermocoagulation Under Fluoroscopic Image-Guidance for Idiopathic Trigeminal Neuralgia. J Korean Neurosurg Soc. 2011 Nov; 50(5): 446–452.. 2011 November; 50(5):446-452.
24. Tew JM, Jr, Keller JT, Williams DS. Application of stereotactic principles to the treatment of trigeminal neuralgia. ApplNeurophysiol. 1978;41:146–156.
25. Hakansson S. Trigeminal neuralgia treated by the injection into the trigeminal cistern. Neurosurgery. 1981;9:638–646.
26. Punyania SR, Jasuja VR. Trigeminal neuralgia: An insight into the current treatment modalities. Journal of oral biology and craniofacial research. 2012 October 13; 2(3):188-197.
27. Kirschner M. Die Behendlung der Trigeminusneuralgie (nach Erfahrugen an 1113 Kranken, Munch Med Wschr 1942;89:235-9
28. White JC, Sweet WH. Pain: Its mechanisms and neurosurgical control. Springfield.IL, Charles C Thomas, 1995.
29. Obermann M. Treatment options in trigeminal neuralgia. Ther Adv Neurol Disord. 2010;3(2):107–115. doi:10.1177/1756285609359317.
30. Hu Y, Guan X, Fan L, et al. Theraputic efficacy and safety of botulinum toxin type A in trigeminal neuralgia: a systematic review. J Headache Pain. 2013;14:72.
31. Goodwin CR, Yang JX, Bettegowda C, et al.Glycerol rhizotomy via a retrosigmoid approach as an alternate treatment for trigeminal neuralgia.Clin Neurol Neurosurg.2013;115(12):2454-2456.

Surgical Stents - A Guide For Precise Implant Placement

***Sona J Lal, *Arya Nair, *Arunima Upendran, **Dr. Nikhil S. Rajan, *** Pradeep C Dathan**

*P.G. Student, ** Reader, ***Professor and Head of the Department, Department of Prosthodontics, Sri Sankara Dental College, Akathumuri, Varkala - 695 318

Send correspondence: Dr. Sona J Lal, E-mail: sonajayalal@gmail.com

Introduction

Accurate positioning of implants is critical for esthetic and functional success of implant supported restorations. Errors in placement can cause loss of parallellism between implant leading to non axial loading during function. This can contribute to the loss of osseointegration and eventual loss of implants. Surgical guide templates facilitate proper positioning and angulation of the implants in the bone and implant placement accomplished with a surgical guide template can decrease clinical and laboratory complications. Radiographic and surgical guide templates are also used for assistance in diagnosis and treatment planning. Since the use of implants in tooth replacement are increasing day by day various techniques have been proposed for the fabrication of surgical guide templates in implant dentistry. The various types of surgical templates and radiographic templates used in implant dentistry are discussed here.

Templates for imaging

A radiographic template is used for imaging and diagnostic purposes. The diagnostic wax-up is done on the diagnostic cast. An acrylic resin matrix is made over the occlusal part of the remaining dentition, including the future position of the implant-supported restoration. Stable positioning of the template in the mouth of the patient is mandatory. A hole is placed into the acrylic resin in line with the desired position and angulation of the implant in relation with the future restoration. It is then filled with a radioopaque material. With this radiographic template a radiograph is made to know the mucosal thickness position and angulation of the implant and the availability of bone, vicinity of neighbouring teeth and other anatomical structures.

Surgical guide template

A surgical guide template is used during surgery as an aid for proper positioning of the implant in the bone. Surgical guide templates are based on various design concepts[2]. They are classified based on the amount of surgical restriction offered by the surgical guide templates. The various designs are nonlimiting design, partially limiting design and completely limiting design.

Non limiting design

Non limiting design indicates ideal location of the implants. No emphasis was given on the angulation of the drill. This design allows more flexibility in the final positioning of the implant. Engelman et al[5] described a technique in which a guide hole was drilled through a vacuum-formed matrix.[3] This will help in optimal position of the dental implant. Adjacent teeth was used to determine the angulation.

Another non limiting design was the one which was advocated by Almog. It is the circumference lead strip guide[6]. In this design, a lead strip was attached to the external surfaces of the diagnostic waxing. This will help to outline position of tooth over implant site. During the surgical phase of im-

plant placement, this design can be used as imaging indicators. The disadvantage associated with this type of design is that it may result in unacceptable implant placement and angulation.

Partially limiting design

In partially limiting designs, surgical template is used for the first drill for osteotomy and the remaining osteotomy and implant placement is done freehand by the surgeon. This design concept involve fabrication of a radiographic template. After the radiographic evaluation was completed, the radiographic template is converted into surgical template. Different techniques have been proposed involving modifications in the radiographic marker used, type of imaging system used, and the process involved in converting the radiographic template into a surgical template.

Completely limiting design

This design restricts all of the instruments used for the osteotomy in a buccolingual and mesiodistal plane. Completely limiting design includes cast-based surgical guide and CAD-CAM based surgical guide.

Cast-based Guided Surgical Guide

- Cast based surgical guide is a combination of an analog technique done along with bone sounding and the use of periapical radiographs in a conventional flapless guided implant surgery.
- Bone sounding has been used in clinical dentistry to acquire an understanding of the thickness of the soft tissue overlying the bone. By subtracting the thickness of the soft tissues from the total width of the alveolar ridge, an estimation can be made of the bone volume at the measured sites.
- A digital software is used to modify the periapical radiograph. This aids in transposition of root structure on to the cast.
- Sectioning of cast is done at the implant site. Then cast osteotomy is performed.
- A laboratory analog is placed in the implant site. A guide sleeve which is consistent with the implant width is modified using wires that are used to create a framework around the teeth.
- Superstructure is made using vinyl polysiloxane occlusal registration material.

CAD/CAM-based surgical guide

CAD/CAM technology uses data from computerized tomography scan (CT)[9] to plan implant rehabilitation. The CT images are converted into data that are recognized by a CT imaging and planning software. This software then transfers this presurgical plan to the surgery site using stereolithographic drill guides.[10] CAD/CAM-based surgical guides offer many advantages. For example, the virtual 3- dimensional (3D) views of the bony morphology allow the surgeon to visualize the surgical bone site prior

Fig 1. Vacuum-formed template.

Fig 2. Circumference lead strip guide.

Fig 3. Brass tube incorporated into the surgical guide.[8]

Fig 4. Gutta-percha guide

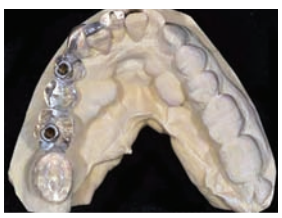


Fig 5. Metal sleeve guide

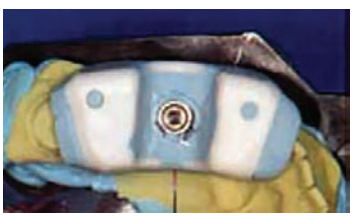


Fig 7. Cast-based surgical guide

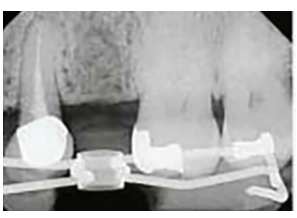


Fig 8. Radiographic view of the cast-based surgical guide.

to implant placement; risks such as inadequate osseous support or compromise of important anatomic structures are avoided; incorporation of prosthetic planning using a scanographic template allows the treatment to be optimized from a prosthodontics and biomechanical point of view;[11] and the technique promotes flapless surgeries, allows presurgical construction of the master cast and provisional restorations, and facilitates immediate loading.[12]

Accuracy of CAD/CAM technology in dental implant planning and predictable transfer of the presurgical plan to the surgical site has been documented.[13] This technique has certain drawbacks. Special training for familiarity with the entire system and special equipment is necessary. Also, a considerable number of technique-related complications were observed.

The various complications recorded were related to inaccurate planning, radiographic stent error, intrinsic errors during scanning, software planning, the rapid prototyping of the guide stent, and the transfer of information for the prosthetics.[2]

The procedure for fabrication of CAD/CAM based surgical guides can be divided into the following steps:

- Fabrication of the radiographic template,
- The computerized tomography scan,
- Implant planning using interactive implant surgical planning software, and
- Fabrication of the stereolithographic drill guide.

The radiographic template must be an exact replica of the desired prosthetic end result, as it allows the clinician to visualize the location of planned implants from an esthetic and biomechanical standpoint. This is followed by fabrication of an interocclusal index, to allow reproducible placement of the scan template intraorally. A double scanning procedure is then followed. The patient is scanned wearing the radiographic scan template and radiographic index (interocclusal index) during the first scan, whereas the second scan is performed without the index. The first scan is used to visualize the bony architecture and anatomy of the site of interest, and a second scan is performed to visualize the nonradiopaque radiographic guide. The 2 resulting sets of 2D CT data (Digital Imaging and Communication in Medicine [DICOM files]) are then superimposed over each other according to the radiographic markers and are further converted into a file format compatible with the 3D planning program. Resulting from this fusion is an exact representation of the patient's bone structure and scanning denture in 3D space. At this point, the virtual surgical procedure can be performed. A 3D implant planning software allows for simultaneous observation of both the arches and the radiographic scan template in 3 spatial planes and helps to virtually plan the location, angle, depth, and diameter of the virtual implants. It produces an axial image, a panoramic image, and a series of cross-sectional images on the screen at the same time. Various implant planning software products are available commercially, namely, SimPlant, SurgiCase (Materialise Dental Ine, Leuven, Belgium), Procera (Nobel Biocare, Göteborg, Sweden), Implant Master (I-Dent Imaging Ltd, Hod Hasharon, Israel), coDiagnostiX (IVS Solutions AG, Chemnitz, Germany), and Easy Guide (Keystone Dental, Burlington, MA). Once the computer planning is accomplished, this plan is saved as a ".sim" file and sent to the processing center for fabrication of the surgical guide, using stereo lithography. Stereo lithography ' is a computer-guided, laser-dependent, rapid prototyping polymerization process that can duplicate the exact shape of the patient's skeletal anatomic landmarks in a sequential layer of a special polymer to produce a special 3D transparent resin model, which fits intimately with the hard and/or soft tissue surface. Once hardened, the polymeric prototype contains spaces for stainless steel or titanium drill-guiding tubes. These tubes precisely guide the osteotomy drills, precluding the need for the pilot drills.

