TAPER

Journal of Indian Dental Association Thiruvalla

VOLUME 10, ISSUE 3 SEPTEMBER- DECEMBER 2026











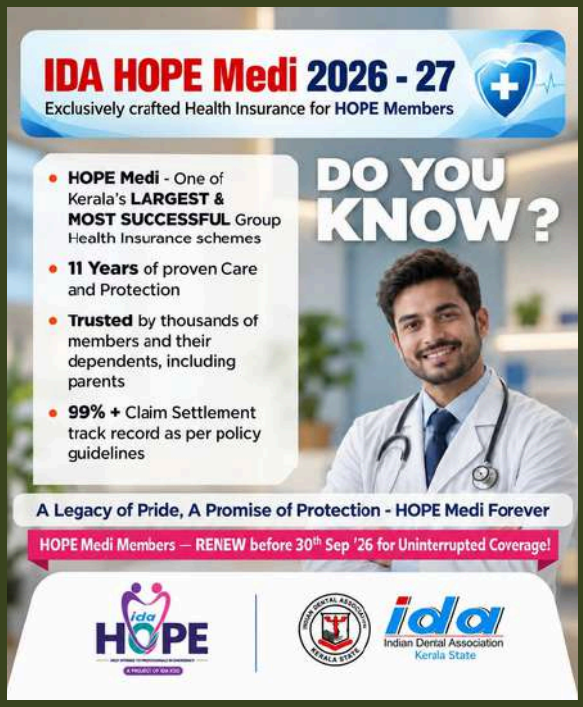
- Dental Considerations of Individuals with Neurodevelopmental Disorders in Pediatric Dentistry: A Condensed Review
- Preserving the Socket: The Role of Xenograft and Injectable Platelet-Rich Fibrin
- Beyond Dental Expansion: How MARPE Reshapes the Maxilla and influences the Airway
- Gingival Clefts: An Ortho Perio Interrelationship
- Digitalisation in Complete Denture Prosthodontics: A Narrative Review of Workflows, Materials, Clinical Outcomes and Future Directions
- Mobile Dental Clinics: Role in Improving Access to Oral Healthcare

Email: editoridathiruvalla@gmail.com

Web: www.idathiruvalla.org.

IDA MEMBER BENEFITS







OFFICE BEARERS OF IDA THIRUVALLA

PRESIDENT
DR. ASWIN. M.R

PRESIDENT ELECT
DR.DAN. V CHERIAN

IMM. PAST PRESIDENT
DR. MAYA MATHAI

VICE PRESIDENTS
DR. ZUBIN CHERIAN
DR. SEEMA JOSEPH

HON. SECRETARY
DR. DEEPTHI SANTHOSH

TREASURER
DR. VIVEK. P.S

FIRST STATE VICE PRESIDENT
DR. RAJEEV SIMON K

EDITORS
DR. SHIBI MATHEW. V
DR. SIJINA K.K

CDE REPRESENTATIVE
DR. ARAVIND. A

CDH REPRESENTATIVE
DR. MATHEWS JUDE

WDC REPRESENTATIVES
DR. ASHLY ANNA PHILIP
DR.ANUJA ELIZABETH MATHEW

IDA THIRUVALLA: A JOURNEY OF EXCELLENCE, SERVICE AND TOGETHERNESS

Celebrating our journey, cherishing our achievements, and looking forward to a brighter future.

The Indian Dental Association (IDA), Thiruvalla Branch, has grown into a vibrant and dynamic professional association, bringing together dental professionals with a shared vision of advancing dentistry, promoting oral health, and serving society. Established on 7 December 2008 with 77 members, the branch began its journey with a commitment to professional excellence, scientific advancement, and community welfare. Over the years, IDA Thiruvalla has evolved into a strong and active branch of IDA Kerala State, building a legacy of meaningful initiatives, collective achievements, and lasting professional relationships.

At the heart of IDA Thiruvalla lies the belief that dentistry extends far beyond the boundaries of a dental clinic. It is a profession rooted in knowledge, compassion, responsibility, and service. Guided by these principles, the branch has consistently worked to strengthen the professional growth of its members while reaching out to the community through various oral health initiatives. Every programme, scientific meeting, awareness campaign, and community activity reflects the dedication of its members towards creating a healthier society.

Scientific advancement and continuing dental education have always been important pillars of the branch. Through Continuing Dental Education (CDE) programmes, seminars, workshops, conferences, and hands-on training sessions, IDA Thiruvalla provides opportunities for dental professionals to update their knowledge, enhance their clinical skills, and remain informed about emerging trends in dentistry. These academic initiatives encourage interaction among practitioners, promote the exchange of ideas, and inspire members to embrace innovation and evidence-based dental practice. In a rapidly evolving profession, the branch continues to recognise the importance of lifelong learning and professional development.

Equally significant is the branch's commitment to community dental health and public awareness. Through dental screening camps, school oral health programmes, awareness sessions, and preventive dental care initiatives, IDA Thiruvalla strives to bring essential oral health information and services closer to the public. By engaging with children, families, and underserved communities, these activities help emphasise the importance of oral hygiene, early diagnosis, and timely dental treatment. Such initiatives remind us that even a small act of awareness can make a lasting difference in someone's life.

The branch's contribution also extends to humanitarian service. In times of difficulty and disaster, the spirit of professional solidarity and compassion becomes especially meaningful. The collective efforts of IDA members in supporting affected communities reflect the humanitarian values that form an integral part of our profession. Through service-oriented initiatives and collaborative action, IDA Thiruvalla continues to demonstrate that the strength of an association lies not only in its professional achievements but also in its willingness to stand beside those in need.

Another remarkable aspect of IDA Thiruvalla is the sense of unity and belonging shared by its members. The branch brings together experienced practitioners, specialists, academicians, consultants, and young dentists, creating a platform where experience meets enthusiasm and knowledge is shared across generations. The dedication of successive office-bearers, committee members, and volunteers has played a vital role in shaping the branch's growth. Their leadership, teamwork, and commitment have helped transform ideas into initiatives and aspirations into achievements.

Over the years, the branch has also earned recognition for its contributions to scientific activities, community service, administration, membership development, and publications. Such achievements are not merely milestones to be celebrated; they represent the collective efforts of every member who has contributed time, energy, and expertise towards the progress of the association. Each recognition serves as an encouragement to continue striving for greater excellence and broader social impact.
As we reflect on the year gone by, we are reminded that the true strength of IDA Thiruvalla lies in its people, its purpose, and its shared vision. Every successful programme, every meaningful interaction, and every initiative undertaken by the branch adds another chapter to its continuing story. The friendships formed, the knowledge shared, the challenges overcome, and the memories created together make this journey truly special.

As the final newsletter of the year reaches our readers, it also becomes a moment to pause, reflect, and express gratitude. We extend our heartfelt appreciation to all our members, office-bearers, contributors, volunteers, and well-wishers who have supported the branch throughout its journey. Their enthusiasm and participation continue to inspire us to aim higher and serve better.

IDA Thiruvalla is more than an association; it is a community united by a profession, strengthened by friendship, and driven by a commitment to service. As we look ahead to another year, may we continue to learn together, grow together, and make a meaningful difference together. With renewed energy and a shared sense of purpose, let us carry forward the legacy of our branch, creating new opportunities, embracing new challenges, and building a future that reflects the very best of our profession



INDIAN DENTAL ASSOCIATION
THIRUVALLA BRANCH
TEAM OF OFFICE BEARERS -2026



Dr. ASWIN M.R.
PRESIDENT
7025189195



Dr. DAN V. CHERIAN
PRESIDENT ELECT
8547325654



Dr. MAYA MATHAI
IMMEDIATE PAST PRESIDENT & REP. TO STATE
8547620052



Dr. ZUBIN CHERIAN
VICE PRESIDENT
9497075891



Dr. SEEMA JOSEPH
VICE PRESIDENT & REP.TO STATE
9961193155



Dr. DEEPTHI SANTHOSH
HON. SECRETARY
7021996481



Dr. VARUN GOPAL
ASST. SECRETARY
7907126258



Dr. ROJI KURIAN
JOINT SECRETARY
8606214851



Dr. VIVEK P.S.
TREASURER
9495934400



Dr. RAJEEV SIMON K.
1ST VICE PRESIDENT IDA KERALA STATE
9447244072



Dr. SAJI KURIAN
VICE CHAIRMAN HOPE BENEVOLENT & IDA KSB STATE EXECUTIVE MEMBER
9847440646



Dr. ARAVIND A.
CDE REPRESENTATIVE
948700764



Dr.MATHEWS JUDE
CDH REPRESENTATIVE
6282671106



Dr. SHIBI MATHEW
EDITOR JOURNAL
9744111724



Dr. SIJINA K.K.
ASST. EDITOR JOURNAL
8281037348



Dr. SIMON GEORGE
EXECUTIVE COMMITTEE MEMBER
9847180197



Dr. TESSA JOSE
EXECUTIVE COMMITTEE MEMBER
9446197688



Dr. SIJU SUNNY
EXECUTIVE COMMITTEE MEMBER
8129061949



Dr. TESSY SAM
EXECUTIVE COMMITTEE MEMBER
9349500578



Dr. VIMAL THOMAS
EXECUTIVE COMMITTEE MEMBER
9495565171



Dr. K.N. THOMAS
NOMINEE TO MEDIA CELL &
CENTRAL COUNCIL MEMBER
Mob: 9847354862



Dr. SAMUEL K. NINAN
NOMINEE TO DISTRICT COMMITTEE
CONVENOR IDA KSB FORCE &
CENTRAL COUNCIL MEMBER
9447440004



Dr. REJI THOMAS
CENTRAL COUNCIL MEMBER
Mob: 9447066543



Dr. AKHILESH PRATHAP
REP. TO STATE
Mob: 9946661016



Dr.LANU ABRAHAM
Rep. TO STATE & CONVENOR IDA KSB SHIELD
Mob: 9961550216



Dr.THOMAS JACOB
Rep. TO STATE
NOMINEE TO PRACTITIONERS FORUM
Mob: 8848068396



Dr. THOMAS EAPEN
IDA HOPE REPRESENTATIVE
Mob: 9446190291



Dr. ASHLY ANNA PHILIP
WDC REPRESENTATIVE
Mob: 7837137199



Dr. ANUJA ELIZABETH MATHEW
WDC REPRESENTATIVE
Mob: 7907259116



Dr. DAN V. CHERIAN
NOMINEE TO LABOUR SUB-COMMITTEE &
MEMBER PRIVILEGE CARD
Mob: 8547325654



Dr. AAKARSH NAIR
IMAGE REPRESENTATIVE
Mob: 9074348755



Dr. ELIZABETH TINTU THOMAS
IDA STORE
Mob: 9495683393



Dr. ADARSH A.R.
SPORTS CO-ORDINATOR
Mob: 9656696153



Dr.ADARSH NINAN SAM
WEBSITE IN CHARGE
Mob: 8606666155



Dr. MIRANDA GEORGE
ACADEMIC CO-ORDINATOR
Mob: 9920432115



Dr. SHAREN SARAH DANIEL
SOCIALMEDIA CO-ORDINATOR &
LIAISON OFFICER FOR C.E
Mob: 8606595188



Dr. SRUTHY RAJAGOPAL PILLAI
CULTURAL CO-ORDINATOR
Mob: 9562069745



Dr. M.G. ANANTHAKRISHNA
TOUR CO-ORDINATOR
Mob: 8300262396

INDIAN DENTAL ASSOCIATION
THIRUVALLA BRANCH

www.idathiruvalla. org

ida_thiruvalla

idathiruvalla



TABLE OF CONTENTS

1.Presidential Address.....8

2.Hon. Secretary's Message.....9

3.Editorial.....10

4.Dental Considerations of Individuals with Neurodevelopmental Disorders in Pediatric Dentistry : A Condensed Review. Dr Aparna K, Dr Elizabeth Joseph.....12

5.Preserving the Socket: The Role of Xenograft and Injectable Platelet-Rich Fibrin. Dr. Prameetha George Ittycheria, Dr. Saumya John.....19

6.Beyond Dental Expansion: How MARPE Reshapes the Maxilla and influences the Airway. Dr Theertha K, Dr Smrithi Muraleedharan, Dr Jacob John, Dr Navin Oommen Thomas, Dr Nooriya T.K.....26

7.Gingival Clefts: An Ortho Perio Interrelationship. Dr Annie Kitty George, MDS, PhD, Dr Rajasree Anoop, Dr Geetanjali Johnson.....31

8.Digitalisation in Complete Denture Prosthodontics: A Narrative Review of Workflows, Materials, Clinical Outcomes and Future Directions. Dr.Feba Mariya, Dr Aby Mathew , Dr. Rene Kuriakose, Dr. Mariya Davis, Dr Reshma.....33

9.Mobile Dental Clinics: Role in Improving Access to Oral Healthcare. Benley George, Ansu Emmauel, Sunu Alice Cherian, Minimol K Johny, Denny Thomas, Anandhulal.....40

10.When HOPE Becomes Strength, Every Story Inspires.....44

11.IDA HOPE.....46

12.Journal Guidelines.....47

President's Message



Dear Members,

It gives me immense pleasure to present the third issue of Taper for this year, reflecting the spirit, dedication, and collective achievements of the Indian Dental Association, Thiruvalla Branch.

A professional journal is more than a collection of words and photographs; it is a reflection of our shared journey, our commitment to excellence, and the bonds that unite us as a professional community. Through Taper, we celebrate our activities, appreciate the contributions of our members, and create a platform to share knowledge, ideas, and experiences that inspire us to move forward together.

The past months have once again highlighted the importance of teamwork, professional engagement, and our responsibility towards society. I sincerely appreciate the enthusiasm and support of our members, whose active participation continues to strengthen our branch and enrich its initiatives.

My heartfelt gratitude goes to our office bearers, committee members, and every individual who has contributed to our branch activities. I would like to express my special appreciation to our journal editors, Dr. Shibi Mathew and Dr. Shijina K, for their dedicated efforts and valuable contributions in bringing this edition of Taper to life.

As we continue our journey, let us remain united in our pursuit of professional excellence, meaningful service, and lasting friendships. May our collective efforts continue to make a positive difference in our profession and in the communities we serve.

I wish the third issue of Taper great success and hope it serves as a cherished record of our shared accomplishments and aspirations.

With warm regards,

Dr. Aswin M. R.
President
IDA Thiruvalla Branch

Hon. Secretary's Message



Warm greetings to all our dear members!

It is indeed an honour and a proud moment for me to present the third edition of journal of IDA Thiruvalla Branch.

I extend my heartfelt gratitude to our editorial team for their dedicated efforts in bringing out this wonderful publication. My sincere thanks also go to all the practitioners who have taken time out of their busy schedules to contribute valuable articles to this journal.

The academic content presented in TAPER will help us translate knowledge into clinical practice and stay updated with the latest developments in our profession. Reading well-presented articles is often a convenient and effective way to gain new insights and refresh our knowledge amidst our busy clinical schedules.

The time, effort and commitment invested by each and every person involved in bringing out this edition are truly commendable. I particularly appreciate the editorial team for collecting a wide range of articles, carefully organising them and presenting them in an appropriate format to make the journal informative, accessible and useful for our members.

I hope this edition inspires more members to share their knowledge, clinical experiences and academic contributions in our forthcoming editions. Let us continue to encourage a culture of learning, sharing and professional growth within our branch.

Thank you all for your valuable contributions and for being an active part of IDA Thiruvalla Branch.

Jai IDA!

