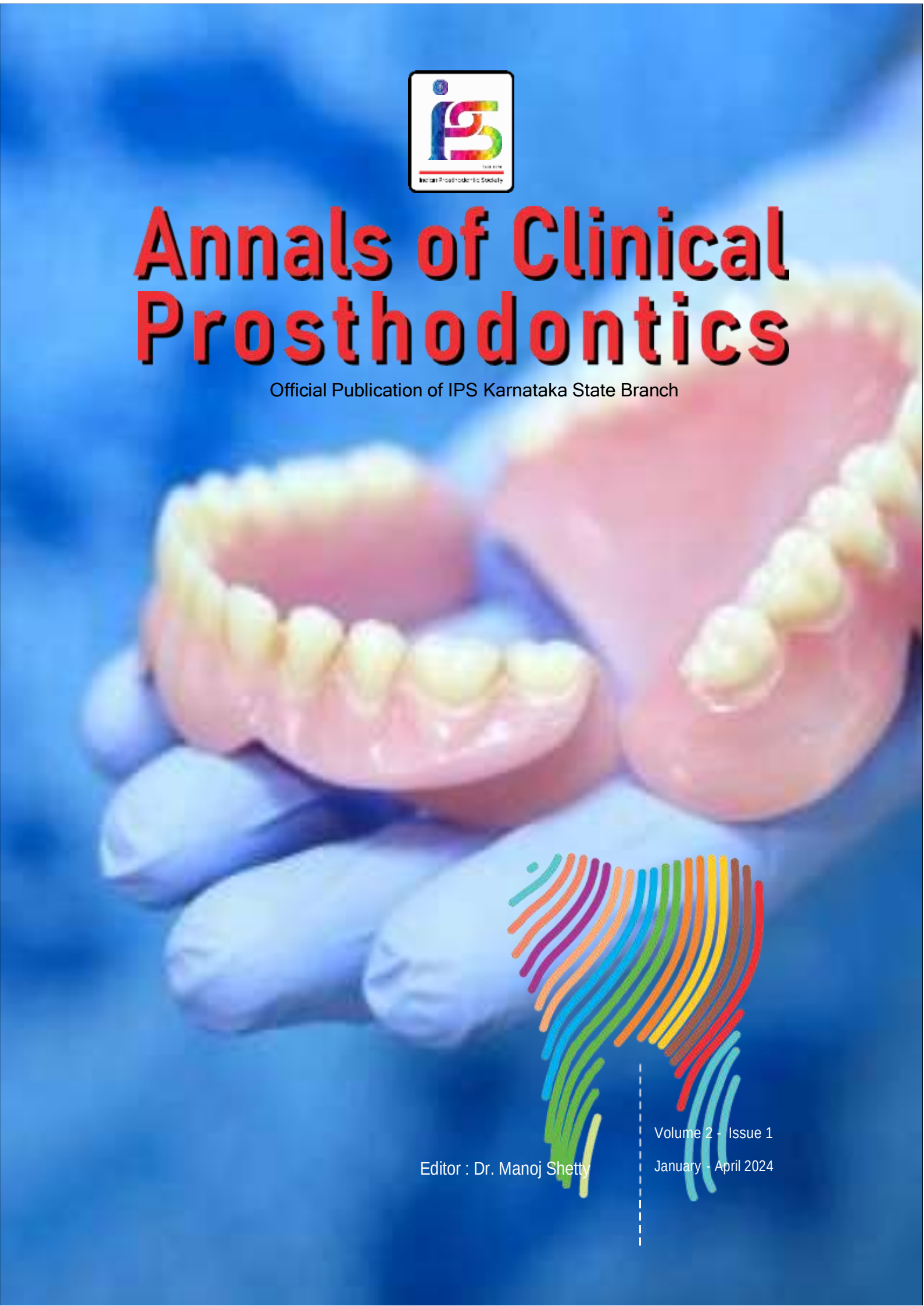


Annals of Clinical Prosthodontics

Official Publication of IPS Karnataka State Branch

Editor : Dr. Manoj Shetty

Volume 2 - Issue 1

January - April 2024

IPS Head Office

Dr. Manish Lahori
President

Dr. Shilpa Shetty
President Elect

Dr. Chethan Hegde
Immediate Past President

Dr.Gopi Chander
1st Vice President

Dr. Neeta Pasricha
2nd Vice President

Dr. P. Shesha Reddy
Joint Secretary

Dr. Sanketh Kethireddy
Treasurer

Dr. Anand Kumar
Editor

EC Members

- Dr. F. D. Mirza ,, Dr. Mahesh Verma ,, Dr. Suhasini Nagda ,, Dr. V. Rangarajan
- Dr. T. V. Padmanabhan ,, Dr. U. V. Gandhi ,, Dr. K. Mahendranadh Reddy ,, Dr. Gururaj Rao
  - Dr. Jigna Shah ,,Dr. Nitesh Shetty ,,Dr. Ravi Shankar Y ,, Dr. Roshan Kumar P
- Dr. Umesh Y Pai ,, Dr. Banga Parmeet Singh ,, Dr. Bishnupati Singh ,, Dr. Bhupinder Yadav
- Dr. Mahesh Gowda ,, Dr. Abhishek Sharma ,, Dr. G. Phani Krishna ,, Dr. Saranjit Singh Bhasin
  - Dr. Vivek Choukse ,, Dr. D. Chalapathi Rao ,, Dr. Deepesh Kumar Gupta
    - Dr. Manish Katyayan ,, Dr. Manoj Shetty ,, Dr. Padmaja Pithani ,, Dr. Arka Swarnakar
      - Dr. Bhavan Chand Yemineni ,, Dr. Chiramana Sandeep ,, Dr. Gaurang S. Mistry
        - Dr. Gunjan Srivastava ,, Dr. Kalinga Keshari Sahoo ,, Dr. Mahesh Babu. M
- Dr. Pankaj Prakash Kharade ,,Dr. Shiva Shankar. M ,, Brigadier (Dr.) Viswambaran M

IPS Karnataka State Branch Office

Founder Members
Dr. N. Sridhar Shetty
Dr. S. Ramanand Shetty
Dr. Chandrashekaran Nair

President
Dr. Anil Kumar Gujjari

Secretary
Dr. Umesh Pai

Treasurer
Dr. Anand Kumar Patil

Immediate Past President
Dr. Prakash Nidawani

President Elect
Dr. Sunil Dhaded

Editor
Dr. Manoj Shetty

Executive Committee Members
Dr. Pradeep S | Dr. Prasanna B G | Dr. Ramesh Naykar | Dr. Nagaraj E

Dr. Gouri Anehosur | Dr. Chandrashekar Sajjan

Annals of Clinical Prosthodontics

(An official Publication of IPS Karnataka Branch)

Editor

Dr. Manoj Shetty

Indian Prosthodontic Society (Karnataka Branch)
S/O A Balakrishna Shetty, 13-2-19A Navi, Near Ajjarkadu
Park, Kitturu Chennamma Road, Ajjarkad
Udupi, Karnataka- 576101 Email: drmanojshetty@nitte.edu.in
Profile link: Department of Prosthodontics| ABSMIDS (nitte.edu.in)

About the Journal:
Annals of Clinical Prosthodontics, a publication of the Indian Prosthodontic Society, was established in 2023. It is a peer-reviewed journal that publishes three issues per year print version. The journal operates under an open-access model, allowing free access to its content. Authors are permitted to self-archive the final accepted version of their articles in any OAI-compliant institutional or subject-based repository.

Scope of the Journal:
The journal will cover technical and clinical studies related to health, ethical and social issues in field of Prosthodontics and restorative dentistry including implants, esthetic, ceramics and reconstructive dentistry. Articles with clinical interest and implications will be given preference.

The Editorial Process:
A manuscript will be reviewed for possible publication with the understanding that it is being submitted to **Annals of Clinical Prosthodontics** alone at that point in time and has not been published anywhere, simultaneously submitted, or already accepted for publication elsewhere. The journal expects that authors would authorize one of them to correspond with the Journal for all matters related to the manuscript. All manuscripts received are duly acknowledged. On submission, editors review all submitted manuscripts initially for suitability for formal review. Manuscripts with insufficient originality, serious scientific or technical flaws, or lack of a significant message are rejected before proceeding for formal peer-review. Manuscripts that are unlikely to be of interest to the Journal of Indian Prosthodontic Society readers are also liable to be rejected at this stage. Manuscripts accepted for publication are copy-edited for grammar, punctuation, print style, and format. Page proofs are sent to the corresponding author. The corresponding author is expected to return the corrected proofs within three days. It may not be possible to incorporate corrections received after that period.

Manuscript Submission, Processing and Publication Charges:
The official language used in this journal is English. The manuscript can be emailed to editorkpsj@gmail.com.
Journal does not charge for submission or publication fee on article.

Copyrights:

Publisher:
Dr. Manoj Shetty
Indian Prosthodontic Society (Karnataka Branch)
S/O A Balakrishna Shetty,13-2-19A Navi, Near Ajjarkadu
Park, Kitturu Chennamma Road, Ajjarkad
Udupi, Karnataka- 576101
Email: drmanojshetty@nitte.edu.in

ARTICLE INDEX

Contact:
Dr. Manoj Shetty, Indian Prosthodontic Society (Karnataka Branch) Editor- Annals of Clinical Prosthodontics, S/O A Balakrishna Shetty, 13-2-19A Navi, Near Ajjarkadu Park, Kitturu Chennamma Road, Ajjarkad, Udupi, Karnataka- 576101, Email: drmanojshetty@nitte.edu.in, Mob: 9845267087

Technical Support: A1 Logics, 5-4-172/2, 1st Floor, 'Takshila', Near Hotel Janatha Deluxe Pathumudi, MG Road, Mangalore, Karnataka, India-575003, Ph:0824 4252005

A DIAGNOSED MENIERE'S DISEASE (MD) CASE, WAS EVALUATED WITH A DIGITAL OCCLUSION ANALYZER AND TREATED WITH DISCLUSION TIME REDUCTION (DTR) THERAPY.

Prof. (Dr.) Prafulla Thumati*

Professor & HOD, Department of Orofacial Pain, RajaRajeshwari Dental College and Hospital, Bengaluru, Karnataka

***Corresponding author:**
Prof. (Dr.) Prafulla Thumati
Professor & HOD, Department of Orofacial Pain, RajaRajeshwari Dental College and Hospital, Bengaluru, Karnataka
Email: thumatiprafulla@gmail.com

Abstract:
Meniere's Disease/Tinnitus (MD) remains a significant challenge to diagnose and treat effectively. This case report intends to assess the measured influence of DTR (Disclusion Time Reduction Therapy) treatment in patients diagnosed with Meiners disease. A patient suffering from Tinnitus and diagnosed by ENT specialists was referred to our dental office to look for any dental component that could be a point of concern. The Meiners symptoms of ear fullness, vertigo, and tinnitus before DTR reduced post-treatment significantly in intensity, duration, and frequency and correlated to symptom improvements or resolution at post 1 month and 3 months. Occlusal forces and timing were the major contributors to the Tinnitus/MD condition in this patient. Menier's disease may have an unnoticed occlusal etiology in long Disclusion Time. Disclusion Time Reduction therapy should be considered a treatment option in patients diagnosed with MD.

