TAPER

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Thiruvalla Branch

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April 2026

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The Indian Dental Association Thiruvalla Branch was officially established on 7th December 2008. Since its inception, the branch has witnessed remarkable and exponential growth under the able guidance of visionary leadership.

Over the past 18 years of dedicated service, the branch has earned immense recognition, securing numerous accolades at both state and national levels. It stands today as a symbol of unity and harmony, bringing together a vibrant blend of experienced professionals and dynamic young members—an energy that is clearly reflected in its outstanding achievements.

From its humble beginnings in the minor category, IDA Thiruvalla has grown steadily into a strong and active body with a membership of 255. Its members, spread across Kerala and around the globe, actively participate in both online and offline programmes, contributing to the branch's continuous growth and impact.

The branch takes immense pride in having nurtured several eminent leaders who have gone on to achieve significant recognition at the state level. In the previous year, under the leadership of Dr. Maya Mathai and her dedicated executive team, the branch reached new heights by securing multiple state and national awards, along with special appreciation honours. With the guiding motto of the year, "Care, Share, Empower," the branch carried out several impactful initiatives including Project V-Can, Project Suraksha Health, Member's Family Directory, Suraksha Self-Defense Certificate Course, the Wayanad Relief Project, and an International Family Tour to Dubai.

IDA Thiruvalla has consistently demonstrated its commitment to its members, especially during challenging times. During the COVID-19 pandemic, the branch acted swiftly by providing PPE kits during periods of scarcity. More recently, it extended support in facilitating CE registrations. The branch remains ever-ready to serve society, extending financial assistance for medical needs, scholarships, food kits, and school stationery. Its social initiatives also include donating a house, establishing a free dental clinic at a destitute home, and setting up a breastfeeding kiosk at the local railway station.

The branch has been actively involved in community outreach through awareness programmes, oral cancer screening, and dental check-up camps for diverse groups including school children, migrant workers, Kudumbashree members, differently-abled children, senior citizens, and tribal communities. Notably, its flagship CDH initiatives include long-standing tribal projects at Attathode Tribal Colony and oral health awareness and screening programmes for the transgender community, reflecting its strong commitment to inclusivity.

With a vision to keep its members updated on the latest advancements in dentistry, the branch regularly organizes innovative Continuing Dental Education (CDE) programmes, hands-on training sessions by renowned practitioners, webinars, and publishes highly informative journals. A remarkable milestone in its history is the record of organizing a State CDE in 2010 with over 1400 participants—the highest attendance recorded in the nation.

The branch's official journal, TAPER, has once again been adjudged the "Best Local Branch Journal" at the national level in 2024 and 2025. It is our sincere hope that the present edition continues to uphold the high standards set by its predecessors.
As we move forward, we extend our heartfelt wishes to Dr. Ashwin M.R and his team for a fruitful and successful journey ahead.

IDA Thiruvalla continues to uphold its unwavering commitment to professional excellence, community service, and the advancement of dental health.
Happy Reading!

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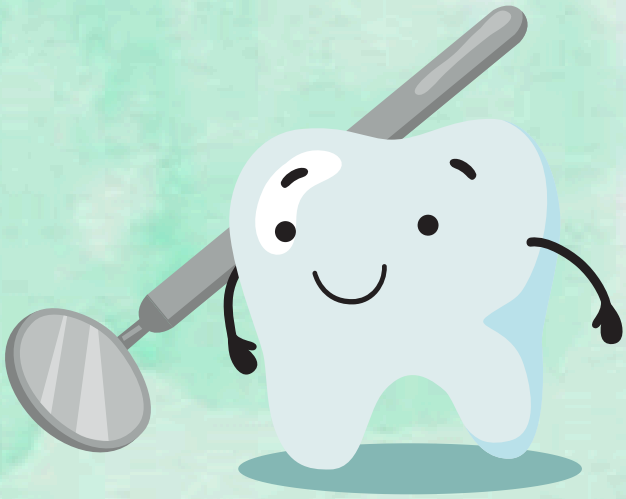

EDITOR'S MESSAGE

Dear Colleagues,

It is both a blessing and a privilege for me to serve as the Editor of TAPER, the quarterly publication of the Indian Dental Association Thiruvalla Branch. I take this opportunity to sincerely thank each and every member for entrusting me with the responsibility of leading this esteemed journal. I express my heartfelt gratitude to the President and the Executive Committee for their constant support, encouragement, and guidance throughout this journey.

My sincere appreciation goes to all the contributors and authors who have generously shared their knowledge, insights, and experiences. Your valuable contributions form the backbone of this publication and play a vital role in enriching our professional community.

I would also like to place on record my deep admiration for Dr. Prameetha George Ittycheria, whose exemplary leadership set remarkable standards for our journal. Under her guidance, the journal achieved the proud distinction of winning the Best Journal Award at both the National and State levels consecutively in 2024 and 2025—a remarkable legacy that continues to inspire us.

In this issue of the journal, we are pleased to present insightful review articles along with updates on the latest advances in dentistry, including emerging innovations such as nanotechnology, digital dentistry, CAD-CAM technology, laser applications, and minimally invasive treatment approaches. These advancements are transforming the way we deliver care by enhancing precision, efficiency, and patient comfort. The issue also features two informative case reports, as well as articles highlighting important aspects such as HOPE registrations and clinical establishment requirements.

The loss of any body part, especially those that contribute to appearance and function, can have a profound impact on an individual's life. Beyond physical limitations, such loss often affects self-esteem, social interactions, and overall psychological well-being. Replacing lost body parts through appropriate rehabilitative measures plays a vital role in restoring not just function, but also beauty and confidence. By improving aesthetics and functional ability, these treatments empower patients to regain dignity, reintegrate into society, and lead a better quality of life.

I extend my special thanks to Dr. Sijina K.K., Associate Editor, for her dedication and support, and to all our authors for their timely inputs, which helped in expediting the release of this first issue.
As we move forward, let us embrace the philosophy of "Give to Gain"—for it is through sharing knowledge, supporting one another, and contributing selflessly that we grow both personally and professionally.

"Excellence is not a destination; it is a continuous journey." Let us strive together to achieve greater heights in our profession and in life.
I also request our valued readers to kindly share their feedback after going through this journal and to point out any inadvertent errors that may have occurred during the editing and publishing process.
Wishing you all a fruitful and enriching journey through the pages of this journal.

Thanking you,
Warm regards,
Dr. Shibi Mathew V
Editor

ASSISTANT EDITOR'S MESSAGE

Dear Members,

It is with great pride and enthusiasm that we present this issue of Taper, the official publication of the Indian Dental Association, Tiruvalla Branch. This edition brings together a thoughtfully curated collection of scholarly works that reflect the evolving landscape of modern dentistry, blending foundational principles with emerging innovations.

The articles featured in this issue explore critical aspects of prosthodontic rehabilitation, particularly focusing on the principles and challenges involved in achieving optimal stability and retention in complex maxillofacial cases. Emphasis has also been placed on the intricate relationship between oral structures and phonetics, offering valuable insights into how speech and sound are influenced in edentulous conditions and the role of dental interventions in restoring functional harmony.

Advancements in science and technology are well represented through discussions on novel microscopic entities and their expanding applications in healthcare, highlighting their potential to transform conventional treatment approaches. In addition, this issue sheds light on clinically significant mucocutaneous conditions characterized by recurrent patterns, providing an overview of their presentation, progression, and the importance of timely diagnosis in clinical practice.

Furthermore, the integration of digital technologies into prosthetic rehabilitation has been explored, demonstrating how modern design concepts and 3D printing are revolutionizing the fabrication of facial and dental prostheses. These innovations not only enhance precision and efficiency but also significantly improve patient outcomes and quality of life.

Each contribution in this issue aims to deepen clinical understanding, encourage evidence-based practice, and inspire continued learning among dental professionals. The diversity of topics underscores the dynamic nature of our field and the importance of staying abreast with both established knowledge and cutting-edge developments.

I extend my heartfelt appreciation to all the authors, reviewers, and contributors for their dedication and scholarly efforts. Their commitment has been instrumental in bringing out this comprehensive and enriching edition.

We hope this issue serves as a valuable resource and motivates readers to pursue excellence in both clinical practice and academic endeavors.

Warm Regards,
Dr Sijina KK
Assistant Journal Editor

STATE PRESIDENT'S MESSAGE

Dear Colleagues,

Warm greetings to all.

It is indeed a pleasure to be part of the release of Taper – Volume 10, Issue1.

Every new issue of a journal brings with it fresh thoughts, new perspectives, and the enthusiasm of contributors who are keen to share their knowledge and experience.

Over the years, Taper has grown into a meaningful platform for academic exchange and clinical insight. Such efforts are vital in keeping our professional community intellectually active and clinically updated. In a field like dentistry, where change is constant, staying connected to learning and research is not an option, but a responsibility.

I must appreciate the sincere efforts taken by the Editor, Dr. Shibi Mathew V, Assistant Editor, Dr. Sijina KK, and the entire team behind this publication.

I also take this opportunity to encourage our younger colleagues and students to make use of this platform, whether it is to present their work, share clinical experiences, or simply develop the habit of scientific writing.

Wishing the editorial team all success, and hoping that Taper continues to grow stronger with each issue.

With warm regards,

Dr. Eapen Thomas
President
IDA Kerala State

STATE HON. SECRETARY'S MESSAGE

Dear Members,

It gives me immense pleasure to extend my warm greetings and heartfelt congratulations to the Indian Dental Association, Thiruvalla, on the launch of the inaugural issue of TAPER. The release of a professional journal is a significant milestone for any branch, reflecting its commitment to academic excellence, knowledge sharing, and the advancement of the dental profession.

A journal like TAPER serves as a vital platform for clinicians, academicians, and students to exchange ideas, present research, and stay updated with the evolving trends in dentistry. It not only strengthens scientific temperament but also inspires young professionals to contribute meaningfully to the field.

I commend the editorial team and all those who have worked tirelessly behind the scenes to bring out this first issue. Your dedication and vision are truly appreciable. I am confident that TAPER will grow into a respected publication, enriching the dental fraternity with valuable insights and innovations.

Wishing TAPER great success in all its future editions.

Dr Siddharth V Nair
Hon. Secretary
IDA KSB

STATE FIRST VICE PRESIDENT'S MESSAGE

Dear Members,

It gives me immense pride and pleasure to extend my warm greetings to all readers of TAPER, the official journal of IDA Thiruvalla Branch, on the release of its Volume 10 – Number 1 edition.

Over the years, TAPER has evolved into a vibrant platform that showcases the academic excellence, clinical expertise, and collective spirit of its members. Each edition reflects not only scientific advancement but also the commitment of the branch towards continuous learning and professional growth.

IDA Thiruvalla Branch has consistently stood out for its dynamic initiatives in Continuing Dental Education, community outreach programmes, and member engagement activities. The branch's dedication to promoting quality dental care and public awareness is truly commendable and serves as an inspiration to the wider dental fraternity across the state.

At the state level, it is encouraging to witness such active participation and enthusiasm from branches like Thiruvalla, which significantly contribute to strengthening the vision and mission of IDA Kerala State. Your efforts in fostering unity, encouraging young professionals, and upholding ethical standards in practice are highly appreciated.

I would also like to take this opportunity to express my heartfelt gratitude to the members of IDA Thiruvalla Branch for their constant support and encouragement, which has been instrumental in my journey to serve at the state level. Being a part of this vibrant branch is truly a matter of pride for me.

I would like to extend my sincere congratulations to the Editorial Board for their dedication and hard work in bringing out this excellent edition. My heartfelt appreciation also goes to all contributors whose valuable articles add depth and richness to this publication.

As we move forward, let us continue to strive for excellence in our profession, expand our service to society, and uphold the values that define the Indian Dental Association.

Wishing TAPER continued success in all its future endeavors.

With warm regards,
Dr. Rajeev Simon Kurudamannil
First Vice President
IDA Kerala State

PRESIDENTS MESSAGE

Dear Members,
I am pleased to address the members of IDA Thiruvalla Branch through this issue of our official journal for the year 2026. The past period has been marked by steady academic engagement, professional collaboration, and a continued commitment to the objectives of the Indian Dental Association.

IDA Thiruvalla has actively contributed to professional development through academic programs, continuing dental education initiatives, and structured professional forums, while also fulfilling its social responsibility through public awareness and community-oriented activities. These efforts reflect the branch's consistent focus on maintaining professional standards and ethical practice.