With warm regards,

Dr. Deepthi Santhosh
Secretary
IDA Thiruvalla Branch

Editor's Message



"Knowledge grows when we keep learning, excellence follows when we keep improving, and progress begins when we share what we know."

Dear Members and Readers,

It gives me immense pleasure to present the third edition of TAPER, the journal of the Indian Dental Association (IDA), Thiruvalla Branch, covering September–December 2026.

TAPER reflects the dedication, hard work, and research-oriented spirit of our members. It provides a valuable platform to share knowledge, exchange ideas, and highlight the professional and academic contributions of our fraternity.

In a rapidly evolving field such as dentistry, continuous learning is essential. Updating ourselves through regular reading of scientific journals, current guidelines, research publications, and professional literature enables us to remain informed about emerging concepts, technologies, treatment modalities, and evidence-based practices. Reading not only broadens our understanding but also encourages critical thinking, helps us reassess established approaches, and supports lifelong professional development. By engaging with scientific literature, research, and professional experiences, we can expand our knowledge, refine our clinical skills, make informed decisions, and improve patient care. I hope this edition encourages readers to remain curious, embrace evidence-based practice, and contribute actively to the advancement of our profession.

Documenting our clinical experiences and cases through a journal such as TAPER is equally important. Each case carries valuable lessons, whether it demonstrates a successful treatment outcome, presents a diagnostic challenge, highlights an unusual clinical finding, or offers insight into the management of complications. Careful documentation preserves these experiences as a lasting record and transforms individual learning into shared professional knowledge. It allows us to reflect on our clinical decisions, evaluate outcomes, identify areas for improvement, and guide future practice. Sharing well-documented cases also promotes discussion among colleagues, encourages collaboration, and provides a meaningful educational resource for both present and future members of our dental community. I encourage all members to make use of this platform and contribute their cases, observations, innovations, and reflections so that our collective experiences may continue to enrich the profession.
I extend my sincere gratitude to all contributors for sharing their valuable insights and articles. Your time and effort form the foundation of this journal and have made this edition meaningful and enriching.

I also express my heartfelt thanks to the executive committee members of IDA Thiruvalla Branch for their continued encouragement and support, and to my co-editor, Dr. Sijina K.K., for her dedicated collaboration throughout this endeavour. My sincere appreciation goes to all our members and readers for their constant encouragement and for helping make TAPER a platform for collective growth and professional excellence.

May we continue to read, learn, document, and share our experiences, strengthening our commitment to excellence in dentistry and service to society.

Warm regards,

Dr. Shibi Mathew V
Editor-in-Chief
TAPER – IDA Thiruvalla Branch

Editor's Message



Dear Members,

As we come to the final edition of TAPER for this year, it is a moment to look back with gratitude, pride, and a renewed sense of purpose. Every edition of our journal is more than a collection of articles; it is a reflection of our collective knowledge, professional growth, shared experiences, and commitment to the advancement of dentistry.

Throughout the year, TAPER has continued to serve as a platform for sharing scientific knowledge, clinical insights, innovative ideas, and the remarkable contributions of our members. The enthusiasm and support of our contributors, readers, and the entire IDA Thiruvalla family have been the driving force behind this journey.

As Assistant Editor, it has been a privilege to be part of this editorial journey. My sincere gratitude goes to our branch leadership for their encouragement, our authors for their valuable contributions, and our editorial team for their dedication and teamwork. Every article, every idea, and every effort has helped shape the identity of our journal.

As we close this year's chapter, let us carry forward the same spirit of collaboration, curiosity, and excellence into the coming year. May TAPER continue to grow as a vibrant platform that inspires learning, encourages research, and strengthens the professional bond among our members.

With every edition, we turn knowledge into inspiration and collaboration into progress.
Thank you for being an integral part of our journey. Wishing all our members a fulfilling year ahead, filled with new opportunities, meaningful achievements, and continued success.

Warm regards,
Dr. Sijina KK
Assistant Editor
IDA Thiruvalla

Dental Considerations of Individuals with Neurodevelopmental Disorders in Pediatric Dentistry: A Condensed Review

Dr Aparna K*, Dr Elizabeth Joseph**

Abstract

Children and adolescents with special health care needs (SHCN) have increased oral health risks and may experience barriers to dental care. Their management requires individualized adaptation of conventional pediatric dental approaches. This review summarizes dental considerations for intellectual disability, Down syndrome, cerebral palsy, epilepsy, autism spectrum disorder (ASD), and attention-deficit/hyperactivity disorder (ADHD). Key principles include early establishment of a dental home, comprehensive medical and dental assessment, caregiver involvement, preventive care, communication adaptation, behavior guidance, appropriate positioning, management of systemic comorbidities, and use of sedation or general anesthesia when conventional care is not feasible. Recognition of condition-specific oral manifestations and medical risks is essential for safe and effective treatment. A preventive, individualized, and multidisciplinary approach can improve access to care and support long-term oral health.

Keywords: Children with special health care needs; intellectual disability; Down syndrome; cerebral palsy; epilepsy; autism spectrum disorder; ADHD; dental management

Introduction

Special health care needs encompass physical, developmental, mental, sensory, behavioral, cognitive, and emotional impairments requiring specialized health interventions. These conditions may affect oral health, self-care, communication, behavior, and access to dental services. Although special needs dentistry has developed substantially, comprehensive dental treatment may still require adaptations beyond routine pediatric care. Effective management depends on the child's developmental and functional status, oral manifestations, systemic disease, medications, communication needs, behavioral characteristics, and caregiver resources. Early prevention and individualized treatment are therefore central to acceptable oral health outcomes.

Classification of Special Health Care Needs

SHCN may be broadly classified into six clinical categories: (1) mentally challenged—mental retardation, cerebral palsy, and epilepsy; (2) physically challenged—hearing, visual, and speech impairments; (3) medically challenged—cardiovascular, renal, respiratory, gastrointestinal, hematological, endocrine/metabolic, liver disorders and hepatitis, and AIDS; (4) genetically challenged—Down syndrome, Marfan syndrome, Pierre Robin syndrome, ectodermal dysplasia, cleidocranial dysplasia, Crouzon syndrome, Apert syndrome, Klinefelter syndrome, Treacher Collins syndrome, hemifacial microsomia, and cleft lip and palate; (5) emotionally challenged—child abuse and neglect; and (6) learning disabilities—autism, ADHD, and dyslexia.

General considerations

The principal goals are to improve access to care, establish a dental home early, obtain comprehensive medical, dental, and social histories, create a suitable clinical environment, provide oral-health education and anticipatory guidance, and deliver preventive and therapeutic care using appropriate behavior guidance and multidisciplinary collaboration. Assessment should include developmental and mental age, communication ability, systemic disease, medications, seizure history, caregiver involvement, consent requirements, and practical limitations. Preventive care is particularly important because difficulties with oral hygiene and regular attendance can increase caries and periodontal risk. Non-pharmacological behavior guidance, including familiarization and desensitization, should

***Postgraduate, Department of Pediatric and Preventive Dentistry, Pushpagiri College of dental Sciences,**
****Professor, Department of Pediatric and Preventive Dentistry, Pushpagiri College of dental Sciences**

precede more restrictive approaches. Protective stabilization should be limited to necessary situations and used with appropriate consent. Sedation or general anesthesia may be considered when cooperation is inadequate or extensive treatment cannot safely be completed conventionally. Medical consultation is important when systemic disease, seizures, drug interactions, or antibiotic prophylaxis may influence treatment.

Various developmental Disabilities

The following conditions require condition-specific assessment because their medical, behavioral, communication, and oral characteristics can substantially alter dental risk and treatment planning.

1. Intellectual Disability

Intellectual disability (ID) is characterized by significant limitations in intellectual functioning and adaptive behavior involving conceptual, social, and practical skills, with onset before 18 years of age. The manuscript reports an estimated global prevalence of approximately 3% and an Indian prevalence of 10.5 per 1,000. Children with ID may have increased susceptibility to early childhood caries and rampant decay, particularly with sugary liquid medications, nighttime bottle feeding, and demand breastfeeding. Poor plaque control may produce calculus, halitosis, gingival inflammation, and drug-related gingival overgrowth, especially with anticonvulsant therapy. Dentoalveolar trauma, lip and cheek biting, self-injury, tooth agenesis, enamel hypoplasia, delayed eruption, malocclusion, and speech impairment may occur.

Dental Management Considerations

Management begins with assessment of developmental level, communication, medical status, consent, caregiver involvement, and practical factors. Physician consultation may be needed for systemic disease, seizure control, drug interactions, or possible antibiotic prophylaxis. Introductory visits and desensitization can establish trust. Protective stabilization is a last-resort measure with appropriate consent; sedation . or general anesthesia may be necessary for non-cooperative patients or extensive treatment. Frequent periodontal recalls, fluoride-releasing restorative materials such as glass ionomer cement, and stainless steel crowns for severely broken-down teeth may simplify care. Single-appointment endodontic treatment can reduce visits when cooperation is limited. In uncontrolled epilepsy, removable dentures and fixed bridgework require particular caution because of trauma and aspiration concerns.

2. Down Syndrome (Trisomy 21)

Down syndrome is the most common chromosomal anomaly associated with generalized intellectual disability and growth delay. Craniofacial, systemic, and oral characteristics have direct implications for pediatric dental management.

Systemic & Craniofacial Characteristics

Typical findings include a brachycephalic skull, flat occiput, persistent metopic suture, midfacial hypoplasia, ocular hypotelorism, epicanthic folds, upward-slanting palpebral fissures, and hypoplastic or absent paranasal sinuses. Generalized hypotonia, joint hyperflexibility, short stature, and atlantoaxial instability may occur. Congenital heart defects are reported in 40–50% of affected individuals; mitral valve prolapse, cellular immune deficiency, and seizure disorders may also complicate care.



Oral Manifestations

Perioral hypotonia may contribute to mouth breathing, drooling, angular cheilitis, and open-bite malocclusion. The tongue may appear relatively enlarged because of reduced oral cavity size and impaired lymphatic drainage; fissured or geographic tongue and scalloping may occur. Other findings include reduced palatal height and length, xerostomia, microdontia, conical crowns, taurodontism, peg-shaped lateral incisors, enamel

hypoplasia, hypodontia/agenesis, delayed eruption, and retained deciduous teeth. Severe early-onset periodontal disease is an important concern, with ANUG, candidiasis, and aphthous ulcers also described.



Figure 2:Everted lips with tongue protrusion due to hypotonic orbicularis oris muscle



Figure 3:Enlarged, fissured tongue



Figure 4:High-arched palate

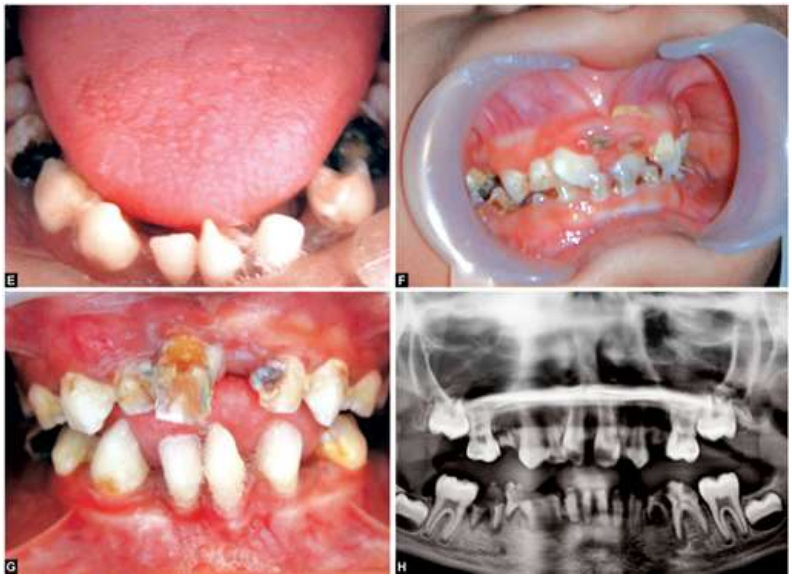


Figure 5:Dental caries, tooth agenesis, rotated, malposed and congenitally missing teeth along with taurodontism and short crown root ratio

Dental Management Considerations

Medical consultation is required when cardiac defects or mitral valve prolapse are present to determine whether infective endocarditis prophylaxis is indicated before invasive procedures. Positioning should accommodate hypotonia and ligamentous laxity; neck pillows and avoidance of excessive extension or rotation are important with atlantoaxial instability. Preventive care should emphasize plaque control, frequent recalls, topical fluoride when xerostomia is present, and lip care. Seizure history and anticonvulsant therapy should be documented. Mouth props and rubber dam clamps should be secured with floss ties. If a seizure occurs, the oral cavity should be cleared, the patient positioned laterally as appropriate, the airway monitored, and objects should not be forced between the teeth.

3. Cerebral Palsy (CP)

Cerebral palsy is a group of non-progressive disorders of movement and posture caused by disturbances in the developing fetal or infant brain. Motor impairment may be accompanied by sensory, cognitive, communication, perceptual, and seizure disorders. It is the most common motor disability of childhood. Etiological factors may be prenatal, perinatal, or postnatal and include congenital brain malformations, intrauterine infection, hypoxic-ischemic injury, septicemia, meningitis, kernicterus, severe hypoglycemia, trauma, cerebrovascular accidents, and post-infectious anoxic insults. Prematurity, low birth weight, and maternal intra-amniotic infection are associated factors.

Primitive Reflexes Relevant to Dental Care

The asymmetric tonic neck reflex may produce extension and stiffening of limbs on one side with flexion on the opposite side when the head is turned. The tonic labyrinthine reflex may cause postural extension after sudden backward head tilting. The startle reflex can produce sudden forceful body movements after unexpected auditory or visual stimuli. Recognition of these reflexes assists safe positioning and treatment.

Oral Manifestations

Severe enamel erosion may occur with gastroesophageal reflux and frequent emesis. High plaque accumulation, mouth breathing, anticonvulsant-associated gingival overgrowth, tongue thrusting, anterior open bite, flared maxillary anterior teeth, micrognathic oral cavity, and severe bruxism may be present. Spontaneous jaw dislocation can occur because of uncoordinated muscle spasms.

Dental Management & Clinical Adaptations

Early morning appointments may reduce fatigue-related difficulties. Adequate head and body support, including physical stabilization or vacuum pillows when appropriate, can help control involuntary movement and hyperreflexia. Sudden movements and loud sounds should be avoided because they may trigger startle responses. When gagging limits radiography, modified oblique lateral jaw or reverse bitewing techniques may be useful. Stainless steel crowns can provide durable treatment while reducing procedural complexity. Caregivers should receive practical brushing instructions, including head stabilization, adapted handles or electric toothbrushes, fluoridated toothpaste, post-medication water rinsing, and preference for sugar-free liquid formulations.

4. Epilepsy

Epilepsy is a brain disease characterized by at least two unprovoked or reflex seizures occurring more than 24 hours apart, or one unprovoked seizure with a substantial probability of recurrence over the following 10 years. The manuscript describes focal, generalized, and undetermined/special-origin forms. Stress, anxiety, social isolation, and medication effects may influence seizure frequency, while cognitive and learning difficulties may include impaired concentration, short-term memory deficits, slow motor execution, and speech or reading difficulties.

Oral Manifestations

Long-term phenytoin and other antiepileptic drugs can cause drug-induced gingival overgrowth, which may be complicated by

plaque-related inflammation, malodor, and malocclusion. Seizures increase the risk of dentoalveolar trauma, including luxation, avulsion, crown-root fractures, jaw and facial fractures, and soft-tissue injury or biting.

