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Editorial

From The Desk of Guest Editor.....

The Rise of Artificial Intelligence in Endodontics Precision, Prediction, and a Paradigm Shift

"It is not the strongest of the species that survives, nor the most intelligent ; it is the one most adaptable to change." **- Charles Darwin**

Dentistry is no stranger to change - from the advent of radiog-raphs to rotary instruments, from apex locators to 3D imaging. Yet, no transformation has been as profound or as promising as the integration of Artificial Intelligence (AI)into Endodontics. This is not merely an upgrade - it is a revolution. A redefinition of how we diagnose, plan, treat, and teach.

Artificial intelligence is rapidly emerging as an indispensable ally - an extension of our clinical mind and diagnostic eye. As members of this editorial board, it is both our responsibility and privilege to spotlight this technological renaissance that is propelling our specialty toward new frontiers of precision, prediction, and personalization.

Rewriting the Rules of Precision

Endodontics is built on precision - a field where microns matter and a missed canal could mean failure. The entry of AI has raised the bar exponentially. With the help of deep learning algorithms and neural networks, clinicians can now access diagnostic insights that rival - and often exceed - human capabilities.

AI-based systems trained on vast datasets can swiftly detect periapical radiolucencies, internal resorptions, root fractures, or rare canal morphologies with impressive accuracy. Whether it's a second MB canal or a missed lateral accessory canal, intelligent software now serves as a digital microscope, scanning every pixel, leaving nothing to chance.

This is precision redefined - not just in what we see, but in what we know before we act.

The Power of Prediction

The potential of AI extends beyond seeing the present — it lies in anticipating the future.

With AI-integrated platforms analyzing radiographs, clinical notes, systemic health, and treatment outcomes across vast populations, we are entering an era of predictive endodontics. These systems can alert clinicians to the likelihood of procedural complications, estimate prognosis with surprising accuracy, and even flag cases at risk of flare-ups or failure before symptoms appear.

Such insights do not replace clinical acumen - they amplify it. Treatment is no longer one-size-fits-all. It is intelligent, individualized, and grounded in data-driven foresight.

Guided Endodontics - Precision Meets Planning

One of the most game-changing innovations in this AI-driven landscape is Guided Endodontics - a technique that represents the perfect harmony between artificial intelligence, digital dentistry, and clinical execution.

In cases of pulp canal obliteration or calcified canals, what was once a blind pursuit with high chances of iatrogenic damage is now a guided journey. AI helps analyze CBCT data, and with 3D planning and printing, clinicians can use customized guides to prepare access cavities with microscopic precision.

This approach significantly reduces chair time, preserves tooth structure, and improves accuracy. Particularly in retreatment and geriatric cases, Guided Endodontics has become a beacon of minimally invasive, predictable dentistry- where AI acts not just as an aid, but as a navigator.

Transforming Education and Skill-Building

Artificial intelligence is also revolutionizing how we teach and train the next generation of endodontists. With AI-driven simulation platforms, virtual reality environments, and intelligent feedback systems, students are no longer passive learners - they are immersed, interactive participants.

These tools offer adaptive learning, adjusting complexity based on student performance, and providing immediate analytics on precision, timing, and decision-making. Faculty gain access to real-time data on student skills, identifying areas of improvement not visible during traditional teaching.

This is a shift from procedural teaching to performance analytics - a future where every student receives a personalized learning curve, guided by both mentors and machines.

Ethics, Empathy, and the Human Touch

As we welcome AI into the operatory, we must remain vigilant about what must never be replaced - clinical empathy, ethical integrity, and human judgment.

AI is a collaborator, not a commander. It does not feel, understand emotion, or replace the nuanced decisions made in the context of a patient's story. As clinicians, we remain the ultimate decision-makers, responsible for interpreting AI's suggestions with discernment.

We must also be mindful of data privacy, bias in AI training sets, and transparent accountability. Building a safe, responsible framework around AI implementation is not optional - it is imperative.

A Call to Leadership and Innovation

The road ahead is filled with promise - and responsibility. As an editorial board, we are committed to:

- Publishing cutting-edge research and real-world applications of AI in endodontics
- Encouraging interdisciplinary collaboration between dental professionals, data scientists, and engineers
- Supporting the ethical development and integration of AI tools in both clinical and academic settings
- Facilitating conferences, workshops, and mentorship programs focused on AI literacy and innovation

Conclusion

The future of endodontics is not a distant horizon - it is being forged today at the intersection of clinical excellence and artificial intelligence. As an editorial board, we are committed to championing innovation, nurturing interdisciplinary collaboration, and upholding the ethical integration of AI in both practice and pedagogy. We believe the true advancement of our field lies not in replacing human skill, but in amplifying it - empowering clinicians with tools that make precision sharper, diagnoses faster, and outcomes more predictable. We will not passively witness this transformation; we will lead it - boldly, responsibly, and relentlessly. Let this be the generation that redefines limits, where the hand of the clinician and the mind of the machine work not in opposition, but in perfect harmony. Because the future doesn't wait - and neither will we.

Dr. B. Gurudutt Nayak
Principal and Professor & Head,
Department of Conservative Dentistry & Endodontics,
Mansarovar Dental College,
Bhopal (Madhya Pradesh)

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Afzal A. Zaidi
Managing Editor
Media House, Zaidi Colony, Idgah Road
Near New Era Public School, Qazipara
Bijnor-246701 (U.P.) India
P.: +91-1342-359420, C.: +91-9027637477
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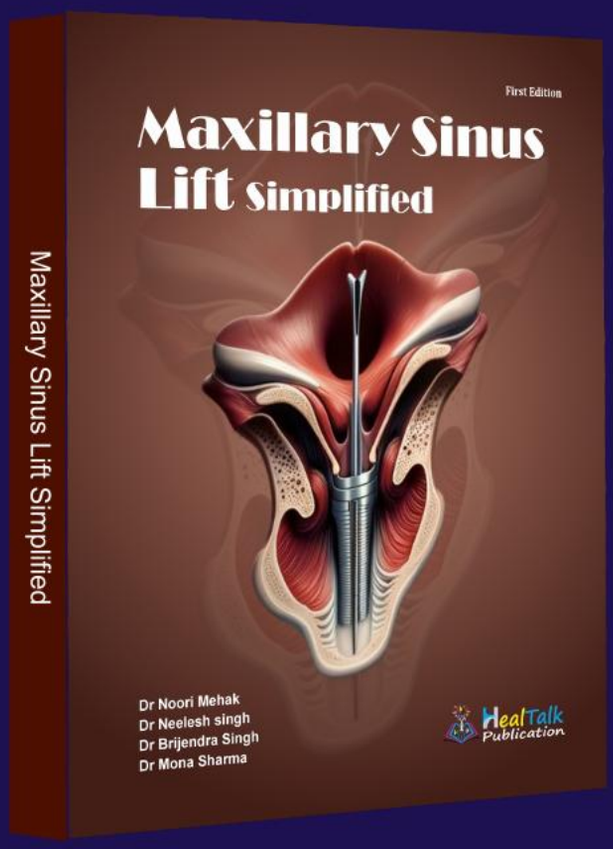

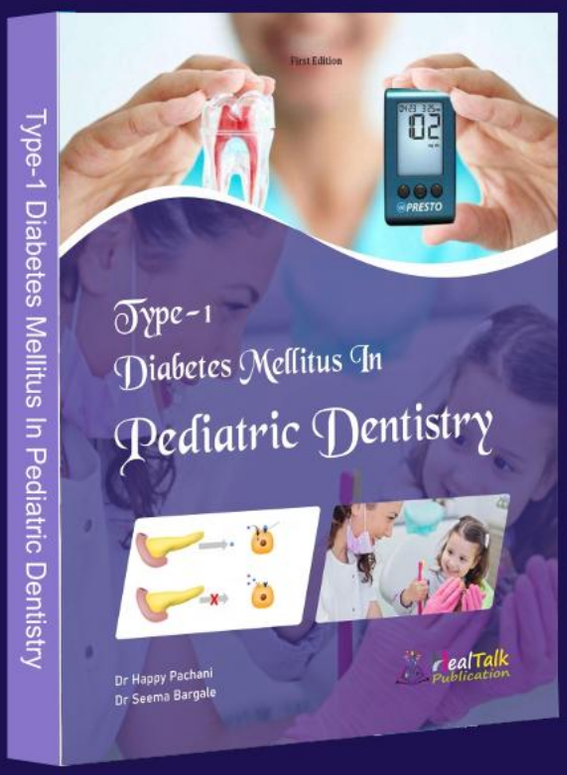

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Cone Beam Computed Tomography in Endodontics (Part II)

Dr. Rajiv K. Chugh
National President, Indian Dental Association (2023-24)
Chairman, Pierre Fauchard Academy, India Section
Visiting Professor, Sibar Institute of Dental Sciences, Guntur
Member, Dental Council of India
Secretary General, Indian Academy of Restorative Dentistry
Editor-in-Chief (Asia), UPDENT- A Journal of Advanced Dentistry

Applications of CBCT in Endodontics

CBCT and Tooth Morphology

An accurate portrayal of root canal anatomy is a prerequisite for successful diagnosis and treatment. Everytooth is anatomically unique. The internal anatomy of a tooth poses a challenge in successfully diagnosing, localising, negotiating, disinfecting andfilling the root canal system. Anatomical complexities can compromise treatmentoutcome. Owing to the two-dimensional nature of conventional radiology, it cannotreveal the actual number of canals present in teeth. Studies have highlighted that CBCT is superior toconventional radiography in revealing the number of roots.