Stereolithiography

- This technique uses advanced computer software (Surgi Case, Leuven, Belgium) along with a rapid prototyping technology called stereolithography.
- It permits graphic and complex 3D implant simulation and fabrication of computer-generated surgical templates (Surgi guides, Materialise, Leuven, Belgium) that seat directly on the bone and are

preprogrammed with the individual depth, angulation, mesiodistal, and buccolingual positioning of individual implants as planned during the 3D computer workup.

Conclusion

Although the completely limiting design is considered a far superior design concept, most clinicians still adopt the partially limiting design due to its cost-effectiveness and credibility in the field, in addition, it has been observed that most clinicians use surgical guide templates that are based on cross-sectional imaging to facilitate accurate planning and guidance during the surgical phase. The use of CT scans and surgical planning software to produce a CAD/CAM surgical template, as well as the use of a flapless surgical technique, can make implant placement more predictable, safer, and easier for patients. Cast-based guided implant surgery allows for the precise placement of dental implants with the possibility to continue with an immediate load protocol. The fast flapless procedure allows for minimal patient discomfort, while attaining a high level of precision.

References

1. Misch CE, Dietsh-Misch F. Diagnostic casts, preimplant prosthodontics, treatment prostheses, and surgical templates. In: Misch CE, ed. Contemporary Implant Dentistry. 2nd ed. St Louis, Mo: Mosby; 1999:135-150.
2. Lambert J.Stumbel. Cast-based guided implant placement: A novel technique. J Prosthet Dent 2008;100:61-69.
3. Tarlow JL. Fabrication of an implant surgical stent for the edentulous mandible. J Prosthet Dent. 1992;67:217-218.
4. Blustein R, Jackson R, Rotskoff K, Coy RE, Godar D. Use of splint material In the placement of implants. Int J Oral Maxiliofac Implants. 1986;1:47-49.
5. Engelman MJ, Sorensen JA, Moy P. Optimum placement of osseointegrated implants. J Prosthet Dent. 1988;59:467-473.
6. Almog DM, Torrado E, Meitner SW. Fabrication of imaging and surgical guides for dental implants. J Prosthet Dent. 2001;85: 504-508.
7. Ku YC, Shen YF. Fabrication of a radiographic and surgical stent for implants with a vacuum former. J Prosthet Dent. 2000;83: 252-253.
8. Becker CM, Kaiser DA. Surgical guide for dental implant placement. J Prosthet Dent. 2000;83:248-251.
9. Marchack CB. CAD/CAM-guided implant surgery and fabrication of an immediately loaded prosthesis for a partially edentulous patient. J Prosthet Dent. 2007;97:389-394.
10. Nikzad S, Azari A. A novel Stereolithographic surgical guide template for planning treatment involving a mandibular dental implant. J Oral Maxillofac Surg. 2008;66:1446-1454.
11. Holst S, Blatz MB, Eitner S. Precision for computer-guided implant placement: using 3D planning software and fixed intraoral reference points. J Oral Maxillofac Surg. 2007;65:393-399.
12. Spector L. Computer-aided dental implant planning. Dent Clin North Am. 2008;52:761-77540.
13. Horwitz J, Zuabi O, Machtei EE. Accuracy of a computerized tomography-guided template-assisted implant placement system: an in vitro study. Clin Oral Implants Res. 2009;20:1156-1162.
14. Nikzad S, Azari A. A novel Stereolithographic surgical guide template for planning treatment involving a mandibular dental implant. J Oral Maxillofac Surg. 2008;66:1446-1454
15. Misch CE. Contemporary Implant Dentistry. St. Louis: Mosby Elsevier

All you need to know about CAD-CAM

***Anju D, *Arunima Upendran, * Ambadi Jayakumar *Lakshmi Ajithan, **Chandrathara T.K, ***Pradeep C Dathan**

*PG Student, **Reader, **Professor and Head of the Department, Dept of Prosthodontics, Sri Sankara Dental College, Akathumuri, Varkala

Send correspondence: Dr. Anju D, E-mail: anjubds2@gmail.com

Computer-aided design/computer-aided manufacturing (CAD/CAM) technology play a major role in the design and fabrication of dental restorations, including complete dentures. Dental restorations designed and fabricated with computer assistance have become more common in recent years. This technology uses the skill of a computer and aid in the design, analysis, and fabrication of the prosthesis. The fabrication can be an additive manufacturing such as rapid prototyping or subtractive manufacturing such as computerized numerical control machining [CNC]. Additive manufacturing, or 3-dimensional (3D) printing, uses images from a digital file to create an object by laying down successive layers of a chosen material. Subtractive manufacturing uses images from a digital file to create an object by machining (cutting/milling) to physically remove material and achieve the desired geometry[1].

Some of the anticipated advantages of CAD/CAM are;

1) Reduced number of patient visit
2) Superior strength and fit
3) Reduced plaque accumulation
4) Easily reproducible due to stored digital data
6) Improved potential for standardization

The term 'CAD/CAM' in dental technology is currently used as a synonym for prostheses produced by 'milling technology'. This is not entirely correct. CAD is the abbreviation for 'computer-aided design' and CAM stands for 'computer aided manufacturing'. The term 'CAD/ CAM' does not provide any information on the method of fabrication[1].

CAD/CAM systems consist of three components:

1. A digitalisation tool/scanner that transforms geometry into digital data that can be processed by the computer.
2. Software that processes data and, depending on the application, produces a data set for the product to be fabricated.
3. A production technology that transforms the data set into the desired product.

Depending on the location of the components of the CAD/CAM systems, three different production concepts are available in dentistry:

A. Chairside production
B. Laboratory production
C. Centralised fabrication in a production centre.

- **Chairside production:** All components of the CAD/CAM system are located in the dental office. Fabrication of dental restorations can thus take place at chairside without a laboratory procedure. The digitalisation instrument is an intra-oral camera, which replaces a conventional impression in most clinical situations. This saves time and offers the patient indirectly fabricated restorations at one appointment[1].

At present, only the Cerec System (Sirona) offers this possibility. Other producers also plan to introduce chairside CAD/CAM systems to the market. Since the Cerec system functions with water-cooling, a variety of materials can be processed, from glass-ceramic to high performance oxide ceramic. Clinical observations on ceramic inlays are available over a period of 21 years. Scientific literature reported

success rates for CAD/CAM produced inlays of 90% after ten years and 85% after 12 and 16 years[2,3,4]. Historically, this system was the first CAD/CAM system in dentistry and is currently available in its third product generation. The benefit of this system is that software can three-dimensionally reconstruct the occlusal surface accurately.

- **Laboratory production:** This variant of production is the equivalent to the traditional working sequence between the dentist and the laboratory. The dentist sends the impression to the laboratory where a master cast is fabricated first. The remaining CAD/CAM production steps are carried out completely in the laboratory. With the assistance of a scanner, three-dimensional data are produced on the basis of the master die. These data are processed by means of dental design software. After the CAD-process the data will be sent to a special milling device that produces the real geometry in the dental laboratory. Finally the exact fit of the framework can be evaluated and, if necessary, corrected on the basis of the master cast. The ceramist carries out the veneering of the frameworks in a powder layering or over pressing technique[5-7].

- **Centralised production:** The third option of computer-assisted production of dental prostheses is centralised production in a milling centre. In this variation, it is possible for 'satellite scanners' in the dental laboratory to be connected with a production centre via the Internet. Data sets produced in the dental laboratory are sent to the production centre for the restorations to be produced with a CAD/CAM device. Finally, the production centre sends the prosthesis to the responsible laboratory. Thus, production steps 1 and 2 take place in the dental laboratory, while the third step takes place in the centre. As a result, the configuration of the prosthesis remains in the hands of the dental technician[1].

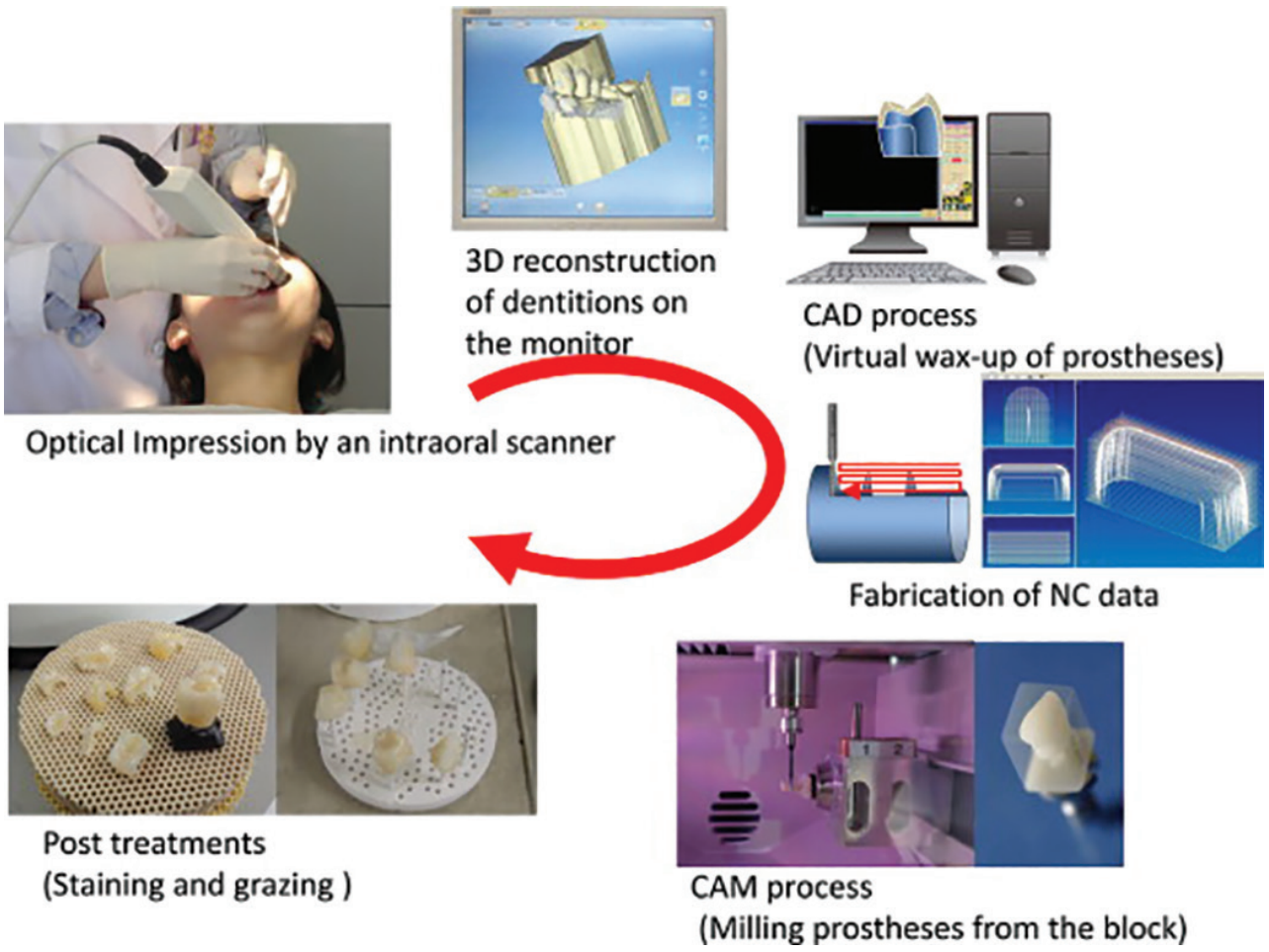


Fig. 1 CAD CAM processing steps

CAD/CAM Components

1. Scanner

Under the term 'scanner' one understands, in the area of dentistry, data collection tools that measure three dimensional jaw and tooth structures and transform them into digital data sets. Basically there are two different scanning possibilities[1]:

- Optical scanners
- Mechanical scanners.