Key Words: Tinnitus, Meniere's Disease (MD), Immediate Complete Anterior Guidance Development (ICAGD) Coronoplasty, Vertigo, Disclusion Time Reduction (DTR).

Introduction:
There is a debate in the health field that excessively unbalanced occlusal forces produced during mastication and other functions can induce hearing problems. [1] In 1936, Costen observed that the loss of posterior tooth support could cause the mandibular condyles to shift posteriorly, exerting pressure on the tympanum. This compression could affect the eustachian tube, auriculotemporal nerve, and/or chorda tympani. [2,3] The research question is, does unbalanced occlusal force induce ear symptoms?

Meniere's Disease (MD) has been extensively studied since Prosper Meniere first described it over 150 years ago. [4] However, its diagnosis and management continue to present significant challenges for clinicians. [5-10] There is still no consensus regarding the etiology of MD, particularly in relation to endolymphatic hydrops. [9-16]

Kerstein's published study theorized that masticatory muscle hyperactivity during oral functions and parafunction due to prolonged mechanoreceptor compressions in the periodontal ligament (pdl) of posterior teeth may lead to signs and symptoms of temporomandibular dysfunction (TMD). [17] In the last 3-4 decades, the development of biometric tools for digital analysis of occlusal forces, electromyography of masticatory muscles, joint vibratography for temporomandibular joints, study of mandibular movements using a kinesiograph helped reveal the unknown terrain of influence of occlusal forces. [18-22] TMD symptoms such as

primary headaches, hearing loss, tinnitus, ear pain, pain around the eyeball, neck pain, and facial pain are the main ones. A study by Lee et al shows that unilateral mastication was associated with hearing loss at different frequencies. [23] A study by Di Berardino et al and Peroz showed that tinnitus symptoms are more frequent in patients with occlusal disorders. [24]

Objective occlusal measurements conducted using digital occlusal technology (T-Scan 10/BioEMG III; Tekscan, Inc., S. Boston, MA, USA; Bioresearch Assoc., Milwaukee, WI, USA) (Figure 1) showed an imbalance in occlusal forces and prolonged exclusion time (DT) bilaterally. The patient opted to address the underlying occlusal dysfunction, which led to a significant improvement in MD/tinnitus symptoms, including the restoration of previous hearing loss, as confirmed by audiometric testing following occlusal treatment.

Case Report:

A patient diagnosed with Tinnitus/Meniere's Disease (MD) by an otolaryngologist (ENT) was assessed at our dental office, which provides specialized Disclusion Time Reduction (DTR) therapy for individuals with temporomandibular dysfunction (TMD). The patient had previously undergone magnetic resonance imaging (MRI), which excluded the presence of auditory neuromas.

The dental practice was located at Raja Rajeshwari Dental College, Department of Orofacial Pain in Bengaluru, India. The Otolaryngology Department of Raja Rajeshwari Medical College referred this patient who met for dental evaluation.

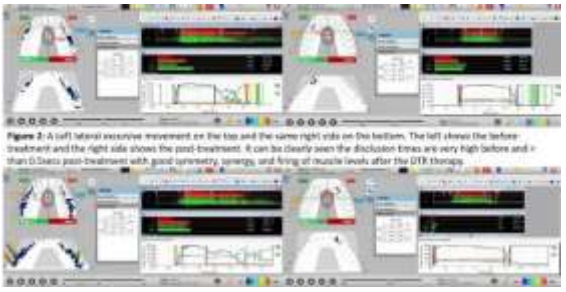
Informed consent was obtained from the patient for both the DTR coronoplasty procedure and the collection of data on the severity, frequency, and duration of tinnitus/MD symptoms via questionnaires. The patient's oral health history was also recorded, with the patient reporting MD symptoms such as ear fullness, tinnitus, vertigo (including drop attacks), and hearing loss in at least one ear.

Before the development of Immediate Complete Anterior Guidance (ICAGD), the participant underwent an excursive assessment of right and left lateral movements using the synchronized T-Scan 10/BioEMG III system (Tekscan Inc., S. Boston, MA, USA; Bioresearch Assoc., Inc., Milwaukee, WI, USA) (Figure 1).

Figure 1: T-Scan 10/BioEMG III measuring the temporalis (red leads) and masseter muscles (green leads) in real-time. Subjects closed firmly into their Maximum Intercuspation Position (MIP) and clenched their teeth together for 1- 3 seconds.

Description of DTR Therapy with the ICAGD Coronoplasty:

Clinical maximum intercuspation (MIP) photographs of the subject, along with her right and left excursive occlusal relationships, were taken before any ICAGD procedures. On the first day of treatment, recordings were made, including right and left excursive T-Scan/BioEMG data, as well as pre-treatment exclusion durations (DT) and excursive electromyography (EMG) levels. These initial measurements were recorded for comparison with the DT and EMG values following ICAGD (Figure 2).



ICAGD occlusal corrections were performed in 2 phases:

• **ICAGD Phase I adjustments –**The patient's teeth were air-dried, and then the patient closed ICAGD occlusal corrections were carried out in two phases:

• **ICAGD Phase I adjustments** – The patient's teeth were air-dried, and the patient then closed into the maximum intercuspal position (MIP) with articulation paper (Arti-Fol® Red, 8µ, Bausch, Germany) inserted. The patient was instructed to initiate a right outward excursion to contact the right canine's incisal edges,

return to the MIP, then perform a left excursion to the incisal edges of the left canine before sliding back into the MIP. Pre-treatment T-Scan/BioEMG recordings were used to identify and correct extended excursive contacts, marked with articulation paper, using finishing burs (Mani Dia-Burs, Japan), leaving contact points on the central fossa, tip, and marginal ridges.

• **Phase II** – Modifications to the usual closure at MIP. After all posterior quadrants underwent ICAGD, the subject performed unguided mandibular closures to MIP. All high-force contacts were refined until the new MIP felt "comfortable". When only the contacts in the MIP remained and the trajectory of the center of force rested on the midline of the arch, indicating that there was good occlusal balance, the closure adjustments were complete.

Post-therapy recordings were taken in the same manner as pre-treatment to verify that the excursion times were accurate (Figure 2). The patient was followed up on day 1, one month, and three months to refine the procedure, allowing the muscles to heal after the occlusal corrections. At each of the three visits, the patient completed new questionnaires assessing the frequency, duration, and intensity of symptoms.

Symptoms of vertigo, tinnitus, and ear fullness, along with their duration and frequency, showed a decrease from baseline to three months post-DTR. The disclusion time (DT) was reduced to less than the neurophysiological level of <0.5 seconds, and the symmetry, synergy, and muscle EMG firing were all neurophysiologically healthy, as indicated by EMG measurements.

Discussion:

The findings in this patient support earlier clinical studies on Meniere's disease (MD) (Sutter, 2016, 2019), which showed that reducing the lateral excursive time through ICAGD led to significant improvement in MD symptoms within a short time frame, lasting up to six months. The complexity of MD may be partly due to the fact that both medical and dental fields have been investigating the wrong factors for answers. This case report suggests that MD and malocclusion may not be separate conditions, but rather two aspects of the same underlying disease process, diagnosed differently depending on whether the diagnosis comes from an otolaryngologist or a dentist. Treating the true cause of MD could prevent the recurrence of symptoms and stop the disease from worsening. The authors recommend that the Academy of Otolaryngology-Head and Neck Surgery implement a symptom screening protocol to include MD under the scope of temporomandibular disorders (TMD), helping avoid unnecessary treatments and inefficient use of resources.

This case confirms that the patient diagnosed with MD experienced a reduction in the frequency, duration, and intensity of symptoms, as well as a decrease in muscle activity, after shortening the lateral excursion time through computer-guided coronoplasty. Although occlusion has not been widely acknowledged as a potential cause of MD in both medical and dental literature, the findings of this study indicate that malocclusion—especially issues related to bite force and timing—may be the root cause of the symptoms experienced by this MD patient.

References:

1. Abel MD, Levine RA. Muscle contractions and auditory perception in tinnitus patients and nonclinical subjects. J Craniomandib Sleep Pract. 2004;22(3)181-191.

2. Costen JB. Neuralgias and ear symptoms associated with disturbed function of the temporomandibular joint. JAMA.1936;107(4):252-255.

3. Saldanha ADD, Hilgenberg PB, Pinto LMS, et al. Are temporomandibular disorders and tinnitus associated? J Craniomandib Sleep Pract. 2012;30(3):166-171.

4. Méniere "Sur une forme de surdité grave dépendant d'une lésion de l'oreille interne" (On a form of severe deafness dependent on a lesion of the inner ear), Bulletin de l'Académie impériale de médecine, 1861; 26: 241.

5. Perez-Carpena P, Lopez-Escamez JA. Current Understanding and Clinical Management of Meniere's Disease: A Systematic Review. Semin Neurol. 2020 Feb;40(1):138-150. doi: 10.1055/s-0039-3402065. Epub 2019 Dec 30. PMID: 31887752.

6. Mancini F, Catalani M, Carru M, Monti B. History of Meniere's disease and its clinical

presentation. Otolaryngol Clin North Am. 2002 Jun;35(3):565-80. doi: 10.1016/s0030-6665(02)00017-8. PMID: 12486840.

7. Oberman BS, Patel VA, Cureoglu S, Isildak H. The etiopathology of Ménière's disease: a contemporary review. Acta Otorhinolaryngol Ital. 2017 Aug;37(4):250-263. doi: 10.14639/0392-100X-793. PMID: 28244505; PMCID: PMC5584095.

8. Harris JP, Nguyen QT. Meniere's disease: 150 years and still elusive. Otolaryngol Clin North Am. 2010 Oct;43(5): xiii-xiv. doi: 10.1016/j.otc.2010.05.011. PMID: 20713235.

9. Basura GJ, Adams ME, Monfared A, Schwartz SR, Antonelli PJ, Burkard R, Bush ML, Bykowski J, Colandrea M, Derebery J, Kelly EA, Kerber KA, Koopman CF, Kuch AA, Marcolini E, McKinnon BJ, Ruckenstein MJ, Valenzuela CV, Vosooney A, Walsh SA, Nnacheta LC, Dhepyasuwan N, Buchanan EM. Clinical Practice Guideline: Ménière's Disease. Otolaryngol Head Neck Surg. 2020 Apr;162(2_suppl):S1-S55. doi: 10.1177/0194599820909438. PMID: 32267799.

10. Hegemann SCA. Menière's disease caused by CGRP - A new hypothesis explaining etiology and pathophysiology. Redirecting Menière's syndrome to Menière's disease. J Vestib Res. 2021;31(4):311-314. doi: 10.3233/VES-200716. PMID: 33044205.