The clinician should be aware of the dental anomalies and the anatomic variations in every tooth to ensureendodontic success. One common method of evaluatingroot morphology is periapical radiography. This is a costefficient and simple to use technique; however, superimposition and image distortion can be some potentialdisadvantages.

Descriptive studieshave shown that CBCT can accurately highlight root morphology and overcome the flaws inconventional radiography.

Number and Shape of The Root Canals

Some authors believe that conventional radiographs failto identify the number of canals present in teeth subsequently compromisingthe outcome. Pre-operative knowledge of the canalanatomy can lead to a conservative cavity preparationand avoidance of mishaps such as ledge formation, canaltransportation and perforation.

Localisation of Canals

Pre-operative knowledge of the tooth anatomy can pre-empt endodontic complexities and improve treatmentoutcome. Anatomic challenges may hinder endodonticsuccess. Maxillary first molar usually has three roots andfour canals. An in vivo study wasdone where maxillary first and second molars were sectioned and the number of canals was determined only tofind that there was 80% correlation between CBCT andsectioning. The disadvantage was a small sample size.

Studies have reported the presence of a fourthcanal in 67.14% of the teeth. It has been concluded that the reliability of CBCT imaging to detect the additional canalsin the maxillary molar increased with magnification.

Calcified Canals

According to Ball, intra-operativeCBCT can be useful for the assessment of the depth ofthe calcification to guide the clinician for locating andassessing the patent part of the canals. In addition, whena complete calcification is detected, CBCT can be used to study the apical pathosis to avoid perforation of acompletely calcified canal. It can be used in cases withcomplex tooth anatomy within the realms of doseconsiderations.

CBCT and Canal Curvature

Estrela et al assessed the curvatureof the root canals with the aid of CBCT. CBCT is areliable method to assess the radius of curvature whichcan reduce the aberrations and chances of instrumentfracture.

Complex Root Anatomy

Dens invaginatus is a malformation caused due to the infolding of the enamel organ into the dental papilladuring the stages of tooth development. CBCT canbe useful in assessment of teeth with complex toothanatomy. There is a shortage of studies which describethe endodontic treatment of dens invaginatus. Studies bysome authors justifies the use ofcone beam computed tomography for teeth with complex aberrations (such as dens invaginatus) in caseswhere periapical radiography does not reveal the information required for the management and treatment of such teeth.

Concluding Remarks

Conventional radiographs can assist the clinical to builda mental image of the tooth. Accuracy is however dependent on factors such as the clinician's skill, knowledge, experience and the quality of the radiographs. CBCT is a useful tool in the interpretation of the anatomy of the tooth morphology where parallax technique and microscopes have failed to reveal the true picture. The root morphology can be well visualised and the canals can be

mapped. A limited field ofview with a high-resolution CBCT scanner can be usedwhen periapical radiography is not able to provide thenecessary information on the root canal anatomy. It isimperative to ensure that the radiation levels are justifiedand optimised. There is still scope for further evidencethat will highlight the accuracy of CBCT for root canalmorphology.

CBCT and Apical Periodontitis

Introduction

Apical periodontitis is defined as a dynamic encounter between the microbes and host defence system at the interface between the infected radicular pulp and periodontal ligament. This results in inflammation, periapical destruction and resorption, eventually manifesting asvarious histopathological forms of periapical lesions.

The aim of endodontic treatment is to preserve the tooth in function and to promote periapical healing. Currently, the method of choice to view periapicalchanges is radiography (digital or conventional). Unfortunately, periapical radiography may not be able to reflect the changes in the cancellous bone. In the initial stages of apical periodontitis, the periapical changes are minimal and working towardsa diagnosis is a challenging task. This can be a cause for operator confusion and patient frustration in the diagnosis of thecausative tooth. CBCT is highly sensitive in recognition of apical periodontitis. It can detect endodontic lesions before theybecome apparent on conventional radiographs. Early diagnosis of apical periodontitiscan improve endodontic outcome.

Detection of Apical Periodontitis

It is well established from the results of ex vivo studies with reference standards, that is where the periapical status is known before hand, that CBCT is more accurate than periapical radiography to detect periapicalperiodontitis. In one of the first studies to compare the prevalence of periapical lesions using CBCT and conventional radiographs. They assessed periapical lesions on[46] maxillary and mandibular posterior teeth using parallaxperiapical radiography and CBCT. Periapical radiographscould diagnose lesions in thirty-two teeth. On the otherhand, CBCT could detect lesions on an additional 10(31%). Assessment of the periapical status of individualroots revealed that CBCT could detect 62% more lesionsthan conventional radiographs. This could be attributed tominimisation of geometric distortion and anatomical noisein the maxillary and mandibular second molar region.

It is well documented that CBCT is more accurate in determination of periapical lesions than conventional radiographs. Cone beam computed tomography may reveal thepresence of previously undiagnosed pathoses. The increased accuracy of CBCT images in identifying periapical radiolucencies should result in a moreobjective and accurate assessment of the outcome ofpulp preservation, primary root canal and secondaryroot canal treatment as well as periapical micro-surgery.

Concluding Remarks

- The sensitivity of CBCT is higher than periapical radiography.
- Due to the limitations of conventional radiography, the size of periapical lesions is underestimatedwhen compared to CBCT;
- Current evidence suggests that CBCT has a highersensitivity than periapical radiography for the detection of periapicallesions;
- Cone beam computed tomography may be indicated to aid the diagnosis of (non-)odontogenicpain when clinical examination and conventional radiographic assessment are not clear;
- Cone beam computed tomography may be considered when (in) direct pulp capping or pulpotomy is being planned inextensively carious teeth where periapical radiography does not reveal anything untoward.
- Incases of poorly localised symptoms when clinical and periapical radiography does not reveal any evidence of pathology, CBCT can be a savoir.

The detection of apical periodontitis by CBCT can influence endodontic diagnosis, instrumentation, disinfection and prognosis. CBCT should be reserved fordiagnosing periapical pathology in symptomatic patientswhere clinical and radiographic imaging is unremarkable.

CBCT and Endodontic Outcome

Introduction

'Outcome is defined as the measurement of success of atreatment in a designated time frame'. In endodontics, outcome can be determined by evaluation of clinicalsymptoms and radiographic interpretation. Assessmentof outcome is considered imperative as chronic apicalperiodontitis can exist even in the absence of clinicalsigns and symptoms. Needless to state,any outcome can directly influence a treatment plan. Togive an example, success of primary root canals is perceived to be in the range of 60–100% intraditional casesdemonstrating healing outcomes, but when outcome assessment is done using CBCT a lower healing rate isnoted. Why is this so? Because CBCT can accentuate lesions which are otherwise not visible.

Various studies have compared the outcome of root canal treatment by CBCT andconventional periapical radiography to come to the conclusion that CBCT can discover 20–35% more lesions. Other major findings to name a few are CBCT can detect bone destruction before it becomes evident on conventional radiographs. CBCT can detect signs of disease(such as periapical radiolucency and widened periodontal ligament space) even though conventional radiograph displayed healing.

Outcome of treatment is improved if clinical signs aretreated before the development of the disease. Outcome assessment is important before placing a coronal restoration. CBCT is not routinely usedfor assessment of apical periodontitis, due to raised exposure parameters but it can be used in cases wherepain and

clinical signs of periapical inflammation do notcorrelate with periapical radiographs.Additionally, CBCT can be been used for the volumetric measurement of periapical healing where measurement of the volume of a periapical lesion could give aninsight towards periapical healing.

Histopathological examination is another method to confirm the presence of apical lesions. Some studies have concluded that radiographs can be used to assess the presence/absence of apical periodontitis but they are not a reliable indicator of the true histological picture.

CBCT demonstrated increased sensitivityand accuracy in the diagnosis of apical periodontitis in contrast to periapical radiography.

Researchers used CBCT and conventional radiography to compare the quality of root canal treatment. CBCT revealed a higher number of endodontic failures as compared to conventionalradiography.

Concluding Remarks

There is a demonstrable need to have an accurate, quantitative and robust system to evaluate the outcome of endodontic treatment. Such a system provides in numerable benefits like accurate outcome assessment and measurement of healing. It can be concluded from the evidence mentioned in the paragraphs above that due to the limitations of conventional radiography, the size of the periapical radiolucency can be underestimated. On the other hand, CBCT has higher sensitivity as compared to conventional radiography in the detection of periapical pathology. Specificity, however, is similar for both the systems.