2. Design software

Special software is provided by the manufacturers for the design of various kinds of dental restorations. With such software, crown and fixed partial dentures (FPD) frameworks can be constructed on the one hand; on the other hand, some systems also offer the opportunity to design full anatomical crowns, partial crowns, inlays, inlay retained FPDs, as well as adhesive FPDs and telescopic primary crowns. The software of CAD/CAM systems presently available on the market is being continuously improved. The latest construction possibilities are continuously available to the user by means of updates. The data of the construction can be stored in various data formats. The basis therefore is often standard transformation language (STL) data[1].

3. Processing devices

The construction data produced with the CAD software are converted into milling strips for the CAM-processing and finally loaded into the milling device. Processing devices are distinguished by means of the number of milling axes[1]:

- 3-axis devices
- 4-axis devices
- 5-axis devices.

MILLING VARIANTS

a) Dry processing: It is applied mainly with respect to zirconium oxide blanks with a low degree of pre-sintering. This offers several benefits:
• Minimal investment costs for the milling device
• No moisture absorption by the die ZrO2 mould, as a result of which there are no initial drying times for the ZrO2 frame prior to sintering[1]. (Fig 3)

b) Wet milling: In this process the milling diamond or carbide cutter is protected by a spray of cool liquid against overheating of the milled material. This kind of processing is necessary for all metals and glass ceramic material in order to avoid damage through heat development[1]. (Fig 2)

MATERIALS FOR CAD/CAM PROCESSING

The list of various materials for processing by CAD/CAM devices depends on the respective production system. The following materials can normally be processed on dental CAD/CAM devices:

a) Metals
b) Resins
c) Silica based ceramics
d) Infiltration ceramics
e) Oxide high performance ceramics

Conclusion

CAD/CAM technologies have started a new age in dentistry. The quality of dental prostheses has improved significantly by means of standardised

Fig. 2 Wet Milling

Fig. 3 Dry Milling

production processes. This makes very efficient quality management possible. On the one hand it increased the productivity tremendously and changed dental laboratories from manufacturers to modern computerised production centres. On the other hand this increase in productivity leads to a competitive capability to produce dental prostheses independent of the manufacturing site, which might be a major factor for the high wage countries to keep business volume in the country. Last but not least CAD/CAM technology has made it possible to machine interesting new materials like the high performance ceramics and titanium with great accuracy. However, some drawbacks of this fabrication technology have to be mentioned. The high investment for machines might overextend the budget of smaller laboratories. Some applications are limited due to software and production procedures. CAD/CAM technology has already changed dentistry and will replace more and more of the traditional techniques in fabricating dental restorations[1].

Reference

1. Digital dentistry: an overview of recent developments for CAD/CAM generated restorations British Dental Journal 2008:204: 505-511
2. Otto T, De Nisco S. Computer-aided direct ceramic evaluation of posterior all-ceramic three-unit (In restorations: a 10- year prospective clinical study of Cerec CAD/CAM inlays and onlays Int J Prosthodont 2002:15:122-128.
3. Reiss B. Clinical results of Cerec inlays in a dental practice over a period of 18 years. Int J Comput Dent 2006; 9: 11-22
4. Sjögren G, Molin M, van Dijken J W. A 10-year prospective evaluation of CAD/CAM-manufactured (Cerec) ceramic inlays cemented with a chemically cured or dual-cured resin composite. Int J Prosthodont 2004; 17: 241-24
5. Luthy H, Filser F, Loeffel O, Schumacher M et al. Strength and reliability of four unit all-ceramic posterior bridges. Dent Mater 2005; 21: 930-937.
6. May K B, Russell M M, Razzoog M E, Lang B R. Precision of fit: the ProceraAllCeram crown. J Prosthet Dent 1998; 80: 394-404.
7. Raigrodski A J. All-ceramic full-coverage restorations: concepts and guidelines for material selection. PractProcedAesthet Dent 2005; 17: 249-256, quiz 258.
8. Raigrodski A J, Chiche G J. The safety and efficacy of anterior ceramic fixed partial dentures: a review of the literature. J Prosthet Dent 2001; 86: 520-525.
9. CAD/CAM fabricated complete dentures: concepts and clinical methods of obtaining required morphological data J Prosthet Dent 2012:107:p34–46
10. Computer-aided technology for fabricating complete dentures: Systematic review of historical background, current status, and future perspectives The J Prosthet Dent 2013:109:361–366
11. 3D Printed Complete Dentures Quintessence of Dent Technol. 2016:39:141-149.

Miniscrew Implants in Orthodontics- A peek through into its various applications

*** Jayakrishnan U, ** Anjali Jayaraj, ***K. Nillan Shetty, ****Rohan Rai, *****Govind S.L**

*Post Graduate, Department of Orthodontics and Dentofacial Orthopedics, A.J Institute of Dental Sciences, Mangalore; **Post Graduate, Navodaya Dental College, Raichur; ***Head of the Department, ****Professor, Department of Orthodontics and Dentofacial Orthopedics, A.J. Institute of Dental Sciences, Mangalore; *****Post Graduate, Vinayaka Missions Sankarachariyar Dental College, Salem

Send correspondence: Dr. Jayakrishnan U., E-mail: jayakrisjk@gmail.com

Abstract

Anchorage loss has been one of the problems faced by the clinician while deriving support from the posterior units for retraction of teeth. Almost always, the desired tooth movement gets masked by the unwanted tooth movement that occurs in the posterior segment, such that space requirements become a difficult factor in planning the treatment outcome. Many methods, such as Extra oral anchorage, use of opposing anchors, increasing the number of anchor units have been tried and tested, but each have its own demerits and most of them take into account patient compliance as well. The advent of implants in Orthodontics gained popularity because of its robust size, ease of insertion and removal, the ability to load the implant with orthodontic forces immediately and their ability to provide absolute anchorage with minimal patient compliance. Some of the characteristics of implants related to the bone quality, the method of insertion, its angulations are reviewed in this article. Additionally, risk associated with miniscrew placement and the complications are discussed.

Key Words: Absolute anchorage, Bone Density, Temporary anchorage devices, Implant Fracture

Introduction

Biomechanics of various appliances and their impact on the tooth movement is the backbone of Orthodontics. The influence of physics on the biology makes biomechanics of tooth movement more interesting. Sir Isaac Newton framed his laws of motion as a guide for evaluating various aspects of movement of objects. His third law, 'every action has an equal and opposite reaction' has great importance in Orthodontics as it explains many phenomena, that we observe during the treatment[1]. As the Orthodontic treatment begins, the tooth is exposed to various force and movements. So, all the forces generate reciprocal forces or reactions in the opposite direction too. These forces need to be well directed in order to get the intended tooth movement. Anchorage forms one of the most important factor in this regard. The end treatment result is to achieve the desired tooth movement along with functional harmony and aesthetics[2].

There are many factors for obtaining anchorage such as the extraoral anchorage, use of opposing anchors, increasing the number of teeth in the anchorage units and much more. The extra oral anchorage is cumbersome to use and can cause injuries which might compromise on the patient compliance. Absolute anchorage can be achieved when the anchorage unit remains completely stable, which is a concern with the traditional orthodontic mechanics. Skeletal anchorage is Absolute anchorage which is achieved

using mini implants. The advent of mini implants has revolutionised the concept of anchorage. There are minimum unwanted side effects with the use of mini implants for anchorage[3]. Mini screws are also known as TAD's (Temporary Anchorage Devices) or Microimplants or Ortho implant.

Evolution

It was in early part of 1945, Gainsforth and Higley introduced the concept of implant supported anchorage. They used vitallium screws and stainless-steel wires in the Ramal area of the mandible in dogs to bring about the retraction of upper canines. However, initiation of orthodontic force resulted in the loss of screw in 16 to 31 days. This is considered to be the first published case of an implant for orthodontic anchorage[4].

In 1984, Robert & fellow researchers collaborated the findings of Branemark in an extensive study of titanium implants in rabbits. 6 – 12 weeks after placing titanium screws in the rabbit femur, 100 gm of force was loaded for 4 – 8 weeks by stretching a string between the screws. Most of the implants remained rigid. Robert result indicated that titanium implants developed a rigid osseous interface and continuously loaded implant remains stable within the bone. The study concluded that titanium endosseous implants provides firm osseous anchorage for Orthodontics & Dentofacial Orthopedics[5].

Classification[6]

Fig: a) Small head,b) Long head, c) Circle head, d) Fixation head, e) No head, f) Bracket head

Biomaterials used in implants[7]

Ideal requirements of biomaterials used in implants:

- ❖ Biological properties
  - ➢ Provide effective osseointegration
  - ➢ No diffusible toxic substances
  - ➢ Should not harm the soft or hard tissues
- ❖ Physical properties
  - ➢ Should provide dimensional stability
  - ➢ Possess adequate strength and resilience

to resist the functional forces

The osseointegrated dental implants/screws are composed of 99% titanium. The medical grade Titanium used for general body implants is classified as Grade I to IV. Commercially pure Titanium is used widely as a material of choice in implants because of the properties it possesses, one being its excellent biocompatibility. Titanium alloy (Ti6Al4V) (Grade V) is the material of choice for Orthodontic miniscrews. Use of this alloy increases the modulus of elasticity to six times that of bone so that long and thinner screws can be used without any risk of damage[8].