Dental Management & Status Epilepticus Protocol

A detailed seizure history should include type, frequency, triggers, last episode, treatment compliance, and the complete antiepileptic regimen. Appointments should be planned when stress and fatigue are lowest. In uncontrolled epilepsy, removable prostheses and fixed partial dentures may present detachment, fracture, and aspiration risks; direct bonded restorations with adequate occlusal clearance may be preferable. Rubber dam clamps and mouth props should be secured with floss ties. If a seizure occurs, treatment must stop and instruments/materials must be removed from the mouth. The patient should not be forcibly restrained and objects should not be inserted between the teeth. The chair should be reclined and the patient positioned laterally as convulsive activity subsides to protect the airway. A seizure lasting 5 minutes or longer, or recurrent seizures without recovery of consciousness, is a medical emergency requiring rescue medication according to local protocol and activation of emergency medical services. Buccal midazolam or rectal diazepam may be used according to applicable protocol.

5. Autism Spectrum Disorder (ASD)

Autism spectrum disorder is a neurodevelopmental disorder characterized by difficulties in social interaction and verbal/non-verbal communication with restricted or repetitive behavioral patterns. Early manifestations may include absent social smile, poor eye contact, lack of pointing, delayed speech, resistance to cuddling, and failure to respond to one's name. Older children may prefer isolation, have difficulty interpreting social cues, experience sensory hypersensitivity or anxiety, and show strong adherence to routines.

Oral Manifestations & Challenges

Caries risk may increase with preferences for soft or pureed sweetened foods, food pouching, sweetened medications, frequent sweet rewards, and difficulty performing oral hygiene. Bruxism, gingival picking, lip biting, pica, tongue thrusting, non-nutritive chewing, enamel erosion, heavy plaque accumulation, trauma, delayed eruption, and anticonvulsant-associated gingival hyperplasia may occur. Altered pain perception may complicate recognition of oral disease.

Dental Management Protocols

Pre-appointment assessment should identify behavioral triggers, communication level, preferences, medications, comorbidities, and effective comfort strategies. Familiarization visits can introduce the dental environment. Sensory stimulation should be minimized by reducing loud sounds, bright lights, and unnecessary waiting. Consistent personnel and surroundings may reduce anxiety. Communication should use short, clear, direct, literal instructions, with advance warning before physical contact or procedural changes. Tell-Show-Do and visual modeling may help. Initial visits may focus on rapport and simple examination. Parents may remain present when supportive. Physical immobilization should be limited to necessary situations and used with informed parental consent. Conscious sedation or general anesthesia may be required for extensive treatment when office-based behavior management is unsuccessful.

6. Attention-Deficit/Hyperactivity Disorder (ADHD)

ADHD is a chronic neurobehavioral disorder characterized by persistent inattention, hyperactivity, and impulsivity that interfere with developmental functioning. Inattention may present as distractibility, forgetfulness, and difficulty completing instructions; hyperactivity as restlessness, fidgeting, excessive talking, and difficulty with quiet activities; and impulsivity as interruption, acting without thinking, and difficulty waiting.

Oral Manifestations & Risk Factors

Dentoalveolar trauma is common because of hyperactivity, impulsivity, falls, collisions, violence, and traffic accidents, with the maxillary central incisors frequently affected. Caries rates may be increased in both primary and permanent dentitions because of poor

plaque control and inconsistent brushing routines. Dietary changes and altered appetite associated with stimulant therapy may influence oral health. Reduced total salivary mass and altered salivary function may occur despite increased flow rate. Short attention span and motor restlessness can compromise cooperation

Dental Management & Clinical Considerations

Morning appointments may be advantageous because fatigue is lower and attention may be greater. Treatment should be organized efficiently within relatively short appointments. Medication timing should be discussed with the child's physician; stimulant medication should not be altered or withheld except under medical direction. Structured Tell-Show-Do, directive guidance, and voice control may help maintain attention and cooperation. Conscious sedation or general anesthesia may be considered when non-pharmacological approaches are inadequate.

Local Anesthesia (LA) & Cardiovascular Protocols

Profound local anesthesia is important for eliminating pain and reducing endogenous catecholamine release. Aspirating syringes should be used to reduce the risk of intravascular injection. The manuscript specifies an initial maximum epinephrine dosage of ≤1 µg/kg, with an absolute maximum of 40 µg, approximately equivalent to two cartridges of 2% lidocaine with 1:100,000 epinephrine. Vital signs should be reassessed before additional anesthetic administration. For patients taking tricyclic antidepressants such as desipramine or imipramine, levonordefrin should be avoided because of the risk of severe hypertension and cardiac arrhythmias; epinephrine has a milder interaction and may be used cautiously, with the manuscript specifying up to three cartridges per 30-minute interval.

Preventive & Restorative Care

Preventive care should include pit and fissure sealants and topical fluoride. Parents and caregivers should receive simple, stepwise oral hygiene instructions. Salivary substitutes may be considered when dry-mouth symptoms occur.

Conclusion

Children with SHCN require individualized dental care integrating developmental, behavioral, medical, communication, and oral-health needs. Intellectual disability, Down syndrome, cerebral palsy, epilepsy, ASD, and ADHD present distinct challenges affecting disease risk, treatment planning, positioning, communication, behavior guidance, and emergency management. Early establishment of a dental home, thorough assessment, caregiver education, preventive intervention, appropriate behavior guidance, and coordination with medical professionals are central to effective care. Sedation or general anesthesia should be reserved for situations in which conventional management is insufficient. A structured, preventive, and multidisciplinary approach can facilitate safer treatment and improve continuity of oral health care in children with SHCN.

References

1.McDonald and Avery's DENTISTRY for the CHILD and ADOLESCENT,ELEVENTH EDITION(2016)

2.Priya Verma Gupta's Understanding and Management of special child in Pediatric Dentistry,1st edition(2012)

3.Ajami BA, Shabzendedar M, Rezay YA, Asgary M. Dental treatment needs of children with disabilities. J Dent Res Dent Clin Dent Prospects. 2007Summer;1(2):93-8. doi:10.5681/joddd.2007.016. Epub 2007 Sep 10. PMID: 23277841; PMCID: PMC3525932.

4.Sami W, Ahmad MS, Shaik RA, Miraj M, Ahmad S, Molla MH. Oral Health Statuses ofChildren and Young Adults with Autism Spectrum Disorder: An Umbrella Review. J Clin Med.2023 Dec 22;13(1):59. doi: 10.3390/jcm13010059. PMID: 38202066; PMCID: PMC10780292.

5.Chavis SE, Wu E, Munz SM. Considerations for Protective Stabilization in Community General Dental Practice for Adult Patients with Special Healthcare Needs. Compend Contin Educ Dent. 2021 Mar;42(3):134-138. PMID: 34010574; PMCID: PMC8281605

6.Reynolds K, Chimoriya R, Chandio N, Tracey D, Pradhan A, Fahey P, Stormon N, Arora A. Effectiveness of sensory adaptive dental environments to reduce psychophysiology responses of dental anxiety and support positive behaviours in children and young adults with intellectual and developmental disabilities: a systematic review and meta-analyses. BMC Oral Health. 2023 Oct19;23(1):769. doi: 10.1186/s12903-023-03445-6. PMID: 37858057; PMCID: PMC10585952.

7.Hasell S, Hussain A, Da Silva K. The Oral Health Status and Treatment Needs of PediatricPatients Living with Autism Spectrum Disorder: A Retrospective Study. Dent J (Basel). 2022Nov 28;10(12):224. doi: 10.3390/dj10120224. PMID: 36547040; PMCID: PMC9777396.

8.Fakhruddin KS, El Batawi H, Gorduysus MO. Effectiveness of audiovisual distraction with computerized delivery of anesthesia during the placement of stainless steel crowns in childrenwith Down syndrome. Eur J Dent. 2017JanMar;11(1):15.doi:10.4103/ejd.ejd_288_16. PMID:28435357; PMCID: PMC5379820.

9.Fakhruddin KS, Gorduysus MO, El Batawi H. Effectiveness of behavioral modification techniques with visual distraction using intrasulcular local anesthesia in hearing disabledchildren during pulp therapy. Eur J Dent. 2016 Oct-Dec;10(4):551-555. doi: 10.4103/1305-7456.195159. PMID: 28042274; PMCID: PMC5166315.

10.People's Archive of Rural India.Person's with disabilities in India-A statistical profile

11.www.who.int

12.National Survey of Children's health(NSCH)www.childhealthdata.org

13.Alamri H. Oral Care for Children with Special Healthcare Needs in Dentistry: A LiteratureReview. J Clin Med. 2022 Sep 22;11(19):5557. doi: 10.3390/jcm11195557. PMID: 36233425;
PMCID: PMC9573545.

14.Schalock RL, Luckasson RA, Shogren KA, Borthwick-Duffy S, Bradley V, Buntinx WH, Coulter DL, Craig EM, Gomez SC, Lachapelle Y, Reeve A, Snell ME, Spreat S, Tassé MJ,Thompson JR, Verdugo MA, Wehmeyer ML, Yeager MH. The renaming of mental retardation:understanding the change to the term intellectual disability. Intellect Dev Disabil. 2007Apr;45(2):116-24. doi: 10.1352/1934-9556(2007)45[116:TROMRU]2.0.CO;2. PMID: 17428134.

15.Lakhan R, Ekúndayò OT, Shahbazi M. An estimation of the prevalence of intellectual disabilities and its association with age in rural and urban populations in India. J Neurosci RuralPract. 2015 Oct-Dec;6(4):523-8. doi: 10.4103/0976-3147.165392. PMID: 26752897; PMCID:PMC4692010.

16.Zemene MA, Dessie AM, Anley DT, Ahunie MA, Gebeyehu NA, Adella GA, Kassie GA,Mengstie MA, Seid MA, Abebe EC, Gesese MM, Tesfa NA, Kebede YS, Moges N, Bantie B,Feleke SF, Dejenie TA, Bayih WA, Chanie ES. Dental caries and mean values of DMFT amongchildren with cerebral palsy: a systematic review and meta-analysis. BMC Oral Health. 2024 Feb15;24(1):241. doi: 10.1186/s12903-024-03985-5. PMID: 38360629; PMCID: PMC10868010.References

Preserving the Socket: The Role of Xenograft and Injectable Platelet-Rich Fibrin

Dr. Prameetha George Ittycheria*, Dr. Saumya John**

Abstract

Tooth extraction is followed by a natural healing process that inevitably results in changes in the dimensions of the alveolar ridge. Loss of ridge width and height may complicate subsequent implant placement and can sometimes necessitate additional bone augmentation procedures. Alveolar ridge preservation aims to reduce these post-extraction changes and maintain a more favourable foundation for future rehabilitation.

Among the materials used for socket preservation, xenografts have gained wide clinical acceptance because of their ability to provide a stable scaffold and maintain space during bone healing. More recently, autologous platelet concentrates have attracted attention because of their potential to support soft-tissue healing and bone regeneration. Injectable platelet-rich fibrin (I-PRF) is a liquid platelet concentrate that can be prepared from the patient's own blood without the addition of anticoagulants. Its biologically active components and growth factors have led to increasing interest in its use in regenerative procedures.

The combination of a xenograft with I-PRF represents an interesting approach that brings together structural stability and biological stimulation. Emerging clinical evidence suggests that platelet concentrates may have beneficial effects on post-extraction healing, although variations in preparation protocols, graft materials, clinical techniques and outcome assessment make direct comparison between studies difficult.

This article provides a clinically oriented overview of socket healing, the rationale for alveolar ridge preservation, the role of xenografts and the potential applications of I-PRF in extraction sockets. It also discusses the possible advantages and limitations of combining I-PRF with xenograft materials.

Keywords: alveolar ridge preservation, xenograft, injectable platelet-rich fibrin, tooth extraction, bone regeneration

Introduction

Tooth extraction is one of the most common procedures in clinical dentistry. Although the extraction socket has a remarkable capacity for spontaneous healing, extraction is followed by a series of dimensional changes in the alveolar ridge. These changes are particularly important when the extracted tooth is planned to be replaced by an implant.

After extraction, the socket initially becomes occupied by a blood clot. This is followed by granulation tissue formation, connective tissue maturation and progressive bone formation. At the same time, remodelling of the bundle bone and surrounding alveolar bone occurs. The result is a reduction in the original dimensions of the ridge.[1],[2]

A systematic review by Tan et al. demonstrated that both horizontal and vertical changes occur after tooth extraction.[1] More recent evidence has confirmed that ridge reduction is a predictable consequence of unassisted socket healing, although the amount of dimensional change varies according to the tooth and anatomical site.[2]

These changes may reduce the available bone volume for implant placement and may alter the position of the future implant in relation to the prosthetic restoration. Therefore, maintaining the architecture of the extraction site has become an important component of contemporary implant planning.

Socket preservation, involves the placement of a biomaterial into the extraction socket with the objective of limiting post-extraction ridge resorption and maintaining the available hard and soft tissue volume.[3,4]

Several materials have been investigated for this purpose, including autogenous bone, allografts, xenografts, synthetic graft materials, collagen-based materials and platelet concentrates. Among these, xenografts and platelet-rich fibrin have received considerable clinical attention.

Dr.Prameetha*,Dr.Saumya, Department of Periodontology, Pushpagiri College Of Dental Sciences**

What Happens to the Ridge After Tooth Extraction?

Healing of an extraction socket is a dynamic biological process. The initial blood clot provides a matrix for cellular migration. It is gradually replaced by granulation tissue, connective tissue and immature bone, followed by progressive remodelling and maturation.

The reduction in ridge dimensions is not simply a result of loss of the extracted tooth. The alveolar bone surrounding the tooth is itself a structure that undergoes considerable remodelling following extraction.

In a systematic review, Tan et al. [1] reported a 29- 63% of horizontal and 11-22% of vertical bone loss, which occurred mainly on the buccal side during the first 6 months after tooth extraction without a ridge preservation technique

A systematic review and meta-analysis by Couso-Queiruga et al. reported clinically important horizontal and vertical reductions following unassisted healing.[2] The mean horizontal reduction was greater than the vertical reduction in many of the evaluated sites.

The clinical importance of this process becomes apparent when implant placement is considered. A narrower ridge may require additional augmentation before or during implant placement. Therefore, although complete prevention of post-extraction bone remodelling is not possible, reducing the magnitude of dimensional change may be clinically beneficial.

Why Is Socket Preservation Important?



The primary objective of socket preservation is not to prevent all bone resorption. Rather, the aim is to reduce the extent of dimensional alteration and maintain a more favourable ridge contour.
Several systematic reviews have demonstrated that ridge preservation procedures can reduce horizontal and vertical ridge dimensional changes compared with extraction alone.[3,4]
The benefits may include:

- Maintenance of ridge width and height
- Reduction in the need for additional augmentation
- Improved conditions for future implant placement
- Better preservation of the soft-tissue contour
- Potential reduction in treatment complexity
- More predictable development of the implant site

However, socket preservation should not be regarded as a guarantee that the original ridge dimensions will be completely maintained. Healing remains a biological process, and some degree of remodelling occurs even when grafting procedures are performed.

Xenografts in Socket Preservation

Xenografts are graft materials derived from a species different from the recipient. In dentistry, bovine-derived xenografts are among the most frequently used materials for alveolar ridge preservation.

The main advantage of a xenograft is its ability to act as a scaffold within the extraction socket. The graft particles can help maintain space and provide a framework around which new bone can develop.