CBCT may play a pivotal role in endodontic research itcan used to evaluate the outcome in various treatment strategies such as preparation and instrumentation techniques. On the contrary, there is absence of concrete evidence justifying the use of CBCT in post endodontic treatment owing to increase radiation. Need of the hour isfurther evidence in the assessment of endodontic outcome.

To be continued…….

(It's a review of literature and not an original article)

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Maintaining Space With The Help of 3D Printing - A Case Report

Apurva Chadha[1], Deepti Jawa[2], Shipra Jaidka[3], Sujata Datta[4], Madhuri Gupta[5], Ashjan Ashraf Batha[6]

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Post Graduate Student[1]
Department of Pediatrics And Preventive Dentistry
D.J College of Dental Sciences And Research
Modinagar

Professor[2]
Department of Pediatrics And Preventive Dentistry
D.J College of Dental Sciences And Research
Modinagar

Professor And Head[3]
Department of Pediatrics And Preventive Dentistry
D.J College of Dental Sciences And Research
Modinagar

Post Graduate Student[4]
Department of Pediatrics And Preventive Dentistry
D.J College of Dental Sciences And Research
Modinagar

Post Graduate Student[5]
Department of Pediatrics And Preventive Dentistry
D.J College of Dental Sciences And Research
Modinagar

Post Graduate Student[6]
Department of Pediatrics And Preventive Dentistry
D.J College of Dental Sciences And Research
Modinagar

Corresponding Author

Dr. Deepti Jawa
Professor
Department of Pediatrics And Preventive Dentistry
D.J College of Dental Sciences And Research
Modinagar

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Abstract

Preventive orthodontics in pediatric dentistry, involves a unique set of skills and knowledge aimed at ensuring proper tooth alignment in growing children. One of the most reliable methods to prevent future malocclusions due to premature tooth loss is the placement of a space maintainer (SM), which helps preserve the space until the corresponding permanent tooth erupts. Traditionally, the fabrication of SMs has been a meticulous and time-intensive process, requiring close coordination with dental laboratories to ensure precise fit and function. Advances in digital technology, particularly the use of three-dimensional (3D) printing, have streamlined this process by minimizing manual errors and enhancing fabrication efficiency. This paper explores the integration of digital methods in pediatric dentistry for the development of innovative SM designs and presents a related clinical case.

Keywords : 3D printing, digital scanner, CAD-CAM, Micro laser sintering, 3D printed space maintainer

Introduction

Dental caries remains a significant public health issue, often resulting in the premature loss or extraction of affected teeth[1]. Early loss of primary teeth can interfere with the natural eruption of permanent teeth, leading to complications such as malocclusion and discrepancies in arch length[2]. Consequently, it becomes critical to preserve the space left by prematurely lost primary teeth to prevent problems like crowding, ectopic eruptions, unopposed tooth supra-eruption, and midline shifts [3].

According to the American Academy of Pediatric Dentistry (AAPD), space maintenance involves retaining the current alignment of teeth to prevent the loss of dental arch dimensions, including length, width, and perimeter[4]. The term "space maintenance" was introduced in 1941 by JC Brauer, who described it as the method of maintaining oral space left vacant by the loss of one or more teeth[5]. Space maintainers are devices designed to prevent the neighbouring teeth from shifting into the gap, ensuring enough room for the permanent teeth to erupt properly. These appliances can be either fixed or removable, used on one (unilateral) or both (bilateral) sides of the dental arch, and may be functional (supporting chewing) or non-functional.

Although conventional space maintainers have been widely used in pediatric dentistry, they present several limitations. These include subpar construction, time-intensive and costly lab work, potential processing errors, and difficulties in obtaining dental impressions, especially in young children who may have a strong gag reflex. These issues have prompted the development of alternative space maintainers, such as fiber-reinforced composite and prefabricated designs, which offer quicker fabrication and enhanced patient comfort. However, they too can encounter challenges like debonding at the enamel-composite and fiber-composite junctions, as well as issues related to polymerization shrinkage[5].

Modern dentistry has increasingly turned to digital workflows in fabricating space maintainers, offering numerous advantages over traditional methods. Technological innovations introduced during the 1990s and

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early 2000s revolutionized dental practices[6]. One such advancement is 3D printing, a process that constructs objects layer by layer based on digital models. The digital blueprint is broken into thin slices, which are sequentially built by the printer. Digital scanners capture the anatomical details needed for designing these models, which are then saved in STL (standard tessellation language) file format and sent to the labs where CAD-CAM technology is used for designing the appliance and then transferred to the printer for its fabrication[7].

Case History

A 7-year-old male presented to the Department of Pediatric and Preventive Dentistry with a complaint of a missing teeth in the lower right posterior region, persisting for the past 10 days. The patient reported pain in the region 15 days prior and was taken to a general dentist, who extracted the primary first and second molar (tooth 84, 85) (Figure-1).An intraoral periapical radiograph (IOPA) taken in the region of tooth[84,85] showed the underlying premolar in Nolla's developmental stage 4, indicating an early stage of tooth development[8]. Both arches were scanned using 3 Shape TRIOS 3 scanner (3 Shape, Denmark) (Figure-2 and 3). The scanned file was saved in STL (standard tessellation language) format and was sent to the laboratory, where 3D model was designed. The appliance was designed using CAD-CAM software[9] and was fabricated using micro laser sintering, an additive manufacturing process using a titanium alloy powder (Ti64 Gd23) from LPW Technology Ltd., UK. This method enables precise fabrication and superior material properties suitable for intraoral use[10,11]. The space maintainer was trial-fitted, showing accurate adaptation. It was cemented using Type 2 Glass Ionomer Cement (GC Fuji, Tokyo, Japan) (Figure-4), known for its good biocompatibility and fluoride release[12].

The patient was advised to avoid food and drink for 30 minutes post-cementation and to avoid chewing hard food using the appliance side.A follow-up appointment was scheduled after six months to evaluate appliance integrity and observe the eruptive progress of the premolar. (Figure-5)

Figure - 1

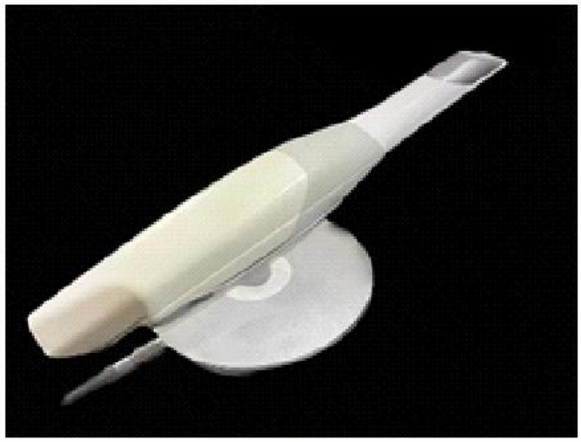
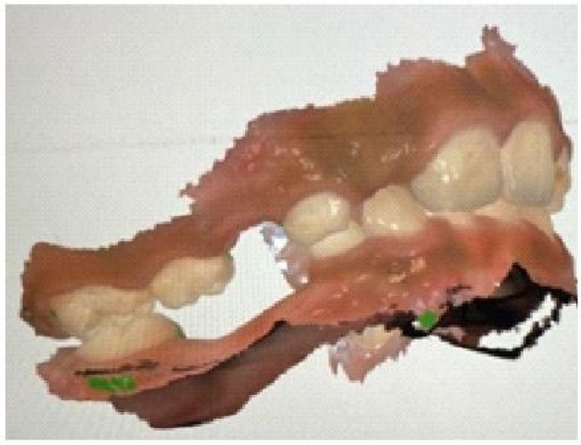


Figure - 2



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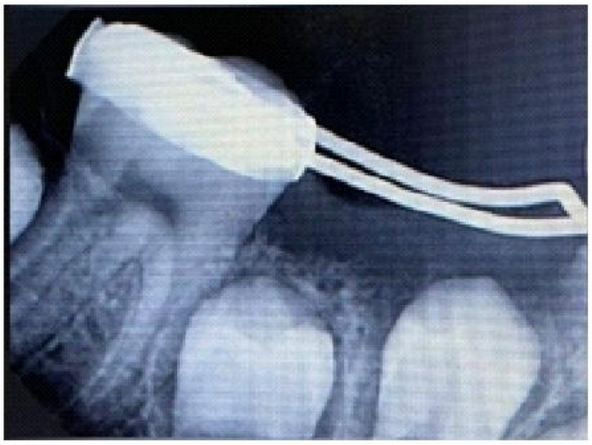

Figure - 5

Discussion

Loss of space in the primary and mixed dentition is a common clinical occurrence. Early intervention plays a critical role in reducing the need for extensive orthodontic treatment later in life by preserving the dental arch integrity[13]. Space loss may occur due to various reasons such as trauma, idiopathic conditions, or premature extractions of primary teeth[2].