Design

The orthodontic miniscrews are designed to be used transmucosally for osseous orthodontic anchorage. Orthodontic miniscrew has four components:

1. Head: it has a slot which enables the placement or archwire or the attachment of auxiliaries.
2. Platform: it is of different sizes (1mm, 2mm, 3mm) for the accommodation of different soft tissue thickness at different implant site.
3. Neck: it is the isthmus between the head and the platform for the attachment of elastic, NiTi coil spring etc.
4. Body: it provides mechanical retention, less loosening breakage and stronger anchorage. It forms the bulk of the implant.

Sites of implant placement[9]

Miniscrew implants are available in varying lengths and diameters to accommodate placement at different sites in both jaws. Most miniscrew implants have a thread diameter ranging from 1.2 mm to 2.0 mm and a length ranging from 6.0 mm to 12.0 mm.

Potential sites for miniscrew implant placement

in the maxilla include:

1. the area below the anterior nasal spine,
2. the palate (either on the midpalate or the paramedian palate),
3. the infrazygomatic crest,
4. the maxillary tuberosities, and
5. the alveolar process (both buccally and palatally between the roots of the teeth).

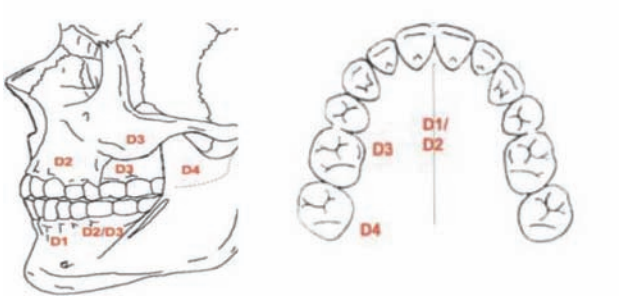
Possible sites for miniscrew implant placement in the mandible include

1. the symphysis or parasymphysis,
2. the alveolar process (between the roots of the teeth), and
3. the retromolar area.

One of the most important factors that determines the success of mini-implant is the cortical bone thickness. Insufficient cortical bone thickness often causes inadequate primary stability. If primary stability is not achieved upon insertion, the miniscrew implant may loosen during orthodontic treatment. A cortical bonethickness of less than 1 mm has a higher likelihood of miniscrew implant failure compared to a thickness of 1 mm or more. Numerical analyses using finite element models (FEMs) have shown that deflection of miniscrew implants decreases as cortical bone thickness increases and that cortical bone with thickness less than 1 mm is vulnerable to stresses that can cause bone resorption in this region.

Two key determinants of primary stability are bone quality and quantity. Cortical bone quantity and quality affect the long-term stability of a miniscrew implant. Stationary anchorage failure often results from low bone density due to inadequate cortical thickness. The primary implant stability of a miniscrew implant can be estimated by computed tomography (CT) measurements of cortical bone thickness.

Misch classification of bone density



If we assess the area from the canine to the second premolar in the maxilla, the cortical bone is thin buccally. The space between the roots are shaped like an inverted pyramid. The space gradually goes on increasing in width to about 5mm as the root taper apically. Therefore, it is mandatory to place the screws at an angulation to avoid any root contact. An angulation of 30 to 40 degree to the long axis of the teeth in the maxilla will keep the screw in the widest apace available between the roots apically[7].

In the mandible, the buccal cortex is of dense

Bone density classification				
Bone Density	**Hounsfield units**	**Description**	**Tactile Analog**	**Location**
D1	>1250HU	Dense cortical	Oak	Anterior Mandible Maxillary Midpalatal
D2	850-1250HU	Porous Cortical and Course Trabecular	White Pine or Spruce	Anterior Maxilla Posterior Mandible
D3	350-850HU	Porous cortical (thin) and Fine trabecular	Balsa Wood	Posterior Maxilla Posterior Mandible Zygoma
D4	150-350HU	Fine trabecular	Styrofoam	Posterior Maxilla Tuberosity

bone and curves more buccally from gingival margin. So shorter screws should be used in mandible as compared to maxilla and the angle is reduce to 10 to 20 degree to reduce the risk of root contact[7].

Insertion Procedure

1. Topical anesthesia – Prior to infiltration in order to reduce the needle prick pain.
2. Infiltration anesthesia – Only the soft tissue infiltration anesthesia is required to determine that whether the implant is touching the roots of teeth or not. If it is touching the roots, the drill can be redirected away.
3. Field preparation – A disinfecting agent can be used to prepare the intraoral or extraoral site for keeping the surgical area aseptic. A guide bar can be placed on the tooth before exposing IOPA (CBCT provide the better idea regarding the surrounding structures). The guide bar can be placed in such a manner that it should be retained during micro implant insertion, which helps in placement of a micro- implant.
4. Insertion – Loading of the selected micro screw into the driver is done, and the screw is inserted at the registration point. The direction of insertion is first horizontal and then angulated at 30 -degree to 40- degree in the maxilla and 10- degree to 20- degree in the mandible. The act of turning the screw should be smooth alternating between turns and stops. Wobbling in the axis of a driver should be avoided to ensure proper stability of implants.
5. The final root position of the screw should be such that the curved funnel at the neck should be cutting against the bone. The head, neck and body of screw should be away from the soft tissues.

Based on the method of insertion of the implant into the bone, there are two different types of miniscrews[7]:

- Self-tapping: In this type of screws, predrilling is required. A tunnel like depression is made in the bone with a pilot drill and then the implant is driven into this tunnel. Such implants will have a blunt, rounded and smooth tip with thick, rounded and blunt threads.
- Self-drilling: This is a drill free type of implant, where the implant itself acts as a drill and is directly inserted into the bone. The tips will be sharp, hooked and pointed with thin and pointed threads.

Application of miniscrews for Non-Surgical correction of Occlusal cant or Vertical Maxillary Excess[10]

The mechanics of using miniscrew implants follow general biomechanical principles. However, compared with conventional orthodontic principles, miniscrew implants have several characteristic features that not only make treatment with conventional orthodontic mechanotherapy easier and more efficient, but also enable treatment in which conventional anchorage would be impossible.

Clinical applications of miniscrew implants have been expanded to include correction of occlusal cant and correction of vertical excess that would otherwise require orthognathic surgery. In adult patients with moderate-to-severe facial asymmetry or hyperdivergency, a combined treatment of orthognathic surgery and orthodontic therapy can improve facial aesthetics, and morphological and functional occlusions. In some patients with facial asymmetry or hyperdivergency, miniscrew implant anchorages are a potential alternative to surgery for improving dental and skeletal disharmony in transverse and/or vertical dimensions.

Complications associated with miniscrew implants

The introduction of miniscrews have expanded the treatment options and is an added advantage in the clinical armamentarium. As with any technique, insertion of miniscrews also needs clinical knowledge of the anatomical sites to avoid any unwanted side effects. The complications that can arise by the miniscrews can be divided into various steps according to the order of its placement as:

1. Complications during insertion
    a. Trauma to the dental root
    b. Implant slippage
    c. Nerve impingement
    d. Nasal and maxillary sinus perforation
    e. Implant fracture

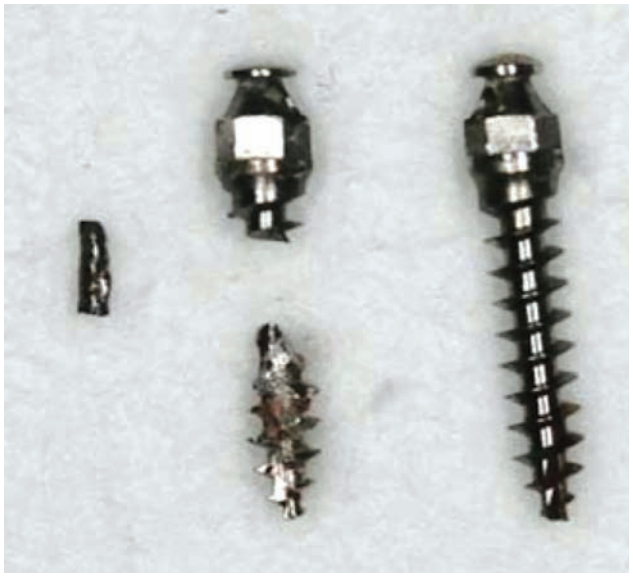


Fig: Implant Fracture on retrieval

2. Complication while Orthodontic load is placed
    a. Migration of the miniscrew
    b. Ulceration of the soft tissues
    c. Infections around the implant site
3. Complications during removal
    a. Osseointegration of implant
    b. Fracture of the miniscrew

Conclusion

The introduction of orthodontic miniscrew implants has greatly influenced and expanded the envelope of discrepancies that are potentially correctable by orthodontic and dentofacial orthopaedic treatment. The efficacy of these implants has been improving due to the wide and varied research progressing in this area. Of the many hypothesized factors in the failure rates of orthodontic miniscrew implants, most need further evidence to support their associations. Clearly, however, the success rate of miniscrew implant placements is improved by CT or CBCT examinations of the maxillofacial field and by technical improvements in the miniscrew implant placement procedure. Further technical advances in miniscrew implants for skeletal anchorage will require improved understanding of the associated orofacial biology and implant-assisted orthodontic biomechanics. With the recent advances, lets hope a more comprehensive evolution of the anchorage system with minimal invasion, desirable physical properties and ease of operation with minimal hazards come into the picture.

References

1. Bjork Ludwig, Dr. Baumgaertel et al.Mini-implants in orthodontics. London: Quintessence Publishing Co.Ltd.
2. P.Salehi, S. Torkan. The use of mini-implants in revolving Orthodontic Problem. Orthodontic- Basic aspects and clinical consideration. Orthodontic Research centre, Shilaz Uni.of Medical Science- Iran, March 9, 2012. Pg.- 195-218
3. Samuel RHA, Jones ML. Orthodontic facebow injuries and safety equipment. Eur.J Orthod 1994;16:385- 394
4. Gainsforth BL, Highley LB. A study of orthodontic anchorage possibilities in basal bone. Am J Orthod 1945; 31:406-17.
5. Roberts WE, Smith RK,Y. Silberman Y, Mozsary P-G, Smith RS. Osseous adaptation to continuous loading of rigid endosseous implants. Am J Orthodont 1984; 86:95-111.
6. Cope Jason. Temporary Anchorage devices in Orthodontics: A Paradigm shift. Seminar in orthodontics. 2005; 11: Pg. 3-9.
7. Bajaj R, Shenoy U, Banerjee S et al. Implants in Orthodontics- A Review. Int J Oral Health Med Res 2017;3(5):92-97.
8. Block MS, Hoffman DR. A new device for absolute anchorage for orthodontics. Am J Orthod. Dentofacial Orthop. 1995; 107: 251- 8.
9. Poggioa PM, Incorvati C, Velo S, Carano A. ''Safe Zones'': A Guide for Miniscrew Positioning in the Maxillary and Mandibular Arch. Angle Orthod 2006; 76:191–197.
10. Hong-Po Chang, Yu-Chuan Tseng. Miniscrew implant applications in Contemporary Orthodontics. Kaohsiung Journal of Medical Sciences (2014) 30, 111-115.