The ideal graft material for socket preservation should be biocompatible, maintain space, allow vascular and cellular ingrowth and gradually become integrated into the newly formed tissue.
Clinical evidence supports the use of xenografts as one of the effective options for alveolar ridge preservation. A recent systematic review and meta-analysis specifically evaluating xenografts found that xenograft-treated sockets demonstrated better preservation of alveolar ridge dimensions compared with extraction alone.[6]
However, xenografts do not necessarily become completely replaced by newly formed bone within a short period. Histological studies have demonstrated varying amounts of residual graft particles along with newly formed bone and

connective tissue. Therefore, the clinical objective is not simply rapid disappearance of the graft, but maintenance of space and development of a favourable tissue environment.

The Role of a Barrier Membrane

When a graft is placed into an extraction socket, containment of the graft particles and protection of the healing site are important considerations. Barrier membranes may be used to stabilise the graft and support guided bone regeneration principles.

Resorbable collagen membranes are commonly used because they eliminate the need for a second surgical procedure for membrane removal. Clinical studies have demonstrated that both graft materials and membrane techniques can contribute to ridge preservation.[7]

The choice of membrane depends on factors such as socket morphology, soft-tissue condition, graft material, the possibility of membrane exposure and the clinician's experience.

Socket preservation should therefore be considered as a complete treatment concept rather than simply the placement of a graft into an extraction socket.

Platelet-Rich Fibrin: A Biological Approach

Platelet-rich fibrin (PRF) is an autologous platelet concentrate that has gained popularity in regenerative dentistry.

Unlike earlier platelet concentrates that require anticoagulants, PRF is prepared from the patient's own blood without the addition of anticoagulants. The resulting fibrin matrix contains platelets, leukocytes and a range of biologically active molecules.

The fibrin network acts as a scaffold and may provide a gradual release of growth factors during healing. These biological characteristics have generated interest in the use of PRF for periodontal regeneration, implant therapy, soft-tissue healing and extraction socket management.[8]

Importantly, PRF should not be viewed simply as a replacement for a conventional bone graft. Its principal attraction is its biological activity rather than its ability to provide long-term structural support.

What Is Injectable PRF?



Injectable platelet-rich fibrin, or I-PRF, is a liquid form of PRF that can be prepared using a specific centrifugation protocol.
Miron et al. described I-PRF as a liquid platelet concentrate prepared without anticoagulants.[8] Because it remains injectable for a limited period before fibrin polymerisation occurs, it can be mixed with particulate biomaterials and adapted to irregular defects.

This property makes I-PRF particularly interesting in socket preservation.

When mixed with particulate graft material, I-PRF may help improve handling and cohesion of the graft particles. The combination also provides an opportunity to introduce an autologous biological component into the grafted socket.

Why Combine I-PRF with Xenograft?

The rationale for combining I-PRF and xenograft is based on the complementary characteristics of the two materials.

The xenograft provides:

- A particulate scaffold
- Space maintenance
- Structural stability
- Support for gradual bone formation

I-PRF may provide:

- A fibrin matrix
- Platelets and leukocytes
- Biologically active growth factors
- Support for early wound healing
- Improved handling of particulate graft material

Thus, the combination can be viewed as bringing together structural support and biological stimulation.

The concept is attractive because the xenograft primarily addresses the physical requirements of the socket, while I-PRF may contribute to the biological environment required for healing.

What Does the Current Evidence Say?

The evidence surrounding platelet concentrates in socket preservation has expanded considerably in recent years.
An earlier systematic review of randomized controlled trials found evidence suggesting potential benefits of PRF in areas such as soft-tissue healing, bone density and some dimensional parameters, although the authors
also noted considerable variation among the available studies.[9]

More recent evidence has strengthened interest in platelet concentrates. A 2025 systematic review with meta-analyses evaluated autologous platelet concentrates in alveolar ridge preservation and included a large number of randomized clinical studies. The review highlighted the potential of platelet concentrates, particularly PRF-based approaches, while also emphasizing variations between protocols and clinical applications.[10]

A 2025 systematic review and meta-analysis comparing PRF, freeze-dried bone allograft and spontaneous healing reported that PRF showed beneficial effects compared with spontaneous healing for some ridge and histological outcomes. However, the authors also reported moderate risk of bias and heterogeneity among the included studies.[11]

More recently, a 2026 systematic review and meta-analysis specifically evaluated PRF as a sole grafting material for alveolar ridge preservation. The findings suggested that PRF may reduce alveolar bone height and width loss and may enhance new bone formation compared with spontaneous healing.[12]

These findings are encouraging, but they should not be interpreted as evidence that all PRF protocols are equivalent. Centrifugation speed, preparation method, amount of blood collected, timing of use and clinical application can influence the characteristics of the final product.

Evidence Specifically Related to I-PRF and Xenograft

Research specifically combining I-PRF with xenograft is more limited than the broader literature on PRF.

A randomized controlled clinical trial published in 2024 compared I-PRF combined with bovine-derived xenograft with other xenograft-based approaches for alveolar ridge preservation. The study included clinical and histomorphometric evaluation, providing evidence that I-PRF can be investigated not only from a radiographic perspective but also in terms of the quality and composition of the healing tissue.[13]
A more recent randomized controlled trial published in 2026 compared I-PRF and advanced PRF in combination with xenograft for preservation of extraction sockets in mandibular molars.[14] The emergence of such studies reflects the increasing interest in combining platelet concentrates with conventional grafting materials.

However, the number of high-quality clinical trials specifically evaluating I-PRF with xenograft remains relatively small. Therefore, further well-designed randomized clinical trials with standardized protocols and objective radiographic and histological outcomes are required.

A Simple Clinical Approach to Socket Preservation

Socket preservation should begin with appropriate case selection and careful treatment planning.

1. Atraumatic extraction

The first step is preservation of the existing anatomy. Excessive trauma during extraction should be avoided whenever possible. Particular attention should be given to the buccal and facial bone plates, especially in areas planned for implant placement.

2. Thorough socket evaluation

After extraction, the socket should be carefully examined for:

- Presence of infection
- Integrity of the socket walls
- Condition of the buccal plate
- Soft-tissue condition
- Presence of granulation tissue or pathological tissue

Appropriate debridement should be carried out before graft placement.

3. Selection of graft material

The choice of graft should be based on the clinical objective, socket morphology and future restorative plan.

Xenografts are frequently selected when maintenance of space and ridge contour are important considerations.

4. Incorporation of I-PRF

When I-PRF is used, it can be combined with particulate graft material before placement. The liquid consistency of I-PRF allows intimate interaction with the graft particles before fibrin polymerisation.

5. Stabilisation and soft-tissue management

The graft should be appropriately contained within the socket. A barrier membrane or other socket-sealing approach may be considered depending on the clinical situation.

6. Follow-up

Healing should be monitored clinically. If the site is intended for future implant placement, appropriate radiographic assessment can be used to evaluate the available bone dimensions and quality.

Advantages of Combining Xenograft and I-PRF

The combination has several theoretical and potential clinical advantages.

1. Structural and biological components
The xenograft provides a scaffold, while I-PRF contributes a biological component.

2. Improved graft handling
I-PRF can make particulate graft material easier to manipulate and adapt to the socket.

3. Autologous material
I-PRF is obtained from the patient's own blood, avoiding the introduction of an additional allogeneic or synthetic biological agent.

4. Potential support for soft-tissue healing
The fibrin matrix and cellular components of PRF may support the early healing environment.

5. Potential influence on bone formation
Emerging evidence suggests that platelet concentrates may have a favourable influence on new bone formation, although the extent of this effect varies between studies.

Limitations and Considerations

Despite its potential, I-PRF should not be considered a substitute for sound surgical principles.

One of the major limitations in the current literature is the lack of standardisation. Different studies use different blood collection volumes, centrifugation systems, centrifugation speeds, preparation times, graft materials and methods of application.

Another important consideration is that the biological activity of platelet concentrates is time-dependent. I-PRF gradually undergoes fibrin polymerisation, and therefore its handling characteristics change during the procedure.

Similarly, graft material selection remains important. I-PRF alone may not provide the same degree of space maintenance as a particulate graft material. This is particularly relevant in larger defects or situations where maintenance of ridge contour is a major concern.

Therefore, the use of I-PRF should be considered as an adjunct to appropriate socket preservation principles rather than as a stand-alone solution for every extraction socket.

Future Directions

Future research should focus on standardising I-PRF preparation and clinical application.

Studies comparing different centrifugation protocols may help determine whether variations in platelet and leukocyte concentration influence clinical outcomes. The relationship between I-PRF and different graft materials also deserves further investigation.

Another important area is the use of three-dimensional imaging such as cone-beam computed tomography (CBCT) for objective assessment of ridge dimensions. Histological and histomorphometric studies may provide additional information regarding the quality of the newly formed tissue.

Future clinical trials should ideally include:

- Standardised I-PRF preparation protocols
- Clearly defined graft materials
- Adequate sample sizes
- Long-term follow-up
- CBCT-based dimensional assessment
- Histological or histomorphometric evaluation where appropriate
- Clinically meaningful implant-related outcomes

Recent systematic reviews have also highlighted heterogeneity among existing PRF studies, reinforcing the need for standardised protocols and well-designed randomized clinical trials.[10,12]

Conclusion

Alveolar ridge alteration is an expected consequence of tooth extraction. Although complete prevention of post-extraction remodelling is not possible, socket preservation can help minimise dimensional changes and create a more favourable site for future implant rehabilitation.

Xenografts provide a well-established structural approach to maintaining space within the extraction socket. Injectable platelet-rich fibrin adds a biological component that may support early wound healing and new bone formation.

The combination of xenograft and I-PRF is therefore a promising approach that integrates scaffold-based regeneration with autologous biological stimulation. Current evidence is encouraging, but the available studies remain heterogeneous, particularly with regard to I-PRF preparation and clinical protocols.

For the practicing clinician, the important message is that successful socket preservation depends not on a single material, but on careful case selection, atraumatic extraction, appropriate debridement, proper graft handling, soft-tissue management and systematic follow-up.

As research continues to clarify the biological and clinical effects of I-PRF, its role as an adjunct to conventional socket preservation may become increasingly relevant in implant site development.

References

1.Tan WL, Wong TLT, Wong MCM, Lang NP. A systematic review of post-extractional alveolar hard and soft tissue dimensional changes in humans. Clin Oral Implants Res. 2012;23 Suppl 5:1-21. doi:10.1111/j.1600-0501.2011.02375.x.

2.Couso-Queiruga E, Stuhr S, Tattan M, Chambrone L, Avila-Ortiz G. Post-extraction dimensional changes: a systematic review and meta-analysis. J Clin Periodontol.2021;48(1):127-145. doi:10.1111/jcpe.13390.

3.Horváth A, Mardas N, Mezzomo LA, Needleman IG, Donos N. Alveolar ridge preservation: a systematic review. Clin Oral Investig. 2013;17(2):341-363. doi:10.1007/s00784-012-0758-5.

4.Avila-Ortiz G, Elangovan S, Kramer KWO, Blanchette D, Dawson DV. Effect of alveolar ridge preservation after tooth extraction: a systematic review and meta-analysis. J Dent Res. 2014;93(10):950-958. doi:10.1177/0022034514541127.

5.Araújo MG, Lindhe J. Dimensional ridge alterations following tooth extraction. An experimental study in the dog. J Clin Periodontol. 2005;32(2):212-218.doi:10.1111/j.1600-051X.2005.00642.x.

6.Sah N, Sarode PP, Warang A, Tarase T, Gavhale P, Mirgane M. Alveolar ridge preservation using xenograft following tooth extraction: a systematic review and meta-analysis.Cureus. 2025;17(4):e81815. doi:10.7759/cureus.81815.

7.Iasella JM, Greenwell H, Miller RL, Hill M, Drisko C, Bohra AA, Scheetz JP. Ridge preservation with freeze-dried bone allograft and a collagen membrane compared to extraction alone for implant site development: a clinical and histologic study in humans. J Periodontol. 2003;74(7):990-999. doi:10.1902/jop.2003.74.7.990.

8.Miron RJ, Fujioka-Kobayashi M, Hernandez M, Kandalam U, Zhang Y, Ghanaati S, Choukroun J. Injectable platelet rich fibrin (i-PRF): opportunities in regenerative dentistry? Clin Oral Investig. 2017;21(8):2619-2627. doi:10.1007/s00784-017-2063-9

9.Castro AB, Meschi N, Temmerman A, Pinto N, Teughels W, Quirynen M. Effect of platelet-rich fibrin on alveolar ridge preservation: a systematic review. J Am Dent Assoc. 2019. doi:10.1016/j.adaj.2019.04.025.

10.Siawasch SAM, Yu J, Castro AB, Dhondt R, Teughels W, Temmerman A, Quirynen M. Autologous platelet concentrates in alveolar ridge preservation: a systematic review with meta-analyses. Periodontol 2000. 2025;97(1):104-130. doi:10.1111/prd.12609.

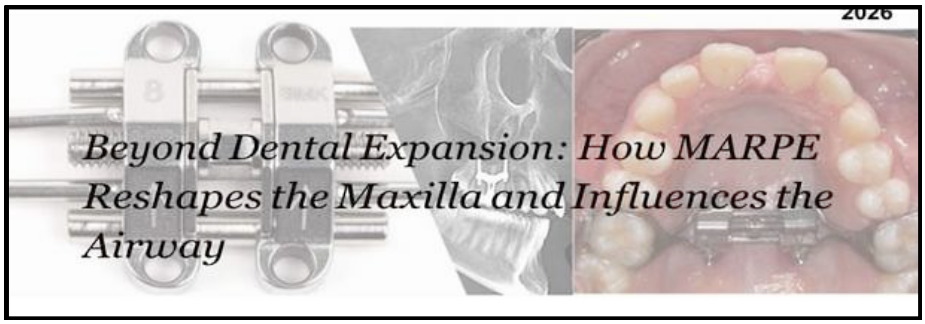
11.Comparative efficacy of platelet-rich fibrin, freeze-dried bone allograft, or spontaneous healing for alveolar ridge preservation: systematic review and meta-analysis. Bioengineering (Basel). 2025;12(11):1253. doi:10.3390/bioengineering12111253.

12.Yan J, Lu K. The efficacy of platelet-rich fibrin in alveolar ridge preservation: a systematic review and meta-analysis of randomized controlled trials. 2026. PMID:41797764.

13.Abaza G, Abdel Gaber HK, Afifi NS, Adel-Khattab D. Injectable platelet rich fibrin versus hyaluronic acid with bovine derived xenograft for alveolar ridge preservation: a randomized controlled clinical trial with histomorphometric analysis. Clin Implant Dent Relat Res. 2024;26(1):88-102. doi:10.1111/cid.13289.

14.Konbar RT, Khalil AEF, Metawie DMN. Comparison of the effect of injectable platelet rich fibrin and advanced platelet rich fibrin with xenograft on the socket preservation of extracted mandibular molars: a randomized controlled clinical trial. BMC Oral Health. 2026;26:608. doi:10.1186/s12903-026-07877-8.

15.Chappuis V, Engel O, Reyes M, Shahim K, Nolte LP, Buser D. Ridge alterations post-extraction in the esthetic zone: a 3D analysis with CBCT. J Dent Res. 2013;92(12Suppl):195S-201S. doi:10.1177/0022034513506713.



Dr Theertha K*, Dr Smrithi Muraleedharan , Dr Jacob John***, Dr Navin Oommen Thomas****, Dr Nooriya T.K*****

ABSTRACT

Maxillary transverse deficiency is more than a dental problem, it can reflect a deeper skeletal constriction affecting the maxilla, palate and nasal airway. As skeletal maturity increases, conventional rapid palatal expansion becomes less predictable and may produce greater dental tipping rather than true skeletal expansion.