The conventional Band and Loop space maintainer is one of the most widely used fixed appliances, especially for single missing teeth[14]. Despite its widespread use, the conventional Band and Loop appliance has certain limitations, including: The need for physical impressions and cast pouring, Multplei-step laboratory fabrication, Risk of decementation and solder joint failures and Multiple patient visits for delivery and adjustments[15].

This has highlighted the demand for advanced materials and design techniques in space maintenance[16].One such innovation is 3D printing, which allows the creation of solid, physical dental appliances directly from digital designs. This technique eliminates the need for conventional impression-taking, casting, and soldering, significantly reducing chairside time and laboratory effort[17].Using intraoral scanners (e.g., 3Shape TRIOS 3 scanner) and CAD software (such as DentalCAD by Exocad), dental professionals can design precise space maintainers digitally. These are then fabricated as a single, seamless unit using materials like titanium or biocompatible resins, enhancing durability and reducing chances of failure [18].

3D printed space maintainers have demonstrated several clinical advantages like enhanced precision and fit, reducing appliance failure, smoother surface finish, lowering plaque accumulation and gingival inflammation. It offers improved patient and parent satisfaction due to comfort and reduced visits and elimination of solder joints, decreasing long-term maintenance needs[19]. Although initial setup of digital dentistry equipment can be costly and requires staff training, the long-term benefits in terms of accuracy, efficiency, and patient compliance justify the investment [20].

Conclusion

The presented 3D Printed space maintainer is found to be precise, quick and child friendly.

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Breakthrough in Sedative Drug Delivery by Chewing gum - An In Vivo Study

Udita Samanta[1], Shipra Jaidka[2], Deepti Jawa[3], Ashjan Ashraf Batha[4], Apurva Chadha[5], Sujata Datta[6]

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Post Graduate Student[1]
Department of Pediatric and Preventive Dentistry
Divya Jyoti College of Dental Science and Research
Modinagar, Ghaziabad

HOD and Professor[2]
Department of Pediatric and Preventive Dentistry
Divya Jyoti College of Dental Science and Research
Modinagar, Ghaziabad

Professor[3]
Department of Pediatric and Preventive Dentistry
Divya Jyoti College of Dental Science and Research
Modinagar, Ghaziabad

Post Graduate Student[4]
Department of Pediatric and Preventive Dentistry
Divya Jyoti College of Dental Science and Research
Modinagar, Ghaziabad

Post Graduate Student[5]
Department of Pediatric and Preventive Dentistry
Divya Jyoti College of Dental Science and Research
Modinagar, Ghaziabad

Post Graduate Student[6]
Department of Pediatric and Preventive Dentistry
Divya Jyoti College of Dental Science and Research
Modinagar, Ghaziabad

Access this article online

Website : www.healtalk.in

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Abstract

Background - Innovative sedative drug delivery systems in pediatric dentistry enhance the comfort and cooperation of young patients during dental procedures. These advancements focus on optimizing drug administration methods for better efficacy, faster onset, and reduced anxiety.

Aim - To compare and evaluate the efficacy and efficiency of innovative route of sedation with conventional routes by measurement of time, visual analogue scale, pulse rate and oxygen saturation level respectively as anaesthetic premedication in Paediatric dentistry.

Methods - An in vivo study was done to evaluate the efficacy and efficiency of different route of sedative drugs administration. Sixty children within the age group of 5-12 years, with Frankel negative behaviour, who required sedation for minor surgical procedures were selected and equally divided into 4 groups. 3 experimental groups and one control group. Group-1 received oral Midazolam mixed with fruit juice, group-2 received nasal spray of Midazolam, group-3 received Midazolam infused with chewing-gum, and group-4 with no sedation. Time to reach the peak sedation level was analysed, pre and post anxiety level was measured by Visual analog scale. O_2 level and pulse rate was determined by using pulse oximeter.

Results - Midazolam infused with chewing-gum achieves significant sedation outcomes and higher patient acceptance compared to oral and nasal routes and demonstrates superior efficacy and comfort in paediatric dental patients.

Conclusion - The study demonstrated that midazolam infused chewing-gum is an effective and safe method which could be a practical delivery system for sedation in clinical settings, providing a convenient alternative to traditional methods.

Keywords - Midazolam, Nasal Spray, Chewing-gum, Sedation

INTRODUCTION

Sedation has long played a pivotal role in paediatric dentistry, serving as a vital tool to manage anxiety, fear, and uncooperative behaviour in children undergoing dental treatment[1]. Traditionally, sedative agents have been administered through oral syrups, nasal sprays, or intravenous injections[2]. Although these methods are effective, they are often associated with several limitations, particularly in young patients. The bitter taste of oral syrups may lead to poor acceptance[3], nasal sprays can be uncomfortable or provoke resistance[4], and intravenous injections are frequently associated with needle-related anxiety and pain[5]. These challenges can significantly hinder patient compliance and contribute to negative dental experiences.

In response to these drawbacks, the field has increasingly focused on developing alternative, more patient-friendly drug delivery systems. Over the years, advancements in pharmaceutical technology have introduced innovative sedative formulations such as medicated lozenges, jellies, ice creams, and chewing gum[6]. These novel approaches aim

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to enhance palatability, reduce invasiveness, and improve the overall experience for paediatric patients. A key advantage of these formulations is their ability to facilitate drug absorption through the oral mucosa, bypassing first-pass hepatic metabolism and resulting in a more rapid onset of action.

Among these emerging options, medicated chewing gum has garnered particular interest due to its unique combination of pharmacologic and psychological benefits. It allows for efficient sublingual delivery of sedative agents while engaging children in a familiar and non-threatening activity.

MATERIALAND METHOD

An in Vivo, comparative study was conducted in the Department of Paediatric and Preventive Dentistry to compare and evaluate the efficacy and efficiencyof innovative route of sedation with conventional routes as drug delivery system. The study was approved by the institutional ethical committee and informed consent was obtained from the parents or legal guardians of all participants.

A total of 60 children, aged between 5 and 12 years, who required sedation for minor surgical dental procedures, were selected for the study. Based on the inclusion and exclusion criteria, the participants were randomly divided into four equal groups (n = 15 per group):

- **Group 1** : Received oral Midazolam mixed with fruit juice.
- **Group 2** : Received intranasal Midazolam spray.
- **Group 3** : Received Midazolam-infused chewing gum.
- **Group 4** : Received no sedation and served as the control group.

Inclusion Criteria

- Children aged 5–12 years
- Children demonstrating negative behavior according to Frankl's Behavior Rating Scale
- Children with parental consent

Exclusion Criteria

- Children with systemic medical conditions (e.g., cardiac or respiratory disorders)
- Children weighing less than 10 kg

To evaluate the efficacy and safety of sedation in pediatric patients, a Visual Analogue Scale (VAS) (Fig 1) was used to assess anxiety levels before and after the procedure in all the groups (Fig 2 and 3), offering a subjective yet quantifiable measure of emotional response[7]. A pulse oximeter was employed throughout to monitor pulse rate and oxygen saturation in every groups, ensuring early detection of any adverse events. An accurate weighing machine was used prior to drug administration to determine the child's weight for precise dosing. Additionally, a stopwatch was used to measure the onset time of sedation, allowing standardized comparisons across patients and sedative agents.

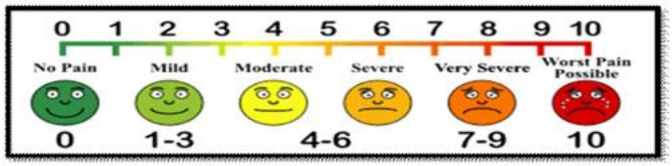


Fig 1 - Visual analogue scale (VSA) to evaluate the anxiety level

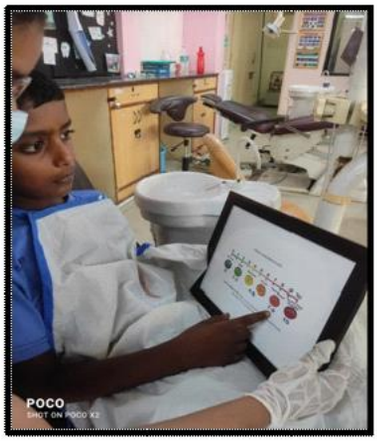
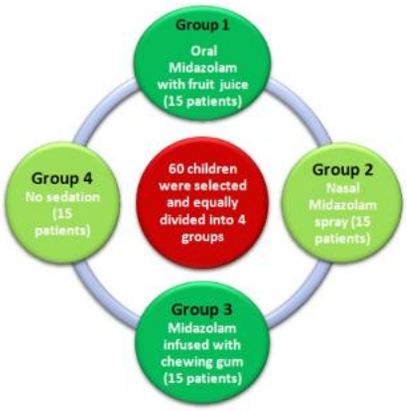


Fig 2 - Pre-Treatment Evaluation done with VSA Scale

Fig 3 - Post Treatment Evaluation Done by VSA Scale



Group 1 (Oral Midazolam Intake with Fruit Juice)