11. Gürkov R, Pyykö I, Zou J, Kentala E. What is Menière's disease? A contemporary re-evaluation of endolymphatic hydrops. J Neurol. 2016 Apr;263 Suppl 1: S71-81. doi: 10.1007/s00415-015-7930-1. Epub 2016 Apr 15. PMID: 27083887; PMCID: PMC4833790.

12. Christopher LH, Wilkinson EP. Meniere's disease: Medical management, the rationale for vestibular preservation and suggested protocol in medical failure. Am J Otolaryngol. 2021 Jan-Feb;42(1):102817. doi: 10.1016/j.amjoto.2020.102817. Epub 2020 Nov 2. PMID: 33202330.

13. Merchant SN, Adams JC, Nadol JB Jr. Pathophysiology of Meniere's syndrome: are symptoms caused by endolymphatic hydrops? Otol Neurotol. 2005 Jan;26(1):74-81. doi: 10.1097/00129492-200501000- 00013. PMID: 15699723.

14. Douglas H. Morgan, DDS Tinnitus of TMJ Origin: A Preliminary Report, Journal of Craniomandibular Practice, 1992.

15. Iwasaki S, Shojaku H, Murofushi T, Seo T, Kitahara T, Origasa H, Watanabe Y, Suzuki M, Takeda N; Committee for Clinical Practice Guidelines of Japan Society for Equilibrium Research. Diagnostic and therapeutic strategies for Meniere's disease of the Japan Society for Equilibrium Research. Auris Nasus Larynx. 2021 Feb;48(1):15-22. doi: 10.1016/j.anl.2020.10.009. Epub 2020 Oct 29. PMID: 33131962.

16. Foster CA, Breeze RE. Endolymphatic hydrops in Ménière's disease: cause, consequence, or epiphenomenon? Otol Neurotol. 2013 Sep;34(7):1210- 4. doi: 10.1097/MAO.0b013e31829e83df. PMID: 23921917.

17. Kerstein RB. A comparison of traditional occlusal equilibration and immediate complete anterior guidance development. J Craniomandib Pract. 1993; 11:126-140.

18. Yiannios N, Kerstein RB, Radke J. Treatment of frictional dental hypersensitivity (FDH) with computer-guided occlusal adjustments. J Craniomandib Sleep Pract. 2016; DOI:10.1080/08869634.2016.1251692.

19. Seedorf H, Leuwer R, Fenske C, et al. The "Costen Syndrome"-which symptoms suggest that the patient may benefit from dental therapy? [Das 'Costen Syndrome]. Laryngorhinootologie. 2002;81(4)268-275. DOI:10.1055/s.2002-25324.

20. Tuz HH, Onder EM, Kisnisci RS. Prevalence of otologic complaints in patients with temporomandibular disorder. Am J Orthod Dentofacial Orthop. 2003;123(6):620-623.

21. Di Berardino F, Filipponi E, Schiappadori M, Forti S, Zanetti D, Cesarani A. The occlusal imaging and analysis system
by T-scan III in tinnitus patients. Biomed J. 2016 Apr;39(2):139-44. doi: 10.1016/j.bj.2016.04.001. Epub 2016 Jun 1. PMID: 27372169; PMCID: PMC6140139.

22. Morais AA, Gil D. Tinnitus in individuals without hearing loss and its relationship with temporomandibular dysfunction. Bra J Otorhinolaryngol. 2012;78(2):59-65.

23. Lee JY, Lee ES, Kim GM, et al. Unilateral mastication was evaluated using asymmetric functional tooth units as a risk indicator for hearing loss. J Epidemiol.2019;29(8):302-307. DOI:10.2188/jea.JE201.

24. Nagasaka H, Matsukubo T, Takaesu Y, et al. Changes and equalization in hearing level induced by dental treatment and instruction in bilaterally equalized chewing: a clinical report. Bull Tokyo Dent Coll. 2002;43(4):243-250. DOI:10.2209/tdcpublication.43.243.

REBUILDING SMILES: A JOURNEY TO FULL-MOUTH RESTORATION (CASE REPORT)

Dr. T. Ritushree[1], Dr. Sunil Dhaded[2*]

[1]Post-graduate student, Department of Prosthodontics Crown Bridge and Implantology, AME's Dental College and Hospital, Raichur.

[2]Professor and Head of Department, Department of Prosthodontics, Crown Bridge and Implantology, AME's Dental College and Hospital, Raichur.

***Corresponding Author**
Dr. Sunil Dhaded
Professor and Head of Department, Department of Prosthodontics, Crown Bridge and Implantology, AME's Dental College and Hospital, Raichur
Email: sunildhaded2000@gmail.com

Abstract-
Full-mouth rehabilitation encompasses a comprehensive and detailed series of restorative procedures aimed at modifying the occlusal plane and achieving proper balance. The Broadrick flag is a traditional tool used to replicate tooth morphology in harmony with the curve of Spee. This case report illustrates the development and use of a custom-designed Broadrick occlusal plane analyzer (BOPA) on a semi-adjustable articulator (Whipmix) to precisely establish the optimal orientation of the occlusal plane during full-mouth rehabilitation (FMR).
Conclusion: Full-mouth rehabilitation was pivotal in the treatment strategy for this case. A customized occlusal plane analyzer was developed and utilized to restore the damaged occlusal plane, ensuring its compatibility with the stomatognathic system.Keywords: Full-mouth rehabilitation, Anterior survey point, Posterior survey point, Curve of Spee, Occlusal plane.

Introduction:
Traditionally, individuals with severe dental challenges were treated with full-mouth extractions followed by complete denture placement. However, advancements in dental materials, techniques, and technology have revolutionized Prosthodontics, making it more efficient to restore compromised mouths. Full-mouth rehabilitation entails a comprehensive approach that includes occlusal plane adjustments to achieve functional and balanced results.The occlusal plane plays a key role in these procedures. Tools such as the Broadrick occlusal plane analyzer are instrumental in recreating tooth contours that follow the curve of Spee, thus avoiding protrusive interferences. However, the Broadrick occlusal plane analyzer (BOPA) is a high-cost tool with limited compatibility, as it is designed for specific articulator systems. To make it more accessible, a custom-made version was developed for semi-adjustable articulators, allowing for broader use with minimal modifications.
This case report details the construction and application of a customized Broadrick occlusal plane analyzer, showcasing its effectiveness in diverse full-mouth rehabilitation cases.

Case report:
A 48-year-old female patient visited the Department of Prosthodontics at AME's Dental College and Hospital, Raichur, Karnataka, with a primary concern of multiple missing and decayed teeth. Her dental history revealed cases

of caries and periodontal disease, which led to the extraction of several teeth. An intraoral examination showed a partially edentulous maxillary and mandibular arch. The missing teeth included 12, 22, and 23 in the maxilla and 46, 47 in the mandible, along with root stumps in 14, 16, 18, and 37, and decay in 38. The vertical dimension remained intact, necessitating only adjustments to the occlusal plane.

The treatment involved extracting root stumps and performing root canal therapy on decayed teeth. A Broadrick Occlusal Plane Analyzer (BOPA) was employed to evaluate and refine the occlusal plane orientation. The maxillary cast was detached from the articulator, and a custom-made flag was attached to its upper member. The anterior survey point (ASP) was set at the midpoint of the disto-incisal edges of the mandibular canines bilaterally. Using a 4-inch radius, a long arc was drawn from the ASP on the flag. The posterior survey point (PSP) was identified at the anterior border of the articulator's condylar element, and a short arc was drawn, intersecting the ASP arc. The intersection point served as the pivot for drawing a 4-inch radius line along the buccal surfaces of the mandibular teeth. The process was repeated on both sides, and a putty index with polyvinyl siloxane material was created along these lines to aid in plane reduction.

Afterwards, an arbitrary facebow transfer was performed, and centric and lateral bite records were captured for mounting on a Whipmix articulator. Preparations were completed for teeth 11–14, 21–26 in the maxilla, and 34, 35, 44–47 in the mandible. Implants were placed at 36 and 37 for rehabilitation. Temporary restorations were provided, and the final restorations were temporarily cemented for a week. Following necessary adjustments during a recall visit, final cementation was performed.

PRE-OPERATIVE EXTRAORAL AND INTRAORAL VIEWS

BROADRICK'S OCCLUSAL PLANE ANALYZER(CUSTOM MADE)

FACEBOW TRANSFER

FACEBOW TRANFER ON WHIPMIX ARTICULATOR

TOOTH PREPRATION DONE IRT MAXILLARY AND MANDIBULAR ARCHES

IMPLANT PLACEMENT IRT 36.37

METAL TRY-IN DONE

FINAL PROSTHESIS INTRORAL AND EXTRAORAL POSTOPERATIVE VIEW

Discussion:

As an essential component of the stomatognathic system, the mouth's functionality can be compromised by any disruption within its structures. Full-mouth rehabilitation is necessary to restore these components, ensuring proper function. The goal is to convert destructive forces exerted on

the teeth into positive forces that support periodontal health and promote normal function. This process involves comprehensive procedures to establish a healthy, aesthetic, and self-sustaining stomatognathic system.

Dr.Broadrick introduced an instrument in 1963 to determine the optimal position and orientation of the occlusal plane posteriorly. This device allows for the reconstruction of the Curve of Spee, ensuring alignment with incisal and condylar guidance. For cases involving a Dentatus semi-adjustable articulator, where no such apparatus was available, a custom Broadrick Occlusal Plane Analyzer (BOPA) was developed.

Over two months of weekly follow-ups, no signs of occlusal imbalance or tooth damage were observed. The patient exhibited maximum intercuspation in centric occlusion without interferences during jaw movements. Additionally, the patient reported significant improvements in chewing ability with the prosthetic solution.

Conclusion:

Full-mouth rehabilitation was a cornerstone of the treatment protocol in this case, addressing the multifaceted needs of the patient's compromised masticatory system. This comprehensive approach involved a series of restorative and rehabilitative procedures aimed at creating a healthy, functional, aesthetic, and self-maintaining mechanism. By focusing on the intricate relationship between the occlusal plane and the stomatognathic system, the treatment sought to restore harmony and functionality.

A custom-designed occlusal plane analyzer was meticulously fabricated to re-establish the severely disrupted occlusal plane. This device enabled precise adjustments, ensuring alignment with the stomatognathic system to support optimal function and comfort. Each step of the rehabilitation process was tailored to address the patient's specific needs, incorporating careful planning, advanced techniques, and high-quality materials.

The culmination of this thorough treatment protocol resulted in a significant transformation for the patient. The restoration not only improved oral functionality but also enhanced aesthetics, boosting the patient's confidence and overall satisfaction with the outcome. The case highlights the importance of integrating innovative tools like a custom occlusal plane analyzer in achieving comprehensive and sustainable rehabilitation outcomes.

References:

1. Goldman I. The goal of full mouth rehabilitation. J Prosthet Dent 1952;2:246–51.

2. Lynch CD, McConnell RJ. Prosthodontic management of the curve of Spee: Use of the Broadrick flag. J Prosthet Dent 2002;87:593–7.