Miniscrew-assisted rapid palatal expansion (MARPE) addresses this limitation by transferring expansion forces directly to the palatal skeleton through miniscrew anchorage. This approach can achieve meaningful skeletal expansion in selected late-adolescent and adult patients while reducing unwanted dentoalveolar effects. This review explores the biological basis, skeletal maturity assessment, MARPE and MSE designs, activation along with skeletal, dental and airway effects. Current evidence suggests that MARPE can provide greater skeletal expansion with less dental inclination than conventional expansion, although outcomes depend on skeletal maturity, palatal anatomy, appliance design and activation. Airway dimensions may improve, particularly nasally, but functional benefits are less consistent. MARPE therefore represents an individualized, minimally invasive approach to skeletal transverse correction.

Keywords

MARPE; maxillary skeletal expansion; transverse maxillary deficiency; midpalatal suture; nasal airway; rapid palatal expansion.

When Expansion Becomes Skeletal

The significance of MARPE lies in its ability to expand the maxilla itself, rather than simply moving the teeth outward. An increase in intermolar width does not necessarily indicate skeletal expansion. CBCT studies have demonstrated separation of the midpalatal suture and helped distinguish true skeletal changes from dental tipping.

Evidence reviewed by Brunetto et al. supports the skeletal effects of MARPE and highlights its advantages over conventional tooth-borne expansion, particularly in late adolescents and adults. Carlson et al. demonstrated orthopedic expansion using a microimplant-assisted expander in an adult, while Choi et al. reported acceptable stability of nonsurgical miniscrew-assisted expansion in young adults, with an approximately 86.96% success rate cited by Brunetto et al.

These findings support MARPE as a clinically relevant nonsurgical option for transverse maxillary deficiency in selected skeletally mature patients, potentially reducing the need for surgical expansion procedures such as SARPE.

From the Maxilla to the Airway: Angelieri Midpalatal Suture Maturation Classification

Stage E – Complete fusion of the midpalatal suture with no visible suture line. Angelieri

Post graduate student*,,***** ,Department of orthodontics and dentofacial orthopedics ,Pushpagiri college of dental sciences,Head of the Department*** ,Pushpagiri college of dental sciences ,Additional professor**** , Pushpagiri college of dental sciences**

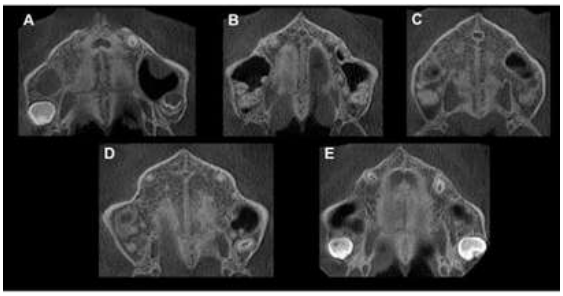
staging is useful because chronological age alone does not reliably predict sutural maturation; it should be interpreted with palatal bone anatomy and the overall skeletal pattern.

Stage D – Fusion in the palatine bone posteriorly, while the maxillary portion may remain identifiable anteriorly.

Stage C – Two parallel, scalloped high-density lines separated by low-density bone; the maxillary and palatine components are distinguishable.

Stage B – Scalloped suture with increasing interdigitation; the suture remains clearlyidentifiable.

Stage A – Relatively straight, high-density suture line with minimal interdigitation.



The story becomes even more interesting when the anatomy above the palate is considered. The maxilla forms the floor of the nasal cavity; therefore, transverse skeletal expansion has the potential to alter the dimensions of the nasal airway. As the two halves of the maxilla separate, the nasal floor may widen and the nasal cavity may become broader. This provides a logical anatomical pathway linking skeletal expansion with airway changes.

This relationship was dramatically illustrated in the adult case reported by Brunetto et al. The 22-year-old patient presented with a posterior crossbite and difficulty breathing, particularly during sleep. CBCT demonstrated maxillary transverse deficiency and nasal cavity constriction, while polysomnography revealed an apnea-hypopnea index of 7.9. The patient wished to avoid surgical expansion, and MARPE was selected. The case therefore linked three clinical observations in one patient: transverse skeletal deficiency, nasal airway limitation and a desire for nonsurgical correction. After expansion, the authors documented an increase in the nasal cavity floor and a marked clinical response. Most strikingly, the AHI decreased from 7.9 to 1.5, accompanied by improvement in the patient'srespiratory symptoms. The authors described this as a short-term case report demonstrating nonsurgical resolution of transverse deficiency associatedwith obstructive sleep apnea. However,a single case cannot establishcausation or justifyMARPE as a primary treatment for sleep apnea; its value lies in illustrating a clinically plausible pathway arch could investigate.

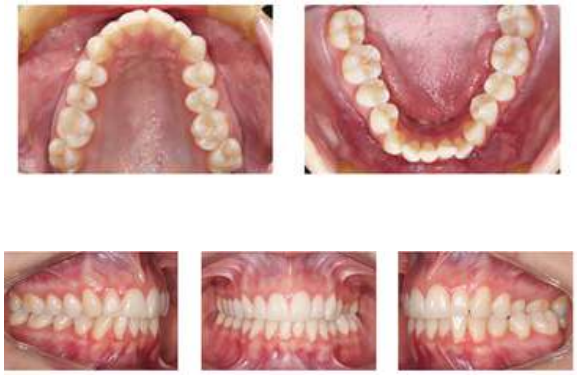


Figure 2: Initial occlusal photographs; moderate crowding in mandibular arch due to constriction caused by the maxilla. Note the lingual inclination of left posterior teeth in maxillary arch. Initial intraoral photographs: good occlusal relationship on the right side



Figure 3: After 20 activations, the appearance of an interincisal gap confirmed midpalatal suture opening, with no significant tipping of the teeth or alveolar bone. Following 44 activations (8.8 mm), MARPE produced skeletal expansion with increased nasal cavity width, while the AHI improved from 7.9 to 1.5, accompanied by better breathing symptoms.



Figure 4; CBCT slices show homogenous suture opening along anterior and posterior regions and uniform separation of the hemimaxillae

What Does the Evidence Show?

Further research supports the skeletal effects of MARPE. Studies have shown that it can widen the maxilla while reducing unwanted tooth movement and periodontal effects seen with conventional expansion. Therefore, the aim of MARPE is not simply to make the dental arch wider, but to achieve skeletal expansion with minimal dental side effects.

MARPE may also influence the airway. Studies have reported changes in the size of the nasal cavity and airway after expansion. However, a larger airway does not necessarily mean better breathing. Factors such as nasal resistance, soft tissues, and individual breathing patterns also affect respiratory function.

Beyond the Dental Arch

The importance of MARPE goes beyond correcting a crossbite. Instead of simply moving the teeth outward, it aims to widen the narrow upper jaw itself. This creates better space for the teeth to align and may also change the shape of the nasal structures.

In simple terms, MARPE corrects the underlying jaw problem, which may also influence the nasal airway and breathing. Thus, its effects can extend beyond the teeth to the surrounding skeletal and nasal structures.

Appliance Design and Activation Protocol

MARPE represents a family of skeletal anchorage-assisted expanders. Common designs use a rigid expansion screw connected to two anterior and two posterior palatal miniscrews; hybrid designs may additionally use molar bands. The Maxillary Skeletal Expander (MSE), associated with Won Moon and colleagues, is a specific MARPE design characterized by a rigid posteriorly positioned expansion screw, four miniscrew sleeves and an emphasis on bicortical anchorage when permitted by anatomy.

Principal components include: (1) expansion jackscrew, (2) rigid framework, (3) connecting arms, (4) miniscrew tubes/sleeves, (5) palatal miniscrews and, in hybrid designs, (6) molar bands. Miniscrew diameter and length should be selected from three-dimensional assessment of palatal and nasal-floor anatomy rather than from a fixed universal specification. Fig 5 shows parts of Miniscrew and technique of insertion

Activation protocolis appliance-specific. A commonly describedMSE protocol uses approximately 0.20 mm per activation, with two activations/day initially and modification after clinical evidence of sutural opening. Published MSE Type II protocols have also used smaller increments, such as approximately 0.13 mm per quarter-turn. Therefore, a scientific report should state the exact screw increment, activations/day, total activation and endpoint. Activation should be individualized according to skeletal maturity, resistance, clinical response and planned transverse correction.

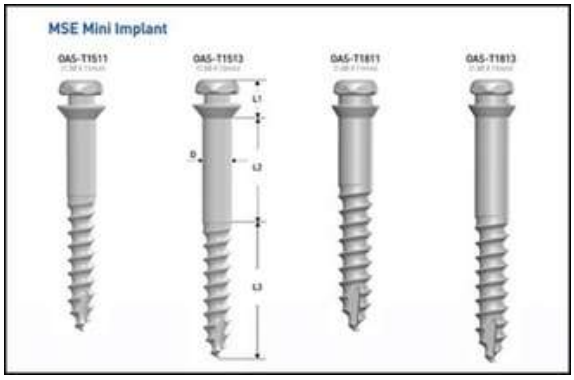


FIGURE 5: Parts of Miniscrew and technique of insertion

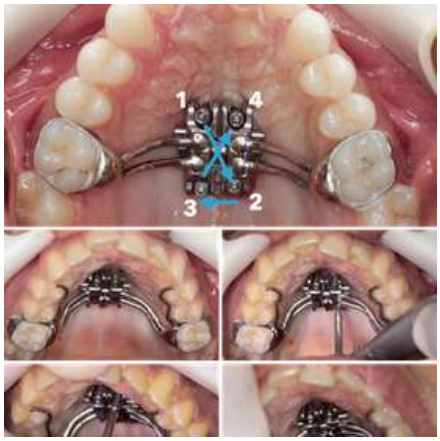




FIGURE :6 representing pretreatment occlusal view showing constricted Maxillary arch ,and maxillary arch after expansion and alignment

A 14-year-old male patient, reported with a history of chronic mouth-breathing habit for the past 6 years. Clinical examination revealed crowding in both the maxillary and mandibular arches. CBCT evaluation showed constriction of the upper airway, along with transverse maxillary deficiency.

Considering the skeletal transverse deficiency and airway constriction, MSE Type 2 (Maxillary Skeletal Expander) was initiated. The appliance was activated over a period of 1 month, followed by a 3-month retention period. Post-expansion CBCT evaluation demonstrated improvement in the upper airway dimensions, along with an increase in intermolar and intercanine widths (Figure 6 represents pre and post treatment photographs)

Following the expansion and retention phase, fixed orthodontic appliance therapy was initiated for further alignment, finishing, and occlusal settling.

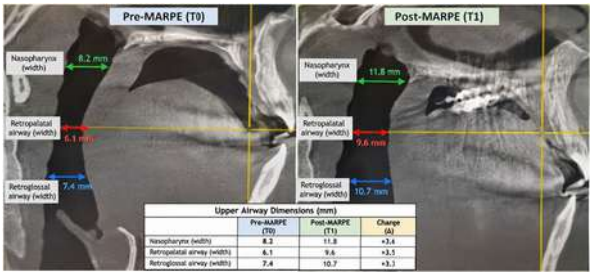


FIGURE 7: Pre treatmentT0 and post treatment T1 CBCT showing upper airway improvement

Where MARPE Stands Today

MARPE has moved transverse correction beyond the traditional boundary of tooth movement. Evidence from the Brunetto article supports its use as a nonsurgical skeletal expansion approach in appropriately selected mature patients, while also demonstrating that miniscrew anchorage can reduce dependence on the dentition. At the same time, the literature reminds us that treatment is not universally successful.
Miniscrew stability, skeletal maturity, palatal anatomy, appliance design and the resistance of the circummaxillary structures all influence the outcome.

The future of MARPE lies in moving from a one-size-fits-all expander toward individualized skeletal treatment planning. CBCT, digital models and three-dimensional assessment may allow clinicians to determine not only whether expansion is possible, but also where the skeletal deficiency lies and how the expansion force should be delivered. Future research should increasingly connect skeletal measurements with functional outcomes, particularly nasal airflow, respiratory symptoms and long-term stability.

CONCLUSION

The story of MARPE begins with a familiar orthodontic finding—anarrowmaxilla—butits implications extend much further.By transferring expansionforces from the teeth to the palatal skeleton,MARPE can achievetransverse skeletal correction in patients for whomconventional expansion becomesless predictable. The resulting skeletal changes may also widen the

nasal cavity and alter the airway environment. Although the respiratory implications remain an evolving area of research, the evidence supports an important shiftin perspective: MARPEis not simply a methodof making the dental arch wider; it is a means of reshaping the skeletal environment in which both the dentition and the airway exist.

REFERENCES

1. McNamaraJA Jr, Lione R, Franchi L, AngelieriF, Cevidanes LH, DarendelilerMA, et al. The role of rapidmaxillary expansion in the promotion of oral and general health.Orthod. 2015;16:33.

2. Aloufi F, Preston CB, Zawawi KH. Changes in the upper and lower pharyngeal airway spaces associated with rapid maxillary expansion. ISRN Dent. 2012;2012:290964.

3.De Rossi M, De Rossi A, Hallak JE, Vitti M, RegaloSC. Electromyographic evaluation in children havingrapid maxillary expansion. Am J OrthodDentofacial O2009;136(3):355-60.

4.Alexander NS, Schroeder JW Jr. Pediatric obstructive sleep apnea syndrome. Pediatr Clin North Am. 2013;60(4):827-40.

5.VidyaVS, Sumathi FA. Rapid maxillary expansion as a standard treatment for obstructive sleep apnea syndrome: a systematic review. J Dental Med Sci. 2015;14:51-

6.Lagravere MO, Heo G, Major PW, Flores-Mir C. Meta-analysis of immediate changes with rapid maxillary expansion treatment. J Am Dent Assoc. 2006;137(1):44-53.

7.McNamara JA. Maxillary transverse deficiency.Am J Orthod DentofacialOrthop. 2000;117(5):567-70.

8.Haas AJ. The treatment of maxillary deficiency by opening the midpalatalsuture. Angle Orthod. 1965;35:200-17.

Gingival Clefts: An Ortho Perio Interrelationship

Dr Annie Kitty George*, MDS, PhD, Dr Rajasree Anoop**, Dr Geetanjali Johnson***

Abstract:

Gingival clefts which develop following orthodontic extractions often hinder space closure and also impairs periodontal stability. This short review summarizes the most recent available information on gingival clefts, factors that contribute to gingival cleft formation, preventive strategies and management.

Introduction:

Gingival cleft is an invagination/crease or in-folding of the soft tissue of 1-2mm depth.1(Figures 1 and 2) Gingival clefts commonly occur after orthodontic tooth extractions. Frequency of gingival cleft formation is in approximately 35-100% of cases of orthodontic extractions and occurs more commonly in the mandible.1 They can appear in the buccal, lingual or crestal aspects and may extent from buccal to lingual across the alveolar ridge.

Gingival cleft formation poses both orthodontic and periodontal problems. Gingival clefts delay or impede with space closure and may cause relapse or contribute to less-than-optimal aesthetic outcomes. Gingival clefts also impair oral hygiene measures and self cleansibility and may be associated with increased probing pocket depths and clinical attachment loss on the adjoining teeth. Gingival clefts vary in severity ranging from those which involve the soft tissue only, to those clefts which involve the underlying bone.