OVERVIEW

Osseodensification- a novel approach for implant osteotomy

***Jisha J.S., **Aby Mathew T, *Tessa Kuriachan, *Parvathy Kamath S.**

*PG Students, **Prof. and HOD, Dept of Prosthodontics and Crown and Bridge, Pushpagiri College of Dental Sciences, Thiruvalla

Send correspondence: Dr. Parvathy Kamath S. E-mail: kgskamath@gmail.com

Abstract

Osseointegration is an important factor which contributes to the long term success of dental implants. Many factors including surgical techniques, bone quantity and quality are a strong base for achieving primary stability. This primary stability is considered to be a prerequisite for establishing good osseointegration. Osseodensification, a recently developed technique enhances the bone density around dental implants and increases the primary stability. Osseodensification is a non-extraction technique and the concept was introduced by Dr. Huwais S. It is carried out with specially designed burs to increase bone density as they expand osteotomy site. The main concept of osseodensification technique is that the drill designing creates an environment which enhances the initial primary stability through densification of the osteotomy site walls by means of autografting. This article gives an insight to this new and interesting technique "osseodensification".

Key Words: Absolute anchorage, Bone Density, Temporary anchorage devices, Implant Fracture

Introduction:

Primary stability in implant placement is one of the most critical factors that determine the outcome of implant therapy. It is, actually, influenced by the shape and design of the implant[1], the quality and quantity of the bone,[2] the surgical technique,the insertion torque and skills of the surgeon[3], while its maintenance is depended on the loading conditions, the presence of parafunctional habits[4] and the healing capacity of the host[5].

Primary stability is achieved when there is no micromovement of implant in its completely seated position. This will allow the implant to mechanically interlock with the bone tissue until secondary stability is achieved. Implant stabilisation is a very important factor as it reduces the fibrous tissue formation around the implant. Due to surgical trauma, 1 mm of bone around the implant body gets devitalised, resorbed and remodelled in the initial period of osseointegration, and this will decrease the primary stability. Later bone starts forming around implant body, thereby increasing the bone implant contact. This biologic stability of the implant known as secondary stability leads to an osseointegrated implant[6].

Methods to increase primary stability

Many surgical techniques were developed which can increase the implant primary stability in low density bone. A method to increase the primary stability that is widely used is the under prepara-

tion of the implant bed. It is achieved by using a one or more size smaller as the last drill than selected implant diameter. In the presence of poor bone quality, 10% undersized implant bed preparation is sufficient to increase primary stability whereas, additional decrease does not improve primary stability values[5,7].

Summers RB described the use of osteotomes to condense bone in case of low bone density[8]. The principle behind the bone condensation at the periphery of implant bed is to insert implant in a high density bone matrix. The osteotome technique, uses hand driven devices and compresses the surrounding bone by gradual expansion leading to enhanced insertion torque values and it is considered by the practitioners as an indication of improved primary stability. Many studies state the bone condensing technique as another method to increase the primary stability of an implant. Stavropoulos A et al, reported good primary stability of implants using bone condensation technique[9].

Osseodensification (OD) is a new technique of preparation of the implant bed. It creates an autograft layer of condensed bone at the periphery of the implant bed with the help of particularly designed burs rotating in clockwise and anti-clockwise direction.

Principles of osseodensification

Osseodensification (OD), a nonextraction technique, was developed by Huwais in 2013 and is a new technique of preparation of the implant bed, to develop a condensed autograft surrounding the implant, which increases implant stability. OD uses specially designed burs (densah burs) which are rotated in reverse at 800 to 1500 rpm. Standard traditional drills remove and excavate bone during implant site preparation. The new burs (densah burs) allow bone preservation and condensation through compaction autografting during osteotomy preparation thereby increasing the peri-implant bone density, and the implant mechanical stability. The rationale behind this process is that the densification of the bone that will be in immediate contact to the implant results in higher degrees of primary stability due to physical interlocking between the bone and the device, faster new bone growth formation due to osteoblasts nucleating on instrumented bone which is in close proximity with the implant[10].

Bur technology

Huwais S. goal was to create a new instrument and procedure to maintain healthy bone while preparing osteotomies rather than remove it, led to the concept of OD and creation of densah bur[11]. Specially designed densah burs precisely cut bone in the clockwise direction and densify bone in a non cutting counterclockwise direction combined with copious irrigation which facilitates the surgical technique during implant placement.

Densah burs progressively increase in diameter throughout the surgical procedure and they preserve and condense bone at 800-1500 rpm in a counterclockwise direction (OD) and precisely remove bone at 800-1500 rpm in a clockwise direction (cutting mode)[12].

The osseodensification implant site preparation

Traditional drilling as a method of osteotomy preparation for implant placement is considered to be a subtractive procedure that cuts and removes bone tissue from the implant site. Osseodensifying burs have been designed to work in a non-subtractive manner.

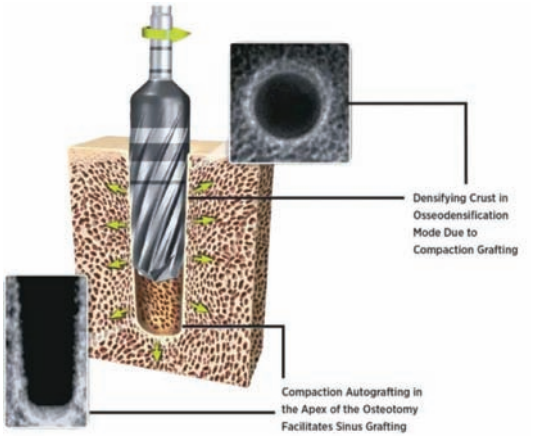
The implant bed preparation begins with a much smaller hole than conventional drilling due to recovery of elastic strain. The purpose is to create a condensed autograft zone along the periphery and at the apex of the implant. These densifying burs have four or more lands and flutes that smoothly compact the bone Densifying burs have a cutting chisel edge and a tapered shank, so as they enter deeper into the osteotomy they have a progressively increasing diameter that controls the expansion process. These burs are used with a standard surgical engine and can densify bone by rotating in the noncutting direction (counterclockwise at 800–1,500 rotations per minute) or drill bone by rotating in the cutting direction (clockwise at 800–1,500 rotations

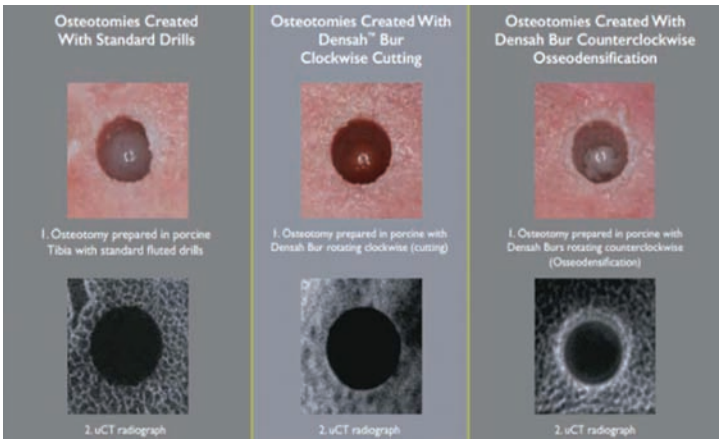
per minute). This new technique's proposed method of bone compaction is through the application of controlled deformation due to rolling and sliding contact along the inner surface of the osteotomy with the rotating lands of the densifying bur. The bone deformation occurs through viscoelastic and plastic mechanisms when the load is controlled beneath the ultimate strength of bone.

Copious amounts of irrigation fluid during this procedure provide lubrication between the bur and bone surfaces and eliminate overheating. A recommended technique is for the surgeon to utilize a bouncing motion of the bur in and out of the osteotomy, which will induce a hydrodynamic compression wave ahead of the point of contact so that the bone is compressed laterally by continuously rotating and concurrently forcibly advancing the bur. The taper design of the bur allows the operator to instantly lift away from contact to allow for irrigation. The irrigation fluid that is then forced into the osteotomy may also facilitate autografting of bone particles along the inner surface of the osteotomy. The autografting supplements the plastic bone compaction to further densify the inner walls of the osteotome. The surgeon can safely control the osseous densification process because the bur-to-bone contact applies an opposing axial reaction force that is proportional to the intensity of the force applied by the surgeon. This gives the surgeon haptic feedback to control force based on the bone density that is encountered and to facilitate the strain-rate controlled plastic deformation that compacts the bone and expands the osteotomy.

Implant primary stability is positively related to the insertion torque exercised[13]. According to Norton[14] torque of only 25 Ncm would seem more than sufficient to yield a favorable clinical outcome. However, if the implant is scheduled to be immediately loaded then an insertion torque of at least 32 Ncm is to be considered[15], which should be increased to 45Ncm in sites of low quality bone. When the ossodensified osteotomy remained empty its diameter was reduced by approximately 91%, which was due to the viscoelastic nature of deformation[16]. The residual strains of viscoelasticity create compressive forces against the implant surface, as a spring-back effect, increasing the bone-to-implant contact and primary stability[17].