3. Toothaker RW, Graves AR. Custom adaptation of an occlusal plane analyzer to a semiadjustable articulator. J Prosthet Dent 1999;81:240–2.

4. Small BW. Occlusal plane analysis using the Broadrick flag. Gen Dent 2005;53:250–2

5. Needles JW. Mandibular movements and articulator design. J Am Dent Assoc 1923;10:927–35.

6. Joseph.S.Landa. An analysis of current practices in mouth rehabilitation. J Prosthet Dent 1955;5:537. 7. Gill JR. Treatment planning for mouth rehabilitation. J Prosthet Dent 1952;2:230–45.

7. Dawson PE. Evaluation, diagnosis and treatment of occlusal problems. 2nd ed. St Louis: Elsevier 1989;85:373–81

GUIDED SURGERY FOR IMPLANT SUPPORTED PROSTHESIS USING ALL ON FOUR CONCEPT: A CASE REPORT

Dr. Samanvaya Gupta [1*], Dr. Rakshith Hegde [2]

[1] Post graduate Student, Department of Prosthodontics and Crown & Bridge, A B Shetty Memorial Institute of Dental Sciences, NITTE (Deemed to be University), Mangaluru, 575018, India

[2] Professor, Department of Prosthodontics and Crown & Bridge, A B Shetty Memorial Institute of Dental Sciences, NITTE (Deemed to be University), Mangaluru, 575018, India

***Corresponding Author**
Dr. Samanvaya Gupta
Post graduate Student, Department of Prosthodontics and Crown & Bridge, A B Shetty Memorial Institute of Dental Sciences, NITTE (Deemed to be University), Mangaluru, 575018, India
Email: samanvaya.21dpro08@student.nitte.edu.in

Abstract:

Dental implants are widely recognized as one of the most dependable and conservative methods for replacing lost teeth. The success of implant dentistry has grown more predictable with the development of newer materials and advancements in digital technology, particularly in the areas of guided implant surgery, implant planning software, and computed tomography. This case study demonstrates the use of 3D guided technology for dental implant surgery diagnosis, planning, and execution. Dental implantologists have been studying and researching the combination of CBCT with three-dimensionally guided implant surgery employing stents, since it has opened up new avenues for the discipline. A digitally designed and printed stent is used to create an osteotomy in order to install a surgically guided implant, which has the ability to achieve the maximum degree of control, precision, and accuracy.

Keywords: Guided implant surgery, CBCT, Surgical stent, All on Four, Full Mouth Rehabilitation

Introduction:

The field of clinical dentistry has seen a significant change with the introduction of computer aided design and manufacturing (CAD/CAM) technologies, particularly in the field of oral implantology, thanks to the fast advancement of computer technology in recent years. Computer-aided design/computer-aided manufacturing (CAD/CAM) and three-dimensional (3D) computed tomography (CT) scan images have been used to create this therapeutic approach of 3 dimensionally guided implant placements. Clinicians can plan implants in the simulated three-dimensional image created from CT data by using specialized software. This helps medical professionals to create a treatment plan that takes prosthetics and anatomy into account. The computer-guided stereolithographic surgical template is then created using the desired data. Predictability, precision in implant placement, low invasiveness, and reduced post-operative pain are the benefits of the 3D guided surgical procedure. Additionally, it shortens the amount of time needed for tissue recovery as compared to traditional implant insertion techniques because the template makes it possible to place implants without raising a flap. To get the

greatest clinical outcome, the accessible bone can be assessed eliminating the need for a bone graft.[1-3]

This case study describes the utilization of 3D CBCT computer-assisted diagnostics, virtual implant planning by merging the DICOM files for a prosthetic guided implant placement, the creation of a stereolithographic surgical template, and the insertion of dental implants using surgical guides at pre-planned sites.

Case report:

A 51-year-old male patient presented with the chief complain of ill fitting complete denture. On thorough examination, it revealed the patient had a set of complete denture fabricated one year prior with underextended flanges leading to poor retention. Intraoral examination revealed well rounded completely edentulous ridge in maxilla and the mandible and the inter-ridge distance was 29mm. The patient had no significant past medical history and deleterious habits.

After discussing various treatment modalities, the approach of full mouth rehabilitation using surgical stent guided implant placement was chosen.

The case was then planned and executed adhering to surgical protocols laid by the manufacturer.

Treatment planning→

An intraoral orthopantomogram and CBCT was done for evaluation and further treatment planning.

The denture was tried inside the patient's mouth to verify the location of the existing acrylic teeth and their location over the ridge.

CBCT data revealed inadequate bone in the posterior region of maxilla and mandible with the crest being in close proximity to the vital structures present (maxillary sinus in the maxilla and inferior alveolar nerve canal in mandible)

Considering the limited amount of bone available, it was decided to place implants following the All on Four concept with mesial angulation of the maxillary posterior implants.

Scan of the prosthesis→

A CBCT scan of the existing denture was made using radio-opaque markers in the intended site of implant placement.

The canine region in the anterior and first molar region in the posterior maxilla was selected to be the site of implant placement. For mandible it was the lateral incisor region and the second premolar region.

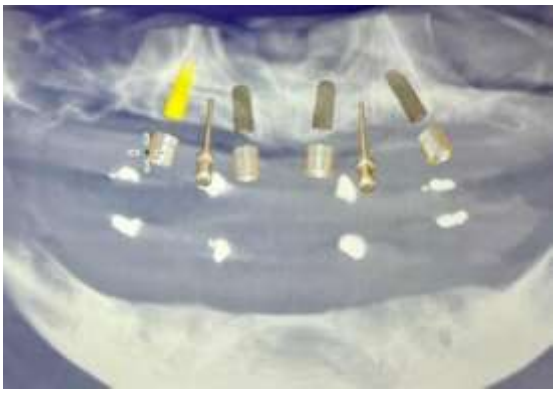
Software based planning and designing of the surgical guide→

The data of the CBCT of the hard tissue and the existing denture was merged together (DICOM on DICOM merging).

The posterior implants in maxilla were angulated mesially to bypass the maxillary sinus. The anterior implants were angulated labially according to the bone morphology.

In mandible the posterior implants were planned straight and anterior implants were angulated labially. Shorter length of implant in mandibular posterior region was to bypass the anterior loop of inferior alveolar nerve.

The finalised guide design was printed via a stereolithographic printer.



Osteotomy and Implant Placement:
The fit of the surgical stent was verified intra-orally prior to the day of surgery.
During surgery, the area was anesthetized and the stent was fixed using anchorage pins. The surgery was performed as per the guided instrument set in surgery cassette.
Using a tissue punch, soft tissue was scooped out and the sequence of drills was used starting with the pilot guided drill, the twist drill, final drill and the crestal drill.
Healing abutments were placed post the implant placement and the patient was kept on a therapeutic dose of antibiotic, analgesic and antiulcerogenic drugs for a period of five days along with chlorhexidine containing mouthwash.
The patient was recalled after one month for follow-up.

Discussion:
A new approach of guided implant surgery makes use of 3D CBCT and a stereolithographic surgical template to design the final position of the implants. This helps to make implant placement easier. It is critical to comprehend the methodology and final location of implants positioned with the help of a surgical template. Even though flapless guided surgery may need less time for the surgical intervention than conventional approaches, significantly more time is spent on preoperative preparation.[1-4]
When implant placement, the freehand/conventional method yields much more errors than either static or navigation approaches. When employing a computer-assisted static system and placing the implant at the right depth, there is a noticeable increase in accuracy at both the apical and coronal positions of the implant. It leads to a smaller angulation error (<5°) and crestal and apical position variation (<2 mm). It is a noninvasive technique that results in less trauma and morbidity than freehand techniques and supports the working surgeon's improved posture.[4]
However using surgical guides in the posterior areas or in restricted mouth opening might present some difficulties because of the different drill diameters.
Since a flapless technique is frequently employed it is beneficial when the implant location is close to anatomical features such as the maxillary sinus, mental foramen, and mandibular nerve and has a sufficient thickness of keratinized tissue. Hahn claims that this approach's success rate is comparable to that of traditional methods. The accuracy and speed of treatment were given by Nickenig and Eitner, who in 2007 verified the dependability of static aided computer navigation using a flapless technique.[4]
This approach's main flaw is its inability to gauge the operative bone region and provide access. Accidental perforation on and through the crest can also result in implant failure.[4]

Conclusion:
With the current age of digital technology, the ease, predictability and success of implant placement has increased immensely. Paying due attention to the limitations, the margin of error could be reduced both during implant planning and placement. A comprehensive knowledge about the software and rationale of implant placement would provide the best results to the patient.

References:

1. Kumar, C.A., Kumar, C.R., Sujesh, M., Priyalatha, S., & Harilal, G. (2020). Implant placement using CBCT guided stent and conventional stent - A case report. IP Annals of

Prosthodontics and Restorative Dentistry.

2. Agarwal, Anant & Agarwal, Dr & Parihar, Swarnika. (2022). 3D Guided Implant Surgery using CBCT and Stent: A Case Report. International Journal of Research and Review. 9. 833-837. 10.52403/ijrr.20220870.

3. Maharjan, Shyam & Srb, Mathema. (2018). 3D Guided Implant Surgery: A Case Report. 1. 10.3126/jnprossoc.v1i2.23863.

4. Kalaivani G, Balaji VR, Manikandan D, Rohini G. Expectation and reality of guided implant surgery protocol using computer-assisted static and dynamic navigation system at present scenario: Evidence-based literature review. J Indian Soc Periodontol. 2020 Sep-Oct;24(5):398-408.

5. Buser D, Bornstein MM, Weber HP, Grütter L, Schmid B, Belser UC. Early implant placement with simultaneous guided bone regeneration following single-tooth extraction in the esthetic zone: A cross-sectional, retrospective study in 45 subjects with a 2- to 4-year follow-up. J Periodontol. 2008;79:1773–81

6. Akça K, Iplikçioğlu H, Cehreli MC. A surgical guide for accurate mesiodistal paralleling of implants in the posterior edentulous mandible. J Prosthet Dent. 2002;87:233–5.

7. Pawar A, Mittal S. A Step toward Precision: A Review on Surgical Guide Templates for Dental Implants. International Journal of Scientific Study. 2016:3(11): 262-266.

8. Kathleen Manuela D'Souza, Meena Ajay Aras. Types of Implant Surgical Guides in Dentistry: A Review. Journal of Oral Implantology.2012:38(5):643-652.

9. Choi W, Bao-Chau Nguyen, Andrew Doan. Freehand Versus Guided Surgery: Factors Influencing Accuracy of Dental Implant Placement. Implant Dent. 2017;26(4):500–509.