In an evolving professional landscape shaped by regulatory changes, policy developments, and academic expansion, the role of the Indian Dental Association remains pivotal. Constructive engagement with policymakers, safeguarding professional interests, and upholding quality dental care are responsibilities that require sustained unity and informed participation from all members.

I acknowledge with appreciation the valuable contributions of my predecessors, whose leadership has laid a strong foundation for the branch's continued progress. Carrying forward this legacy with clarity of purpose and academic integrity remains a priority.

The branch journal serves as an important platform for disseminating scientific knowledge and professional perspectives. I commend the efforts of the journal Editor, Dr. Shibi Mathew.V, and Assistant journal Editor, Dr. Sijina K.K,for maintaining academic rigor and quality in this publication.

I place on record my sincere thanks to the executive committee members for their support and cooperation. With collective effort and professional commitment, I am confident that IDA Thiruvalla Branch will continue to contribute meaningfully to the growth of the profession in the year 2026 and beyond.

With regards,
Dr. Aswin M.R
President
IDA Thiruvalla Branch

HON. SECRETARY'S MESSAGE

Dear Members,

It gives me immense pleasure to present the first edition of our Journal in 2026. Dentistry is a field that constantly evolves with new technologies, materials, and treatment modalities, all aimed at enhancing patient care. As professionals, it is our responsibility to stay updated and continuously refine our skills.

Publications serve as valuable platform to share scientific insights, clinical experiences, research updates, and innovative ideas that enrich our profession. I wholeheartedly appreciate the Editors, Contributors, and all our members who have invested their time and effort in bringing out this inaugural issue.
Let this first edition be a source of inspiration, encouraging every member to contribute articles in the upcoming volumes.

I wish you all an engaging and enlightening reading experience.

Regards,

Dr Deepthi Santhosh
Hon. Secretary
IDA Thiruvalla Branch

Speech and Sound in Edentulism: Literature Insights on Denture Phonetics

Dr. Riya Ann Joseph*, Dr. Sobin Kurian*,
Dr. Firoz Khan N*, Dr. Aby Mathew T**,
Dr. Rene Kuriakose***

ABSTRACT

Speech is an essential function of human communication, intricately linked to social interaction, self-esteem, and overall quality of life factors particularly influenced by the effectiveness of complete dentures. A comprehensive grasp of how oral structures influence phonation is vital in complete denture prosthodontics, as it directly affects speech intelligibility and patient satisfaction. This review highlights the anatomical, physiological, phonetic, and prosthetic considerations necessary to ensure optimal speech outcomes for edentulous patients using complete dentures.

KEYWORDS: Speech, Edentulism, Complete Dentures, Phonetics, Resonance, Articulation, Phonation

INTRODUCTION

Speech is one of the most complex and essential functions of human communication, involving an intricate interplay of respiratory, phonatory, resonatory, articulatory, and neurological systems (Figure 1). In edentulous individuals, the loss of teeth and associated oral structures alters these mechanisms, often impairing speech clarity and fluency. Complete dentures aim to restore not only esthetics and mastication but also phonetics, which is equally crucial for social interaction and psychological well-being.

Speech is a dynamic process that depends heavily on anatomical integrity and functional adaptation. The introduction of a prosthesis into the oral cavity can significantly affect the articulation of sounds, particularly consonants that require precise tongue, lip, and tooth coordination. Hence, understanding the basic principles of phonetics and their clinical implications is vital for prosthodontists.

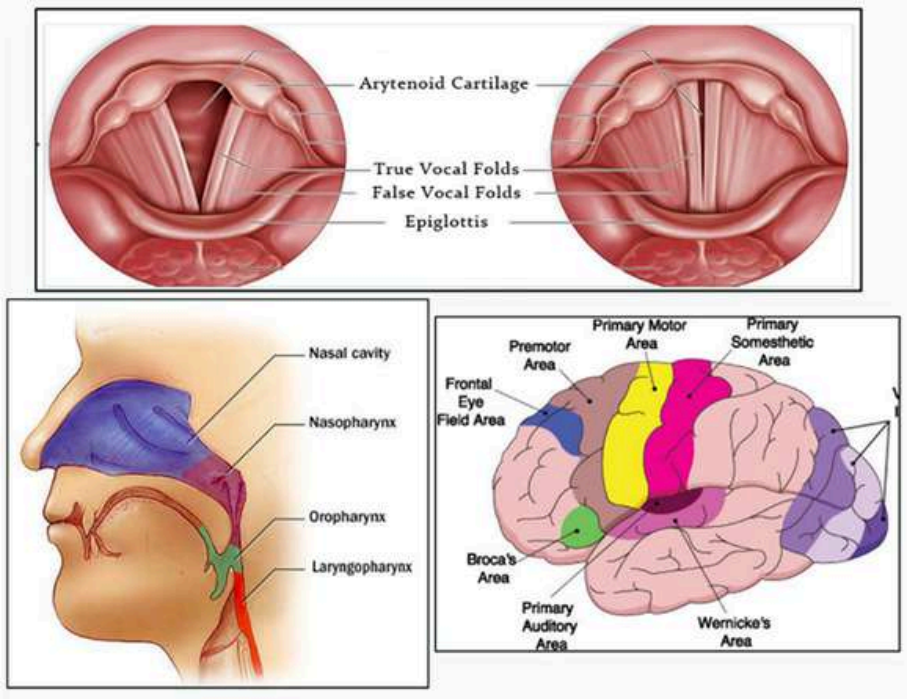

Figure 1: Different components involved in the Mechanism of Speech Production like vocal cords, pharynx, larynx, nasal cavity and different parts of the brain

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HISTORICAL BACKGROUND

The relationship between dentures and speech was first explored in detail in the mid-20th century. One of the earliest proponents of phonetics in denture fabrication was Gysi (1927), who emphasized the role of speech sounds—particularly sibilants—in determining the correct vertical dimension and anterior tooth positioning. His work laid the foundation for phonetics as a clinical tool in denture prosthodontics. In 1949, Sears proposed grooving the palate to enhance articulation. Pound (1951) emphasized palatal contouring to simulate the natural oral anatomy. Landa introduced the use of phonemes to evaluate rest positions and freeway space. Silverman's "speaking method" in the 1950s revolutionized vertical dimension recording through phonetic cues. Morrison suggested using specific words like "sixty-six" and "Mississippi" to determine speaking space accurately. Boucher (1970) stressed the importance of restoring not only esthetics and mastication but also speech as one of the primary goals of complete denture therapy. He emphasized that speech evaluation should be an integral part of the denture insertion process.

These historical insights laid the foundation for modern speech-centered prosthodontics, emphasizing the clinical value of phonetic analysis in complete denture fabrication [1–3].

MECHANISM OF SPEECH PRODUCTION

Speech is a multi-system function comprising the following five key mechanisms (Figure 2):

1.Respiration: Provides the airstream necessary for phonation. The lungs and associated muscles function as the motor system.
2.Phonation: The vocal cords in the larynx vibrate to create voice.
3.Resonance: The quality of sound is modified by resonating chambers—oral cavity, nasal cavity, pharynx, and paranasal sinuses.
4.Articulation: The transformation of sound into meaningful speech using the lips, tongue, teeth, and palate.
5.Neurological Control: The brain integrates these mechanisms, ensuring precision and coordination.

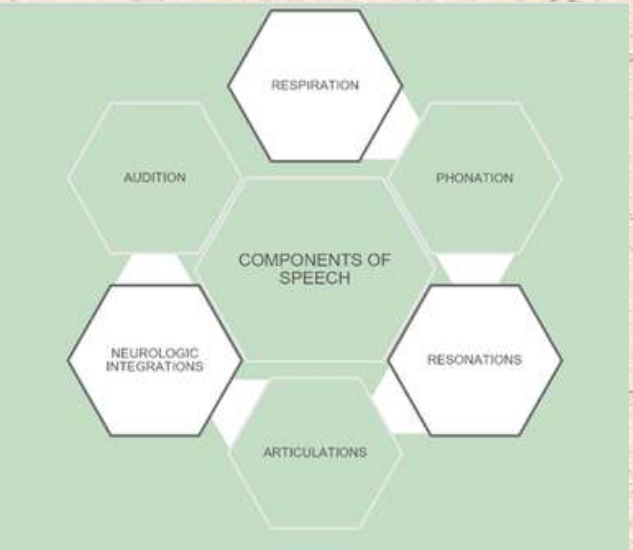

Figure 2: Components of Speech[1]

Any disruption in these systems, whether due to anatomical changes from edentulism or prosthetic limitations, can adversely affect speech [1,2].

CLASSIFICATION OF SPEECH SOUNDS

Speech sounds are typically classified into[8]:

- Vowels: Voiced sounds without obstruction (e.g., a, e, i, o, u).
- Consonants: May be voiced or unvoiced, requiring varying degrees of obstruction:
  - Plosives (P, B, T, D)
  - Fricatives (S, Z)
  - Affricatives (Ch, J)
  - Nasals (M, N, NG)
  - Liquids (L, R)
  - Glides (W, Y)

Sonority classification divides sound into[7]:

- Struds (voiceless sounds like S, H)
- Sonants (voiced sounds like vowels)
- Consonants (produced by modifying the airstream at precise locations)

Place-based classification—especially relevant in prosthodontics—includes[4]:

- BILABIAL: FORMED WITH BOTH LIPS (B, P, M)(FIGURE 3)

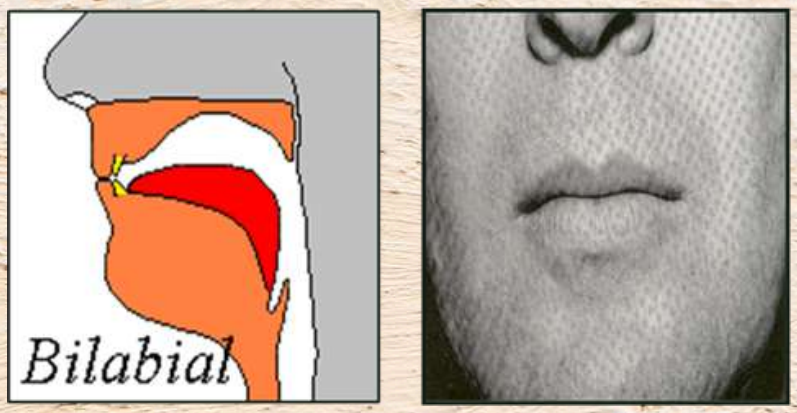

Figure 3: Bilabial Sounds[4]

- LABIODENTAL: LOWER LIP AND UPPER INCISORS (F, V)(FIGURE 4)

Figure 4: Labiodental Sounds

- LINGUODENTAL: TONGUE AND TEETH (TH)(FIGURE 5)

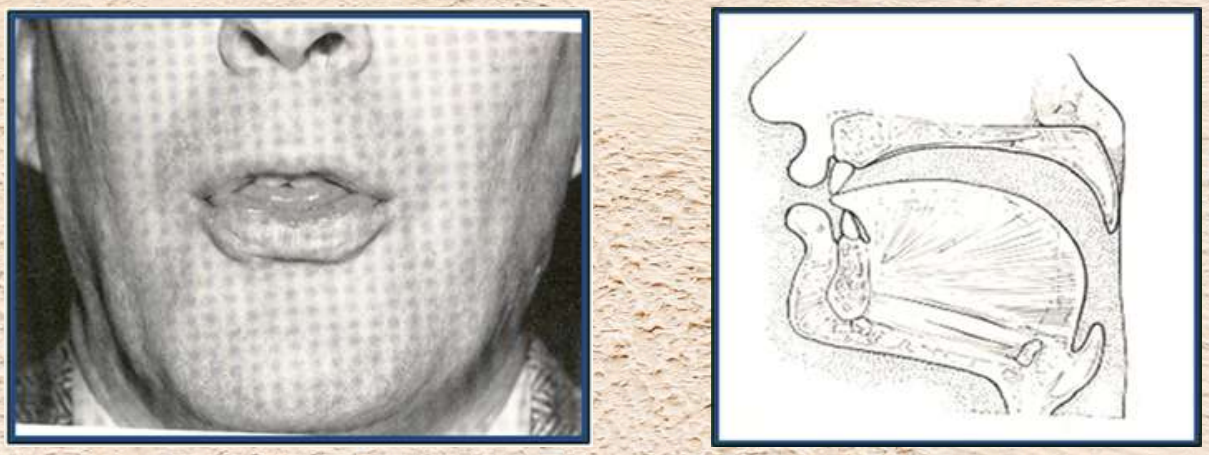

Figure 5: Linguodental Sounds [4]