The efficacy of this new surgical technique to enhance bone density, ridge width and implant secondary stability was evaluated by Trisiet al.[20] in a recent study. The researchers inserted 20 implants in the iliac crest of 2 sheep. On the left sides they used the conventional drilling protocol (control group) while on the right sides they inserted the implants by using the osseodensification method (test group). Biomechanical and histological analyses were performed after 2 months. Authors report a significant increase of the ridge width and bone volume percentage of approximately 30% in the test group compared to the control group. Additionally,

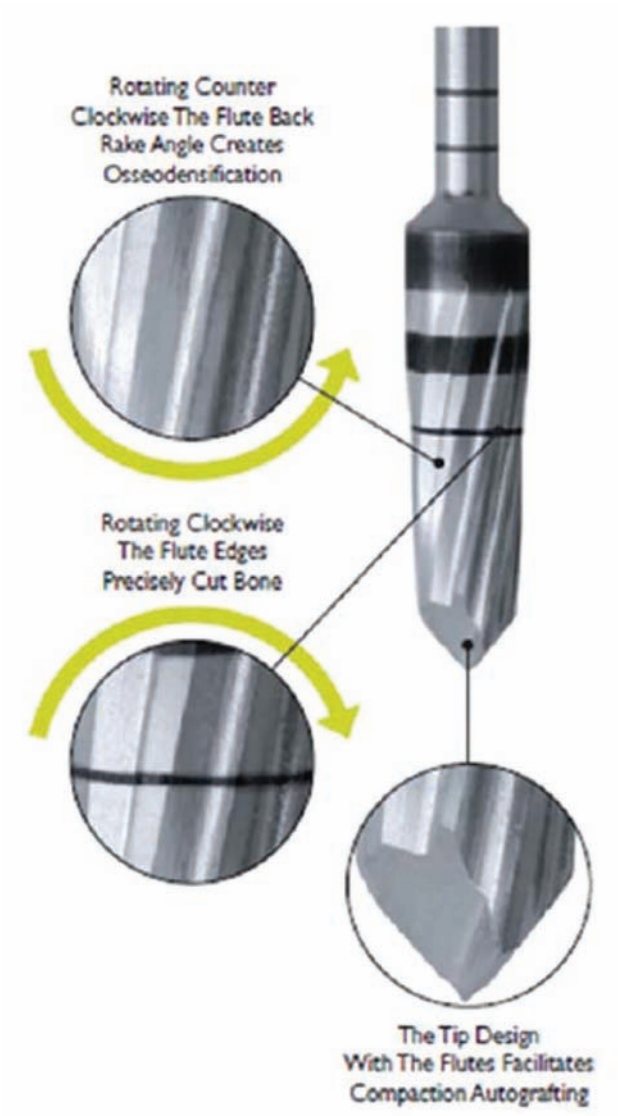




better removal torque values and micromotion under lateral forces were recorded for the test group. The increase of bone density in the test group was particularly evident in the most coronal implant region where bone trabeculae were thickened because of incorporation of autogenous bone fragments during the healing process. It was concluded that the osseodensification procedure is able to increase the bone volume around implants inserted in low density bone which may lead to enhanced implant stability.

Discussion

Achieving primary stability is very important for establishing osseointegration. The placement of implant begins with a smaller drill rather than conventional drilling due to the recovery of elastic strain. Researchers claim that compaction of bone is performed by a controlled deformation which occurs through viscoelastic and plastic mechanisms. According to the study by inventors, the OD technique increased the insertion torque of implants to 49 Ncm approximately in low density bone when compared to 25 Ncm in standard conventional drilling technique. According to the authors, the osseodensified osteotomy diameter was reduced by 91% due to viscoelastic nature of deformation. This spring back effect of bone due to viscoelasticity in OD, causes residual strains which create compressive forces against the implant surface, thereby enhancing the bone implant contact and primary stability[18].



Advantages of Osseodensification

Compaction autografting/condensation: Undersized implant site preparation and the use of osteotomes to condense bone are surgical techniques proposed to increase primary implant stability and bone implant contact percentage in poor density bone[19]. OD maintains the bulk of bone by condensation which results in higher bone implant contact.

Enhances bone density: In vitro testing reported that the densah burs allow bone preservation and condensation through compaction autografting during osteotomy preparation, increasing the peri-implant bone density, and the implant mechanical stability[20].

Residual ridge expansion: Narrow ridges are shown to expand in width along with OD thus facilitating for placement of large diameter implants and also avoiding of fenestration and dehiscence defect[12]

Increases residual strain: The bouncing motion (in and out movement) helps to create a rate dependent stress to produce a rate dependent strain, and allows saline irrigation to gently pressurise the bone walls. These together facilitate increased bone plasticity and bone expansion.

Increases implant Stability: Huwais S, concluded that, this specially designed bur technology fa-

cilitates ridge expansion with maintained alveolar ridge integrity. It allows for complete implant length placement in autogenous bone with adequate primary stability. He also concluded that, despite compromised bone anatomy, OD preserved bone bulk and promoted a shorter waiting period to the restoration[21].

Contraindications of Osseodensification

OD does not work with cortical bone as cortical bone is a non dynamic tissue which lacks plasticity. Densification of xenografts should be avoided because they behave biomechanically different than the bone tissue, as they have only inorganic content and they just provide the bulk without any viscoelasticity.

Conclusion

Patients demand for a shorter and a faster final treatment. With the introduction of specially designed burs, making OD possible, not only reduces treatment time but, also gives a successful implant outcome. OD is a promising concept which creates an autograft layer of condensed bone at the periphery of the implant bed with the use of densah burs that rotate in a clockwise and anti-clockwise direction, thereby enhancing implant stability and success. It is ideal for patients with poor bone quality, providing good primary implant stability.

References:

1) Holberg C, Winterhalder P, Rudzki-Janson I, Wichelhaus A. Finite element analysis of mono-and bicortical mini-implant stability. European journal of orthodontics. 2013 Apr 18;36(5):550-6.
2) Lioubavina-Hack N, Lang NP, Karring T. Significance of primary stability for osseointegration of dental implants. Clin Oral Implants Res, 2006;17:244-250
3) Al-Marshood MM, Junker R, Al-Rasheed A, Al FarrajAldosari A, Jansen JA, Anil S. Study of the osseointegration of dental implants placed with an adapted surgical technique. Clin Oral Implants Res, 2011;22:753-759.
4) Sennerby L, Gottlow J. Clinical outcomes of immediate/early loading of dental implants. A literature review of recent controlled prospective clinical studies. Aust Dent J, 2008;53:S82-88
5) Degidi M, Daprile G, Piattelli A. Influence of underpreparation on primary stability of implants inserted in poor quality bone sites: an in vitro study. J Oral MaxillofacSurg, 2015;73:1084-1088.
6) Podaropoulos L. Increasing the stability of dental implants: the concept of osseodensification. Balk J Dent Med. 2017;133-140.
7) Alghamdi H, Anand PS, Anil S. Undersized implant site preparation to enhance primary implant stability in poor bone density: A prospective clinical study. J Oral Maxillofac Surg. 2011;69(12):e506-12.
8) Summers RB. A new concept in maxillary implant surgery: The osteotome technique. Compendium. 1994;15:152,154-56, 158 passim; quiz 162
9) Stavropoulos A, Nyengaard JR, Lang NP, Karring T. Immediate loading of single SLA implants: drilling vs. osteotomes for the preparation of the implant site. Clinical oral implants research. 2008 Jan;19(1):55-65.
10) Jimbo R, Tovar N, Marin C, Teixeira HS, Anchieta RB, Silveira LM, Janal MN, Shibli JA, Coelho PG. The impact of a modified cutting flute implant design on osseointegration. International journal of oral and maxillofacial surgery. 2014 Jul 1;43(7):883-8.
11) Huwais S. Autograftingosteotome. Geneva, Switzerland: World Intellectual Property Organization Publication. 2014 May.
12) Trisi P, Berardini M, Falco A, Vulpiani MP. New osseodensification implant site preparation method to increase bone density in low-density bone: In vivo evaluation in sheep. Implant dentistry. 2016 Feb;25(1):24.
13) Huwais S, Meyer EG. A Novel Osseous Densification Approach in Implant Osteotomy Preparation to Increase Biomechanical Primary Stability, Bone Mineral Density, and Bone-to-Implant Contact. International Journal of Oral & Maxillofacial Implants. 2017 Jan 1;32(1).
14) Trisi P, De Benedittis S, Perfetti G, Berardi D. Primary stability, insertion torque and bone density of cylindric implant ad modumBranemark: is there a relationship? An in vitro study. Clinical oral implants research. 2011 May;22(5):567-70.
15) Himmlova L, Dostálová TJ, Kácovský A, Konvic◙ková S. Influence of implant length and diameter on stress distribution: a finite element analysis. The Journal of prosthetic dentistry. 2004 Jan 1;91(1):20-5.
16) Anitua E, Carda C, Andia I. A novel drilling procedure and subsequent bone autograft preparation: a technical note. International Journal of Oral and Maxillofacial Implants. 2007 Jan 1;22(1):138.
17) Green JR, Nemzek JA, Arnoczky SP, Johnson LL, Balas MS. The effect of bone compaction on early fixation of porous-coated implants. The Journal of arthroplasty. 1999 Jan 1;14(1):91-7.
18) Podaropoulos L. Increasing the stability of dental implants: The concept of osseodensification. Balkan Journal of Dental Medicine. 2017 Nov 27;21(3):133-40.
19) Wennerberg A, Albrektsson T. Suggested guidelines for the topographic evaluation of implant surfaces. International Journal of Oral & Maxillofacial Implants. 2000 May 1;15(3).
20) Huwais S, Meyer EG. A Novel Osseous Densification Approach in Implant Osteotomy Preparation to Increase Biomechanical Primary Stability, Bone Mineral Density, and Bone-to-Implant Contact. International Journal of Oral & Maxillofacial Implants. 2017 Jan 1;32(1).
21) Kanathila H, Pangi A. An Insight into the Concept of Osseodensification-Enhancing the Implant Stability and Success. Journal of Clinical & Diagnostic Research. 2018 Jul 1;12(7).

CASE REPORT

Telescopic denture - a case report

*** Shahin Ismail, **Sona J Lal, **Arya Nair, **Arunima Upendran, *Nissy Elizabeth, *** Pradeep C Dathan**

*Lecturer, **P.G. Student, ***Professor and Head of the Department, Department of Prosthodontics,
Sri Sankara Dental College, Akathumuri, Varkala - 695318

Abstract

M.M. Devan's dictum states that "It is more important to preserve what already exists than to replace what is missing". Retaining teeth and roots for overdenture provides better support, proprioception, and maintenance of alveolar bone. This clinical report describes the prosthodontic rehabilitation of a patient with telescopic denture by utilising few maxillary natural teeth for better support and psychological benefits of the patient.