10. Stumpel LJ. Cast-based guided implant placement: a novel technique. J Prosthet Dent.2008;100:61–69.

QUALITATIVE AND QUANTITATIVE OCCLUSAL MARKERS: A REVIEW

Dr. Anirudh Verma[1], Prof (Dr.) Krishna Prasad D[2]

[1]Post-graduate Student, Department of Prosthodontics and Crown & Bridge, A B Shetty Memorial Institute of Dental Sciences, NITTE (Deemed to be University), Mangaluru, 575018, India

[2]Professor, Department of Prosthodontics and Crown & Bridge, A B Shetty Memorial Institute of Dental Sciences, NITTE (Deemed to be University), Mangaluru, 575018, India

Corresponding author:
Dr. Anirudh Verma Post Graduate Student, Department of Prosthodontics and Crown & Bridge, A B Shetty Memorial Institute of Dental Sciences, NITTE (Deemed to be University), Mangaluru, 575018, India
Email: anirudhvrm03@gmail.com

Abstract
Achieving proper occlusion is crucial for the function and health of the masticatory apparatus. Each element plays a vital role, from the alignment of individual teeth to the harmony between occlusal contacts and the positioning of condyles and mandibular musculature. Any disturbance in this delicate balance can lead to various issues, ranging from trauma and periodontal disease to bruxism and temporomandibular joint dysfunction (TMD).In clinical practice, identifying and addressing occlusa interferences is paramount. Various occlusal indicators are available to assist clinicians in this task, each with its own characteristics, sensitivity, and method of usage. These indicators can range from simple articulating paper to more advanced systems like the T-Scan. However, it's crucial for clinicians to have a comprehensive understanding of these tools, including their limitations and proper interpretation of the markings they provide. By carefully evaluating occlusal contacts and utilizing appropriate indicators, clinicians can ensure that prosthetic replacements for missing teeth achieve optimal occlusion, thereby promoting overall oral health and function. A manual search of pertinent publications and a literature search utilizing the PubMed database. Relevant English-language articles published between January 1950 and May 2024 were taken into consideration.

Keywords: Articulating Paper; Articulating Silk; Articulating film; High Spot Indicator; Occlusal Indicators; T Scan

Introduction

Occlusal contacts arise when the mandibular and maxillary teeth come into contact with one another.[1] Noncontacts are regions where there is a 0.5-2 mm gap between the teeth, conversely, near contacts are defined as having a separation of no more than 0.5 mm between the occluding surfaces [2] The distinction between occlusal contacts, near contacts, and noncontacts is essential for understanding how the teeth come together during various movements.

"Occlusal interference" refers to any tooth contact that hinders the remaining occluding surfaces from creating harmonized and stable connections. "[3] It is necessary to eliminate occlusal interference as little as 15 µ since it may result in an unwanted
result. While data suggests that occlusal interferences are not the cause of persistent jaw dysfunction issues, they can cause tooth pain or movement. [4,5]

Since all occlusal surfaces should connect at the same period during mandibular closure, there should be a time interval of 0 s between the first and the last occlusal contact. This is known as true occlusal contact time simultaneity.[6] Sufficient evaluation and management of occlusion are necessary to ensure optimal performance of the masticatory machinery. An

array of clinical symptoms, including tooth migration, broken enamel, periodontal tissue atrophy, gingival recession, migraines, and orofacial pain, can result from irregular occlusal contacts. [7-15].

The use of occlusal indicators plays a significant role in assessing occlusion and guiding treatment. While many indicators are commonly used, their accuracy can vary, especially in determining the sequence of occlusal contacts. Using qualitative indicators may lead to false markings and misinterpretations, potentially resulting in incorrect treatment decisions such as placing restorations in infra-occlusion. The thickness, tensile strength, and flexibility of the recording substance, the oral setting, and the dentist's interpretation all affect how accurate the applied approach is. [16, 17]

Therefore, selecting the appropriate occlusal indicator is critical for achieving precise occlusal therapy and ensuring optimal dental function and patient comfort.

Types of occlusal indicators

The two main categories of occlusion indicators are qualitative and quantitative, with the primary distinction being the latter's ability to quantify tooth contact events.

Qualitative markers

• High spot indicator; articulating paper; articulating silk; articulating film; metallic shim stock film

Quantitative markers

• Virtual patient; Occlusal analysis system T-Scan

Qualitative indicators

Articulating Paper

Articulating papers are the most commonly used qualitative markers for identifying intraoral occlusal contact locations. They vary in width, thickness, and the type of dye used. These papers are hydrophobic, with their primary ingredients being a coloring agent and a bonding agent (such as Transculase-Bausch Articulating Paper), which are placed between two layers of film. The bonding agent helps the coloring agent adhere to the tooth surface, while the coloring agent is released when occlusal contact occurs. The resulting mark typically shows a core region without colorant, surrounded by a rim of dye, which is referred to as the "target" or "iris," indicating the exact point of contact. The density of the markings does not correlate with the force of the contact, as heavy contacts tend to spread the mark beyond the actual contact area. In larger contact areas, the interference requiring correction is most clearly visible in the central portion.

Some writers claim that the articulation paper's markings cannot be accurately interpreted since occlusal interactions are subjectively assessed, making it impossible to pinpoint the exact timing or intensity of the contacts.[18–21] The drawback of high-quality occlusal indicators is that they cannot determine the strength and order of interactions. Some authors contend that the marking's intensity is a flawed metric for determining how strong occlusal interactions are. [18]

Utilizing two distinct articulating paper thicknesses (23 and 60 mm thick) sandwiched between articulated ivorine casts and obscured by a load cell at three distinct loads (150, 200, and 250 N), Saad et al. (2012) tested the reliability of articulating paper marking as well as the ability to describe occlusal force. The thicker paper produced more and larger markings, according to the scientists, while an increase in the applied weight had no discernible effect on mark size. They also mentioned that the professional needs to use "acumen" in order to interpret the marks subjectively and distinguish between false positives and true occlusal contact. [22]

600 paper marks produced by applying increasing occlusal pressures to articulated epoxy casts (between 0 and 500 N) were examined by Carey et al. in 2007.[23] According to the scientists, there was a significant variation in mark sizes for every test load, indicating that many mark sizes could be indicative of a single load. Additionally, they showed that no one tooth's mark area size increased in proportion to a little increase in load. Rather, they noticed that the articulating paper mark areas occasionally shrank in size when subjected to higher stresses. Ultimately, they discovered that the load that was applied and mark size only agreed by 21%, indicating a low likelihood of equal loads being displayed by marks of the same size.

Figure1: Bausch Articulating paper of various shapes

Source Courtesy: Bauschpaper.com

Articulating Silk

Articulating silk is composed of a color pigment that has been micronized and mixed with an emulsion of wax and oil. It is effective when used intraorally and does not generate pseudomarkings during use due to its soft texture. But as stain components dry, they lose their capacity to mark, and saliva can damage them. Therefore, it is imperative that it be stored in a cold, dry place. On highly polished surfaces, such as gold and ceramic in lab models, one strip can be used up to ten times, making it the perfect tool for the job. Some researchers claim that the most effective way to register occlusal interactions is by silk articulation.[24,25]

Figure 2: Bausch Articulating silk

Source Courtesy: Bauschpaper.com

Articulating film: The thickness of the Bausch Inc. Artifol articulating film is just 8 µ, far less than the patient's threshold for perceptual thickness. It is composed of a 6 µ thick hydrophobic emulsion encased in a polyester film. It must be used with specific holders in a dry environment. It works on lab models as well as intraorally and is generally applicable.

Figure 3: Bausch Articulating Film

Source Courtesy: Bauschpaper.com

Metallic shim stock film: One side of the film is colored coded, while the other has a metallic surface. It is mainly advised for use in occlusal splint therapy so that the lab can accurately mark the contacts on the soft splint.

Figure 4: Bausch Arti-Fol

Source Courtesy: Bauschpaper.com

According to Sharma et al., articulation foil is the thinnest occlusal indicator and registers occlusal interactions between teeth more accurately than paper and silk. [26] Using the Shimstock foil, it is possible to determine whether the antagonist teeth are in contact with one another. [27] A perfect occlusal registration strip, according to Halperin et al. (1982), should be thinner than 21 mm, as this is the average proprioception of patients who present with normal dentitions.[28]

High spot indicator: This liquid indicator is recommended for use in laboratories to examine the proximal contacts. Using a brush, the liquid is applied to the coping's proximal surface, creating a 3µ thick film. The proximal contact area is recognized as a show-through area in the base material of the crown upon

removal once the dye has been seated in the cast.

Figure 5: High Spot Indicator

Source courtesy: Yeti Dental

The two-phase occlusion indication method involves using articulating paper and articulating film sequentially to precisely identify interference points. First, the articulating paper is used to mark the contacts, creating a distinct central zone surrounded by a peripheral area filled with dye. In the second phase, articulating foil in a contrasting color is applied to pinpoint the contact locations within the areas previously marked by the articulating paper. The core areas highlighted by the articulating foil represent the actual interferences that need to be corrected.

Choosing the Qualitative Indices

The majority of patients perceive thickness at a level lower than the parameters to be taken into account when choosing these qualitative indicators.[29] This technique will allow for the accurate mounting of centric occlusion on a hinge articulator, the identification of occlusal contacts on newly restored teeth, the establishment of occlusal contacts on unrestored teeth, and the verification of occlusal precision in wax-ups. [30]

Locating the working and balancing interferences is another use for it.

• Thickness - Even in cases when there is no tooth contact between opposing teeth, registration strips can indicate tooth contact when their thickness exceeds the space between the teeth.[31] Furthermore, an overabundance of thickness may trigger a proprioceptive reaction, which may displace the jaw.

• Plastic deformation: Dentists can yank at occlusal registration strips with plastic deformation to assess occlusal contact since the strips will stretch before tearing.

Tensile strength: While thinner strips would rupture before they could be used, those with plastic deformation will stretch before ripping.

• Marking ability: The coloring material ought to adhere to the tooth upon occlusal contact. The occlusal registration strip should be thin and flexible. Marking sensitivity ratings are highest for articulating foils and lowest for articulating paper. The teeth should be dried before using the registration strips because it has been discovered that saliva negatively affects the marking capabilities of all qualitative recording media.

Quantitative indicators

T-Scan

The T-Scan occlusal analysis system (Tekscan), a Microsoft-compliant system, has the ability to record a specific contact sequence in intervals of 0.01 seconds. It is made up of a sensor handle, a piezoelectric foil sensor, and hardware and software for data recording, analysis, and visualization. The distribution and time magnitude of the occlusal contacts are determined by the T-Scan.

In any circumstance when bilateral simultaneous occlusal contact is required, this device is advised. Complete dentures; Fixed or removable partial dentures; FPD-only complete arch reconstruction; full arch reconstruction utilizing implants; disclusion time reduction; occlusal splints; and mandibular repositioning devices.