In this group, children were administered Midazolam at a dose of 0.5 mg/kg body weight. To enhance palatability and maintain consistency, the medication was mixed with one-fourth

glass of fruit juice before oral administration, ensuring effective masking of the drug's taste and standardized delivery across all patients. (Fig 4)

Fig 4 - Intake of Midazolam

Group 2 (Nasal Midazolam Spray Administration)

Midazolam was given intranasally at a dose of 0.2 mg/kg body weight. The calculated dose was divided and delivered as two sprays into each nostril, ensuring even distribution and effective absorption through the nasal mucosa. This method allowed for rapid onset and non-invasive administration of the sedative agent. (Fig 5)

Fig 5 - Nasal Midazolam Spray is Administrated

Group 3 (Midazolam Infused with Chewing Gum Administration)

An innovative method was adopted for this group, where Midazolam was delivered via medicated chewing gum. The recommended sublingual dose of 0.2 mg/kg body weight was calculated for each child, drawn into a sterile syringe, and infused into homemade chewing gum (Fig 6). Children were instructed to chew the gum for 3–5 minutes, after which it was discarded. (Fig 7)

Fig 6 - Chewing gum Infused with Midazolam

Fig 7 - Child Getting Sedated by Midazolam Infused Chewing gum

Group 4 : Control Group (No Sedation)

This group received no sedative premedication and served as the control for comparison. Anxiety levels and physiological parameters were recorded before the dental procedure using the same evaluation methods.

Results

The collected data were tabulated and subjected to statistical analysis using appropriate software. Descriptive statistics, ANOVA, and post hoc tests were applied to determine the significance of differences among the groups. A p-value of <0.05 was considered statistically significant. The analysis revealed that a reduction in anxiety levels across all experimental groups, with the exception of the control group where no sedation was administered. Among the sedative groups, the greatest reduction in anxiety was observed in the group that received Midazolam infused chewing gum followed by Midazolam nasal spray group while the least reduction was noted in the group where Midazolam was administered orally with fruit juice (Table 1 and Graph 1). Intergroup comparisons demonstrated highly significant differences in anxiety reduction between all the groups. (Table 2)

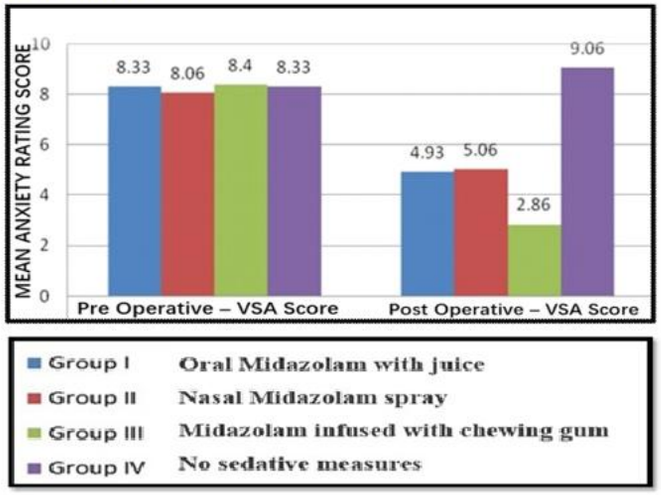
	Pre Intervention	Post Intervention	Mean Change	F value	P value	Significance
Group I	8.33±1.112	4.93±1.334	3.40±0.910	74.732	0.001	Significant
Group II	8.06±1.091	5.06±1.667	3.00±1.301			
Group III	8.40±0.984	2.86±1.124	5.53±0.991			
Group IV	8.33±0.891	9.06±0.883	-0.73±1.38			

-Sign indicates increase in the anxiety scores , Intergroup comparison done using One Way NOVA

Table 1 – Intergroup comparison of anxiety level in pre and post intervention by one way ANOVA test

Intergroup comparison		Mean Diff	Std Error	P value	Significance
Group I	Group II	.40000	.42613	0.352	Non-Significant
Group I	Group III	-2.13333*	.42613	0.001	Significant
Group I	Group IV	4.13333*	.42613	0.001	Significant
Group II	Group III	-2.53333*	.42613	0.001	Significant
Group II	Group IV	3.73333*	.42613	0.001	Significant
Group III	Group IV	6.26667*	.42613	0.001	Significant

Table 2 – Further intergroup comparison of anxiety level in mean score by Post hoc analysis



Graph 1 – Mean value change in pre and post intervention anxiety level

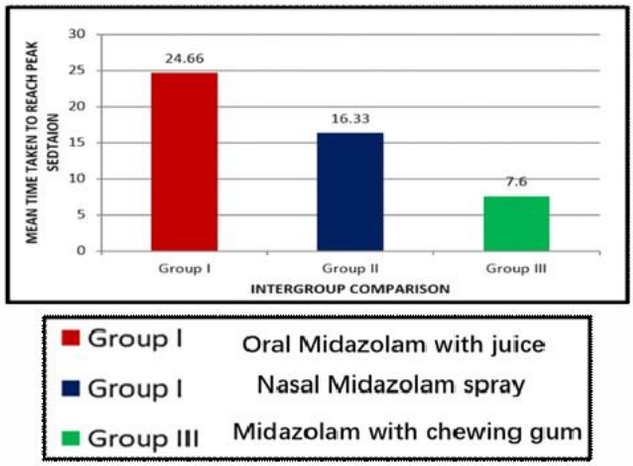
Similarly on statistical evaluation it was found thatthe mean time to achieve the desired level of sedationwas shortest in the group where chewing gum was used, followed by the group that received intranasal spray, while the longest time was observed in the group administered Midazolam mixed with fruit juice (Table 3 and Graph 2). The intergroup comparison showed statistically significant differences, indicating that the route and method of administration influenced the onset time of sedation (Table 4).

	Mean	Std Dev	Std Error	F value	P value	Significance
Group I	24.66	3.538	0.913	198.115	0.001	Significant
Group II	16.33	1.676	0.432			
Group III	7.60	1.502	0.387			

Table 3 - Intergroup comparison of mean time taken to achieve required sedation level by one way ANOVA test

Intergroup comparison		Mean Diff	Std Error	P value	Significance
Group I	Group II	8.333	.88419	0.001	Significant
Group I	Group III	17.06*	.88419	0.001	Significant
Group II	Group III	8.73*	.88419	0.001	Significant

Table 4 - Further intergroup comparison of mean time to achieve required sedation level by Post hoc analysis



Graph 2 - Mean time taken to achieve sedation in various experimental groups

A similar trend was observed in pulse rate measurements, with a noticeable reduction in post-intervention values across all sedative groups, indicating a calming effect following sedation. (Table 5 and 6)

	Pre Intervention	Post Intervention	Mean Change	F value	P value	Significance
Group I	83.00±5.20	81.46±1.92	1.53±5.84	12.687	0.001	Significant
Group II	84.93±4.49	81.33±2.63	3.60±3.56			
Group III	84.73±4.86	78.00±2.67	6.73±3.10			
Group IV	85.86±3.97	89.53±1.35	-3.66±3.75			

All the values are in multiples of $X10^3$

Table 5 - Intergroup comparison of pulse rate in pre and post intervention groups by one way ANOVA test

Intergroup comparison		Mean Diff	Std Error	P value	Significance
Group I	Group II	-2.53333	1.21302	0.048	Significant
Group I	Group III	-2.73333*	1.21302	0.028	Significant
Group I	Group IV	5.33333*	1.21302	0.000	Significant
Group II	Group III	-2.20000	1.21302	0.045	Significant
Group II	Group IV	5.86667*	1.21302	0.000	Significant
Group III	Group IV	8.06667*	1.21302	0.000	Significant

Table 6 - Further intergroup comparison of pulse rate done by Post hoc analysis

In contrast, oxygen saturation levels remained stable in both experimental and control groups, suggesting that none of the sedation methods compromised respiratory function. (Table 7)

	Pre Intervention	Post Intervention	Mean Change	F value	P value	Significance
Group I	97.33±1.23	97.40±0.82	-0.06±1.33	0.803	0.437	Non-Significant
Group II	97.40±0.91	97.26±0.59	0.13±1.18			
Group III	97.33±0.81	97.53±0.99	-0.20±1.14			
Group IV	97.46±0.83	97.00±0.65	0.46±0.99			
All the values are in multiples of $X10^3$						

Table 7 - Intergroup comparison of O2 saturation level in pre and post intervention groups by one way ANOVA

In case of O2 saturation level one way ANOVA test was insignificant therefore further post hoc analysis is not required as it would be eventually come insignificant. These findings support the safety and differential efficacy of the various sedation delivery methods used in the study.

DISCUSSION

Administering sedative medications to pediatric patients presents unique challenges. Traditional methods, such as oral syrups, often have an unpleasant taste, leading to resistance among children, while nasal sprays can be intimidating and uncomfortable, as noted by Shanmugavel, Asokan et al. (2016)[8]. To address these issues, innovative approaches like sedative chewing gum have been explored as alternative delivery systems. This method not only offers a more palatable option but also facilitates sublingual drug absorption, potentially enhancing the onset and efficacy of sedation.