Factors contributing to development of gingival clefts:

The documented reasons for gingival cleft formation are increased amount of alveolar bone loss during/after tooth extraction and compression of the gingiva coupled with decreased tissue remodeling.2Factors that may affect gingival cleft formation are the periodontal phenotype, presence of buccal bone dehiscence, the timing of initiation of orthodontic treatment after extractions and the rate of tooth movement. The incidence of gingival cleft formation in relation to the timing of initiation of orthodontic tooth movement after extractions is controversial.1,3Incidence of gingival clefts may be higher among 'fast' versus 'slow' movers.1,3

Management of gingival clefts:

Gingival clefts which involve the soft tissue only, can be surgically excised by gingivectomy. When the cleft involves the underlying bone, and hinders space closure, soft tissue may be excised and the underlying osseous component may be treated by bone grafting.[2] However, long term evidence on the results of such treatment is sparse. The excision of a gingival cleft may be done just prior to or immediately after space closure is achieved.

Prevention of cleft formation:

may be the key to management. Atraumatic orthodontic extractions, and emphasis on preserving the osseous walls of the alveolar socket may be beneficial. Orthodontic alignment prior to extractions may help shorten time gap between extractions and space closure.[1] Socket preservation following tooth extraction may also have a prophylactic role in prevention of gingival clefts.

Conclusion:

Alterations in periodontal tissue remodeling following orthodontic tooth extractions and tooth movement into the spaces created by

*Professor, Dept of Periodontics, Pushpagiri College of Dental Sciences, **,***Post graduate student, Dept of Periodontics, Pushpagiri College of Dental Sciences

extractions needs careful consideration to the dynamics of underlying alveolar bone remodeling and reorganization of the adjoining resilient gingival fibers. Gingival clefts may be a contributing factor of delayed space closure.









References:

1. Bertl K, Neuner H, Meran A, et al. Does the time-point of orthodontic space closure initiation after tooth extraction affect the incidence of gingival cleft development? A randomized controlled clinical trial. J Periodontol. 2020;91(5):572-581. doi:10.1002/JPER.19-0376

2. Gölz L, Reichert C, Jäger A. Gingival invagination—a systematic review. J Orofac Orthop / Fortschritte der Kieferorthopädie. 2011;72(6):409-420. doi:10.1007/s00056-011-0046-z

3. Mahfouz M, Alzaben E. Gingival Clefting Following Orthodontic Space Closure: A Scoping Review and Meta-Analysis. Published online May 26, 2026. doi:10.21203/rs.3.rs-9788437/v1

Digitalisation in Complete Denture Prosthodontics: A Narrative Review of Workflows, Materials, Clinical Outcomes and Future Directions

Dr.Feba Mariya*, Dr Aby Mathew ,Dr. Rene Kuriakose***, Dr. Mariya Davis****, Dr Reshma*****

Abstract

Background: Edentulism remains common in ageing populations, and complete dentures are still the most widely used treatment. Conventional fabrication is technique-sensitive, requires multiple appointments and is affected by polymerisation shrinkage. Computer-aided design and computer-aided manufacturing (CAD/CAM) and related digital technologies have been introduced to address these limitations.

Aim: To summarise the evolution, workflows, materials, clinical performance and limitations of digitalisation in complete denture fabrication, and to identify future directions.
Review approach: A narrative review of the literature on digital data acquisition, design software, subtractive and additive manufacturing, and in vitro and clinical outcomes of digitally fabricated complete dentures.

Findings: Digital workflows reduce the number of clinical visits, allow storage and reproduction of the denture design, and use industrially polymerised PMMA blanks with low porosity and residual monomer. Milled denture bases generally show equal or better adaptation and retention than conventionally processed bases in vitro and in short-term clinical studies. 3D-printed dentures offer lower material waste and lower cost, but accuracy depends strongly on printer, orientation and post-processing, and long-term data on resin biocompatibility and durability are limited. Patient-reported outcomes are broadly comparable to conventional dentures. High-quality randomised trials with long follow-up are scarce.

Conclusions: Digital complete dentures are a clinically acceptable alternative to conventional dentures and offer clear workflow advantages. Digital intraoral capture of the edentulous arch, standardised protocols for printed materials and long-term randomised evidence remain the main gaps.

Keywords: complete denture; CAD/CAM; digital dentistry; 3D printing; additive manufacturing; intraoral scanning; edentulous; prosthodontics

Introduction

Complete dentures restore function, aesthetics and quality of life in edentulous patients, and demand is expected to persist because of population ageing, even as age-specific edentulism declines in many countries. The conventional workflow involves preliminary and final impressions, jaw relation records, try-in, laboratory processing and delivery, usually across five or more appointments. Each stage introduces possible error, and heat-polymerised acrylic bases are subject to polymerisation shrinkage, porosity and residual monomer.

The first CAD/CAM complete dentures were described in the 1990s [1], and commercial systems became available in the early 2010s [2-4]. Since then, intraoral scanners, facial scanners, design software, high-speed milling units and dental 3D printers have transformed the field [5,6]. Several narrative and systematic reviews have addressed digital dentures [3,7-9], but rapid developments in additive manufacturing and digital data capture mean that regular updating is needed.

This review describes (i) the historical

*,*****,******Post graduate, Department of Prosthodontics, PCDS, **Professor and HOD, Department of Prosthodontics, Pushpagiri College Of Dental Sciences,.***Professor, Department of Prosthodontics, Pushpagiri College Of Dental Sciences

development of digital complete dentures, (ii) the digital workflow from data acquisition to manufacturing, (iii) available materials, (iv) clinical and laboratory outcomes, (v) education, cost and limitations, and (vi) future directions.

Historical development

Maeda and colleagues reported the first CAD/CAM system for complete dentures in 1994, but cost, limited software and the difficulty of capturing edentulous anatomy and jaw relations prevented clinical adoption [1]. Two commercial systems, AvaDent and Dentca, reached the market around 2012 to 2013 and were evaluated in early reviews [2,4]. Their introduction was followed by multiple systems combining conventional clinical records with digital design and manufacturing, including Baltic Denture System, Ivoclar and Wieland Digital Denture, and printed systems such as Lucitone Digital Print. Digital denture techniques are now taught in many dental schools [10].

The digital workflow

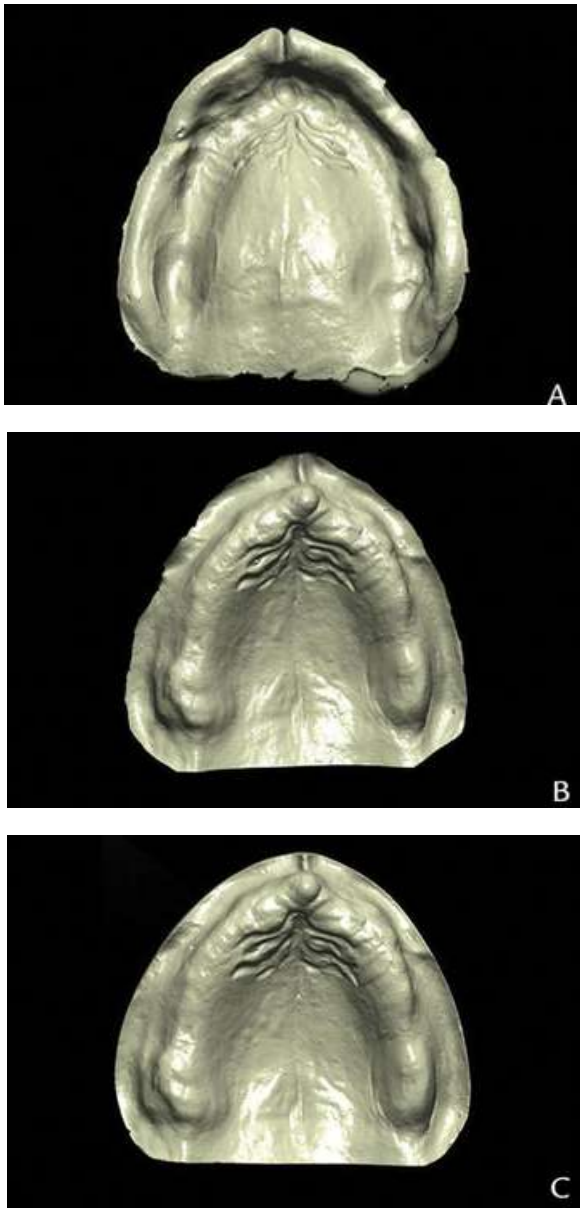
Data acquisition

Conventional impressions digitized in the laboratory.

Final impressions or poured casts are scanned with a laboratory scanner. This is the most common route and preserves the clinician's established border-moulding and functional impression skills.

Intraoral scanning of edentulous arches.

Intraoral scanners have been widely evaluated for dentate patients [11], but edentulous arches lack fixed landmarks and have mobile mucosa, which makes stitching and accuracy more difficult. Published techniques use scan markers, dedicated scan bodies or modified scanning strategies, and single-arch and full-arch workflows have been reported [12,13]. Intraoral scanning does not capture functional mucosal displacement and muscle-trimmed borders in the way a border-moulded impression does, and this remains a key limitation.



A, Scan of physical impression in polysulfide with laboratory scanner. B, Digital cast (dREC) obtained from inversion of scan of polysulfide impression. C, Scan of stone cast with laboratory scanner (dEOC). dEOC

Jaw relation records.

Vertical dimension and centric relation can be recorded with conventional record bases and occlusion rims, with specialized digital devices, or by using the existing dentures. In the digitally replicated denture technique, the patient's existing denture is scanned and duplicated, with its tooth positions and occlusion retained and corrected as required [14].

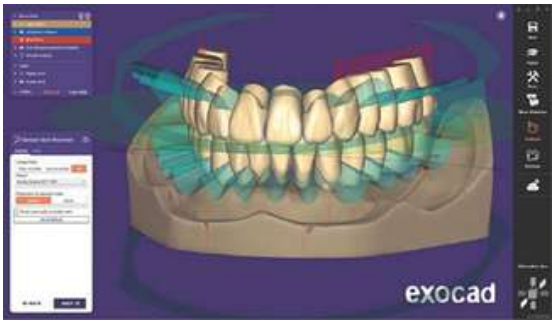
Facial scanning and virtual patient.

Facial scans, photographs and videos can be merged with intraoral or cast data to align the occlusal plane, midline and smile line, and to build a three-dimensional virtual patient [15]. This allows the dentist and patient to preview the design before manufacturing.



Design

Design software uses the scanned data to define the denture border, tissue surface, polished surfaces and tooth arrangement. Most platforms provide libraries of prefabricated or milled denture teeth, automated arch-form and set-up based on anatomical landmarks, and tools to modify tooth position, contour and gingival anatomy. A digital try-in can be performed on screen or with a milled or printed prototype in the patient's mouth. Saved designs can be reproduced without repeating clinical records, which is a particular advantage for replacement or duplicate dentures.



Manufacturing

Subtractive manufacturing (milling).

Prepolymerised PMMA discs are milled to produce the denture base and, in some systems, the teeth. Because the PMMA is polymerised industrially under heat and pressure, polymerisation shrinkage is largely eliminated at the point of manufacture and porosity is low. Disadvantages include material waste, bur wear, inability to mill very fine undercut details and, in many systems, the need to bond separately milled teeth into the base.



Additive manufacturing (3D printing).

Stereolithography (SLA), digital light processing (DLP) and liquid-crystal display (LCD) printers cure photopolymer resins layer by layer. Printing allows complex geometry, little material waste and low unit cost, and it is well suited to try-in dentures, prototypes and, increasingly, definitive dentures [16,17]. Accuracy and mechanical properties depend on layer thickness, build orientation, support design, washing, post-curing and storage [18,19].

Hybrid techniques.

A printed or milled base can be combined with printed or prefabricated teeth, or a milled base can be paired with conventionally processed teeth. Rapid prototyping of a pattern followed by conventional flasking and processing is also used.

Table 1. Comparison of conventional, milled and 3D-printed complete denture fabrication.

Feature	Conventional	Milled (CAD/CAM)	3D printed
Clinical visits	Typically 5 or more	Typically 2 to 4	Typically 2 to 4
Polymerisation shrinkage	Present, affects fit	Minimal (pre-polymerised disc)	Layer-wise curing, depends on post-cure
Porosity and residual monomer	Higher	Lower	Variable, resin-dependent
Material waste	Low	High	Low
Equipment and unit cost	Low, labour-dependent	Higher equipment cost	Lower material cost, printer cost
Reproducibility of design	Requires new records	High (stored file)	High (stored file)
Main limitation	Technique sensitivity	Detail and tooth integration	Material validation and accuracy control

Materials

Industrially polymerised PMMA blanks used for milling have shown higher flexural strength, lower surface roughness and lower residual monomer than conventionally processed acrylic [20,21]. Milled bases are also associated with lower Candida adhesion in vitro, possibly because of a denser, less porous surface [22,23].

Printed denture base resins are typically methacrylate-based photopolymers with additives for strength and colour. Reported mechanical properties vary by product and printing parameters, and some printed resins show lower flexural strength or higher water sorption than milled PMMA, whereas others are comparable to conventional acrylics [20,24,25]. Concerns relate to residual monomer and photoinitiator release, cytotoxicity if post-processing is inadequate, colour stability, wear and long-term fracture resistance [18]. Printed tooth materials, multi-material and multi-colour printing, and bonding between printed teeth and bases are areas of active development. Standardised post-processing protocols are essential for predictable results.

Clinical and laboratory outcomes

Fit, retention and accuracy

In vitro and clinical studies generally report better or equal tissue-surface adaptation of milled bases compared with conventionally processed ones [26,27], and higher retention in maxillary dentures [28]. Comparisons of injection-moulded, milled and rapid-prototyped bases show that accuracy depends on the technique and region of the base [29]. Systematic reviews report that digital fabrication produces dentures with acceptable trueness and that milled dentures are often more accurate than printed ones, although heterogeneity and the in vitro nature of most data limit firm conclusions [8,9,30]. Studies of DLP-printed maxillary and mandibular bases show clinically acceptable adaptation but find that results vary with printing orientation [31-33].

Biological and mechanical outcomes

Milled PMMA shows lower residual monomer and microbial adhesion than conventional acrylic in laboratory tests [20-23]. Evidence on mucosal health, denture stomatitis and fracture rates in long-term clinical use is still limited. Printed resins require further clinical evaluation, particularly for long-term wear and colour stability.

Patient-reported and clinician-assessed outcomes

Prospective pilot work on two-visit CAD/CAM dentures and overdentures reported favourable patient-centred outcomes [34]. Predoctoral comparisons found comparable quality with fewer appointments for digital dentures [35], and cross-sectional data showed high patient satisfaction with CAD/CAM dentures [36]. Systematic reviews conclude that patient satisfaction, oral health-related quality of life and chewing function are similar between digital and conventional dentures, although the quality of the evidence is low to moderate and follow-up is short [7,8].

Time, cost and efficiency

Digital workflows typically reduce chair time and the number of clinical appointments, although total dentist-plus-laboratory time may be similar when scanning, design and learning-curve time are included [8,37]. Capital investment in scanners, software, milling units or printers is substantial, and cost-effectiveness depends on case volume. Digital storage of the design lowers the cost of replacements, which is valuable for patients who lose or fracture dentures.

Digital complete dentures in education

Surveys of dental schools show increasing inclusion of digital denture techniques in pre- and postdoctoral teaching [10]. Advantages include standardised teaching, objective feedback by software, reduced consumption of laboratory materials and the ability to review student designs. Challenges include cost, faculty training, and the need to maintain competence in conventional techniques for patients and settings where digital options are unavailable.