The T-Scan system was deemed the best clinical instrument in 2016 by Afrashtehfar and Qadeer for the diagnosis of occlusion because it documented the distribution of contacts rapidly and accurately. [19] When utilizing the T-Scan system, the dentist obtains data that enables precise occlusal modification. [32,33]

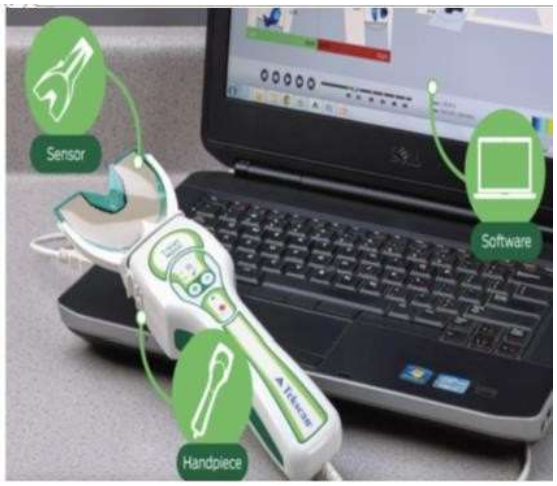


Figure 6: Tekscan T- Scan

Souce courtesy:Tekscan

Virtual Dental Patient

This is a freshly developed idea in which the patient's dentition cast data is scanned to create a three-dimensional dental model. This offers quantifiable data that can help determine the occlusal interferences and evaluate his chewing performance. Furthermore, the dentist can determine how the patient's occlusion has changed over time by sequentially comparing these occlusal contacts.[34]

Discussion

Halperin et al. (1982) suggested that the optimal occlusal registration strip should be no thicker than 21 microns, based on the average proprioception of patients with normal dentition. This finding is important for both researchers and practitioners. Clinically, materials of different thicknesses have been shown to produce varying occlusal surface markings, which may affect the ability to detect and assess premature contacts and interferences. This is significant because the ultimate goal of any dental restoration is to be created, placed, and adjusted to achieve harmonious contact with the opposing dentition. The size of the markings these materials produce can influence the adjustments that a clinician or laboratory technician must make.

Some researches claim that the most effective way to register occlusal interactions is by silk articulation. [24, 25] Some writers claim that because occlusal contacts are subjectively assessed and it is impossible to pinpoint the exact timing and intensity of their occurrence, the markings produced from the articulation paper cannot be accurately interpreted. [18–21] There is no scientific correlation between the depth of color and the surface area, force, or amount of the mark, which limits articulating papers' ability to detect occlusal load.[23] While some studies suggest that stain intensity can indicate contact strength, a key limitation of quality occlusal indicators is their inability to assess the sequence and strength of contacts. Some researchers argue that the intensity of the mark is not a reliable measure for evaluating the strength of occlusal interactions.[18, 35] Sharma et al. state that articulation foil, being the thinnest occlusal indicator, more accurately records occlusal interactions between teeth compared to paper and silk.[24] Additionally, the Shimstock foil can be used to confirm whether there is contact between the opposing teeth. [17] Because the T-Scan technology measures both contact duration and occlusal forces, it provides a dependable way to record occlusion. [36]

Conclusion

We have talked about the several occlusal registration indications that are accessible. Their traits and level of sensitivity distinguish how they should be used in various contexts.

1. The location and quantity of contacts can be determined using qualitative recording materials. The main reasons these materials are favored are their affordability and simplicity of use.

2. Any qualitative recording medium's ability to be marked is adversely affected by saliva; therefore, it is advised that when using intraorally, the teeth be dried before testing and that the medium be used only once.

3. Since the T-Scan technology measures the force and timing features of occlusal contacts, utilizing it to produce bilateral simultaneous occlusal contacts that are genuine and measurable is a therapeutically feasible goal.

References

[1] Korioth TW. Number and location of occlusal contacts in intercuspal position J Proshet Dent 1990;64:206-10.

[2] Millstein PL. A method to determine occlusal contact and noncontact areas: Preliminary report. J Proshet Dent

1984;52:106-10.
[3] Agerberg G, Sandstrom R. Frequency of occlusal interferences: A clinical study in teenagers and young adults. J Prosthet Dent 1988;59:212-7.
[4] Sarocoglu A. Ozpinar B. *In vivo* and *in vitro* evaluation of occlusal indicator sensitivity. J Prosthet Dent 2002;88:522-6.
[5.] Halperin GC, Halperin AR, Norling BK. Thickness,strength and plastic deformation of Occlusal registrationstrips. J Proshet Dent 1982;48:575-8.
[6] Kerstein RB, Grundse K. Obtaining measurable bilateralsimultaneous Occlusal contacts with computer analyzed and guided Occlusal adjustments. Quintessence Int 2001;32:7-8
[7] J. L. Ruiz, "Seven signs and symptoms of occlusal disease: the key to an easy diagnosis," Dentistry Today, vol. 28, no. 8, pp. 112-113, 2009.
[8] A. Spijker, C. M. Kreulen, and N. H. Creugers, "Attrition, occlusion, (dys)function, and intervention: a systematic review," Clinical Oral Implants Research, vol. 18, no. 3, pp. 117–126, 2007.
[9] M.Mazur,M.Jedliński,A.Ndokajetal.,"Long-termeffective- ness of treating dentin hypersensitivity with Bifluorid 10 and Futurabond U: a split-mouth randomized double-blind clini- cal trial," Journal of Clinical Medicine, vol. 10, no. 10, p. 2085, 2021.
[10] S.Ishigaki,T.Kurozumi,E.Morishige,andH.Yatani,"Occlu- sal interference during mastication can cause pathological tooth mobility," Journal of Periodontal Research, vol. 41, no. 3, pp. 189–192, 2006.
[11] C. Wang and X. Yin, "Occlusal risk factors associated with temporomandibular disorders in young adults with normal occlusions," Oral Surgery, Oral Medicine, Oral Pathology, Oral Radiology, vol. 114, no. 4, pp. 419–423, 2012.
[12] M. Racich, "Occlusion, temporomandibular disorders, and orofacial pain: an evidence-based overview and update with recommendations," The Journal of Prosthetic Dentistry, vol. 120, no. 5, pp. 678–685, 2018.
[13] R. de Kanter, P. Battistuzz, and G. Truin, "Temporomandibular disorders: "occlusion" matters!," Pain Research and Management, vol. 2018, 13 pages, 2018.
[14] C. V. Graves, S. K. Harrel, J. A. Rossmann et al., "The role of occlusion in the dental implant and peri-implant condition: a review," The open dentistry journal, vol. 10, p. 594, 2016.
[15] M. Chang, V. Chronopoulos, and N. Mattheos, "Impact of excessive occlusal load on successfully-osseointegrated dental implants: a literature review," Journal of Investigative and Clinical Dentistry, vol. 4, no. 3, pp. 142–150, 2013.
[16] E. Schelb, D. A. Kaiser, and C. E. Brukl, "Thickness and mark- ing characteristics of occlusal registration strips," The Journal of Prosthetic Dentistry, vol. 54, no. 1, pp. 122–126, 1985.
[17] T. Reiber, K. Fuhr, H. Hartmann, and D. Leicher, "Recording pattern of occlusal indicators. I. influence of indicator thickness, pressure, and surface morphology," Deutsche zahnärz- tliche Zeitschrift, vol. 44, no. 2, pp. 90–93, 1989.
[18] M. N. Saad, G. Weiner, D. Ehrenberg, and S. Weiner, "Effects of load and indicator type upon occlusal contact markings," Journal of Biomedical Materials Research. Part B, Applied Bio- materials, vol. 85B, no. 1, pp. 18–22, 2008.
[19] K.I.Afrashtehfar and S.Qadeer,"Computerized occlusal analysis as an alternative occlusal indicator," Cranio, vol. 34, no. 1, pp. 52–57, 2016.
[20] P. Millstein and A. Maya, "An evaluation of occlusal contact marking indicators: a descriptive quantitative method," Journal of the American Dental Association (1939), vol. 132, no. 9, pp. 1280–1286, 2001.
[21] R. B. Kerstein, "Articulating paper mark misconceptions and computerized occlusal analysis technology," Dental Implantology Update, vol. 19, no. 6, pp. 41–46, 2008.
[22] Saad MN, Weiner G, Ehrenberg D, Weiner S. Effects of load and indicator type upon occlusal contact markings. J BiomedMater Res. 2008;85(1):18–23.
[23] Carey JP, Craig M, Kerstein RB, Radke J. Determining arelationship between applied occlusal load and articulating paper mark area. Open Dent J. 2007;1:1–7.
[24]A.Sharma,G.R.Rahul,S.T.Poduval,K.Shetty,B.Gupta,and V. Rajora, "History of materials used for recording static and dynamic occlusal contact marks: a literature review," Journal of Clinical and Experimental Dentistry, vol. 5, no. 1, p. 48, 2012.
[25] E. Schelb, D. A. Kaiser, and C. E. Brukl,

"Thickness and mark- ing characteristics of occlusal registration strips," The Journal of Prosthetic Dentistry, vol. 54, no. 1, pp. 122–126, 1985.

[26] A.Sharma, G.R.Rahul, S.T.Poduval, K.Shetty, B.Gupta and V. Rajora, "History of materials used for recording static and dynamic occlusal contact marks: a literature review," Journal of Clinical and Experimental Dentistry, vol. 5, no. 1, p. 48, 2012.

[27] T. Reiber, K. Fuhr, H. Hartmann, and D. Leicher, "Recording pattern of occlusal indicators. I. influence of indicator thick- ness, pressure, and surface morphology," Deutsche zahnärztliche Zeitschrift, vol. 44, no. 2, pp. 90–93, 1989.

[28] Halperin GC, Halperin AR, Norling BK. Thickness, strength, and plas- tic deformation of occlusal registration strips. J Prosthet Dent. 1982; 48(5):575–578.

[29] Carossa S, Lojacono A, Schierano G, Pera P. Evaluation of occlusal contacts in the dental laboratory: Influence of strip thickness and operator experience. Int J Prosthodont 2000;13:201-4.

[30]. Lyons MF, Sharkey SW, Lamey PJ. An evaluation of the T-Scan computerised occlusal analysis system. Int J Prosthodont 1992;5:166-72.

[31] Millstein P, Maya A. An evaluation of occlusal contact marking indicators: A descriptive quantitative method. J Am Dent Assoc 2001;132:1280-6.

[32] R. B. Kerstein and J. Radke, "Masseter and temporalis excur- sive hyperactivity decreased by measured anterior guidance development," Cranio, vol. 30, no. 4, pp. 243–254, 2012.

[33] P. Thumati, B. A. Sutter, R. B. Kerstein, N. Yiannios, and J. Radke, "Beck changes in the Beck Depression Inventory–II scores of TMD subjects after measured occlusal treatment," Advanced Dental Technologies & Techniques, vol. 1, no. 1, pp. 2–13, 2018.

[34]. Delong R, Ko CC, Anderson GC, Hodges JS, Douglas WH. Comparing maximum intercuspal contacts of virtual dental patients and mounted dental casts. J Proshet Dent 2002;88:622-30

[35] K. Baba, Y. Tsukiyama, and G. T. Clark, "Reliability, validity, and utility of various occlusal measurement methods and techniques," The Journal of Prosthetic Dentistry, vol. 83, no. 1, pp. 83–89, 2000.