One significant benefit of using medicated chewing gum is its ease of administration. Mutsumi Takahashi, Yogetsu bando et al. (2024)[9] highlighted that it eliminates the need for water or specialized medical equipment, making it particularly suitable for on-the-go scenarios and reducing logistical challenges in various settings. This convenience is especially beneficial in pediatric care, where patient cooperation can be limited. Moreover, Sengul Yaman-Sozbir, Sultan ayaz-Alkaya et al. (2019)[10] found that the act of chewing gum, being familiar and non-threatening to children, helps overcome psychological barriers associated with sedation.

Drugs delivered via medicated chewing gum can be absorbed through the oral mucosa, allowing them to bypass the gastrointestinal tract and first-pass metabolism in the liver. Tick Whai Lim, Shu May Choo et al. (2018)11 reported that this pathway leads to a faster onset of action and improved bioavailability of the medication. Additionally, Shanmugavel et al. (2016)[8] demonstrated that the dosage can be adjusted by varying the concentration of the drug in the gum or by controlling the duration of chewing, providing flexibility in managing sedation levels.

Research comparing different administration routes of midazolam-a commonly used sedative-suggests that the sublingual route is more effective than oral and nasal routes. Studies by Tick Whai Lim et al. (2018)[11] and Shanmugavel et al. (2016)[8] found that sublingual administration of midazolam resulted in a quicker onset of sedation and greater overall effectiveness compared to other methods, further supporting the potential of medicated chewing gum as a viable delivery system.

Beyond its pharmacological advantages, chewing gum has also been shown to improve perioral muscle strength[12]. In a study conducted by Takahashi et al. (2024)[9], participants engaged in regular gum-chewing exercises over three months, resulting in significant enhancements in tongue and cheek muscle strength. Furthermore, Sengul Yaman et al. (2019)[10] observed that such exercises contributed to reductions in stress, anxiety, and depression, indicating additional psychological benefits.

Several other studies have corroborated these findings. Takahashi et al. (2024)9 reported that gum-chewing exercises led to significant improvements in perioral muscle strength, with effects maintained for at least three months after discontinuation of the exercise. Similarly, Shirai et al. (2018)13 demonstrated that gum-chewing exercises increased maximum bite force, suggesting enhanced masticatory function. These findings further support the multifunctional benefits of chewing gum beyond sedation.

Despite these advantages, safety considerations must be addressed. J Jacobsen, LL Christrup, NH Jensen, et al (2004) reported a case of acute poisoning in a child who ingested dexmedetomidine-containing chewing gum, emphasizing the need for careful dosing and monitoring when using medicated chewing gum for sedation. This highlights the importance of ensuring appropriate formulations and dosages, particularly in pediatric applications.

CONCLUSION

In conclusion, the integration of medicated chewing gum as a sedative delivery method presents a promising alternative to traditional routes, particularly in paediatric care. Its ease of administration, combined with pharmacokinetic advantages and additional benefits such as improved perioral muscle strength and psychological well-being, positions it as a viable option for sedation. Midazolam chewing gum facilitates faster and more consistent drug absorption through the oral mucosa, potentially leading to more efficacy and efficiency for sedation. Hence it is recommended as an innovative sedative drug delivery system in pediatric dentistry.

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Diabetes and Dental Disease : A Two-Way Street

Sujata Datta[1], Deepti Jawa[2], Apurva Chadha[3], Udita Samanta[4], Nitin Kumar Som[5], Neha Bhati[6]

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Post Graduate Student[1]
Department of Pediatric and
Preventive Dentistry
Divya Jyoti College of Dental Science
and Research
Modinagar, Ghaziabad

Professor[2]
Department of Pediatric and
Preventive Dentistry
Divya Jyoti College of Dental Science
and Research
Modinagar, Ghaziabad

Post Graduate Student[3]
Department of Pediatric and Preventive Dentistry
Divya Jyoti College of Dental Science
and Research
Modinagar, Ghaziabad

Post Graduate Student[4]
Department of Pediatric and Preventive Dentistry
Divya Jyoti College of Dental Science
and Research
Modinagar, Ghaziabad

Senior Lecturer [5]
Department of Pediatric and Preventive Dentistry
Divya Jyoti College of Dental Science
and Research
Modinagar, Ghaziabad

Reader[6]
Department of Pediatric and Preventive Dentistry
Divya Jyoti College of Dental Science
and Research
Modinagar, Ghaziabad

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Abstract

Diabetes mellitus is the most common endocrine disease and can be classified into type 1, type 2, gestational, and other specific types. Type 1 diabetes is often autoimmune in origin, typically emerging in childhood, and requires lifelong insulin therapy. Type 2 diabetes, more prevalent in adults and increasingly in children, is related to insulin resistance and often linked with obesity. Diabetes manifests systemically and has significant oral health implications such as xerostomia, periodontal disease, increased caries risk, and poor wound healing. Proper diagnosis involves plasma glucose tests and HbA1c levels. Management includes lifestyle changes, pharmacologic therapy with insulin or metformin, and careful dental care planning. Dentists must assess glycemic control before procedures, prevent hypoglycemic episodes during treatment, and ensure post-operative care to minimize complications. Interdisciplinary coordination is essential for optimal outcomes in diabetic patients, particularly in managing dental and systemic health.

Keyword : Diabetes Mellitus, Dental Operatory, Endocrine Disease, Oral Menifestation.

Introduction

Endocrine and metabolic diseases are one of the common contemporary human afflictions, particularly in the United States and other countries with generous nutrition and screening programs for high-risk individuals.

Endocrine disease refers to a group of medical conditions that affect the endocrine system, which is responsible for producing hormones that regulate various bodily functions. These disorders can be caused by a variety of factors, including hormonal imbalances, genetic factors, and tumors . Some common types of endocrine diseases include Diabetes mellitus, Hyperthyroidism, Hypothyroidism, Cushing disease, Addison disease, Acromegaly etc.[1]

Classification

There are many different types of endocrine disorders. Diabetes is the most common endocrine disorder.

Other Endocrine Disorders Include[2]

Adrenal insufficiency. The adrenal gland releases too little of the hormone cortisol and sometimes, aldosterone. Symptoms include fatigue, stomach upset, dehydration, and skin changes. Addison's disease is a type of adrenal insufficiency.

Cushing's disease. Overproduction of a pituitary gland hormone leads to an overactive adrenal gland. A similar condition called Cushing's syndrome may occur in people, particularly children, who take high doses of corticosteroid medications.

Gigantism (acromegaly) and other gro-wth hormone problems. If the pituitary gland produces too much growth hormone, a child's bones and body parts may grow abnormally fast.

Dwarfism, If growth hormone levels are too low, a child can stop growing in height.

Hyperthyroidism. The thyroid gland produces too much thyroid hormone, leading to weight loss, fast heart rate, sweating, and nervousness. The most common cause for an

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overactive thyroid is an autoimmune disorder called Grave's disease.

Hypothyroidism. The thyroid gland does not produce enough thyroid hormone, leading to fatigue, constipation, dry skin, and depression. The underactive gland can cause slowed development in children. Some types of hypothyroidism are present at birth.

Hypopituitarism. The pituitary gland releases little or no hormones. It may be caused by a number of different diseases. Women with this condition may stop getting their periods.

Multiple endocrine neoplasia I and II (MEN I and MEN II). These rare, genetic conditions are passed down through families. They cause tumors of the parathyroid, adrenal, and thyroid glands, leading to overproduction of hormones.

Polycystic ovary syndrome (PCOS). Overproduction of androgens interfere with the development of eggs and their release from the female ovaries. PCOS is a leading cause of infertility.

Precocious puberty. Abnormally early puberty that occurs when glands tell the body to release sex hormones too soon in life.

Diabetes Mellitus

"Diabetes mellitus is a group of endocrine diseases characterized by hyperglycemia resulting from defects in insulin secretion, insulin action, or both, leading to abnormalities in fat, carbohydrate, and protein metabolism"(American Diabetes Association 2014a).[3]

Epidemiology

Global

The most recent statistics (2010) indicate that in the United state approximately 215,000 children younger than 20 years old have either type 1 or type 2 diabetes. (Centers for disease control and prevention, 2010).

The odds are higher for African-American and Hispanic children-nearly 50% of them will develop diabetes.

India

It is estimated that childhood diabetes accounts for around 5% of total population of diabetics. In India alone, there are likely to be about 4,00,000 infants and children with this disease.

Diabetes mellitus (DM) can occur in children at any age, but 40% of children diagnosed are between 10 to 14 years old and 60% are between 15 to 19years old.[4]

Girls are 1.3 to 1.7 times more likely to develop type 2 diabetes than boys.