Key Words: Telescopic denture; Primary coping; Secondary coping; Overdenture; Double crown

Introduction

According to Glossary of prosthodontic terms, a telescopic denture is also called as an overdenture, which is defined as any removable dental prosthesis that covers and rests on one or more of the remaining natural teeth, on the roots of the natural teeth or on the dental implants. It is also called as overlay denture, overlay prosthesis and superimposed prosthesis. In situations with few remaining natural teeth, overdenture therapy has been proven to be advantageous[1]. A telescopic denture is a prosthesis that consists of a primary coping that is cemented to the abutments in a patient's mouth and a secondary coping that is attached to the prosthesis and fits on the primary coping. These crowns are an effective means for retaining the removable partial dentures. The advantages associated with overdenture therapy was the preservation of alveolar bone around the retained teeth and continuing the presence of periodontal sensory mechanisms.[2]

Telescopic crowns are also known as a double crown. There are three different types of double crown systems. They differ by their retentive mechanism. These are telescopic crowns, which achieve retention by using friction, and conical crowns or tapered telescope crowns, which exhibit friction only when they are completely seated by using a "wedging effect." The magnitude of the wedging effect is mainly determined by the convergence angle of the inner crown: The smaller the convergence angle, the greater is the retentive force.[3] The double crown with a clearance fit (also referred to as a hybrid telescope or a hybrid double crown) exhibits no friction or wedging during its insertion or removal. The retention is achieved by using additional attachments or functional molded denture borders.

This clinical report describes the prosthetic management of a patient with few remaining maxillary teeth by using the telescopic denture.

Case report

A 46 year-old male patient reported to the Department of Prosthodontics, with the chief complaint of difficulty in chewing. On intraoral examination, the maxillary arch was partially edentulous (Kennadies Class I) and mandibular arch was dentulous. The remaining teeth present in the maxillary arch were 12,13,21,22 and 23. Clinical and radiographic examination revealed grade III mobility and severe bone loss with respect to

12, 21, 22 and were extracted (Fig. 1 and 2). All treatment options were discussed with the patient, including total extraction and conventional denture, implant-supported denture, telescopic denture with maxillary arch. After considering various aspects, the patient elected to have telescopic denture for

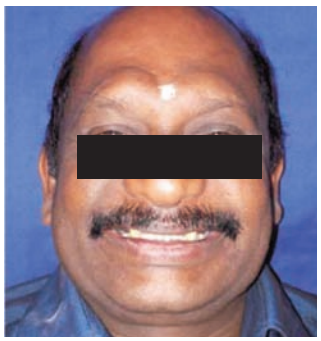


Fig. 1 Preoperative extraoral view

Fig. 2 Preoperative OPG

Fig. 3 Tooth Preparation

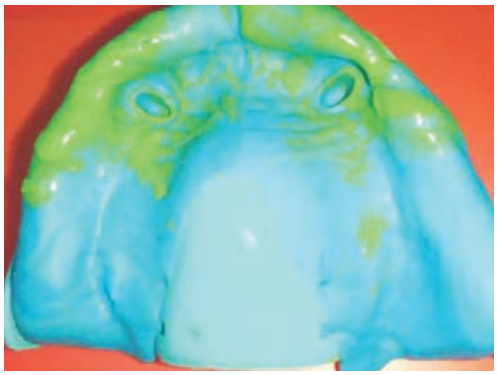


Fig. 4 Impression

Fig. 5 Surveying

Fig. 6 Primary coping

Fig. 7 Wax Pattern

Fig. 8 Tentative Jaw Relation

Fig. 9 Final prosthesis

Fig. 10 Postoperative intraoral view

Fig. 11 Postoperative extraoral view

maxillary arch. Extraction of all mobile teeth were carried out. Maxillary canines on the right and left side were retained. Oral prophylaxis, root planning and endodontic treatment were carried out. After assessing endodontic therapy, tooth preparation was done for receiving primary copings for right and left maxillary canines (Fig. 3). Impressions were made by the putty reline technique (Fig. 4). The wax pattern was invested, cast, finished and modified on surveyor for parallelism, the metal crowns were cast using Co-Cr and returned to the surveyor to be resurveyed for the final path of insertion (Fig. 5). Finally, the castings were polished and cemented in the patients mouth (Fig. 6). After duplication of the master cast, the refractory cast was obtained and the cast metal framework along with secondary coping was fabricated in Co-Cr alloy (Fig. 7). The framework was tried in the patient's mouth for final fit. Ceramic veneering of the secondary coping was done, The jaw relation record was recorded with occlusal rims on the framework (Fig. 8). Try in was done in the patient's mouth. Acrylization of the framework was done using heat cure acrylic resin (Fig. 9). Telescopic denture was delivered to the patient. The patient reported with satisfactory fit and ease of use (Fig. 10).

Discussion

After tooth loss, the residual alveolar ridge undergoes resorption. The residual ridge resorption is stated to be rapid, progressive, irreversible and inevitable[4]. It is observed that bone is maintained around long-standing teeth and implants. Retaining teeth as overdenture abutments will slow down the rate of alveolar bone resorption. The objective of tooth preservation is to provide the tensile stimulation to the oblique periodontal fibers and the end result is the deposition of more bundle bone followed by decrease in abutment mobility.

The telescopic crowns have many advantages like axial loading of the tooth and full covering of the abutment which may reduce the tilting forces on the abutment supporting tissues.[9] The axial forces also stimulates periodontal tissues and alveolar bone. Telescopic crowns also provide indirect splinting.[5] Sufficient space must be available to accommodate the primary and secondary copings also the denture base should have sufficient thickness to avoid fracture, and proper space for the arrangement of the teeth to fulfill the esthetic requirements.[6] The abutments should be periodontally sound with adequate bone support. An even distribution of the abutment in each quadrant of the arch is preferable for better stress distribution and for increased retention and stability of the prosthesis.[7]

Conclusion

The telescopic denture revealed a long-lasting treatment modality in the prosthetic treatment of patient with reduced dentition.[8] It has been found that telescopic dentures provides better retention, stability, support and chewing efficiency as compared with the conventional complete dentures and also there is a decrease in the rate of the residual ridge resorption because of better stress distribution and the transfer of compressive forces into the tensile forces by the periodontal ligament, which effects the rate of bone remodelling.[9] Periodic recall and oral hygiene maintenance is essential for the success of telescopic denture.

References

1. Bolender CL, Zarb GA, Carlsson GE. Boucher's Prosthodontics Treatment for Edentulous Patients. 11th ed. St.Louis: Mosby Year Book; 1997. p. 46-7.
2. 2. Yalisove IL. Crown and sleeve-coping retainers for removable partial prosthesis. J Prosthet Dent 1966;16:1069-85.
3. Preiskel HW. OverdentureMade Easy: A Guide to Implant and Root Supported Prostheses. London: Quintessence Publishing Co Ltd; 1996. p. 61.
4. Atwood DA. Reduction of residual ridges: A major oral disease entity. J Prosthet Dent 1971;26:266-79.
5. Langer Y, Langer A. Tooth-supported telescopic prostheses in compromised dentitions: A clinical report. J Prosthet Dent 2000;84:129-32.
6. Sharry JJ. Complete Denture Prosthodontics. 3rded. US: McGraw-Hill Inc; 1974. p. 310-1
7. Wenz HJ, Lehmann KM. A telescopic crown concept for the restoration of the partially endentulous arch: The Marburg double crown system. Int J Prosthodont1998;11:541-50.
8. Hou GL, Tsai CC, Weisgold AS. Periodontal and prosthetic therapy in severely advanced periodontitis by use of the crown sleeve coping telescope denture. A longitudinal case report. Aust Dent J 1997;42:169-74.
9. Lord JL, Teel S. The overdenture: Patient selection, use of copings, and follow-up evaluation. JProsthet Dent 1974;32:41-51.

CASE REPORT

Prosthetic rehabilitation of partially edentulous maxilla with precision attachment

***Arya Nair R, *Sona J Lal, *Anju D, **Nissy Elizabeth, ***Pradeep C Dathan**

*P.G. Student, **Lecturer, *** Professor and Head of the Department, Department of Prosthodontics, Sri Sankara Dental College, Akathumuri, Varkala - 695 318

Send correspondence: Dr. Arya Nair R, E-mail: aryarakesh224@gmail.com

Abstract

Precision attachment is one of the treatment modality in rehabilitation of partial edentulousness with only a few remaining teeth which can provide better aesthetics and function. This article presents a method of fabrication of semi precision attachment for cast partial denture.

Key Words: Precision Attachment, Extracoronal Attachments, Removable Partial Denture

Introduction

The periodontal status of remaining teeth, anatomical relationships of tissues and esthetics play an important role in rehabilitating partially edentulous conditions. Various treatment options available in the rehabilitation of partially edentulous arches includes Overdentures, Clasp retained removable partial dentures, Removable partial dentures with precision attachments and implant supported prosthesis.[1] Treatment planning is done based on location of remaining teeth, functional requirements, retention, and economic considerations. Retention of the prosthesis can be improved by incorporating an attachment to the prosthesis and abutment teeth. Extra-coronal attachment has a projecting male component soldered to the crown, and a female housing is incorporated in the removable prosthesis. This type of attachments provide a certain amount of movement between the two sections of the prosthesis and at the same time retains the prosthesis.[2]

This case report presents the rehabilitation of partial edentulous condition with an extracoronal attachment and cast partial denture.

Case Report

A 64-year-old female was presented to the Department of Prosthodontics, with a chief complaint of missing teeth in front and back region on either side of the upper and lower jaw and wishes to replace the same. On clinical examination 23, 24, 25, 27, 34, 35, 36, 38, 44 and 45 were present. There was reduced vertical facial height due to loss of posterior opposing tooth contact and generalized attrition of remaining teeth. The maxillary partially edentulous arch presented with Kennedy's Class II modification 1 and the mandibular arch presented with Class II modification 2.

Endodontic treatment for remaining teeth was performed and composite build up was done. An interim RPD was fabricated to increase the vertical diamension by 2mm. Patient was advised to wear the interim removable prosthesis for three weeks, to determine whether the increased vertical dimension

was comfortable for the patient or not. Metal ceramic crown was planned in relation to maxillary left canine and premolars. Extra coronal attachment was placed on the mesial aspect of canine for providing attachment for the cast partial denture. The RPD for the mandibular arch was designed and fabricated in the conventional manner.

Technique

Tooth preparation was performed for porcelain fused to metal crowns and occlusal clearance was assessed in relation to 23, 24, and 25 (Fig 4). Rest seat preparation was done in relation to 27. Final impression of the prepared tooth was made with Polyvinylsiloxane impression material using dual impression **procedure** and then poured with die stone. Wax patterns were fabricated for porcelain fused to metal crown. Extra coronal retainer was attached to wax pattern ie The patrix was attached to the mesial surface of the anterior abutment wax-up on the master cast. Metal coping with patrix was fabricated and tried in (Fig 5). A pick-up impression of metal coping was made and poured to obtain the cast (Fig 6). Veneering of the crown was done with ceramic. Metal framework for removable partial denture with the receptacle was fabricated (Fig 7,8). Crown cementation done in relation to 23, 24, 25. Try in of the framework was done. Jaw relation and trial was performed (Fig 9, 10). Acrylisation finishing and polishing was done and the prosthesis was delivered to the patient. (Fig 11,12, 13). Periodic follow up was done and maintenance of partial denture was done.