- **PALATOLINGUAL: TONGUE AND HARD/SOFT PALATE (T, D, N, S) (FIGURE 6)**

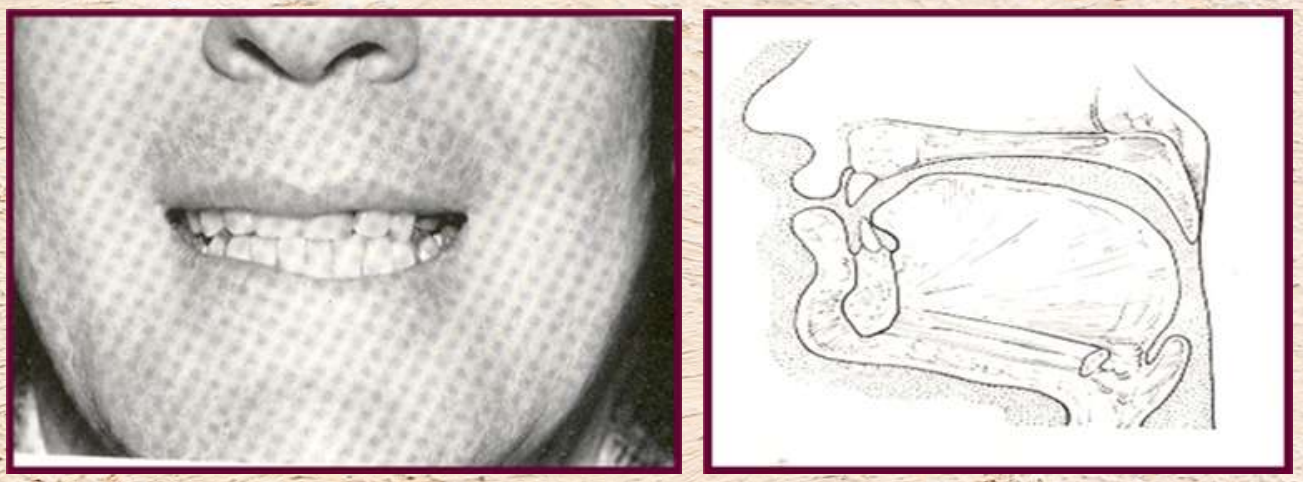

Figure 6: Palato lingual Sounds [4]

- **LINGUOALVEOLAR: TONGUE AND ALVEOLUS (S, Z, L) (FIGURE 7)**

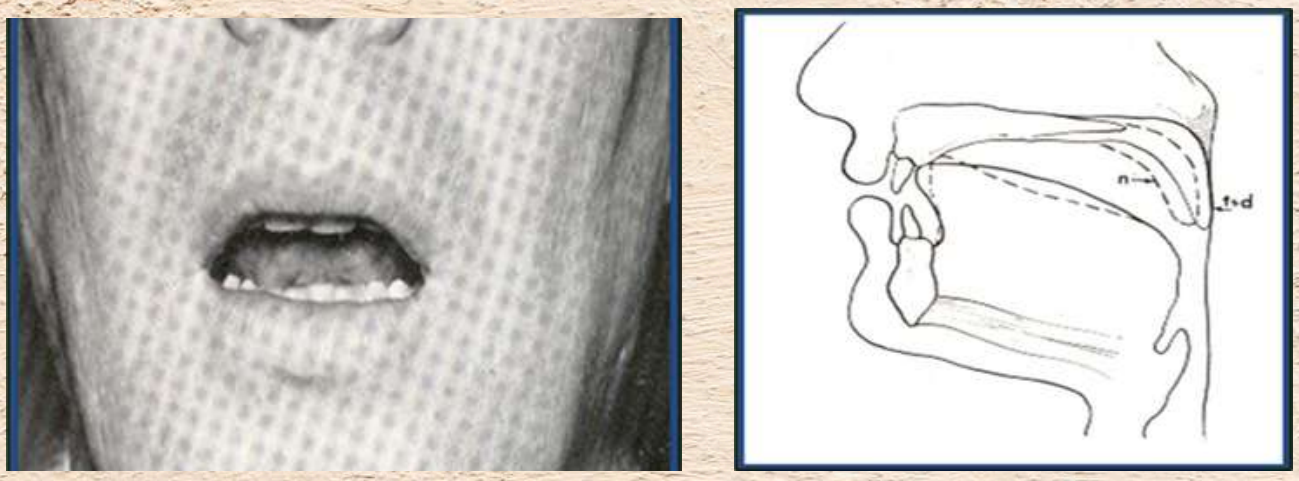

Figure 7: Linguoalveolar Sounds [4]

Each group's articulation is sensitive to tooth positioning, denture contour, and base thickness [4–7].

PHONETICS AND DENTURE DESIGN

Several denture design elements influence speech production:

1. Denture Thickness

Excessive palatal thickness can cause lisping (S, Z sounds). Thicker bases also hinder tongue-palate contact, affecting plosive and sibilant sounds [6].

2. Vertical Dimension

If too high, bilabials (P, B, M) may sound unnatural or create clicking sounds. A low dimension may result in mumbling or poor articulation.

3. Occlusal Plane

Improper occlusal height affects labiodental sounds. A high plane may prevent lower lip positioning, while a low plane may cause excessive overlap [6].

4. Anterior Tooth Position

If maxillary teeth are too lingual, the lower lip cannot meet the incisal edge (F → V error). If too labial, V may sound like F.

5. Post-dam Area

Overextension causes gagging and affects palatolingual sounds like K, NG. Inadequate extension impairs palatal seal and resonance.

6. Dental Arch Width

Narrow arches limit tongue movement, affecting sounds like T, D, N, K, and S.

7. Upper-Lower Incisor Relationship
Sibilant sounds require close approximation of incisors. Excessive gaps or overlap distorts articulation.

CLINICAL PHONETIC EVALUATION

Phonetics should be tested at the trial stage. Key evaluations include:

- Sibilant Test: Patient says "S" or counts 50–60. Whistling may indicate excessive base thickness or tooth misplacement.
- "TH" Sound: Evaluates interocclusal space and anterior tooth placement.
- "F" and "V" Sounds: Indicate vertical and horizontal position of upper anterior teeth.
- "M" Sound: Mandible should remain stationary, indicating correct freeway space.

These tests ensure phonetic accuracy before final denture fabrication [3,5].

PALATOGRAM[5] AND SPEECH ANALYSIS

A palatogram visually maps tongue-palate contact using food grade colors or powder on the denture base (Figure 8). Many other mediums like occlude alginate, Impression waxes, aerosol, pressure indicating paste, gothic arch tracing ink and gypsum products can be used to record palatogram. This identifies over- or under-contoured areas. Adjustments can be made by trimming acrylic or adding tissue conditioner, followed by permanent modification with auto-polymerizing resin. (Figure 9)

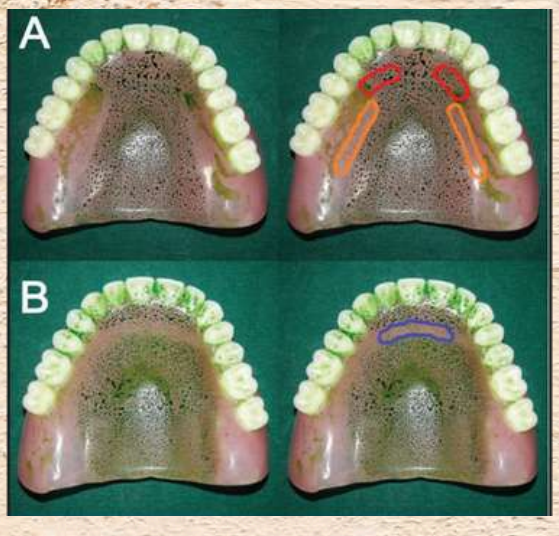

Figure 8: Palatograms for "s" and "T" sounds. A. Red outlined area shows under- contoured palate while orange outline shows over-contoured area. B. Violet outlined area shows under-contoured part of palate.[13]

Figure 9: Tissue conditioner applied to deficient zones and Molded area replaced with auto-polymerizing resin; final denture polished. 13

SPEECH ANALYSIS[2] CAN BE:

- Perceptual/Acoustic:Subjective evaluation using paragraph reading.
- Kinematic: Using ultrasound, radiography, or electropalatography for objective data [5,6].

SPEECH DISORDERS AND ADAPTATION

Speech disorders in edentulous patients may include[2]:

- Aphasia: Neurological speech impairment
- Dysarthria: Motor speech disorder
- Speech retardation: Delayed development

Older patients often struggle with new dentures due to diminished neuromuscular coordination. Replicating palatal contours of old dentures can help maintain speech clarity. Dentists must also address auditory feedback, as impaired hearing can hinder speech adaptation [2,6].

CLEFT PALATE AND SPECIAL PROSTHESES

Patients with unrepaired cleft palate or velopharyngeal insufficiency exhibit:

- Hypernasality
- Poor articulation (especially of plosives and fricatives)
- Nasal emission of sounds
-

Prosthetic options:

- Obturators seal the defect to allow pressure buildup for speech.
- Speech bulbs support the soft palate for closure.(Figure 10)

Figure 10: Hollow complete denture with a speech bulb prosthesis post insertion [12]

Case studies show significant improvement in intelligibility and quality of life after using hollow dentures with integrated speech bulbs [11,12]. The prosthodontist may require the assistance of a speech pathologist.

Cleft palate patients will invariably require speech therapy. Patients often exhibit hypernasality. The obturator is adjusted to the point where the patient can produce a clear “p” and a sustained “f” or “s” sound without emission of air through the nose. Several authors suggested that the sustained pressure required for the “s” phoneme may be a reliable method of evaluating the effectiveness of the obturator. Whereas greater intraoral pressure may be required for stop-plosives, such as “p”, the sustained pressure required for “s” mitigates the compensatory elevation of the tongue to assist with closure.

SPEECH TESTING POST-INSERTION

Post-insertion evaluation includes:

1.Random Speech Test: Subjective feedback from patients.
2.Specific Sound Test: Words rich in S, SH, CH.
3.Reading Paragraphs: Objective analysis of speech clarity.

Persistent issues may require collaboration with speech pathologists. Modification of denture base, anterior teeth, or occlusal relations can often resolve phonetic problems [6,7].

SIGNIFICANCE OF RUGAE DUPLICATION

Sharry emphasized that while most patients adapt their speech over time, some individuals require additional guidance from palatal structures to restore clear articulation, especially for linguopalatal consonants like /t/, /d/, /n/, and /l/ .[7] Rothman observed that improper palatal contours often lead to articulation issues, such as lisping, due to the lack of orientation landmarks for the tongue .[4]

Palatal rugae are anatomical ridges on either side of the mid-palatal raphe. Their inclusion in complete dentures not only restores a natural feel but also provides proprioceptive feedback necessary for speech production. According to Allen, replication of these rugae can enhance phonetics by mimicking the native oral environment, reducing the adjustment period post-insertion .[14]

Babu et al. introduced a simplified method for replicating palatal rugae using a custom-made acrylic palatal stamp .[15] In their case report, a 60-year-old female Bhagavad Gita reciter experienced improved speech clarity after receiving a denture fabricated using this technique. The method involves creating a stamp from the patient's master cast and transferring the rugae pattern onto the denture using light-body elastomeric material and tissue conditioner. This technique not only preserved speech articulation but also increased patient satisfaction.

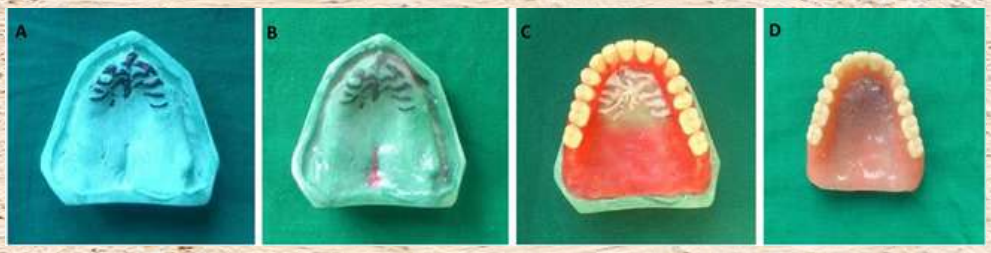

Figure 11: (A) Diagnostic cast, (B) master cast, (C) wax trial denture with duplicated rugae, (D) processed, and finished denture.