Classification

A. According to "The american diabetes association standards of medical care for diabetes 2021" :[5]
   1. Type 1 Diabetes - Autoimmune destruction of insulin secreting β-cells leading to insulin deficiency.
   2. Type 2 Diabetes - Inadequate insulin secretion that cannot overcome the existing degree of insulin resistance.
   3. Gestational diabetes - Diabetes diagnosed in the second or third trimester of pregnancy that is not clearly overt diabetes.
   4. Monogenetic diabetes syndromes - Neonatal diabetes, maturity-onset diabetes of the young [MODY].
   5. Disease of the exocrine pancreas - Cystic fibrosis, pancreatitis, pancreatectomy.
   6. Medication induced- Glucocorticoids, treatment of HIV/AIDS, immunosuppressants, chemotherapeutic agents

B. "WHO"classification of diabetes based on etiology (2019):[6]
   1. Type 1 diabetes (Insulin dependent diabetes mellitus)
   2. Type 2 diabetes (Non insulin dependent diabetes mellitus)
   3. Hybrid forms of diabetes
      a. Slowly evolving immune-mediated diabetes of adults
      b. Ketosis prone type 2 diabetes
   4. Other specific types
      a. Monogenic diabetes
         - Monogenic defects of β-cell function
         - Monogenic defects in insulin action
      b. Diseases of the exocrine pancreas
      c. Endocrine disorders
      d. Drug- or chemical-induced
      e. Infections
      f. Uncommon specific forms of immune-mediated diabetes
      g. Other genetic syndromes sometimes associated with diabetes
   5. Unclassified diabetes

      This category should be used temporarily when there is not a clear diagnostic category especially close to the time of diagnosis of diabetes.
   6. Hyperglycemia first detected during pregnancy
      - Diabetes mellitus in pregnancy
      - Gestational diabetes mellitus

Clinical Featues of Type 1 And Type 2 Diabetes[7,8]

A. Type 1 Diabetes Mellitus (Insulin dependent diabetes mellitus)-Type 1 diabetes mellitus (T1DM) comprises several diseases of the pancreatic ß cells which lead to an absolute insulin deficiency. Less common (10%) usually younger then 30 years. This is usually considered to be the result of an autoimmune destruction of the pancreatic ß cells (type 1A). Some patients with T1DM with no evidence of ß cell autoimmunity have underlying defects in insulin secretion often from inherited defects in pancreatic ß cell glucose sensing and from other genetic or acquired diseases.

The onset of symptoms is rapid and Patients present in two ways:

1. Classic triad- polyuria, polydipsia and polyphagia in association with weight loss.
2. Ketoacidosis-some patients present with diabetic ketoacidosis following acute infection or surgery or without any apparent cause. If ketoacidosis is severe patients may develop mental apathy, confusion and may lapse into coma called diabetic ketotic coma. Patient will die if left untreated.

B. Type 2 Diabetes Mellitus(Non insulin dependent diabetes mellitus)-Type 2 diabetes mellitus (T2DM) is by far the more common type of diabetes and is characterized by insulin resistance resulting from defects in the action of insulin on its target tissues (muscle, liver, and fat), but complicated by varying and usually progressive failure of beta cells' insulin secretary capacity. More common (90%) usually seen in obese and older. Most patients with T2DM in the US and Europe are overweight or obese, however in India and China, most T2DM patients have a lean body mass index (BMI), albeit with increased visceral and hepatic fat.

1. Eye- Recurrent styes, Frequent change of glasses due to error of refraction, Visual impairement due to premature development of cataract.
2. GI tract- Chronic diarrhoea, malabsorption,gastroparesis.
3. Cardiovuscular- Ischaemic heart disease, hypertension, peripheral vascular diseases.
4. Skin-Multiple boils, carbuncles, abscesses, non healing wound, mucocutaneous candidiasis.
5. Respiratory- Pneumonias, lung abscess, tuberculosis etc.

C. Monogenic Diabetes

Monogenic forms of diabetes are characterized by impaired secretion of insulin from pancreatic β cells caused by a single gene mutation. These forms comprise a genetically heterogenous group of diabetes including, maturity onset diabetes of the young (MODY), permanent or transient neonatal diabetes, and mitochondrial diabetes. MODY is the most common form of monogenic diabetes, with autosomal dominant transmission of one of several genes encoding a primary defect in insulin secretion.

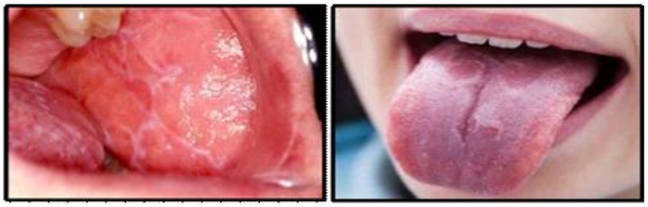
D. Neonatal diabetes mellitus (NDM)

A special form of genetic diabetes is neonatal diabetes mellitus (NDM) and diabetes that manifests within the first 6 months of life. Clinically, they are classified into 2 subgroups: transient (TNDM) and permanent (PNDM) neonatal diabetes mellitus. For diagnosis of neonatal diabetes or diabetes manifestation up to and including the sixth month of life.

Oral Manifestation

1. **Xerostomia -** People with diabetes experience salivary dysfunction, which can lead to decreased salivary flow and change in saliva composition. The estimated universal prevalence of xerostomia among diabetic patients ranges between 34% and 51% .[9]
2. **Dental caries -** Diabetic patients are susceptible to the development of new and recurrent dental caries. Reduced cleansing and buffering capacity of the saliva, increase of carbohydrate in the saliva, and increased level of oral yeasts, mutans streptococci and lactobacilli can lead to an increase in the incidence of tooth decay. In addition, chronic hyperglycemia may cause irreversible pulpitis leading to pulp necrosis
3. **Periodontal disease -** Poor glycemic control can be associated with the outbreak and progression of gingivitis, periodontitis, and alveolar bone loss. Periodontal disease has been reported with increased incidence and prevalence in patients with type 1 and 2 diabetes. Prevalence of severe periodontitis in diabetic patients compared to non diabetics has been found to be 59.6%.[10]
4. **Oral infections -** Patients with diabetes are more susceptible to the development of various oral infections including fungal and bacterial infections. Decreased salivary flow rate and the absence of its antimicrobial effects can cause these infections. In addition, an impaired defense mechanism and poor metabolic control may play an important role in developing infection. Oral candidiasis is an opportunistic fungal infection. The prevalence of that is increasing, as it is one of the most common fungal infections. Higher candida colonization rates were reported in patients with diabetes type 1 when compared to type [2].
5. **Burning mouth -** Burning sensation or dysesthesia in the oral cavity of diabetic patients is attributed to poor glycemic control, metabolic alterations in oral mucosa, angiopathy, candida infection, and neuropathy. Neuropathic pain in these patients can be manifested as burning, tingling, or even as electric shock or stabbing sensation that these symptoms may be very debilitating.
6. **Taste dysfunction -** Taste dysfunction can occur in patients with poorly controlled diabetes. In a crosssectional study, among diabetic or prediabetic patients, 5.7% had a sweet taste disorder and 8.6% had a salt taste disorder . Salivary dysfunction can cause altered taste sensation or raise of detection thresholds. Neuropathy also increases the threshold of taste.
7. **Oral mucosa alterations -** Some oral mucosa alterations such as coated and fissured tongue, geographic tongue, recurrent aphthous stomatitis, and some premalignant lesions including lichen planus can be associated with diabetes . OLP occurs more frequently in patients with type 1 diabetes compared to type 2, because type 1 diabetes is considered an autoimmune disease, and OLP has an underlying autoimmune mechanism .(Fig:1)
8. **Poor wound healing** - Delayed healing of soft and hard tissues in diabetic patients is a well-known complication during oral surgeries. Based on some studies, effective factors in the prolonged wound healing of these patients include

delayed vascularization, diminished blood flow and hypoxia, a reduction in innate immunity, decreased growth factor production, and psychological stress.[11]



A B

Fig 1-Oral manifestation of diabetes A-Lichen Planus , B- Fissured Tongue

Diagnosis

Diabetes mellitus is characterized by recurrent or persistent hyperglycemia, and is diagnosed by demonstrating any one of the following:[7]

1. Plasma glucose level ≥11.1 mmol/L (200 mg/dl) 2 hour after a 75 g oral glucose load as in a glucose tolerance test.
2. Fasting plasma glucose level 7.0 mmol/L (126mg/dl).
3. Glycated haemoglobin (Hb AIC) ≥6.5%.

Management

A. Non-pharmacological management- lifestyle modification can be achieved by increasing physical activity and dietary modification.