Limitations and challenges

- Capturing functional impressions and jaw relations digitally in edentulous patients is less established than for dentate patients [12,13].
- Most evidence is in vitro. Clinical trials are few, have small samples and short follow-up, and have rarely been randomised.
- Heterogeneity in systems, materials, printers and post-processing makes comparisons difficult [8,38].
- Resin biocompatibility, ageing and fracture behaviour of printed dentures need long-term study.
- Equipment cost, software learning curve, data-file interoperability and data security.
- Regulatory and standardisation gaps for printed denture resins and validation of printing workflows.

Future directions

- Improved intraoral capture of edentulous arches with dynamic or functional impression data and scan-body-assisted techniques.
- Artificial intelligence for automated tooth arrangement, border definition, occlusal scheme design and prediction of vertical dimension from facial scans. These applications are emerging, and clinical validation is still needed.
- Virtual patient and dynamic jaw tracking that combine facial scans, CBCT, motion capture and virtual articulators for patient-specific design.
- Multi-material and multi-colour printing of the base, gingival shading and teeth in a single build, with validated high-strength, biocompatible resins.
- Teledentistry and chairside manufacturing to shorten treatment time and expand access to care.
- Implant-retained and implant-supported overdentures and fixed full-arch prostheses using the same digital pipeline.
- Pragmatic randomised controlled trials with long follow-up, standard outcome sets and cost-effectiveness analysis.

Conclusions

Digitalisation has changed complete denture prosthodontics. Current evidence supports digital complete dentures as a clinically acceptable alternative to conventional dentures, with advantages in clinical efficiency, reproducibility

and material properties for milled dentures. Printed dentures are promising and economical but need standardised protocols and longer-term clinical evidence. The main challenges are digital capture of functional edentulous anatomy and jaw relations, the scarcity of randomised trials, and cost. Clinicians should treat digital and conventional techniques as complementary and select the workflow that best fits the patient, the operator's expertise and the available resources.

Declarations

Conflict of interest: None

Funding: None

References

1.Maeda Y, Minoura M, Tsutsumi S, Okada M, Nokubi T. A CAD/CAM system for removable denture. Part I: Fabrication of complete dentures. Int J Prosthodont. 1994;7(1):17-21.

2.Goodacre CJ, Garbacea A, Naylor WP, Daher T, Marchack CB, Lowry J. CAD/CAM fabricated complete dentures: concepts and clinical methods of obtaining required morphological data. J Prosthet Dent. 2012;107(1):34-46.

3.Bidra AS, Taylor TD, Agar JR. Computer-aided technology for fabricating complete dentures: systematic review of historical background, current status, and future perspectives. J Prosthet Dent. 2013;109(6):361-366.

4.Kattadiyil MT, Goodacre CJ, Baba NZ. CAD/CAM complete dentures: a review of two commercial fabrication systems. J Calif Dent Assoc. 2013;41(6):407-416.

5.Infante L, Yilmaz B, McGlumphy E, Finger I. Fabricating complete dentures with CAD/CAM technology. J Prosthet Dent. 2014;111(5):351-355.

6.Bilgin MS, Baytaroglu EN, Erdem A, Dilber E. A review of computer-aided design/computer-aided manufacture techniques for removable denture fabrication. Eur J Dent. 2016;10(2):286-291.

7.Kattadiyil MT, AlHelal A. An update on computer-engineered complete dentures: a systematic review on clinical outcomes. J Prosthet Dent. 2017;117(4):478-485.

8.Srinivasan M, Kamnoedboon P, McKenna G, et al. CAD-CAM removable complete dentures: a systematic review and meta-analysis of trueness of fit, biocompatibility, mechanical properties, surface characteristics, color stability, time-cost analysis, clinical and patient-reported outcomes. J Dent. 2021;113:103777.

9.Wang C, Shi YF, Xie PJ, Wu JH. Accuracy of digital complete dentures: a systematic review of in vitro studies. J Prosthet Dent. 2021;125(2):249-256.

10.Fernandez MA, Nimmo A, Behar-Horenstein LS. Digital denture fabrication in pre- and postdoctoral education: a survey of U.S. dental schools. J Prosthodont. 2016;25(1):83-90.

11.Mangano F, Gandolfi A, Luongo G, Logozzo S. Intraoral scanners in dentistry: a review of the current literature. BMC Oral Health. 2017;17:149.

12.Lo Russo L, Salamini A. Single-arch digital removable complete denture: a workflow that starts from the intraoral scan. J Prosthet Dent. 2018;120(1):20-24.

13.Fang JH, An X, Jeong SM, Choi BH. Development of complete dentures based on digital intraoral impressions: case report. J Prosthodont Res. 2018;62(1):116-120.

14.Clark WA, Duqum I, Kowalski BJ. The digitally replicated denture technique: a case report. Quintessence Int. 2019;50(1):18-22.

15.Hassan B, Greven M, Wismeijer D. Integrating 3D facial scanning in a digital workflow to CAD/CAM design and fabricate complete dentures for immediate total mouth rehabilitation. J Adv Prosthodont. 2017;9(5):381-386.

16.Revilla-Leon M, Ozcan M. Additive manufacturing technologies used for processing polymers: current status and potential application in prosthetic dentistry. J Prosthodont. 2019;28(2):146-158.

17.Anadioti E, Musharbash L, Blatz MB, Papavasiliou G, Kamposiora P. 3D printed complete removable dental prostheses: a narrative review. BMC Oral Health. 2020;20:343.

18.Unkovskiy A, Bui PH, Schille C, Geis-Gerstorfer J, Huettig F, Spintzyk S. Objects build orientation, positioning, and curing influence dimensional accuracy and flexural properties of stereolithographically printed resin. Dent Mater. 2018;34(12):e324-e333.

19.Hada T, Kanazawa M, Iwaki M, et al. Effect of printing direction on the accuracy of 3D-printed dentures using stereolithography technology. Materials (Basel). 2020;13(15):3405.

20.Srinivasan M, Gjengedal H, Cattani-Lorente M, et al. CAD/CAM milled complete removable dental prostheses: an in vitro evaluation of biocompatibility, mechanical properties, and surface roughness. Dent Mater J. 2018;37(4):526-533.

21.Janeva NM, Kovacevska G, Elencevski S, Panchevska S, Mijoska A, Lazarevska B. Advantages of CAD/CAM versus conventional complete dentures: a review. Open Access Maced J Med Sci. 2018;6(8):1498-1502.

22.Al-Fouzan AF, Al-Mejrad LA, Albarrag AM. Adherence of Candida to complete denture surfaces in vitro: a comparison of conventional and CAD/CAM complete dentures. J Adv Prosthodont. 2017;9(6):402-408.

23.Murat S, Alp G, Alatali C, Uzun M. In vitro evaluation of adhesion of Candida albicans on CAD/CAM PMMA-based polymers. J Prosthodont. 2019;28(2):e873-e879.

24.Prpic V, Schauperl Z, Catic A, Dulcic N, Cimic S. Comparison of mechanical properties of 3D-printed, CAD/CAM, and conventional denture base materials. J Prosthodont. 2020;29(6):524-528.

25.Gad MM, Fouda SM, Abualsaud R, et al. Strength and surface properties of a 3D-printed denture base polymer. J Prosthodont. 2022;31(5):412-418.

26.Goodacre BJ, Goodacre CJ, Baba NZ, Kattadiyil MT. Comparison of denture base adaptation between CAD-CAM and conventional fabrication techniques. J Prosthet Dent. 2016;116(2):249-256.

27.Steinmassl O, Dumfahrt H, Grunert I, Steinmassl PA. CAD/CAM produces dentures with improved fit. Clin Oral Investig. 2018;22(8):2829-2835.

28.AlHelal A, AlRumaih HS, Kattadiyil MT, Baba NZ, Goodacre CJ. Comparison of retention between maxillary milled and conventionally processed complete dentures. J Prosthet Dent. 2017;117(2):233-238.

29.Lee S, Hong SJ, Paek J, Pae A, Kwon KR, Noh K. Comparing accuracy of denture bases fabricated by injection molding, CAD/CAM milling, and rapid prototyping method. J Adv Prosthodont. 2019;11(1):55-64.

30.Kalberer N, Mehl A, Schimmel M, Muller F, Srinivasan M. CAD-CAM milled versus rapidly prototyped (3D-printed) complete dentures: an in vitro evaluation of trueness. J Prosthet Dent. 2019;121(4):637-643.

31.Yoon HI, Hwang HJ, Ohkubo C, Han JS, Park EJ. Evaluation of the trueness and tissue surface adaptation of CAD-CAM mandibular denture bases manufactured using digital light processing. J Prosthet Dent. 2018;120(6):919-926.

32.Hwang HJ, Lee SJ, Park EJ, Yoon HI. Assessment of the trueness and tissue surface adaptation of CAD-CAM maxillary denture bases manufactured using digital light processing. J Prosthet Dent. 2019;121(1):110-117.

33.Goodacre BJ, Goodacre CJ. Additive manufacturing for complete denture fabrication: a narrative review. J Prosthodont. 2022;31(S1):47-51.

34.Bidra AS, Farrell K, Burnham D, Dhingra A, Taylor TD, Kuo CL. Prospective cohort pilot study of 2-visit CAD/CAM monolithic complete dentures and implant-retained overdentures: clinical and patient-centered outcomes. J Prosthet Dent. 2016;115(5):578-586.

35.Kattadiyil MT, Jekki R, Goodacre CJ, Baba NZ. Comparison of treatment outcomes in digital and conventional complete removable dental prosthesis fabrications in a predoctoral setting. J Prosthet Dent. 2015;114(6):818-825.

36.Saponaro PC, Yilmaz B, Heshmati RH, McGlumphy EA. Clinical performance of CAD-CAM-fabricated complete dentures: a cross-sectional study. J Prosthet Dent. 2016;116(3):431-435.

37.Schwindling FS, Stober T. A comparison of two digital techniques for the fabrication of complete removable dental prostheses: a pilot clinical study. J Prosthet Dent. 2016;116(5):756-763.

38.Schweiger J, Stumbaum J, Edelhoff D, Guth JF. Systematics and concepts for the digital production of complete dentures: risks and opportunities. Int J Comput Dent. 2018;21(1):41-56.

Mobile Dental Clinics: Role in Improving Access to Oral Healthcare

Dr Benley George*, Dr Ansu Emmanuel, Dr Sunu Alice Cherian***, Dr Minimol Johny****, Dr Denny Thomas*****,Dr Anandhulal******

Abstract

Mobile dental units (MDUs) are advanced vehicles equipped with diagnostic and treatment facilities, including oral examinations, hygiene education, preventive treatments, and basic restorative procedures to remote and underprivileged communities. These clinics function as community outreach platforms, often operated by dental colleges and public health programs, to promote oral health awareness and provide cost-effective care. Mobile dental units demonstrate higher reach and engagement than stationary clinics, contributing significantly to improved oral health outcomes among target populations.

Key words: Mobile dental unit, Dental treatment, National Dental Commission, Oral examination

Introduction

India faces major public health challenges due to insufficient dental care access, which affects most of its population. A majority of Indian citizens reside in rural communities, whereas most dental facilities and professionals are concentrated in urban centers. The current dentist-to-population ratio in India stands at 1:10,000, whereas the World Health Organization (WHO) recommends 1:7,500 clinicians per population, and approximately 80% of Indian dentists practice within urban areas [1,2]. A recent report by the Indian Dental Association (IDA) further highlights that more than 75% of dental clinics are located in urban or semi-urban areas, serving only about 30% of the population, while the remaining 70%, predominantly in rural zones, have access to less than 25% of the available dental infrastructure [2]. As per the National Dental Commission (NDC), there are currently 331 dental colleges within the country. At present there are 4,05961 registered dentists in India. [3]

Due to the urban-rural imbalance, combined with high levels of poverty and low health literacy in rural areas there are large unmet needs for oral healthcare. Studies have shown a rising burden of dental diseases in these underserved populations, including high prevalence of dental caries and periodontal disease, and India has been considered as the “Oral cancer Capital” of the world due to the widespread tobacco use [4]. People in remote or low-income groups often go without treatment; for example, one rural outreach program found over 93% of patients had never received any prior dental care [5].

In India, there are several barriers to dental care which includes geographic isolation, lack of transportation, financial constraints, and social factors. In the rural regions people may have to travel long distances to reach a dentist, which is difficult due to inadequate public transport and challenging terrain [6]. The cost of dental treatment in private clinics is prohibitive for lower socio-economic groups, leading many to delay or avoid care until problems become severe. Government dental facilities are limited and serve only a small fraction of the patients, while the majority must rely on private dental clinics [7]. Consequently, untreated dental issues can progress to advanced disease, causing pain, tooth loss, and even systemic health complications. Innovative strategies are needed to deliver oral healthcare to those who cannot access conventional clinics [8].

Mobile dental Units, also referred to as 'mobile dental vans' and 'mobile dental clinics', act as an effective remedy for providing oral healthcare services in underserved locations. These dental clinics on wheels enable on-site dental service delivery using specially equipped trailers, trucks, and buses outfitted with dental chairs, diagnostic tools, and materials for patient care [9]. This mobility enables dental providers to reach patients in remote villages, urban slums, educational institutions, and community sites. Mobile dental services help make healthcare more accessible and cost-effective by overcoming physical distance and

*Prof and HOD, Dept of Public Health Dentistry, **Senior Lecturer, Dept of Periodontology, ****Associate Professor, Dept of Conservative Dentistry and Endodontics, **********Lecturer, Dept of Public Health Dentistry, Pushpagiri College of Dental Sciences, Medicity, Perumthuruthy, Thiruvalla, Keralam

transport-related barriers [10]. These outreach-based interventions are being increasingly implemented not only in India but globally, and are recognized as a promising solution to healthcare inequity.

Community dentistry programs and dental camps are supportedby mobile clinic vans operatedby dental colleges,which serve distant populations while also providing training platforms for undergraduate students [11]. The National Dental Commission (NDC)mandates that dentalcolleges in India should maintain outreachMDUs with 2 dental chairs and adequate infrastructure as part of theirpublic health mandate.

Dental Services provided

Mobile dental clinicsin India are equipped to deliver a range of essential dental services, focusingon basic curative care and preventive care that addresses the most common needs. Typically, these mobile units are designed as self-contained operatories with one or more dental chairs, instrument setups, and materials to performroutine dental procedures [9]. Althoughcompact, they oftencarry all necessary equipment such as compressors, suction units, autoclaves, and portable X-ray units [12]. This enables mobileclinics to functionalmost like a small dentalclinic. The Mobile dental unit usually comprise of a front cabin for seating of the passengers including dentists and technical staff, treatment cabin with one or two dental chairs and an area designated for cleaning, sterilization and storage of the instruments. The external cabinets of the mobile dental units contain storage space for Generator, Stabilizer, compressor and suction unit and water tank.

In the Mobile Dental Unit, an initial oral health check-up for patients is done. Dentists take patient histories, perform oral examinations, and diagnose common issues such as dental caries, gum disease, oral infections, and suspicious lesions. Screening for oral canceris also commonlydone, especially in areas with high tobacco use. Basic diagnostic toolsand sometimes portableradiographic equipment allowidentification of problems on-site [1].

Dental treatments performed in the MDU include dental cleanings to remove plaque and tartar, dental fillings, extraction of teeth, preventive dental treatments like topical fluorideapplications to strengthen enamel, and placement of pit and fissure sealants on children's teeth to prevent cavities. Oral hygiene instructions are provided to individuals and groups, teaching proper brushing techniques and flossing. Health education is a continuous activity - the mobile clinic staff use visual aids, models, and demonstrations to promote good oral health practices in the community [1].