Other methods for rugae replication include using putty impressions, silicone stents, or hand carving .[16,17,18] (Figure 11)

Despite the functional benefits, the resilient nature of natural rugae presents a challenge. Artificial rugae made of rigid acrylic do not deform under tongue pressure like their natural counterparts. Thus, using tissue-resilient materials, as proposed by Babu et al., may offer a closer simulation of physiological behaviour.[15]

CONCLUSION

Speech plays a central role in complete denture rehabilitation. Dentists must assess phonetic factors from diagnosis through trial insertion and follow-up. By integrating speech testing into prosthodontic protocols, clinicians can improve patient satisfaction and communicative ability. For complex cases, interdisciplinary approaches involving audiologists, speech pathologists, and maxillofacial prosthodontists are beneficial. Mastery of phonetics not only ensures successful prosthetic outcomes but also restores dignity and confidence in edentulous patients.

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Retention in Maxillofacial Prosthetics: A Comprehensive Review

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Abstract

Maxillofacial prostheses are used to rehabilitate patients with facial defects resulting from trauma, surgical resection, congenital anomalies, or other acquired conditions. Retention of these prostheses remains one of the most critical determinants of clinical success, influencing patient comfort, psychological well-being, and quality of life. This review comprehensively examines the methods of retention used in maxillofacial prosthetics — anatomical, mechanical, chemical (adhesives), and implant-based — tracing their evolution from primitive mechanical fixation to contemporary osseointegrated implant systems and digital fabrication technologies. The advantages, limitations, and clinical considerations of each retention method are critically discussed. Emerging technologies including CAD/CAM, 3D printing, rapid prototyping, and novel biomaterials such as PEEK are highlighted. The review underscores that optimal prosthetic retention requires thorough clinical evaluation and individualized treatment planning by a skilled prosthodontist.

Keywords: maxillofacial prosthesis, retention, adhesives, implants, magnets, CAD/CAM, 3D printing, osseointegration

1.INTRODUCTION

The face is central to human identity, communication, and social interaction. Defects of the maxillofacial region — whether congenital, traumatic, or secondary to disease and its surgical management — can cause profound functional and psychological impairment. Patients with maxillofacial defects may experience difficulties in mastication, deglutition, and speech, in addition to significant psychosocial distress arising from altered facial appearance[1] .

Maxillofacial prosthetics is the subspecialty of prosthodontics concerned with the restoration and/or replacement of stomatognathic and craniofacial structures using prostheses that may or may not be removed on a regular or elective basis. When surgical reconstruction is not feasible — due to the size or location of the defect, the patient's medical status, or failed prior grafting — a maxillofacial prosthesis becomes the treatment of choice[2] .

Among all challenges in maxillofacial prosthetics, retention stands out as the most clinically demanding. Large facial defects are associated with limited anatomic undercuts, mobile soft tissue beds, and significant prosthetic mass, all of which compromise stability and retention. Inadequate retention leads to patient non-compliance, social embarrassment, and prosthesis failure. Conversely, improved retention enhances patient confidence, comfort, and long-term prognosis[1] .

The methods employed to retain maxillofacial prostheses have evolved considerably — from the earliest mechanical fixation techniques described by Ambroise Pare in the 16th century, through chemical adhesives, to the current gold standard of osseointegrated implants and digitally designed superstructures. This review provides a structured appraisal of these retention modalities, with emphasis on their clinical rationale, biomechanical principles, and practical application[1] .

2. Classification of Maxillofacial Prostheses

Maxillofacial prostheses are broadly classified by location, duration of use, and construction material[2] :

2.1 By Location

•Intraoral prostheses: obturators, speech appliances, palatal lift prostheses, tongue prostheses

• Extraoral prostheses: auricular, nasal, orbital, and mid-facial prostheses

•Combination prostheses: orbito-maxillary and naso-maxillary

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2.2 By Duration of Use

- Temporary (surgical/immediate)
- Interim
- Definitive

2.3 By Material

Materials used include acrylic resin, acrylic copolymers, and silicone elastomers. Silicone, introduced for facial prostheses in 1946, revolutionized maxillofacial prosthetics due to its lifelike appearance, flexibility, and biocompatibility. Newer materials such as polyetherether ketone (PEEK) have also gained traction for structural frameworks.

3. METHODS OF RETENTION

Retention in maxillofacial prosthetics is achieved through four main categories: anatomical, mechanical, chemical (adhesive), and implant-based. These may be employed individually or in combination based on clinical needs[3].

3.1 Anatomical Retention

Anatomical retention exploits naturally occurring or surgically planned tissue contours and undercuts to stabilize the prosthesis. It is the most fundamental and least invasive form of retention and is considered first in all cases[1].

3.1.1 Intraoral Anatomical Retention

Intraoral retention relies on hard and soft tissue structures including remaining teeth, alveolar ridges, mucosal surfaces, and bony undercuts. Anatomic undercuts in the palatal, retromolar, cheek, labial, and nasal septum areas contribute significantly. A high-arched palate and prominent alveolar ridges provide greater retention than flat anatomical profiles. Intraoral retentive aids also permit easy removal of the prosthesis for surgical site inspection and hygiene maintenance.

Fig.1.Anatomic retention for prosthesis[1]

3.1.2 Extraoral Anatomical Retention

Extraoral anatomical retention utilizes soft tissue contours, scar bands, and bony prominences of the head and neck. The classic example is the orbital socket, where the existing concavity can retain an ocular prosthesis without additional aids. Scar tissue formed at skin-graft mucosal interfaces can also create favorable retention zones. However, deep undercuts and mobile soft tissues may complicate insertion and removal[4].

3.2 Mechanical Retention

Mechanical retention is the oldest documented method in maxillofacial prosthetics. Historically, Ambroise Pare described retaining an artificial nose using strings and an artificial ear using a metal band worn around the head. Modern mechanical aids include:

3.2.1 Eyeglasses and Frames

Spectacle frames offer a discreet mechanical means of retaining nasal, auricular, and orbital prostheses. They simultaneously help to mask prosthesis margins. The frame should be moderately thick and opaque to prevent retention marks from becoming visible. If the frame is made of acrylic resin, a chemical bond can be created between the frame and the prosthetic material. However, permanent attachment of a prosthesis to eyeglasses is discouraged, as removal of glasses would require simultaneous removal of the prosthesis — a socially embarrassing situation[5].

Fig 2: Ear prosthesis supported

Fig 3: Eye prosthesis supported by eyeglasses

3.2.2 Cast Clasps

Cast metal clasps entering tooth undercuts remain the most common method for retaining intraoral prostheses such as obturators. When properly designed, clasps provide stability, bilateral bracing, reciprocation, and favorable load distribution. They are among the most economical retentive devices and continue to be widely used despite the availability of newer systems[6] .

Fig 4: Cast clasps

Fig 5: Extension from denture

3.2.3 Acrylic Buttons

Acrylic button-retained prostheses incorporate an acrylic or metal substructure that fits into the defect, with one or more mushroom-shaped projections (buttons) onto which the prosthesis snaps for retention. This system is economical and technically straightforward, making it suitable for patients with limited resources or those unsuitable for implants[8].

Fig 6: Metal buttons to retain prosthesis

3.2.4 Retentive Clips

Retentive clips — made of metal or plastic — snap over a bar superstructure connected to implants. They provide greater breakaway retentive force than magnets and are not susceptible to the corrosive effects of bodily fluids. However, they tend to wear faster than magnets. Retentive clips are particularly useful for auricular prostheses in patients with adequate manual dexterity[9].

3.2.5 Precision Attachments

Bar clips, telescopic crowns, and extracoronal ball attachments are precision attachment systems commonly used to connect prosthetic components and implants. They enhance retentive force and can be combined with other retentive mechanisms for complex rehabilitations.

3.2.6 Elastic and Non-Elastic Straps

Head bands and straps are used for extraoral prostheses, particularly auricular prostheses. Orthodontic-type headgear assemblies with adjustable strap extensions provide anchorage for extensive maxillofacial reconstructions. Non-elastic straps are used with buckles to allow adjustment[1]

Fig 7: Elastic straps used for retention of prosthesis

3.2.7 Magnets

Magnets have become significant retentive aids in maxillofacial prosthetics owing to their compact size and strong attractive forces. They can be embedded within prostheses without creating visible bulk and are used in nasal, orbital, auricular, and intraoral-extraoral combination prostheses, as well as in patients with hemimaxillectomy defects and atrophied ridges.

The standard magnetic retention system is a two-component design: a magnetic retention element (paired magnets with protective end plates) and a keeper element (a magnetizable disk that acts as an induced magnet). Alloys used include palladium-cobalt-nickel (Pd-Co-Ni) for the keeper, and cobalt-samarium or neodymium-iron-boron (Nd-Fe-B) for the permanent magnet. Nd-Fe-B alloys provide approximately 20% greater magnetic strength per unit volume than cobalt-samarium[1].

Magnets are classified by:

•Alloy composition (cobalt-containing vs. non-cobalt)
•Coercivity (soft vs. hard magnets)
•Surface coating (coated vs. uncoated, using stainless steel, titanium, or palladium)
•Magnetic field type (open field vs. closed field designs)
•Number and arrangement of poles

Fig 8: Magnets used for retention of prosthesis

Advantages of magnets include:

•Provision of both retention and stability
•Functional rotation allowing for abutment divergence
•Non-critical path of prosthesis insertion and removal
•Automatic reseating of prosthesis if dislodged
•Elimination of pathologic lateral forces on abutments

Disadvantages:

•Corrosion in chloride-containing environments such as saliva, particularly for Nd-Fe-B magnets
•Surface wear and abrasion from trapped debris
•Corrosion mitigation strategies include encapsulation with titanium, stainless steel, or laser welding

3.3 Chemical Retention (Adhesives)

Adhesives are widely used as the primary or supplementary retention method, particularly for patients who cannot or will not undergo implant surgery.

The Glossary of Prosthodontic Terms defines a maxillofacial prosthetic adhesive as a material used to adhere an external prosthesis to the skin and surrounding structures around the periphery of an external anatomic defect[10].

3.3.1 Ideal Properties

•Biocompatible, non-toxic, and non-irritating to skin
•Sufficient bond strength to retain the prosthesis for at least 12 hours daily
•Odourless and moisture-repellent
•Porous when dry to allow passage of secretions
•Easy to apply and remove without damaging prosthesis or skin
•Fast-drying and available in a portable format

3.3.2 Types of Adhesives

Acrylic Resin Adhesives: Composed of acrylic resin dispersed in a water solvent; upon evaporation, a rubber-like adhesive film remains. Surfactants allow controlled wetting and penetration. Bond development requires at least one surface permeable to water to dry the dispersion.
Silicone Adhesives: Room-temperature vulcanizing (RTV) silicones dissolved in a solvent. After application, the solvent evaporates to leave a tacky, contact-bondable film. These adhesives offer good moisture and weathering resistance, low water sorption, and stability against UV, ozone, and many chemicals. The primary disadvantage is relatively low adhesive strength[11].

Fig 9 : Silicone Adhesive

Pressure-Sensitive Tapes: Applied by finger pressure without heat or solvent, these double-sided tapes consist of a backing strip coated with adhesive on both surfaces. Bond strength to skin is lower than acrylic adhesives; best suited for rigid prostheses in areas with minimal movement.

Fig.10. Pressure sensitive tape

Rubber-Based (Natural Latex) Adhesives: Natural rubber latex dissolved in organic solvents such as naphtha. Known for "dry tack" — the ability to bond two fresh, non-sticky surfaces. Examples include Bard Appliance Adhesive[1] .

Combination of Adhesives: Two or more adhesive systems may be combined to overcome the limitations of individual agents. Commonly used combination products include Silastic MDX4-4210, Silastic Medical Adhesive Silicone Type A, Pros-Aide, Epithane-3, Telesis Silicone Adhesive, and 3M bifaceis tape[8] .