Discussion

Even though there are various options for fixed restorations, the preference for removable partial denture is still high in older age groups and in certain compromised situations.[3]

Edentulism can lead to functional impairment

Fig. 1 Preoperative extraoral view

Fig. 2 Preoperative intraoral view

Fig. 3 Vertical dimension established

Fig. 4 Tooth preparation

Fig. 5 Metal try-in

Fig. 6 Pick-up impression

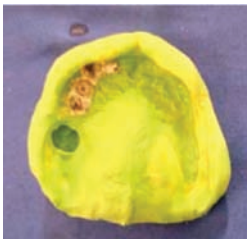


Fig. 7 Wax pattern

Fig. 8 Metal framework

Fig. 9 Jaw relation

Fig. 10 Try-in

with esthetic compromises and psychological changes. The goal of prosthetic reconstruction is to preserve and restore health, function, and esthetics.[4] Since the systemic conditions were not favorable for any surgical procedures, implant supported prosthesis was not considered. Patient requested for a minimum coverage in palatal region. Thus the cast partial denture was designed with closed horse shoe major connector (Fig 8).

Fig. 11 Final prosthesis

Fig. 12 Post-operative intraoral view

Fig. 13 Post-operative extra-oral view

Clasp in removable partial denture can be unesthetic in the anterior region. Removable partial dentures with attachments are considered more efficient in providing retention and restoring function and esthetics. Intra-coronal attachments require more vertical height to accommodate the attachment and require more tooth reduction weakening the tooth structure.[5] Thus a semi precision attachment was designed mesial to the canine to eliminate the display of metal clasp and improve function and aesthetics.[6]

There was only a limited space available between 25 and 27 due to mesial migration of 27. This space was utilised for providing circumferential clasp for both 25 and 27 to improve the retention, stability and support of the prosthesis and to maintain the arch continuity. (Fig 8)

Conclusion

Rehabilitation of partial edentulism using prothesis with Semi precision attachment presents a better treatment alternative. Few remaining natural teeth will be preserved and the attachment improves the retention and stability of the prosthesis and thus improves the quality of life of the patient without major invasive surgical procedures.

References

1. Patel et al, Use of precision attachment and cast partial denture for long-span partially edentulous mouth - A case report; International Journal of Applied Dental Sciences 2014; 1(1): 22-25
2. Burns DK, Ward JE. A review of attachments for removable partial denture design: Part 2. Treatment planning and attachment selection. Int J Prosthodont 1990; 3:169-174.
3. Nu Zitmann, E Hagmann, R Weiger. What is prevalence of various types of prosthetic dental restorations in Europe ?Clin Oral Implant Res. 2007; 18(3): 20- 33
4. D'Souza Col DSJ, Dua Lt Col Parag. Rehabilitation strategies for partially edentulous prosthodontic principles and current trends. MJAFI. 2011; 67(3): 296-98
5. JM Zahler. Intracoronal precision attachments; Dent Clin North Am. 1980; 24-131.
6. Shetty NB, Shetty S E N, Shetty O, D'souza R, Precision attachments for aesthetics and function: A case report; J ClinDiagn Res. 2014; 8(1): 268-70.

IDA Attingal Branch
Reports & Activities

1. INSTALLATION CEREMONY OF NEW OFFICE BEARERS 2019:

The installation ceremony of Dr AFZAL A as the PRESIDENT; Dr DEEPAK S DAS as the SECRETARY, Dr BIJU A NAIR as the Treasurer and the Team of Office bearers for the year 2019 was held on 30th Dec 2019 at ANAMTHARA RESORTS, ATTINGAL from 6:00 pm to 10:00pm. Dr ABHILASH G S (PRESIDENT IDA KSB) was the chief guest, Dr P S TAHA Chairman, PMS COLLEGE OF DENTAL SCIENCES was the guest of honor for the function.

2. CDE PROGRAMMES:

The first CDE of IDA ATTINGAL BRANCH was conducted on 10th March 2019 at Karthika Park, Kazhakoottam on the Topic " SIMPLIFYING CHALLENGES IN CROWN AND BRIDGES " by the faculty Prof: Dr Dinesh N, From the Dept of Prosthodontics and Implantology, PMS College of Dental Sciences And Research. 102 members attended the CDE.

3. CDH PROGRAMS:

A) Camp at Panavilla Sree Durga Bhagavathi Temple (21/03/2019)

IDA ATTINGAL BRANCH conducted an oral screening camp on 21st January 2019 at Panavila Sree Durga Bhagavathy Temple, Attingal, 45 patients were examined, Oral Health kit was distributed, Dr Vasudevan Vinay, Dr Arun S, Dr Jishana attended the camp.

B) Cancer awareness program (4th Feb 2019)

IDA ATTINGAL BRANCH CDH Wing combined with WDC observed WORLD CANCER DAY 2019 on 4th Feb 2019 At MMHS High School, Nilamel and conducted the following program.

1. A Cancer Awareness Program among students.
2. A Quiz competition on Substance Abuse and prize distribution.
3. A Skit program by the students.

The Program was inaugurated by Dr Abhilash G S (President IDA KSB) CDH Convener Dr Vasudevan Vinay, WDC Chairperson Dr Meera Murali, Secretary Dr Shameema, KDC Member Dr Biju A Nair, Dr Ameena attended the program.

INTERNATIONAL WOMENS DAY 2019: (8/03/2019)

IDA ATTINGAL BRANCH women's wing observed international women's day at ANANDATHEERAM (A center for differently abled) CHATHANOOR and conducted the following programs.

1. honoured 3 vibrant lady gems with mementos for their valuable contributions to the society.
2. Parents teachers awareness program.
3. Adoption of Oral health centre
4. Check up / Treatment camp. And lunch was provided for the inmates.
5. Distribution of medicines

The program was inaugurated by Dr Abhilash G S, Dr Vinay Vasudeven, Dr Biju A Nair, Dr Alex Philiph, Dr Meera Murali, Dr Shameema, Dr Atheena Attended the function.

C) NATIONAL DENTIST DAY:

IDA ATTINGAL BRANCH celebrated NATIONAL DENTIST DAY on 10th March 2019, A Cake cutting

INSTALLATION CEREMONY IDA ATTINGAL BRANCH, President Dr AFSAL A, Hon SEC Dr Deepak S Das, Treasurer Dr Biju A Nair And Team of Office Bearers for 2019 with The Chief Guest President IDAKSB Dr ABHILASH GS, Guest of honour Dr P S TAHA.

function and a get together was held for the members. 97 members attended the celebration.

4. EXECUTIVE COMMITTEE MEETINGS:

A) 1st Executive Committee meeting: The 1st Executive committee meeting of IDA Attingal Branch was held on 17/1/2019 at ANAMTHARA Resorts 2019 at 7:30pm. The Meeting was presided by The President Dr Afsal A, Vote of Thanks was delivered by Hon Sec Dr Deepak S Das. 27/30 members were present for the meeting.

B) EOGM: 1st EOGM of IDA ATTINGAL BRANCH was held on 21/2/2019 at Anamthara Resorts, Attingal at 4:30pm. The Meeting was presided by The President Dr Afsal A, Vote of Thanks was delivered by Hon Sec Dr Deepak S Das. 27 members attended the meeting.

C) 2nd Executive committee Meeting: The 2nd Executive committee Meeting of IDA Attingal Branch was held on 21/2/2019 at ANAMTHARA Resorts 2019 at 5:30pm.

The Meeting was presided by The IDA Attingal Branch President Dr Afsal A, Vote of Thanks was delivered by Hon Sec Dr Deepak S Das. 26/29 members attended the meeting.

5) FRATERNITY CONTRIBUTION OF IDA HOPE TRANSFERRED TO THE BEREAVED FAMILY OF Dr DILIP STEWARD.

The Fraternity contribution Amount of Rs 12,11,600/- (A/c Payee Cheque)was handed over to the bereaved Family of Dr Dilip Steward on 31st March 2019 by The President Dr Afsal A, IDA HOPE REPRESENTATIVE Dr Ashok Gopan, IPP Dr Ramesh S, Dr Anil Kumar, Dr Sudeep S were present for the informal function.

1st CDE Presidential Address

Members Attending 1st CDE

1st CDE

DENTIST DAY CELEBRATION, Cake cutting by Senior Member Dr VIJAYAN, President Dr Afsal, Sec Dr Deepak, CDH Convener Dr Vasudevan Vinay

Handing over the Cheque of Fraternity contribution To The bereaved family of Dr Dilip Steward By The President Dr Afsal A and Rep to HOPE Dr Ashok Gopan.

Womens Day Celebrations

Welcome Speech by Dr. MeeraMurali, WDC President IDA Attingal Branch.

Womens Day Celebrations

SM Zirconia

The Best Quality Zirconia Restorations at the Lowest Price ever!

SM ZIRCONIA **PREMIUM**
SM ZIRCONIA **CLASSIC**
SM ZIRCONIA **CRYSTAL**
SM ZIRCONIA **STANDARD**
SM ZIRCONIA **NATURA**
SM ZIRCONIA **MONOLITH**

Features of SM Zirconia

- Premium Quality Zirconia Discs from Germany
- Ultra Translucent Zirconia used
- Unique Shading Technology
- High Strength Performance up to 1450 mpa
- Zirconia Restoration for affordable price

SM DENTAL LAB®
Building Confidence

An ISO 9001:2015 Certified Dental Lab

KANNUR
S.M. House, Onaparampa Road, Puthiyatheru
Kannur - 670011, Kerala, India
E-mail : smdentallab@yahoo.com
Mob : 9744650945

COCHIN
Chundanal Monarch, K. K. Padmanabhan Road
Ernakulam, Kochi - 682 018
E-mail : smdentallabekm@gmail.com
Mob : 8943355205, 8943355052

www.smdentallab.com /smdentallab mail@smdentallab.com customercare.smdentallab /smdentallab

Edited, printed and published by Dr. Pradeep C. Dathan, Editor, Impressions on be half of IDA Attingal Branch, Production: Suman Graphics, Trivandrum