[36]. U. Viram, A. Arora, D. S. Kapur, and K. Anika, "T-Scan: occlu- sion demystified," Unique Journal of Medical and Dental Sciences, vol. 3, no. 1, pp. 1–5, 2015.

ENHANCING DENTURE STABILITY IN FLABBY RIDGES: A CASE STUDY ON LIQUID-SUPPORTED PROSTHETICS

Dr Nitesh J Shetty[1], Dr Shrinidhi Patla[2], Dr Arya R[2], Dr Sapna Chengappa Kambiranda[3]

[1]Professor & HOD, Department of Prosthodontics, Srinivas Institute of Dental Sciences, Mukka, Mangalore, Karnataka, India
[2]Post Graduate Student, Department of Prosthodontics, Srinivas Institute of Dental Sciences, Mukka, Mangalore, Karnataka, India
[2]Post Graduate Student, Department of Prosthodontics, Srinivas Institute of Dental Sciences, Mukka, Mangalore, Karnataka, India
[3]Reader, Department of Prosthodontics, Srinivas Institute of Dental Sciences, Mukka, Mangalore, Karnataka, India

Corresponding Author *
Dr Nitesh J Shetty
Professor & HOD, Department of Prosthodontics, Srinivas Institute of Dental Sciences, Mukka, Mangalore, Karnataka, India
Email: drshettynitesh@gmail.com

Abstract:
An ideal complete denture should be flexible, adapt well to the tissue surface, and offer proper retention, which conventional dentures often lack due to their rigidity. This rigidity leads to uneven load distribution, particularly in patients with flabby, atrophic ridges and significant bone resorption, causing discomfort and instability. Liquid-supported dentures address this issue by incorporating a flexible foil over the denture base that adapts to the mucosa during both functional and resting states. These dentures offer better load distribution, retention, and stability, while continuously adjusting to the oral environment. This makes liquid-supported dentures a superior option, particularly for managing flabby ridges, as they provide improved comfort, support, and long-term fit without the need for frequent adjustments.
KEY WORDS: Flabby ridge, polyethylene sheet, glycerin, liquid supported denture.

Introduction:
The presence of loose, movable soft tissue on the alveolar ridge, either in the maxilla or mandible, is a characteristic of the dental disorder known as flabby ridge. [1] This condition frequently arises in patients who have worn dentures for an extended period, particularly due to the gradual loss of underlying bone and trauma caused by ill-fitting prosthetics. As a result, the ridge becomes covered with hyperplastic tissue that can compromise denture stability and retention. It is more frequently present in the anterior region of edentulous patients. [2]
According to histology, dense collagenized connective tissue, loosely distributed fibrous connective tissue, and hyperplastic mucosal tissue make up flabby ridges. Significant amounts of metaplastic bone and/or cartilage may also be present.
This composition contributes to the mobility of the tissue, impacting the fit and stability of dentures in affected patients. Understanding these characteristics is important for effective diagnosis and management. [3]
Patients with flabby ridges may have serious problems with denture stability and retention,

making prosthetic rehabilitation difficult. The flabby tissue that is easily twisted during the impression process is the cause of these challenges. Surgical intervention to treat the soft tissue, implant-retained prostheses for increased stability, or traditional prosthodontics without surgery are the available treatment options for this problem. To guarantee the best results and the comfort of each patient, each strategy needs to be customized to meet their specific demands. [1] When surgery or the use of implants are not practical, conservative care is typically the recommended course of action. The use of elastic impression material to alleviate traumatized tissue was first described by Chase in 1961. [4] Nevertheless, this can only be a short-term measure. Additionally, candidal growth might be easily derived. Ideal dentures in flabby ridge conditions should be strong enough to resist masticatory pressures and have flexible tissue surfaces to lessen trauma and stress on the underlying tissues. [5] Therefore, one potential answer to this issue is a liquid supported denture.

This case report describes a liquid-supported denture for a patient who has a partially edentulous mandibular arch and a completely edentulous maxillary arch with flabby tissue in the front region. Enhancing comfort and stability is the goal of this technique.

Case report:

A 52-year-old female patient reported to Srinivas Institute of Dental Sciences, Mangalore for replacement of missing teeth. The patient had a history of wearing a maxillary complete denture for 5 years. Her chief complaint was the poor fit of the denture and it felt loose while eating. She provided a history of utilizing adhesive for dentures. Prosthetic therapy was not used to replace missing mandibular teeth. By intraoral examination, a completely edentulous maxillary arch with flabby tissue existing in the anterior region and a partially edentulous mandibular arch were observed (Fig. 1a, 1b, 1c).

Fig. 1a

Fig. 1b

Fig. 1c

The treatment strategy and clinical procedures were adjusted to meet the patient's needs while taking into account the many difficulties that came with the case. A liquid-supported maxillary complete denture was chosen over a removable partial denture for the mandible.

A Preliminary impression was made with alginate material using perforated edentulous stock trays. A maxillary cast was poured and the flabby ridge area was marked, followed by fabrication of custom tray [spaced (2 mm), tissue stops] with two posterior handles. Using a slow-speed motor and carbide acrylic trimming bur, the flanges were modified to be 2 mm shorter than the depth of the sulcus after the tray was tried in the patient's mouth. Border molding was performed using the conventional technique with green stick impression compound following which a maxillary (Fig. 2) & mandibular secondary impression was made using zinc oxide eugenol paste. Pickup impression was made of mandibular arch using

alginate impression material in relation to mandibular arch.

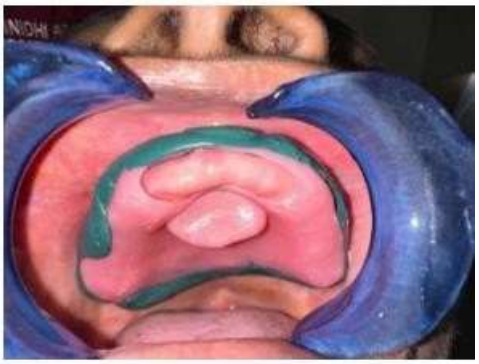


Fig. 2

The impression was evaluated carefully for defects and any excess material on the periphery was removed. In addition, the impression material in the area of flabby ridge was carefully removed using scalpel blade. The maxillary secondary impression was re-seated in the patient's mouth and type II dental plaster was placed in the flabby window region and master cast was obtained (Fig. 3a, 3b).

Fig. 3a

Fig. 3b

Jaw relations were recorded. After the teeth were set, the waxed denture's try-in process was completed. (Fig. 4).

Fig. 4

A liquid-supported denture was created by altering the upper denture design. Using a standard process, the lower removable partial denture was acrylized.

Steps in fabricating a liquid supported denture: A 1 mm thick vacuum heat-pressed polyethylene sheet was adapted to the master cast (Fig. 5), ensuring it was 2 mm short of the sulcus and did not extend into the post-palatal seal (PPS) area. This sheet was incorporated into the denture during the packing stage.

Fig. 5

The upper complete denture, incorporating the 1 mm thick sheet, and the lower removable partial denture were fabricated (Fig. 6a) and delivered to the patient (Fig. 6b).

Fig. 6a

Fig. 6b

The patient was then recalled after two weeks to convert the denture into a liquid-supported version, allowing for an assessment of the

patient's comfort with the polyethylene sheet. At the recall appointment, the 1 mm thick spacer sheet was removed from the denture, resulting in crevices along the borders. These crevices facilitated the final placement of a 0.5 mm thick sheet (Fig. 7a). An addition silicone putty impression of the tissue surface was made (Fig. 7b), and a cast was created to accurately record the junction of the sheet and denture (Fig. 7c). A 0.5 mm thick polyethylene sheet was then vacuum pressed onto this cast, replacing the 1 mm sheet and creating a 0.5 mm space (Fig. 7d).

Fig.7a

Fig. 7b

Fig. 7c

Fig. 7d

The putty index was used as a guide to cut the polyethylene sheet. The 1 mm thick layer was removed, leaving a fissure in which the edges of the 0.5 mm thick sheet were placed. The borders were sealed with cyanoacrylate adhesive and auto-polymerizing acrylic resin to stop any liquid leaks. (Fig. 8).

Fig. 8

The space created by replacing the 1 mm thick sheet with a 0.5 mm thick sheet was filled with glycerin. Two holes were made in the buccal flange area for glycerin injection, while monitoring the vertical dimensions. After filling, the holes were sealed with self-curing acrylic resin to prevent leakage and maintain the denture's integrity (Fig. 9).

Fig. 9

Following the delivery of the upper liquid-supported denture, the patient was given care instructions that included using a soft cloth to clean the tissue surface. Appointments for recall were set for one day, one week, one month, and three months. The patient complained of a floating sensation during the one-week visit. But by the three-month recall, the patient was utilizing the well-maintained denture with ease. (Fig. 10a, 10b).

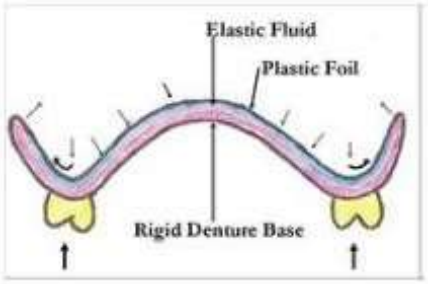
Fig. 10a: Pre-Operative

Fig. 10b: Post-Operative

Discussion:

The liquid-supported dentures incorporate a flexible, liquid-filled base that cushions the underlying mucosa and adjusts continuously to the resorbing ridge, maintaining a consistent fit over time [6]. This design leverages a snug-fitting, flexible membrane that encapsulates a thin layer of liquid, effectively functioning as an ongoing reline for the denture. This setup improves upon traditional dentures by enhancing fit and comfort. When not under pressure, the membrane reverts to its original pre-shaped form, determined during fabrication. Acting like an elastic "tissue conditioner," the liner preserves the denture's original contours, ensuring stability in both

shape and fit [7] (Fig. 11).



When masticatory forces are applied, the liquid's hydrodynamic properties enable the liner to adjust to changes in the mucosa's shape, mimicking the behavior of a "soft liner." After the forces are removed, the membrane returns to its pre-shaped form.

This innovation combines the benefits of tissue conditioners and soft liners while ensuring optimal stress distribution during mastication. Biting forces, including those from bruxism, are distributed across a broader area, thereby reducing pressure points and minimizing the risk of tissue overloading. The liquid redistributes vertically directed forces laterally, reducing localized stress and potentially mitigating complications near the mental foramen in resorbed mandibles. This design may also decelerate and equalize residual ridge resorption over time [8].

In this case, the primary challenges stemmed from combination syndrome, which arises due to uneven stress distribution, leading to tissue changes. These issues were addressed by modifying the impression technique and fabricating a lower removable partial denture along with an upper liquid-supported denture. This approach facilitated better force distribution and reduced tissue trauma.