Fig 11: Pros-Aide Adhesive

Fig 12: Skin Prep Wipes

3.3.3 Selection Criteria

Adhesive selection is guided by bond strength to both the prosthetic material and skin, biocompatibility, prosthesis design, skin type and quality, adhesive composition and viscosity, as well as handling characteristics and shelf life.

3.3.4 Advantages and Disadvantages

Adhesives are cost-effective, non-invasive, and widely accessible, making them valuable for patients who cannot tolerate surgery, have poor prognosis, or face financial constraints. However, they provide unreliable retention over time, may degrade prosthetic materials, cause contact dermatitis, alter prosthesis color, and collect dirt — rendering them unhygienic. Perspiration and facial movement further compromise bond integrity.

3.4 Implant-Based Retention

Osseointegrated implants have emerged as the gold standard for maxillofacial prosthesis retention, providing a stable, reliable, and long-term anchorage system. Originally developed for dental rehabilitation by Branemark and colleagues in 1965, their application was extended to craniofacial structures following demonstrated clinical success. Titanium implants for bone-anchored hearing devices have been used in Sweden since 1977, and their use in retaining ear, nose, and eye prostheses followed shortly thereafter.

3.4.1 Classification of Bone Sites for Implant Placement

Bone availability is a key determinant of implant feasibility in craniofacial regions. Sites are classified as3:

•Alpha (A) sites: Bone volume ≥6 mm; accommodate full-length dental and zygomatic implants. Examples: anterior maxilla, zygomatic arch, zygoma.

•Beta (B) sites: 4–5 mm bone volume; accommodate 4 mm craniofacial implants. Found in periorbital, temporal, and mastoid regions.

• Delta (C) sites: ≤3 mm bone; include pyriform rim, zygomatic arch, medial orbit, and frontal bone. Require ≤3 mm craniofacial implants.

3.4.2 Surgical Procedures

Implant placement may follow a single-stage or two-stage protocol. In the single-stage procedure, recovery screws are placed immediately and the wound closed with suture and protective dressing. The two-stage procedure involves initial implant placement followed by a healing phase for osseointegration (typically 3–8 months depending on site), after which the abutment and superstructure are connected in a second surgery.

3.4.3 Site-Specific Implant Applications

Auricular Prosthesis: Two implants are typically placed in the mastoid area, spaced approximately 15 mm apart and 18–20 mm from the auditory canal. For the right ear, implants are positioned at 9 and 11 o'clock; for the left, at 1 and 3 o'clock. Healing period is 3–4 months. Retention mechanisms include bar and clip, ball clips, and magnetic cap systems. Studies report high implant survival rates for auricular prostheses[2].

Orbital Prosthesis: Implants are placed at the outer and inner canthus, superior orbital rim, and occasionally inferior orbital rim or zygoma. Standard implant length is 3–4 mm with 10–12 mm spacing for hygiene access. The healing period is 6–8 months. The most commonly used retention mechanism is magnets. Types of orbital implants range from non-integrated (PMMA, silicone) to bio-integrated (hydroxyapatite, porous polyethylene).

Fig 13: Implant placed for retention in eye prosthesis case

Nasal Prosthesis: Implants are placed in the floor of the nose, piriform ridge, or inferior orbital foramen, and occasionally in the glabella. Standard fixtures are 4 mm or longer; 7–10 mm fixtures are used for bifunctional implants supporting both intra- and extraoral prostheses. Healing period is 6-8 months.

Mini-magnets are the primary retention mechanism, with bar and clip systems used in select cases.

Maxillary Defects: The residual premaxilla is the most favorable implant site in total maxillectomy patients. Zygomatic implants offer an additional option where conventional sites lack sufficient bone volume[4].

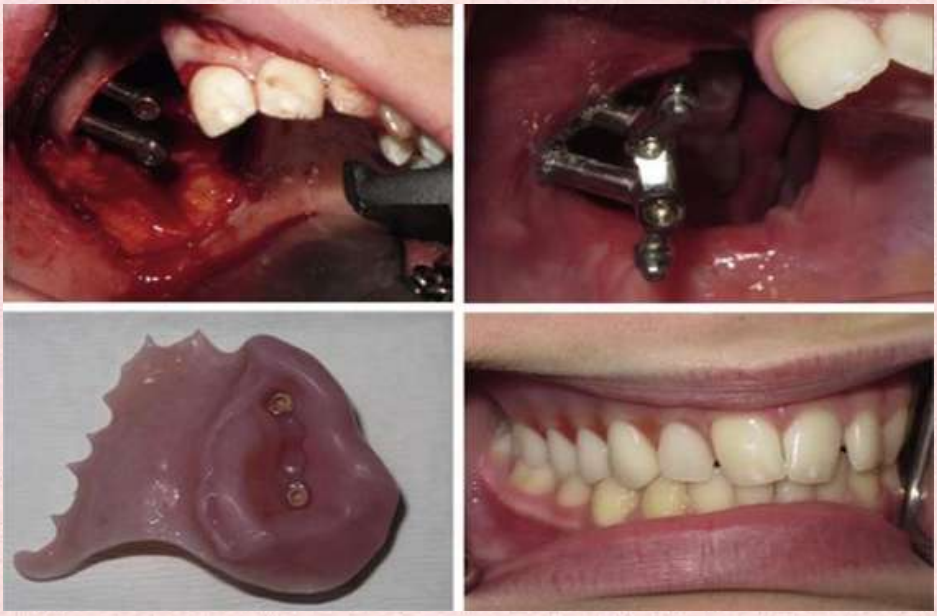

Fig 14: Implant used as retentive aid for maxillary defect

3.4.4 Implant Systems and Superstructures

Extraoral implants can be placed as solitary units (ITI system, IMZ system) or as grouped systems (epitec and epiplating systems secured by multiple screws). Superstructure retention is applied via bar systems (with clip attachment) or magnetic systems. Bar systems provide higher retentive forces while magnetic systems offer ease of insertion and are preferred in patients with limited manual dexterity.

3.4.5 Special Considerations: Irradiated Patients

Radiation therapy, diabetes mellitus, and osteoporosis are relative contraindications to implant placement due to compromised bone healing. A waiting period of 6–18 months post-radiotherapy is generally recommended before implant surgery. Hyperbaric oxygen therapy has been reported to improve implant success rates by approximately 38% in irradiated patients.

3.4.6 Survival Rates and Complications

Implant survival rates are highest for auricular prostheses, followed by nasal and orbital regions. Peri-implantitis, related to hygiene maintenance around skin-penetrating implants, is the most commonly reported complication. Long-term follow-up is essential to monitor tissue health, prosthesis fit, and retention system integrity[2].

4.RECENT ADVANCES IN MAXILLOFACIAL PROSTHETIC RETENTION

4.1 Computer-Aided Design and Manufacturing (CAD/CAM)

CAD/CAM technology has transformed restorative and maxillofacial dentistry over the past three decades. It enables rapid, precise fabrication of provisional and definitive prostheses with improved fit and reduced chairside time. Digital workflows eliminate labor-intensive wax sculpting and reduce human error in prosthesis fabrication. CAD data can be used to design superstructures, implant guides, and prosthetic frameworks with reproducibility[2].

4.2 Rapid Prototyping

Rapid prototyping (RP) — including stereolithography, selective laser sintering, and fused deposition modelling — allows fabrication of patient-specific prosthetic components from digital datasets. In nasal prosthetics, RP has enabled the incorporation of intra-anatomy airway designs that redirect airflow to mimic normal nasal function, reducing displacement during sneezing or coughing and maintaining voice resonance[2].

4.3 Three-Dimensional Printing and Digital Scanning

Three-dimensional digital imaging systems such as the 3dMD face system enable non-contact impression taking, eliminating tissue distortion inherent to conventional impression materials and reducing patient discomfort. Three-dimensional printing has been applied to fabricate ocular, auricular, nasal, and cranial prostheses with anatomic precision and improved color matching. Its use in burn and acid-attack victims has demonstrated particular promise. Bioprinting using bioink offers future potential for tissue-engineered facial constructs.

4.4 PEEK (Polyetherether Ketone)

PEEK has emerged as a structurally promising biomaterial for maxillofacial framework fabrication. Its mechanical properties — including stiffness and strength similar to cortical bone — combined with excellent biocompatibility, chemical stability, and radiolucency make it suitable for craniofacial, frontal, orbital, and maxillary reconstruction. PEEK implants can be machined into complex organic geometries and secured with standard bone screws and plates[3].

5. DISCUSSION

No single retention method is universally superior; optimal retention requires an individualized approach guided by defect type and size, available anatomy, patient health status, dexterity, compliance, financial capacity, and clinical expertise. In practice, combinations of retention methods often yield the best outcomes. Anatomical retention remains the first-line consideration, as it is non-invasive and cost-free. However, it is often insufficient alone for large or complex defects. Mechanical devices such as clasps and buttons provide economical supplementation but are limited by wear and patient-specific anatomic variability. Adhesives serve as accessible and flexible options, particularly as primary retention for patients unsuitable for implants, but their unreliability and hygienic concerns limit long-term use.

Osseointegrated implants represent the most reliable and durable form of maxillofacial retention. They enhance prosthesis stability, function, and marginal fit, while significantly improving patient acceptance and quality of life. The limitation of implants lies in the requirement for adequate bone volume, surgical fitness of the patient, and the associated cost and complexity of treatment. Implant placement in irradiated tissue remains a challenge, though hyperbaric oxygen therapy offers a promising adjunct[1].

Digital technologies — CAD/CAM, 3D printing, and rapid prototyping — are progressively transforming prosthesis fabrication. These tools reduce treatment time, improve accuracy, eliminate invasive impression techniques, and enable replication of anatomic complexity that would otherwise require extraordinary artisanal skill. However, accessibility, cost, and the learning curve associated with digital workflows remain barriers to widespread adoption[1].
Future directions include the integration of tissue engineering for biologic reconstruction of craniofacial structures, further development of biocompatible smart adhesives, and expansion of digital prosthetic workflows to resource-limited settings. The field continues to evolve, and regular follow-up by a multidisciplinary team remains essential for long-term prosthetic success[3].

6. CONCLUSION

Retention is a defining determinant of maxillofacial prosthesis success. The evolution from early mechanical fixation using strings and bands to contemporary osseointegrated implant systems and digitally fabricated superstructures reflects the remarkable progress in this field. Each retention modality — anatomical, mechanical, adhesive, and implant-based — carries its own set of indications, advantages, and limitations[1].

The ideal retention method is patient-specific and must account for defect anatomy, tissue quality, implant feasibility, patient health and compliance, and available resources. Osseointegrated implants remain the gold standard where conditions permit, while adhesives and mechanical devices continue to serve a critical role for patients who are unable to undergo surgical intervention.

Advances in CAD/CAM technology, three-dimensional printing, and novel biomaterials hold significant promise for improving the quality, precision, and accessibility of maxillofacial prostheses. A thorough understanding of all available retention options, combined with careful treatment planning and regular professional follow-up, enables the prosthodontist to meaningfully improve function, esthetics, and quality of life for patients living with maxillofacial defects.

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Nanobubbles – The Tiny Titans

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ABSTRACT

Nano Bubbles are gas filled molecules less than 200 nm in diameter, have emerged as a promising advancement in dental science due to their unique physicochemical properties such as high stability, negative zeta potential and enhanced reactive oxygen species generation. In dentistry, particularly in endodontics, effective disinfection remains a major challenge due to complex root canal anatomy and resistance to biofilms disruption. NBs can demonstrate improved biofilm disruption and has a synergistic action with conventional irrigants. Beyond their role as efficient drug delivery agents that penetrate cells without systemic toxicity for cancer chemo therapy. Also, nanobubbles are highly effective in treating periodontitis and peri-implantitis, as well as providing deep disinfection for dental unit water lines.

KEYWORDS: Nanobubbles, Endodontics, Hydrodynamic Cavitation, Dental Nanotechnology, Ultrasonic Irrigation

INTRODUCTION

Nanobubble (NB) technology has emerged as a promising advancement in dental science, particularly in endodontics. NBs are gas filled cavities (<200nm) with unique physicochemical properties such as high stability due to brownian motion and higher internal pressure which prevents rapid buoyant rise. Remarkably, NBs persist for several days to months. They have large surface area and negative zeta potential (-20 to -50mV at neutral PH) attracting a shell of counter-ions which reduces gas diffusion out of the bubble. They can produce reactive oxygen species which will help in the removal of smear layer. Due to their tiny size, they can penetrate into dentinal tubules up to 50µm, improved biofilm disruption, and increased efficacy of irrigants and medicaments(1).