Basic restorative procedures to treat dental caries and alleviate pain are performed within the mobile dental unit. This includes placing fillings using materials like composite resin or Glass-Ionomer cements to restore decayed teeth [5]. Tooth extractions are one of the most commonly provided services, given that many patients present with badly decayed or infected teeth that are beyond simple restoration. Mobile clinic dentists perform simple extractions of loose or non-salvageable teeth under local anesthesia [5]. This service is critical for relieving pain and preventing the spread of dental infections, especially in communities where advanced dental treatments are not accessible.

A significant portion of the mobile clinic's mission is devoted to education and awareness. Many MDUs have an attached area or provision for group education; for instance, a waiting area that doubles as an oral health education center with posters, audio-visual equipment, and models. While patients wait for treatment or after receiving care, dental staff engage them in talks about preventive oral care, demonstrate brushing techniques, and discuss topics of diet and tobacco cessation. Some programs also involve community health workers or teachers(in school camps) to reinforce oral health messages[1]. This educational function helps create a lasting impact beyond the immediate treatments given.

Challenges and limitations of MDUs

While mobile dental clinics are invaluable in expanding access to care, they face several challenges and limitations, especially in the context of India's diverse and resource-constrained settings. Understanding these limitations is important for optimizing mobile dental programs and making them sustainable.

1.Restricted dental treatments

MDUs focus on basic dental services and have constraints in offering advanced or specialized

treatments. The confined space and portable equipment in a van are sufficient for examinations, fillings, cleanings, and simple extractions, but not for complex procedures [12]. Advanced dental treatments can be performed in proper dental hospital/clinic settings only.

2.Time consuming

The dental treatments performed within the MDU are time consuming. After the dental treatment in each patient the dental chair has to be disinfected which also consumes time. If the MDU has only 1 dental chair, then fewer number of dental treatments can be provided in a day when compared to MDU with 2 dental chairs.

3.Infrastructure and Maintenance Issues

Mobile dental unit requires periodic maintenance and technical support. The vehicles usually travel through poor rural roads, leading to wear and tear. Breakdowns of the van or failure of onboard equipment can interrupt services. An experienced maintenance team is essential to repair mechanical or electrical issues promptly. Additionally, the van relies on internal power supply(generator) rather than external power supply and water supply for dental procedures [13]. In rural areas there will be frequent power disruption due to which external power supply cannot be relied upon for performing dental treatments.

The mobile dental unit often has a low fuel efficiency which leads to increased fuel consumption during the travel. Separate fuel is required for the functioning of the generator for performing dental treatments and functioning of air-conditioner and other dental equipment's. The size of the Mobile dental unit is also an important factor. In certain very remote areas mobile dental unit which is big with 2 dental chairs will not be able to travel to such areas due to the very narrow roads, overhanging electric lines etc. The mobile dental unit has to be parked on a level ground area to enable it to be functional.

Future perspectives for mobile dentistryin India

Mobile dental clinicshave demonstrated their value in India, but there is significant scope to enhancetheir impact and sustainability in the future. As the country strives to improve healthcare access and integrate technology, several future directions and innovations can be envisioned for mobile dentistry.

1.Inclusion of advanced dental equipment's

Mobile dental units can equip with advanced dental equipment's like oral cancer screening devices like Identafi, Velscope, Vizilite which can be used as a screening tool for identification of precancerous conditions and oral cancer. The inclusion of intra oral scanners will help in assessing the dentition of the patient and serve as future dental record.

2.Integration of Tele-dentistry

One promising avenue is the incorporation of tele-dentistry into mobile clinic operations. With advancements in digital health, MDUs can be equipped with portable imaging devices and internet connectivity to consult with remote specialists. Mobile services "may be utilized to implement tele-medicine and tele-dentistry services", effectively linking rural patients with urban healthcare resources [14].

3. Solar Energy

Innovations in vehicle design and equipment can make future mobile dental clinics self-sufficient and eco-friendly. Solar panels installed on roof of vans could power dental equipment, reducing reliance on fuel generators and ensuring a consistent power supply even in areas without electricity. Energy-efficient dental devices and better battery storage can enhance performance [15, 16]. In situations where solar energy is not available, the conventional generator supply can be utilized.

Conclusion

Mobile dental clinics in India have emerged as a promising strategy to bridge the oral healthcare divide, particularly in rural and underserved regions. These clinics help overcome barriers such as transportation challenges, inadequate infrastructure, and financial constraints, making them a cost-effective alternative to static dental facilities. Futuristic technology will enable mobile dental units to provide advanced dental care also for the public.

References

1. Grover S, Pahuja M, Pradhan S, Akif M, Shukla K: Rural oral health: challenges and pitfalls: time to recover and rebuild the pathway: a review article. Indian J Pub Health Res Dev. 2020, 11:893-897.

2. Gambhir RS, Gupta T: Need for oral health policy in India. Ann Med Health Sci Res. 2016, 6:50-55. 10.4103/2141-9248.180274

3. The National Dental Commission. https://dciindia.gov.in/ (Accessed on 12 October 2026).

4. The National Dental Commission Act, 2023: A new future for India dentistry? . (2023). https://www.impriindia.com/insights/dental-act-dentistry-in-india-future/.

5. Bala R, Sargaiyan V, Rathi SA, Mankar SS, Jaiswal AK, Mankar SA: Mobile dental clinic for oral health services to underserved rural Indian communities. Bioinformation. 2023, 19:1383-1387. 10.6026/973206300191383

6. Fricton J, Chen H: Using teledentistry to improve access to dental care for the underserved . Dent Clin North Am. 2009, 53:537-548. 10.1016/j.cden.2009.03.005

7. Gambhir RS, Brar P, Singh G, Sofat A, Kakar H: Utilization of dental care: an Indian outlook . J Nat Sci Biol Med. 2013, 4:292-297. 10.4103/0976-9668.116972

8. Colangelo GA: Innovations to improve oral health care access. Dent Clin North Am. 2009, 53:591-608. 10.1016/j.cden.2009.03.002

9. Srinivasan M, Janssens B, MacDonald D, Müller F: Mobile dental services. Oral Health Care and the Frail Elder. Wiley, 2025. 303-315. 10.1002/9781394182176.ch19

10. Ganavadiya R, Chandrashekar B, Goel P, Hongal S, Jain M: Mobile and portable dental services catering to the basic oral health needs of the underserved population in developing countries: a proposed model. Ann Med Health Sci Res. 2014, 4:293-304. 10.4103/2141-9248.133364

11. Sandesh N, Nagarajappa R, Hussain SA, Ramesh G, Singla A, Prabhusankar K: Utilization of mobile dental vans at post graduate dental institutions in India. Oral Health Dent Manag. 2014, 13:20-26.

12. Douglass JM: Mobile dental vans: planning considerations and productivity . J Public Health Dent. 2005, 65:110-113. 10.1111/j.1752-7325.2005.tb02795.x

13. Gao SS, Yon MJ, Chen KJ, Duangthip D, Lo EC, Chu CH: Utilization of a mobile dental vehicle for oral healthcare in rural areas. Int J Environ Res Public Health. 2019, 16:1234. 10.3390/ijerph16071234

14. Fortich-Mesa N, Hoyos-Hoyos V: Applications of teledentistry in dental practice: a systematic review . Rev Fac Odontol Univ Antioq. 2020, 32:77-88. 10.17533/udea.rfo.v32n1a8

15. Qi SY, Poobalan B, Natarajan M: The design of photovoltaic-based mobile dental healthcare system . ICEES. 2023, 10.1109/ICEES57979.2023.10110244

16. Kshirsagar M, Dodamani A, Pimpale S, et al. (May 11, 2025) Mobile Dental Clinics: Bringing Smiles on Wheels. Cureus 17(5): e83873. DOI10.7759/cureus.83873

When HOPE Becomes Strength, Every Story Inspires

Dr Philip T Mathew did his graduation from Manipal College of Dental sciences, Manglore in 1993. He started his practice in 1996 in his hometown Ranni, St Thomas dental clinic. He shares a happy life with his better half, Dr Susan Joseph who is graduated from Mumbai and they blessed with two children, Dr Rebecca Mary Philip and Ryan Mathew Philip.



Q.Could you briefly tell us about what happened to you and your dental practice during the flood?

Dr:It was on the midnight of 15/08/2018 torrential rains struck havoc in my town. It was raining for the past three days which resulted in one of the worst floods ever in the history of Kerala. I came to know about it only the very next morning. The whole town was massively flooded. About 40 KSEB transformers were drowned. Every room on the ground floor and the first floors were affected. Banks, shops, medical stores, hotels were immersed.

Q.What were the major challenges you faced in the aftermath of the flood?

Dr: The first major challenge was the total shutdown of all essential services to the town like electricity, road access, water supply. There was a total scarcity for food supplies as every shops went under water.

Q.How did the situation affect your professional life and your dental practice?

Dr:It was my first experience with such a huge calamity. My clinic had a 3 foot water level inside despite being located on the first floor. The navy had measured a depth of 22 feet of water in front of my office.

Q.How did you come to know about the IDA HOPE assistance programme?

Dr:I'm a founder member of IDA HOPE scheme since its inception in 1998. I've served as its representative for 5 consecutive years from 2006 to 2011 winning three consecutive state awards. I was well aware of its potential and prospects. I had subscribed into HOPE ASSURE scheme since its inception.

Q.What kind of support did you receive through IDA HOPE?

Dr:The support I received from the organisation right from the state level to my home branch was assuring and comforting during this crisis. My clinic was shut down for about three weeks as all equipments, 3 chairs, generators, compressors and furniture were destroyed and damaged. The whole town was destroyed with no resources to avail. This was the time I realised what a great decision I had made to join IDA HOPE. I was contacted immediately from the insurance office and they reached my office within 4 days and the damages were assessed and I was rewarded the compensation amount within a month.

Q.How did this assistance help you during that difficult period?

Dr:The compensation was well addressed by the insurance company taking into account the loss of equipment, furniture, infrastructure and loss of practices.

Q.Was there any particular moment when you felt that the support from IDA made a meaningful difference to you?

Dr:Definetly It was a comforting moment for all of us. It really strengthened our thoughts and emotions.

Q.How did the support help you restart or rebuild your proffessional activities?

Dr:It was encouraging and inspiring. I was able to repair and replace all the damaged equipment in quick time which was very helpful.

Q.What did the support from your fellow IDA members mean to you personally?

Dr:My personal thanks to many of our members who kept us in their thoughts. My heart goes out to everyone who kept enquiring about my family well being every day. I can't help saying a BIG thanks to Dr Giboy Kurien , my college friend practising in the nearby Erumely town who gave me a chair with support staff to finish off a few pending cases for a fortnight.

Q.Looking back, how would you describe your experience with IDA HOPE in a few words?

Dr:IDA HOPE is a must have scheme in our profession as long as we practice dentistry. It's definitely the best feature we can avail.

Q.What message would you like to share with other IDA members about standing together during difficult times?

Dr: Whatever we are nor wherever we go, staying together makes a huge difference. It builds up your security and confidence indefinitely.

Q.Would you like to share a short message of gratitude to IDA and everyone who contributed to the HOPE initiative?

Dr:My message for those younger friends in IDA Thiruvalla is build your friendship with tons of love, respect, humility and kindness. There's nothing more important than true friendship. Once again thanking everyone who reached out to us in words, prayers and thoughts. May God bless you all. Thank you 🙏

IDA KSB HOPE

5000+ Members
and growing every day

HELP OFFERED TO PROFESSIONALS IN EMERGENCY

- STARTED AS PROFESSIONAL PROTECTION SCHEME IN 2002
- LATER MERGED PPS AND BENEVOLENT (SOCIAL SECURITY SCHEME) TO FORM HOPE IN 2007
- HOPE IS A UNIQUE VOLUNTARY SUBSCRIBED PROJECT OF IDA KSB

HOPE LEGAL CELL
(PROFESSIONAL PROTECTION SCHEME)

- Legal support in Medico/Dento legal cases- takes up the cases from beginning with a lawyer's notice
- Monetary support in court cases - Engages and supports the legal steps including Lawyer's fees and other expenses
- Compensation of upto Rs.3.5 lakhs if awarded will be paid by the scheme

Legal protection starts after one month of receiving payment and acceptance of filled up application forms by the Hon HOPE Secretary

For Legal Assistance Contact
Dr Ittjivirah Babu
Vice Chairman Legal Cell
94967 24042

CONTACT US

OFFICE ADDRESS

Dr M Rajarajan
Hon.Secretary ,IDA HOPE KSB
Maniraj's Dental Clinic , First Floor,
Opp.Village Office,(Near Bus Stand)
Thiruvilwamala, Thrissur-680588.

Email - secretaryidahope@gmail.com
9947096663 (P) 8075869200 (O)

HOPE BENEVOLENT SCHEME

- Supporting the family in unfortunate event of Death or Total Permanent Disability
- The contribution to family is collected from the members (as Fraternity contribution) – Rs.500 per death/TPD
- **Current Death Benefit > 16 lakhs**
- Benevolent coverage starts after one year of receiving payment and acceptance of filled up application forms by the Hon HOPE Secretary

For Assistance Contact
Dr Saji Kurian
Vice Chairman HBS
98474 40646

HOPE ASSURE

- Extended Professional Indemnity cover of Rs 25 Lakhs to 2 crores
- Clinic Insurance against natural calamities, Fire , Floods , Burglary, Theft, Vandalism etc
- Add on for Neon Signages and glass
- Public Liability cover

RENEWALS - JULY

HOPE MEDI

TAILOR MADE FOR IDA HOPE MEMBERS

- No age limit for joining
- No medical checkup
- Pre existing diseases covered from day 1 for members
- Only one year waiting period for parents and dependents for pre existing diseases
- New born baby cover from Day 1 if parents are enrolled

Exempt under section 80 D

RENEWALS/JOINING IN SEPTEMBER

LOWEST PREMIUM IN THE MARKET WHEN COMPARED WITH SIMILAR SCHEMES

EASY ONLINE ENROLLMENT

CASHLESS & REIMBURSEMENT OPTIONS

For Claim reimbursements or processing of Cashless Insurances Contact

Jubilee Insurance Broking
Rahul - 7736810082
Jomcy George - 9544157066

ELIGIBILITY

- ACTIVE (RENEWED) IDA KSB MEMBERSHIP
- RECOGNISED BDS/MDS DEGREEE
- VALID DENTAL COUNCIL REGISTRATION
- AGE < 45 YEARS

HOW TO JOIN HOPE

Apply to Hon.Secretary, HOPE through your branch HOPE Representative with the following documents

1. Filled in original application form
2. Admission fees remitted as NEFT/DD/Online Transfer
3. One recent Passport Photograph
4. BDS/MDS Degree certificate and valid council registration
5. Age and address proofs

ADMISSION & RENEWALS

Upto age of 30 yrs - Rs.5000
31-40 yrs- Rs.7500
41-45 yrs - Rs.10000

RENEWALS IN APRIL – MAY

DEFAULTERS AND DROPOUTS

- HOPE members who do not renew by May 31st will not receive Benevolent Scheme Coverages but can renew upto June 30 with a fine
- After June 30 - no renewals possible and has to join afresh as per the age

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:

Dr. Shibi Mathew V, MDS
Editor (IDA Thiruvalla Branch)
Ph:9744111724
Email.id: shibiprosthodontics@gmail.co



Cover & Design: Dr. Sijina KK