Precautions:

- The denture base should have a minimum thickness of 3 mm for optimal strength and durability.
- A proper seal is essential to prevent microleakage.
- Patients should be provided with detailed denture care instructions.
- Repairs to the denture are feasible when needed.

In this case, a polyethylene thermoplastic clear sheet was selected due to its softness, flexibility, and biocompatibility. Glycerin was used as the liquid component because it is colorless, odorless, viscous, and biocompatible, making it ideal for supporting the denture base.

Conclusion:

Liquid-supported dentures represent a significant advancement in prosthodontics, particularly for patients with challenging anatomical conditions such as flabby ridges. By utilizing a flexible, liquid-filled base, these dentures ensure optimal retention, stability, and patient comfort, addressing many of the shortcomings associated with conventional complete dentures. Their unique characteristics, including plasticity and elastic recovery, facilitate better adaptation to the oral environment, thereby preserving existing tissues and enhancing overall function. As a result, liquid-supported dentures not only meet the aesthetic and functional needs of patients but also align with modern prosthodontic principles, emphasizing the importance of preserving what remains. This innovative approach ultimately leads to improved patient satisfaction and quality of life.

References:

1) Crawford RW, Walmsley AD. A review of prosthodontic management of fibrous ridges. British dental journal. 2005 Dec;199(11):715-9.

2) Carlsson GE. Clinical morbidity and sequelae of treatment with complete dentures. The Journal of prosthetic dentistry. 1998 Jan 1;79(1):17-23.

3) Magnusson BC, Engström H, Kahnberg KE. Metaplastic formation of bone and chondroid in flabby ridges. British Journal of Oral and Maxillofacial Surgery. 1986 Aug 1;24(4):300-5.

4) Chase WW. Tissue conditioning utilizing dynamic adaptive stress. The Journal of prosthetic dentistry. 1961 Sep 1;11(5):804-15.

5) Dammani B, Shingote S, Athavale S, Kakade D. Liquid-supported denture: a gentle option. The Journal of Indian Prosthodontic Society. 2007 Jan 1;7(1):35-9.

6) Jain A, Puranik S, Jagadeesh MS, Kattimani

P, Akki S, Kumar P, laxmi' V. Liquid-Supported Dentures: A Soft Option—A Case Report. Case Reports in Dentistry. 2013;2013(1):307096.

7) Boere G, de Koomen H, Davidson CL. Liquid-supported dentures. Part II: Clinical study, a preliminary report. The Journal of Prosthetic Dentistry. 1990 Apr 1;63(4):434-6.

8) Jain AR. Clinical review on liquid supported dentures. Drug Invention Today. 2018 Nov 1;10(11).

LOW DENSITY BONE MANIPULATION USING OSSEODENSIFICATION APPROACH: A CASE REPORT

Dr. Singh Isha[1], Dr. Shetty Athma[2], Dr. Sorte Nandita[2]*

[1]Post graduate student, Department of Prosthodontics and Crown & Bridge, A B Shetty Memorial Institute of Dental Sciences, NITTE (Deemed to be University), Mangaluru, 575018, India
[2]Lecturer, Department of Prosthodontics and Crown & Bridge, A B Shetty Memorial Institute of Dental Sciences, NITTE (Deemed to be University), Mangaluru, 575018, India

***Corresponding author**
Dr. Sorte Nandita
Lecturer, Department of Prosthodontics and Crown & Bridge, A B Shetty Memorial Institute of Dental Sciences, NITTE (Deemed to be University), Mangaluru, 575018, India
Email: drnandita.sorte@nitte.edu.in

Abstract: Low density regions such as Maxillary posterior region still may pose certain challenges for rehabilitation using implant supported prosthesis. It is difficult to achieve high primary stability in such areas due to the low density of the bone and thus also prevent immediate loading in such areas. Various techniques have been utilised to increase the primary stability in low density bone areas. Bone manipulation approaches such as osseodensification have shown optimum results in cases where there is deficient bone. This case report describes the use of osseodensification drilling approach to achieve high primary stability to ensure successful immediate loading of the implant.

Key words: Implants, Osseodensification, Primary stability, Immediate Loading

Introduction

With new emerging trends and concepts, the field of oral implantology is an evolving branch of dentistry. A vital feature to achieve osseointegration of implants is high implant primary stability, which is correlated to surgical technique, density of bone,
implant surface texture. Bone density being one of the major factors affecting it. [1] In desire to achieve osseointegration with a higher primary stability of the implant, a technique has been introduced called as Osseodensification. Osseodensification is a technique of preparing an implant site by condensing or densifying the bone, which is in contrast to the normal osteotomy preparation. The non cutting, condensing action of this technique results in a higher density bone. [2] This case report aims to describe the technique of osseodensifcation using specifically designed burs to achieve a prerequisite primary stability.

Case Report

A 45 year old female reported to the Department of Oral Implantology with a chief complaint of missing upper posterior tooth. A thorough examination of the patient and the area of interest was done. Relevant medical and dental history along with required blood investigations were recorded. A thorough treatment planning was done. It was concluded according to various factors to place an implant in the area of interest.

Maxillary posterior region comprises of D3/D4 bone (Misch Classification of bone) which is highly porous and of poor quality. To enhance the primary stability of the implant placed, it was decided to follow the osseodensification technique. Specially
designed Densah burs by the Versah company were used for implant site preparation. Densah burs are multi -fluted tapered burs which help in preserving the bone by condensing the bone, accomplished by their counterclockwise rotation.

The patient received prophylactic antibiotic therapy consisting of Amoxicillin 500 mg combined with Clavulanate 125 mg, administered the night before and on the day of the procedure. The surgery took place in a sterile minor operation theater. Preoperative preparation involved applying a Povidone-

Iodine solution (Betadine) as a disinfectant. Local infiltration anesthesia was achieved using Lignospan Special (2% Lidocaine with 1:80,000 Adrenaline) before the surgery commenced.

After administration of local anaesthesia, mid crestal incision was placed and full thickness mucoperiosteal flap was elevated. Sequential osteotomy preparation using Densah burs was performed. Implant (Ankylos) of 3.5mm diameter and 14mm length was placed. Resonance frequency analysis using Ostell Mentor unit was done to assess the implant stability quotient, which gave a reading of 78 ISQ. Standard abutment of diameter 3mm and gingival height of 4mm was placed and torqued manually followed by immediate loading of the implant with a temporary prosthesis (3 M ESPE, Protemp 4). Post operative instructions were given and patient was recalled after 7 days for suture removal.

At the three- and six-month follow-up appointments, the abutments were untorqued, and the Smartpeg was reinserted to reassess implant stability. Radiographic evaluations were conducted at each follow-up visit. After six months, a closed-tray, abutment-level impression was made using Aquasil putty and light body (Dentsply India). The impression, along with the laboratory analogue, was sent to the laboratory for crown fabrication. Metal-ceramic crowns were designed in physiologic occlusion and securely cemented using Zinc Phosphate Cement (De Tray® Zinc).

Discussion

Osteotomy preparation for the dental implant site preparation can greatly influence the primary and secondary stability of the implant. Primary stability is the biometric stability achieved immediately after implant insertion. It can be influenced by various factors such as bone quality and quantity, implant geometry, implant surface. [3] Various techniques have been previously used to achieve a greater primary stability include undersizing of the osteotomy, bone condensation using osteotomes. Surgical instrumentation using specially designed Densah burs to increase bone density while extending an osteotomy. They work by compacting the wall around the implant site preparation and by forming an 'implant lamina dura'. [4] Higher resonance frequency values were reported after implant placement using the osseodensification technique in the above clinical report, suggestive of higher primary stability achieved. As the prerequistes were attained, immediate loading of
the implant was followed. Immediate loading of the implants has been associated with better patient comfort and reduced treatment time.

In poor density bone such as maxillary posterior region, osseodensification can be used to achieve a greater primary stability. A higher primary stability has been associated with faster osseointegration of the implants in the literature by preventing any micromotion. [5]

A systematic review conducted by Pereira et al. in 2023 highlighted that the OD technique offers significant advantages over the SD and osteotome techniques, particularly in achieving superior primary implant stability, bone density, bone-to-implant contact (BIC), and overall clinical success of implants. [6]

The OD technique also enables procedures like maxillary sinus elevation, expansion of narrow alveolar ridges, and immediate placement of implants after tooth extraction. The patient comfort is also a consideration for selection of Densah burs, rather than the usual mallet and osteotome technique. Patients are more accepting and calm with these burs. Various studies have shown that the risk of tinnitus is comparatively lower when using this method.[7]

Conclusion

This case report suggests that when used in low-

density bone, maxillary posterior area, Densah burs have shown positive outcomes by increasing primary stability, bone-implant contact, and clinical success. However, the studies must be conducted to evaluate the limitations and biases.

References

1. de Oliveira PG, Bergamo ET, Neiva R, Bonfante EA, Witek L, Tovar N, Coelho PG. Osseodensification outperforms conventional implant subtractive instrumentation: A study in sheep. Materials Science and Engineering: C. 2018 Sep 1;90:300-7.

2. Lahens B, Lopez CD, Neiva RF, Bowers MM, Jimbo R, Bonfante EA, Morcos J, Witek L, Tovar N, Coelho PG. The effect of osseodensification drilling for endosteal implants with different surface treatments: A study in sheep. Journal of Biomedical Materials Research Part B: Applied Biomaterials. 2019 Apr;107(3):615-23.

3. Javed F, Romanos GE. The role of primary stability for successful immediate loading of dental implants. A literature review. Journal of dentistry. 2010 Aug 1;38(8):612-20.

4. Alghamdi H, Anand PS, Anil S. Undersized implant site preparation to enhance primary implant stability in poor bone density: a prospective clinical study. Journal of Oral and Maxillofacial Surgery. 2011 Dec 1;69(12):e506-12.

5. Trisi et al. New osseodensification implant site preaparation method to increase bone density in low density bone: in vivo evaluation in sheep. Implant Dent 2016;25:24–31

6. Fontes Pereira J, Costa R, Nunes Vasques M, Salazar F, Mendes JM, Infante da Câmara M. Osseodensification: An Alternative to Conventional
Osteotomy in Implant Site Preparation: A Systematic Review. Journal of Clinical Medicine. 2023; 12(22):7046.

7. Huwais et al. A novel osseodensification approach in Implant osteotomy preparation to increase biomechanical primary stability, bone mineral density and bone to implant contact.Int J Oral Maxillofac Implants 2017;32:27-36.

Editor
Dr. Manoj Shetty
Indian Prosthodontic Society (Karnataka Branch)
S/O A Balakrishna Shetty, 13-2-19A Navi, Near Ajjarkadu
Park, Kitturu Chennamma Road, Ajjarkad
Udupi, Karnataka
576101
Email: drmanojshetty@nitte.edu.in

Secretariat Address
A1 LOGICS
5-4-172/2, 1st Floor,
'Takshila', Near Hotel Janatha Deluxe
M.G.Road, Mangalore-575003
Karnataka, India