TYPES OF NBS

Based on their location nanobubbles can be classified as micro pancakes, bulk NBs, and surface NBs. Bulk nanobubbles are spherical, gas-filled cavities dispersed within a liquid volume that exhibit remarkable stability despite their internal pressure, whereas surface nanobubbles are cap-shaped gaseous domains that form at the solid-liquid interface, often accompanied by micro pancakes, which are ultra-thin, quasi-two-dimensional gas layers that spread across a hydrophobic surface. NBs can be categorised as an ozone, oxygen, or hydrogen NBs depending on the kind of air it contains.

GENERATION OF NBS

NBs can be generated by various methods using a NB generator which includes Hydrodynamic cavitation, Membrane method, Electrolysis etc. Hydrodynamic cavitation is the one of the most common methods to generate NB. Cavities develop when a standardized liquid phase goes through a phase transition due to sudden drop in pressure below a specific threshold. Its goal is to induce cavitation in a medium by altering the flow velocity of the medium, thereby causing pressure fluctuations(2).NB generation through nanoporous membrane is one of the most efficient technique. Gas is forced to pass through nanoporous membrane (size 10-200nm) into a liquid medium when the applied gas pressure exceeds the liquid pressure, gas enters the pore and forms tiny nuclei at the pore-liquid interface through heterogenous nucleation(3). As more gas diffuses into the bubble size remains restricted by pore diameter and surface diameter and surface tension forces. Once released into liquid these bubbles remain stable for months due to the zeta potential. The electrolysis method generates NB through electrochemical splitting of water when an electric current is passed through electrolyte solution. When DC current is applied between electrodes immersed in water, electrochemical reaction is initiated and oxygen gas is generated. The generated gas molecules accumulate at electrode surface and form tiny gas nuclei. Under controlled condition these gas molecules do not grow into large bubbles.

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MECHANISM OF ACTION

NBs act through both physical and chemical means. Due to their tiny size, they can penetrate deep into biofilms, microscopic crevices, and dentinal tubules that are inaccessible to larger bubbles or instruments. When NBs water flow over a plaque biofilm or are used with irrigants in a root canal disinfection, the higher shear forces generated at the bubble surface helps to dislodge sticky extracellular polymeric substances and helps to detach adhered bacteria. Additionally, the collapse or bursting of NBs can produce localized microjets and shockwaves, further break down biofilm matrices. Moreover, due to Brownian motion and negative surface charge, enable NBs to accumulate along the surfaces and continuously disturb the biofilm interface. These combined mechanical effects can achieve near-complete removal of microbial biofilm.

NBs can transport reactive gases, such as ozone or oxygen-derived radicals, deep into biofilms. When oxygen-loaded NBs interact with organic material, they collapse and produce reactive oxygen species (ROS), including hydroxyl radicals. Ozone-filled NBs (NBW3) slowly release ozone as they dissolve, leveraging ozone's strong, broad-spectrum oxidative properties. These reactive compounds damage microbial cell membranes and degrade the biofilm structure, resulting in efficient microbial inactivation(4).

Shawli et al. found that NBs water outperforms EDTA in removing the smear layer, enabling fluorescent tetracycline to penetrate dentinal tubules more than 1 mm. Additionally, using EDTA in combination with NBs water significantly increases the release of dentin-derived growth factors like TGF-β1 from root canals, potentially supporting regenerative endodontic treatments(1). NBs also function as micro-carriers, enhancing the wettability and infiltration of irrigation solutions.

APPLICATION OF NBS IN DENTISTRY

·Root canal disinfection by irrigants activation
·Periodontal therapy
·To treat peri- implantitis
·Anti-microbial therapy
·Drug delivery agent in cancer chemo therapy
· Dental unit waterline disinfection

SAFETY AND BIOCOMPATIBILITY

Current evidence indicates that NB water is generally biocompatible, though safety varies depending on the type of gas used. NBs containing oxygen or air seem to pose no harm to oral tissues. In a 3D model of human gingival and epithelial tissue, exposure to ozone-NBs water (ONBW) resulted in only slight reductions in cell viability after 24 hours(5). Similarly, a case study on peri-implantitis noted no cytotoxic effects of ONBW on oral epithelial or mucosal cells(4). Small clinical trials involving NB irrigation have reported no adverse reactions. However, NBs with highly oxidative gases can be cytotoxic. For example, in vitro research by Mori et al. (2024) showed that ONBW significantly reduced fibroblast proliferation (evident in lower cell density at 48 hours), whereas oxygen or hydrogen NBs did not. This suggests that while ONBW is effective at eliminating pathogens, they may also impair host cells under prolonged or concentrated exposure in laboratory settings.

CONCLUSION

NBs revolutionize dentistry by delivering stable gaseous bubbles which can penetrate into inaccessible areas such as dentinal tubules, accessory/lateral root canals and can improve root canal disinfection. Beyond irrigation, NBs aid oral hygiene by reducing plaque in periodontal pocket and is effective in treating periimplantitis, without causing any systemic dysfunction. It can be used as drug delivery agents for cancer treatment. Apart from dentistry it has wide range of uses in food industry, agriculture, medical fields, water treatment. Future clinical trials will solidify their role in everyday practice.

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Pyogenic Granuloma of the palate: - A case report and review of literature

Dr. Rohit Krishna*, Dr. Akhilesh Prathap**

ABSTRACT

Pyogenic granuloma (PG) is a benign, non-neoplastic vascular lesion of the oral mucosa characterized by rapid growth and a marked tendency to bleed. Despite its name, it is neither purulent nor a true granuloma histologically. It often mimics other reactive and neoplastic lesions, posing diagnostic challenges. PG shows a higher prevalence among females and may occur across a wide age range. Its etiopathogenesis is multifactorial, involving local irritation, trauma, drugs, and hormonal influences. This article reviews the epidemiology, etiopathogenesis, clinical features, and management of PG, along with a case report highlighting individualized treatment. Understanding its varied presentation is essential for accurate diagnosis and optimal management.

KEYWORDS: Pyogenic granuloma, Vascular lesion, Pregnancy tumor

INTRODUCTION

Pyogenic granuloma (PG) is a common benign overgrowth of connective tissue characterized by exuberant proliferation of granulation tissue, frequently affecting the skin and oral mucosa. It is one of the most common causes of soft tissue enlargement due to its rapid growth pattern.[1-3]

The lesion was first described by Poncet and Dor in 1897 as "Botryomycosis hominis," while Hartzell later coined the term "pyogenic granuloma" in 1904.[4] However, the term is a misnomer since the lesion neither produces pus nor represents a true granuloma histologically.

Several alternative terminologies exist, including granuloma pediculatum benignum, vascular epulis, fibroangioma, hemangiomatous granuloma, and lobular capillary hemangioma.[5] The International Society for the Study of Vascular Anomalies (ISSVA, 2022) classifies certain forms of PG under vascular tumors, reflecting its angiogenic nature.

CASE REPORT

A 70-year-old male presented with a two-month history of swelling in the soft palate following toothbrush trauma, accompanied by occasional bleeding on manipulation. Clinical examination revealed a 3 × 2 cm pedunculated, erythematous mass with yellowish slough attached to the palatal gingiva. No active bleeding or discharge was noted.

Excisional biopsy was performed under local anesthesia. The stalk was ligated using 3-0 silk to minimize intraoperative bleeding, and the lesion was excised completely. Hemostasis was achieved using local measures including BOTROCLOT Drops. The surgical site was left to heal by secondary intention.

DISCUSSION

ETIOPATHOGENESIS

The exact etiopathogenesis of PG remains unclear and is considered multifactorial. Earlier theories suggested an infectious origin, reflected in its nomenclature.[6] Kerr (1951) proposed contributing factors such as botryomycosis, staphylococcal infection, foreign body irritation, and vascular endothelial infection.[7] Although bacteria have been identified in lesions, they are typically secondary colonizers rather than primary causes. Lee and Lynde (2001) reported an association between Bartonella infection and PG, suggesting a possible microbial role in select cases.[6]

Currently, PG is regarded as a reactive lesion arising from an exaggerated tissue response to local irritation or trauma. Common etiological factors include plaque, calculus, chronic irritation, trauma, faulty restorations, food impaction, periodontal disease, and mechanical injury such as tooth brushing.[1,3]

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Drug-induced PG has been associated with medications such as cyclosporine, tacrolimus, carbamazepine, phenytoin, nifedipine, levothyroxine, and certain antineoplastic agents.[8]

Hormonal influences play a significant role, particularly during pregnancy and puberty. Elevated estrogen and progesterone levels enhance angiogenesis, vascular permeability, and inflammatory response, leading to the formation of pregnancy tumors (granuloma gravidarum).[9,10] These hormones also influence oral microflora, increasing organisms such as Prevotella intermedia and Porphyromonas gingivalis.

CLINICAL FEATURES

PG most commonly occurs on the skin and oral mucosa, with rare involvement of the gastrointestinal tract, trachea, urinary bladder, and central nervous system.

Within the oral cavity, approximately 75% of cases involve the gingiva, particularly the maxillary anterior region. Other sites include lips, tongue, buccal mucosa, palate, and peri-implant tissues.

Clinically, PG presents as a red, exophytic, smooth or lobulated mass that may be sessile or pedunculated. It is often ulcerated and bleeds easily due to its high vascularity. Lesions are typically painless but may interfere with mastication or speech depending on size and location.

Early lesions are soft and highly vascular, whereas older lesions tend to become firmer and less erythematous due to fibrosis.

DIFFERENTIAL DIAGNOSIS

The differential diagnosis includes several reactive and neoplastic lesions:

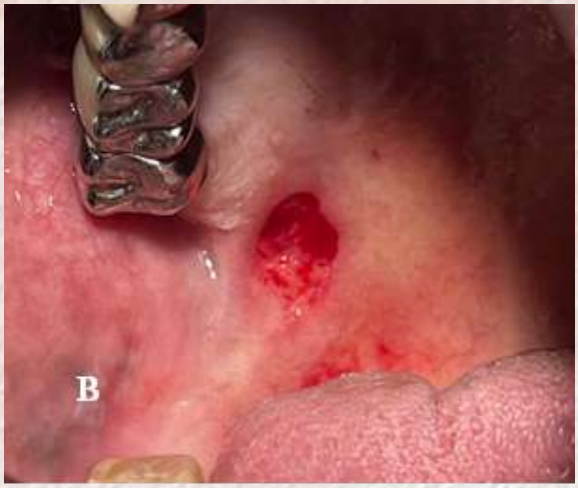
- Gingival hyperplasia
- Peripheral giant cell granuloma
- Peripheral ossifying fibroma
- Hemangioma
- Granulation tissue
- Peripheral odontogenic fibroma

Malignant conditions to be ruled out include:

- Kaposi's sarcoma
- Angiosarcoma
- Bacillary angiomatosis
- Metastatic tumors
- Non-Hodgkin's lymphoma

Accurate diagnosis requires histopathological evaluation to differentiate PG from these conditions.

A) Clinical photograph of the lesion showing a red colored mass with yellowish slough covering it and attached to the palatal gingiva



B) Clinical photograph of the biopsy site after excision of the lesion with temporary arrest of bleeding

TREATMENT

The primary treatment for PG is complete surgical excision, including removal of the lesion up to the periosteum with approximately 2 mm margins to reduce recurrence.

Elimination of local irritants such as plaque, calculus, and faulty restorations is essential to prevent recurrence.

Alternative treatment modalities include:

- Laser therapy – provides better hemostasis and minimal postoperative discomfort
- Cryotherapy – cost-effective, minimally invasive, and results in minimal scarring due to selective endothelial damage[13]
- Sclerotherapy – involves injection of sodium tetradecyl sulfate causing vascular obliteration; requires multiple sessions and carries risks such as necrosis and hyperpigmentation[14]
- Intralesional corticosteroids – reduce angiogenesis by inhibiting VEGF-A, MMP-1, and IL-6[11,12]

PG has a recurrence rate of approximately 15%, mainly due to incomplete excision or persistence of etiological factors.

A conservative management protocol[15] includes:

- Thorough oral prophylaxis
- Use of chlorhexidine mouthwash
- Maintenance of oral hygiene
- Regular follow-up (biweekly initially, then periodically)

Recurrence is less common in extra-gingival lesions following adequate excision.

CONCLUSION

Pyogenic granuloma is a benign reactive lesion characterized by excessive proliferation of granulation tissue, commonly affecting the oral mucosa. It arises due to local irritation, trauma, drugs, and hormonal influences, with pathogenesis involving angiogenic and inflammatory mechanisms.

Although benign, its clinical resemblance to other lesions necessitates careful diagnosis. Surgical excision remains the treatment of choice, supplemented by elimination of etiological factors to prevent recurrence.

Advances in molecular biology and genomics may further clarify its pathogenesis and enable development of targeted, minimally invasive therapies.

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NeoOrbit: Smart Design Of 3D-Printed Orbital Prosthesis

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ABSTRACT:
Ocular prosthesis is either a readymade stock shell or custom made prosthesis (CMP). Loss of the eye and surrounding orbital structures due to trauma, tumors, or congenital defects can significantly impact a patient's physical appearance and psychological well-being. Traditional methods of fabricating orbital prostheses are often time consuming, technique sensitive and highly dependent on the skill of the prosthodontist. With advancement in digital technology, three dimensional printing has emerged as a promising alternative for the design and fabrication of orbital prosthesis. This article explores the application of 3D printing in them creation of customized orbital prosthesis. Digital imaging techniques such as computed tomography (CT) and 3D facial scanning are used to capture precise anatomical details. These data are then processed using CAD software to develop a patient specific prosthesis. The final prosthesis is fabricated using biocompatible materials through additive manufacturing techniques. Thus,3D printing represents a significant advancement in maxillofacial prosthetics, offering a more efficient and precise approach to orbital prosthesis fabrication, ultimately improving patient satisfaction and quality of life.

KEY WORDS:Artificial eye, Computer aided,3D printing, Orbital prosthesis, Additive manufacturing

INTRODUCTION

An artificial eye is an ocular prosthesis that restores the appearance of a missing eye. Cosmetic rehabilitation of such individuals with ocular prosthesis can boost their morale; provide them with increased confidence in professional and personal interaction and reinstates social acceptability[1]. There are two types of ocular prosthesis available: Readymade or "stock: shells, which are readily available, inexpensive and can be fitted instantly; and custom-made prosthesis (CMP), which are tailored and customized to the individual user[1]. CMP has several advantages over stock shells, such as better apposition with the anterior surface of the socket, better cosmesis and enhanced ocular movement. Although CMP is undoubtedly a good option for any patient requiring ocular prosthesis, the fact that it can be designed only by qualified Ocularists lays stress on the availability of skilled labor, which adds to the cost component; CMP also has a lead time (waiting time) when compared to readily available stock shells. In recent years, the emergence of 3D printing technology has revolutionarized the field of maxillofacial prosthetics. By integrating digital imaging, CAD and additive manufacturing, clinicians can now create highly customized orbital prosthesis with enhanced precision, reduced production time, and improved patient comfort. This innovative approach not only streamlines the fabrication process but also allows for better replication of anatomical details, leading to more natural and esthetically pleasing outcomes. This advanced technology is a synergy of Computer Aided Modeling and Medical Imaging and blends their distinctive advantages to derive the best results in terms of fit, comfort and appearance. This process is referred to as Bio-CAD modeling and has proven to be highly successful in the fabrication of facial, nasal, and auricular prosthesis, dentures, and orthopedic implants.

METHOD

The initial and the final stages of the prosthesis manufacturing process are similar for both CMP and Bio-CAD prosthesis. Initially accurate impression of the patient's eye socket is obtained to prepare a suitable wax model. The impression mirrors the exact space the prosthesis will fit into. Position of the iris and the outer curvature are also determined on the wax model. A Computerized Tomography (CT) scan image of the wax model is taken maintaining a slice thickness of 0.318 mm for an average height of the wax model. The CT image is then converted into three-dimensional (3D) format using the Materialize Interactive Medical

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Image Control System (MIMICS) software (Figure 1A). This software enables the user to control and correct the segmentation of CT-scan[3]. The 3D model created by using the preceding procedure will have only one surface and cannot be used for modeling and analysis purpose. The jagged edges, unwanted elements and unclosed triangular edges are softened and corrected by providing them with a fine surface finish by exporting the model developed in MIMICS into a 3-Matic software, which is an inbuilt module of MIMICS. The 3-Matic software refines the borders and contours and also creates a volume mesh. The prosthesis model developed in 3-Matic is a solid three-dimensional final model. Using the same software the model can be designed to be hollow from inside, thereby considerably reducing the weight of the final prosthesis (Figure 1B). The model developed from medical image processing and modeling software (MIMICS + 3– MATIC) is now fed into a Rapid manufacturing machine (Polyjet 3D printing), which fabricates the prototype model of the ocular prosthesis (Figure 1C)[4]. The material used for printing the models is biocompatible medical grade polymethyl methacrylate (PMMA). The prototype model is then handed over to the ocularist, who hand-paints the iris by comparing with the unaffected eye and ensures total uniformity of both. The prosthesis is further coloured and manually painted matching with the other eye. Then, it is ready to be used by the patient (Figure 1D)[10]. The patients were also asked to grade the cosmesis, comfort level, and the perceived difference in ocular motility in three different categories: worse, better, and excellent. Similarly, the patients were asked to categorize amount of socket discharge as mild, moderate and severe (Figures 2 and 3). The final weight and the total effective time required for fabrication of both the prostheses were also compared.

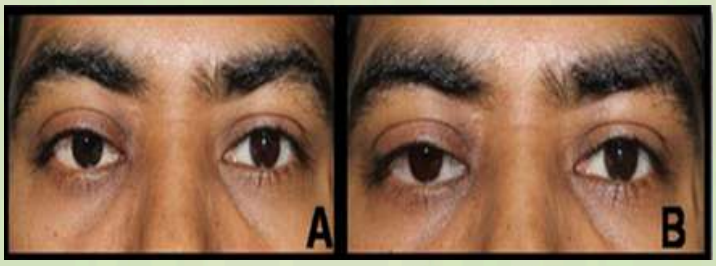


Fig 2

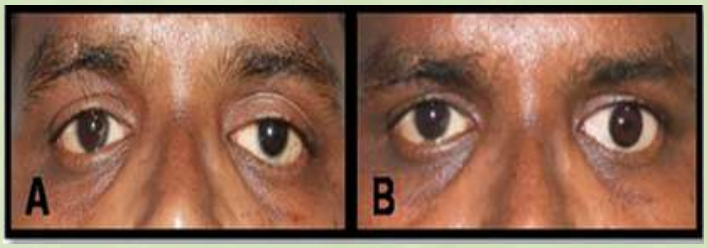


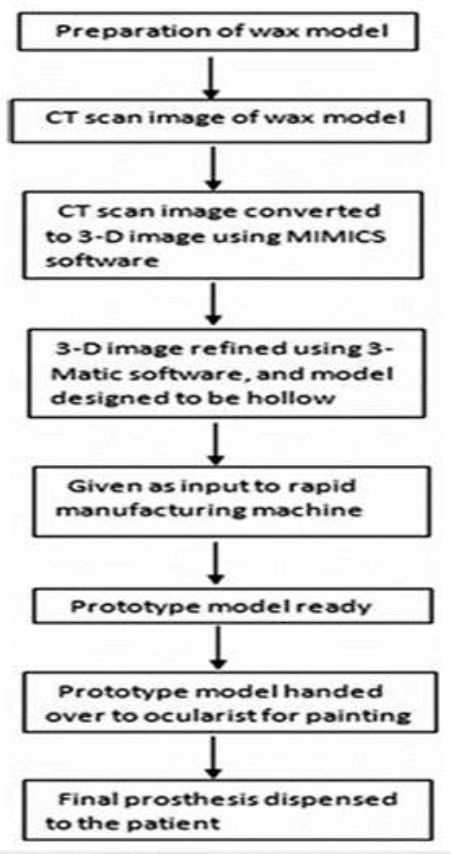
Fig 3

DISCUSSION

CAD-CAM and rapid manufacturing techniques (popularly known as the 3-D printing technique) have extensively been used over the past 25 years in assisting complex surgical procedures, anatomical teaching and surgical training, and fabricating prostheses and implants. Facial, nasal, and auricular prosthesis, dentures and orthopedic implants have been fabricated using this technique with great success[5]. The technique has not been popular in fabrication of ocular prosthesis. The Bio-CAD approach to model human body parts essentially involves the following three major steps:

(a) Image processing;
(b) Surface refinement and volume mesh; and,
(c) Converting model into desired format for design and manufacturing.

Image-based CAD modeling and design approach begins with the acquisition of non-invasive images, using Magnetic Resonance Imaging (MRI) or CT and its subsequent processing of DICOM images[6]. This is followed by a three-dimensional reconstruction of structure using commercially available medical reconstructive and reverse engineering software (MIMICS and 3-MATIC). The final image processed by the soft ware is given as an input to 3-D printing machine which fabricates a prototype model of the prosthesis. The model fabricated is an exact replica of the wax model without any human error[1]. The salient steps involved in fabrication of 3-D ocular prosthesis have been demonstrated by a flow diagram (Figure 4).



A CMP designed by Bio-CAD modeling and rapid manufacturing not only saves time for the patient, it is also less cumbersome for the user and the manufacturer. It does not require any socket handling after the wax model is prepared. One of the biggest advantages of a Bio-CAD model is that the prosthesis can be made hollow, which reduces the weight significantly leading to increase in comfort levels[7]. The fit of the Bio CAD prosthesis should be better than the conventional CMP, as it is the exact replica of the wax model. This eliminates any possible human error in the further steps of manufacturing[7]. However, there will not any clinically significant improvement in the prosthesis motility compared to conventional CMP, but there was a significant difference in terms of comfort level and the total time required for fabrication[6]. In 2013 a British magazine on architecture, interiors and designs reported on 3-D manufacturing of ocular prosthesis. However, the eyes were mass-produced in the form of stock shells without being customized for a particular patient. Recently Ruiters et al. reported a single case of ocular prosthesis fabrication utilizing the 3-D technology[8]. The technique described has quite a few drawbacks. The authors have fabricated only the impression mould using the 3-D technique and the rest of the steps were similar to the conventional method. The anterior curve of the 3-D impression mould was calculated from the mean standard values of normal human eyes, which defeats the purpose of customization of the prosthesis. The technique requires the orbital CT scan of the patient which exposes the patient to unnecessary radiation hazards[9]. Authors have not mentioned the total time required for prosthesis fabrication. The technique described in this article is innovative as the prototype is manufactured not only using 3-D printing technology, but also the prosthesis is made hollow, thus significantly reducing the final weight and thereby increasing the comfort level significantly[9]. This technique can be used to acquire CT images of multiple wax models at the same time and fabricate multiple prostheses simultaneously thereby drastically reducing the final cost and time for the patients[6].

CONCLUSION

This is a novel attempt to use the Bio-CAD and rapid manufacturing techniques to successfully fabricate a customized ocular prosthesis. Moreover the integration of 3D printing technology in the fabrication of orbital prosthesis represents a significant advancement in maxillofacial rehabiltation. By enabling precise customization, improved accuracy, and efficient production, this technology addresses many of the limitations associated with conventional fabrication techniques. Patients benefit not only from enhanced aesthetics outcomes and better fit but also from reduced treatment time and increased overall satisfaction.despite its promising advantages, challenges such as high initial costs, the need for specialized equipment, and technical expertise remain barriers to widespread adoption. However with continous advancements in digital imaging, materials, and printing technologies, these limitations are expected to diminish over time. Overall 3D printing holds great potential to redefine the future of orbital prosthetic rehabiltation, offering a more patient centered, efficient, and innovative approach that improves both quality of care and quality of life.

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WHEN HOPE BECAME REALITY- A DOCTOR'S EXPERIENCE

The IDA HOPE is a welfare program by the Indian Dental Association that provides financial and professional protection to dentists during emergencies. It combines life insurance coverage with legal and professional protection benefits. HOPE also includes options for health insurance and clinic protection against natural calamities and damage. It is specially useful for dentists to ensure themselves, their family and their practice.

Dr. Sruthy Rajagopal Pillai

Q: Could you please introduce yourself (name, specialty, place of practice)? About spouse and children.

Dr: Myself Dr. Sruthy, a Dental practitioner at Madathil Multispeciality Dental Clinic. Iam a Dentist by profession, a wife, and a proud mother of a 7 year old child. Balancing my professional responsibilities along with my family life has always been an important part of who Iam.

Q: How did you come to know about IDA Hope Medi?

Dr: I came to know about IDA Hope Medi through the Indian Dental Association network and my fellow colleagues. It was reassuring to learn that our professional body has such a structured and compassionate welfare initiative for its members.

Q: What motivated you to apply for assistance through this initiative?

Dr: What motivated me was the understanding that as healthcare professionals, we are not immune to unforeseen medical emergencies. One of the most reassuring aspects of this initiative is that the benefits extend to family members — including spouse, children, and even parents. Knowing that my family was protected under this scheme gave me peace of mind. It was a responsible decision taken with foresight.

Q: Can you describethe application and support process?Was it smooth and supportive?

Dr: Yes, the process was smooth, transparent, and very supportive. I felt guided at every step. I woud especially like to acknowledge Dr. Samuel K. Ninan, who personally supportedand guided me throughout this period. His encouragement and timely assistance made the entire process much easier and less stressful for me.

Q: What kind of help did you receivethrough IDA Hope Medi?

Dr: I received financial assistance towards my surgical treatment, along with strong institutional and moral support from the association.

Q: How significant was this supporting enabling you to undergo the surgery?

Dr: The support was highly significant. It reduced the financial burden and allowed me to focus completely on my treatment and recovery. The reassurance and guidance gave me confidence and strength during that challenging phase.

Q: How did you feel when you realized you were not alone and had institutional backing?

Dr: It was deeply comforting. As doctors, we are always the ones providing care to others. During my difficult phase, realizing that my own professional community was standing beside me was truly reassuring and humbling.

Q: Are you able to return to your professional duties fully or partially now?

Dr: I am gradually returning to my professional duties and regaining my strength. The recovery process is ongoing, but I remain optimistic and motivated.

Q: What does this support mean to you personally and professionally?

Dr: Personally, it meant hope and security during a very challenging time. Professionally, it strengthened my belief in the unity, compassion, and solidarity within the Dental fraternity.

Q: Would you like to share a message of gratitude to IDA Hope Medi and the Dental community?

Dr: I sincerely thank IDA Hope Medi and the entire Dental fraternity for standing by me during my time of need. It is truly reassuring to be part of a profession that stands together during difficult times.

Q: How important do you think such welfare initiatives are for healthcare professionals?

Dr: Such initiatives are extremely important. Healthcare professionals dedicate their lives to caring for others, often overlooking their own vulnerabilities. A structured welfare system ensures that no doctor feels alone during a crisis.

Q: What would you say to other doctors who may hesitate to seek help during difficult times?

Dr: Seeking help is not a sign of weakness. We are part of a strong professional family. Reaching out during difficult times is an act of courage and trust.

Q:What message would you like to give to IDA members regarding contributing to welfare programs like Hope Medi?

Dr: I would encourage every IDA member to actively support welfare programs like Hope Medi. Your contribution may become someone's lifeline during an unexpected crisis.

IDA HOPE

HELP OFFERED TO PROFESSIONALS IN EMERGENCY

The concept was formed in 2004 as PPP & SSS, in 2007 it was named HOPE which covers both legal and social security and was offered 2 lakhs in the case where a member is not able to work for life time or during casuality, years went by now we are in 2026 IDA HOPE has over 5000 members and the member benefit after casuality or permanent disability is now given an amount of 16.5 lakhs to the family. It covers the legal liability too, IDA HOPE will stand for the member to fight against the legal cases and will offer a professional indemnity.

IDA HOPE MEDI

This is offered for members and family members including parents to cover the medical expenses. Member can join once he/she becomes IDA HOPE member. Its a rare oppurtunity to include parents of any age starting from 5 lakhs to 7 lakhs to 10 lakhs. Its a previlege Indian Dental Association Kerala has for its members

TO JOIN IDA HOPE

- Fill up original form
- 2 passport size photo
  Should be a member of IDA Kerala
- Should have valid Dental Council registration
- Copy of Degree certificate
  Copy of age proof

HOPE ASSURE

After joining IDA HOPE , members can join HOPE ASSURE to secure our assets both movable and immovable, both house and clinic, also we can cover public liability and top up professional indemnity upto 2 crore. IDA Thiruvalla has around 38 HOPE ASSURE members, we have attained 100% renewal this year.

PAYMENT DETAILS

- Up to 30 years-Rs 5000/-
- 30years to 40 years-Rs 7500/-
- 40years to 45 years-Rs 10000/
- Renewals by APRIL 1st every year

IDA Thiruvalla has crossed 150 IDA HOPE members and has 99.6% renewals done in 2025

CLINICAL ESTABLISHMENTS
Registration and Regulations

The Kerala Clinical Establishments (Registration & Regulations) Act 2018 provides for the registration and regulation of clinical establishments from all recognized systems of medicine, i.e., Modern Medicine, Ayurveda, Naturopathy, Homeopathy, Siddha and Unani in both the public and private sectors.

It includes:

- Establishments owned, controlled, or managed by the government
- A department of the government
- A trust (public or private)
- Individual proprietorship
- A partnership firm
- Corporations registered under a Central, Provincial, or State Act
- A local authority
-

Purpose of CE Act:

The CE Act 2010 was enacted by the Central Government for all clinical establishments, with a view to prescribing minimum standards of facilities and services provided by them.

Provisional Registration:

The 2021 ordinance amending the KCE Act 2018 extended the validity of provisional registration of clinical establishments. The State Government has appointed authorities for each district to regulate registration and ensure compliance with the Act. These authorities include the District Collector, DMO, and Medical Officers of individual systems of medicine.

Provisional registration was provided for all functioning clinical establishments until 31/01/2024. The validity of provisional registration is 2 years from the date of issue of the certificate.

Recent Updates & Compliance:

Inspections were conducted in most of the clinics in our branch by the Clinical Establishment Bill authorities. Based on their directions, doctors have sent official communications to the DMO stating a declaration from clinic owners regarding compliance with the Clinical Establishment Act and application for permanent registration as per rules.

IDA Thiruvalla Branch:

Around 80 clinics of our branch members are registered under the CE Act, including both provisional and permanent registrations. Newly started clinics have completed permanent registration as per the rules.

Dr. Sharen Sarah Daniel
(Liason officer for CE, IDA Thiruvalla)

JOURNAL GUIDELINES

Manuscript type : accepted are i) research ii) case report iii) review iv) short study

Article should be typed in times new roman size 12 A4 size paper. Use 1.5 spacing through out with a significant margin. Authors are advised to retain a soft copy for the reference and a soft copy of the article has to be sent to the editors email.

Ethical consideration: manuscript submitted for publication must comply with the following ethical consideration. Written informed consent must be obtained from the subject before their data included in the study. Any data from the patient must be submitted by hiding their identity. All research should be carried out with prior approval from institutional or national ethic committee and should be in accordance with Helsinki declaration of 1964. If animals are used for research, the authors must follow the institutional or national guidelines for the care of use of laboratory animals.

Manuscript format

Title : The title of the article should be concise, specific & informative
Authors : Name of the author with his/ her highest academic degree and institutional affiliation. Name address phone number and email address of the author and corresponding authors should be mentioned.The maximum number of authors for article is five.

Abstract : the abstract should not exceed 200 words. Below the abstract 3 to 10 key words in alphabetical order should be given. Abstract should contain the purpose of the study, materials and method, statistical analysis, results and conclusion.

Manuscript: For all the manuscript the word limit would be up to 3500 words excluding the references and abstract. Tables should be self-explanatory, numbered in roman numbers, according to the order mentioned in the text. Illustrations should be clearly numbered, each figure should be referred to the text, high quality digital images must be submitted in JPEG format.

Reference : References must be included and the bibliography should follow the vancouver format. The referencing should be numbered sequentially as superscripts in order of their appearance.
Copy right: while submitting the manuscript the authors has to make sure that the article submitted has not been published before .

All communications should be addressed to the Editor and addressed to:
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Editor (IDA Thiruvalla Branch) Ph:9744111724
Email.id: shibiprosthodontics@gmail.co

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TAPER

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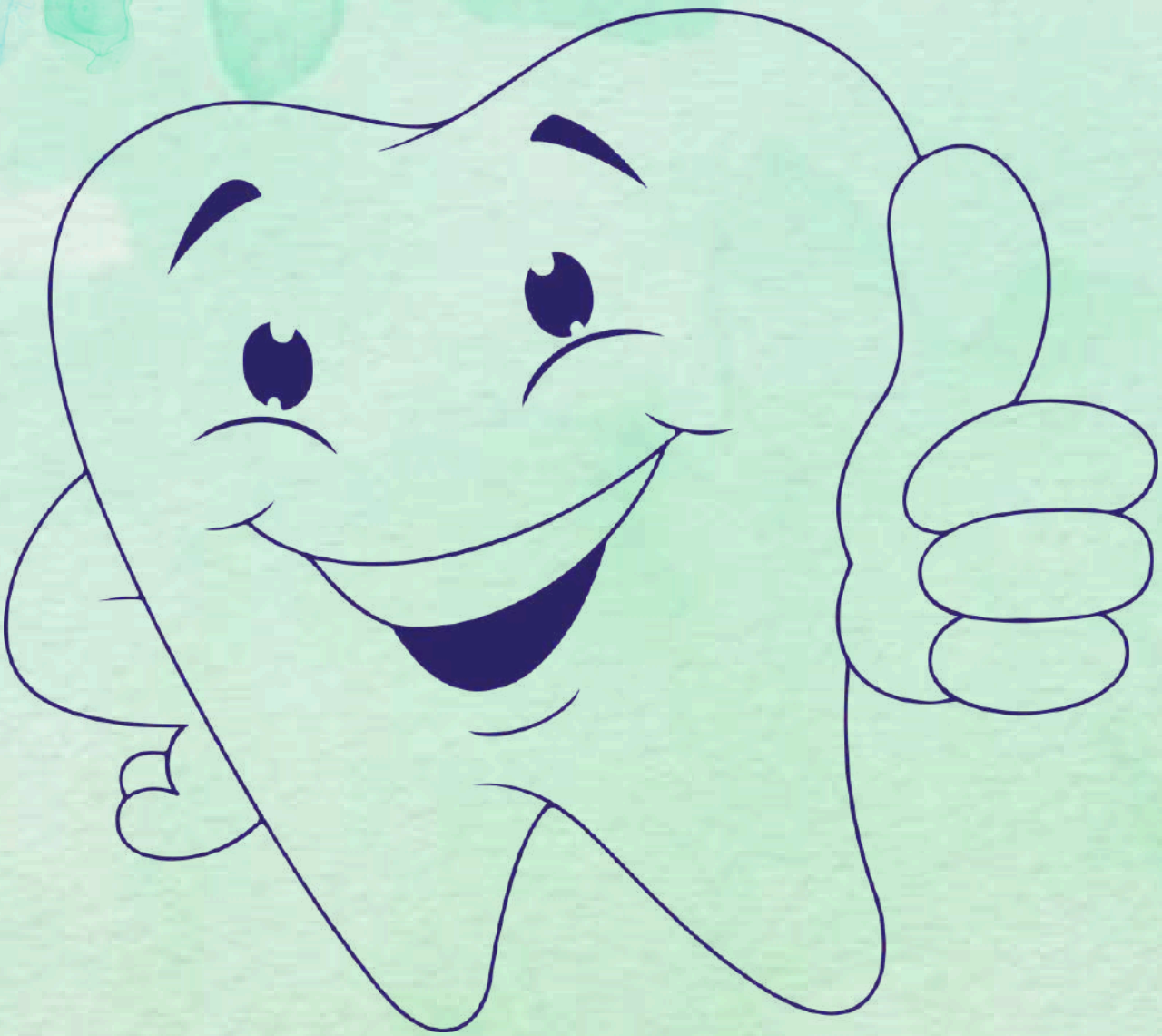
SMILES ARE THE CURVE THAT SETS EVERYTHING STRAIGHT



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