B. Pharmacological therapy-

1. Mild to asymptomatic children who have been on medical nutritional therapy and failed to comply exercise as well,should be on metformin therapy.
2. Symptomatic children with diabetic ketoacidosis and infection should be given insulin for immediated control, once stabilized can be shifted to metformin.
3. Moderate to severe type 2diabetes drug of choice for children is insulin and metformin. However many other antidiabetic drugs are available, e.g. Sulphonylureas, glinides, thiazolidinediones but are not approved for children below 18 years.[12]

C. Dosages

ii.		Subcutaneous insulin doses in children with newly diagnosed type 1 diabetes vary widely from **0.2 units/kg/day to 0.8 units/kg/day**
	Metformin Solution	Children 10 to 16 years,at first **5ml two times a day** taken with meal.if needed dose will increase by 5ml weekly but the dose is usually **not more than 20 ml**.

Table 1- Dosages of Drugs For Diabetes

Dental Management

- **Pre-operatively**[7]

1. History - Detailed case history should be taken before starting of any treatment.

Unknown diabetic patient

a. Any dental patient whose condition remain undiagnosed but has the cardinal symptoms of diabetes should be referred to physician.

b. Patients with findings that may suggest diabetes should be referred to a clinical laboratory or a physician foe screening test.

Known diabetic patient

a. All patients with diabetes must be identified by history,and the type of medical treatment they are receiving must be established.

b. The type of diabetes should be determined and the presence of complications noted.

c. If diabetes is well controlled,all dental procedurs can be performed without special precautions before starting the procedure verify that the patients have take medication and diet as usual.

d. If diabetes is poorly controlled i. e fasting blood glucose <70 mg/dl or >200 mg/dl and any complications (renal disease, congestive heart failure, symptomatic angina, cardiac and blood pressure is high) all elective dental procedures should be postponed. Provide only emergency care and consult patient physician.

2. Appointment - Morning appointments are preferable as endogenous cortisol level are generally high at this time.

3. Others - A source of glucose should be present in the dental office to avoid hypoglycemic attack or hypoglycaemia.

- **During Treatment**[13]

a. Duration of treatment should be small.

b. Minimal trauma during any dental procedure.

Emergency during treatment -A major goal in dental management of diabetes is to prevent insulin shock or hypoglycemia and hyperglycemia.

Hypoglycemia - Hypoglycemia is often defined by a plasma glucose concentration below 70 mg/dL; however, signs and symptoms may not occur until plasma glucose concentrations drop below 55 mg/dL..

a. Sign and symptoms of hypoglycaemia – Confusion, Restlessness, Sweating, Tachycardia, Tremors, Thrist, Flushed skin etc. As soon as such sign and symptoms are present the dentist should check the glucose by the glucometer.

b. Management

i. Establishing airway ,breathing, circulation.

ii. Place the patient in the supine position and turn on the fans or conditioner.

iii. If the patient is conscious and able to take food by mouth then give 15g of the carbohydrate in the following form, orange juice,3-4 tablespoon of sugar ,a small amount of sweet/honey can be placed in buccal fold.

iv. In unconscious patient take 20-30ml of the dextrose in 50% of the concentration or 1mg of the glucagon IV/IM.

The sign and symptoms should be resolved in 10 to 15 mins. The normal blood glucose level is confirmed by the glucometer before the patients leaves.

Hyperglycaemia- Hyperglycemia is blood glucose greater than 125 mg/dL while fasting and greater than 180 mg/dL 2 hours postprandial.

a. Sign and symptoms of hyperglycaemia - This condition is much less common than hypoglycaemia.Signs and symptoms are excessive urination,Fruity breath, Bradycardia,Pale and cold clamy skin etc. As soon as such sign and symptoms are present the dentist should check the glucose by the glucometer. Hypoglycaemia and can eventually lead to coma.

b. Management

i First recognize problem if there was any lack of response to sensory stimulation then discontinue dental treatment and activate office emergency team.

ii. Establishing airway ,breathing, circulation.

iii. Place the patient in the supine position with legs elevated.

iv. Definitive care- Summon emergency medical service .

- **Post operative period**

1. If the patients in not able to eat after the dental procedure so he/she is recommended to eat soft food or liquid. Consult patient physician for the post operative diet plan.
2. Diabetic patients have poor wound healing ,there for they are at greater risk for developing infections. Antibiotic coverage is necessary for the patients undergoing extensive dental surgical procedure.

General Health Care Instruction

1. Patients should follow good home care
2. Good glucose control and take medications as prescribed.

Conclusion

Diabetes mellitus significantly impacts both systemic and oral health, requiring early diagnosis, proper medical management, and coordinated dental care. Effective glycemic control and interdisciplinary collaboration are essential to prevent complications and ensure comprehensive care for diabetic patients.

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3 E's of Emotional Freedom Technique In Pediatric Dentistry

Avani S[1], Deepti Jawa[2], Shipra Jaidka[3], Ashjan Ashraf Batha[4], Manudev S[5], Jerry Rose Aan[6]

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PG Student[1]
Department of Pediatric and Preventive Dentistry
Divyajyoti College of Dental Sciences
and Research
Modinagar

Professor[2]
Department of Pediatric and Preventive Dentistry
Divyajyoti College of Dental Sciences
and Research
Modinagar

Professor & HOD[3]
Department of Pediatric and Preventive Dentistry
Divyajyoti College of Dental Sciences
and Research
Modinagar

PG Student[4]
Department of Pediatric and Preventive Dentistry
Divyajyoti College of Dental Sciences
and Research
Modinagar

PG Student[5]
Department of Endodontics and
Conservative Dentistry
Divyajyoti College of Dental Sciences
and Research
Modinagar

PG Student[6]
Department of Oral Medicine and Radiology
Coorg Institute of Dental Sciences
Virajpet

Access this article online

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Abstract

Background : A child's successful dental appointment typically involves no tears. Many children often feel anxious or scared about dental exams and procedures. To help foster a positive outlook and reduce stress, different methods have been created, such as psychological approaches like Emotional Freedom Technique and Magnetic Finger Induction

Aim : The aim of the present study was to evaluate and compare the Emotional freedom technique and other anxiety management techniques used in paediatric dentistry

Material and methods : The research included 80 children aged 4 to 10. They were randomly divided into 3 experimental groups and one control group. Anxiety management methods such as the Emotional Freedom technique, Magnetic finger induction, and Tell show do were used for the respective experimental groups. The control group did not receive any interventions before their dental treatment. Anxiety levels were assessed using Venham's picture test before and after dental treatment, as well as by observing changes in blood pressure and pulse rate.

Result : After comparing the average variance between pre- and post-intervention levels across the 4 groups,it was noted that Group 1 (Emotional Freedom) showed the greatest reduction in anxiety levels, systolic and diastolic blood pressure and pulse rate.(as per Venham's Picture Test). Following this, Group 2 (Magnetic Induction) showed the next highest reduction, while Group 3 (Tell Show Do) exhibited the least reduction.Conclusion: Study finds that Emotional Freedom Technique is the most effective and cost-efficient method of managing fearful children in Paediatric dentistry.

Keywords : Emotional freedom technique, Magnetic finger induction, Tell show do, Behavior management.

Introduction

Dentistry can indeed be a triggering point for anxiety in both pediatric and adult patients. This anxiety, commonly known as dental anxiety or dental phobia, can stem from various factors, including fear of pain, past traumatic experiences, fear of needles or drills, embarrassment about the condition of one's teeth or a general fear of the dental environment. When it comes to pediatric dentistry, anxiety management becomes the key to a successful ministration for the treatment needed 1. Managing anxiety in children requires a comprehensive approach that addresses their unique needs and circumstances. By providing support, education, and appropriate interventions, parents, caregivers, and mental health professionals can help children develop the skills and resilience needed to cope with anxiety effectively. There is not even a dentist who hasn't come across a very anxious, cantankerous, or screaming child during their time of practice. Over the years, anxiety has been addressed through a variety of approaches, pharmacological interventions, behavioral modeling processes, reinforcement/contingency approaches, physical restraint and additional kinds of distraction. Although the above methods have proven beneficial, ongoing experiments are being conducted to discover

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more advanced anxiety management techniques. One such innovation that allows anxiety control, emotional healing, and relief from various symptoms is the Emotional freedom technique. By applying pressure to acupressure points, the emotional freedom technique incorporates facets of exposure therapy, somatic stimulation, and cognitive-behavioral therapy (CBT), constituting a mind-body intervention. Frequently referred to as "tapping,"[2]. Another psychological method that everyone has heard of but not practiced as such in dentistry at least once is hypnosis, this method also might show some promising results in children's anxiety management. Hypnosis involves inducing a trance-like state where individuals become highly suggestible and receptive to the suggestions of the hypnotist.[3] Hypnosis can be a valuable tool in addressing certain issues in children, Since earlier days conventional methods have been also practiced in dentistry for the management of cranky children, and the most frequently used method is Tell-show-do technique. The tell phase involves an age appropriate explanation of the procedure which the dentist is going to do . The show phase is used to demonstrate a procedure up to the point where the instrument is performed. The do phase is then initiated and treatment is performed.

Material And Method : The study comprises 80 children of 4 to 10 years who visited the dental operatory for the first time. The ethical committee approval was taken and the ethical clearance number was DJC/IEC/02/2021.The total subjects were divided randomly into 4 equal groups based on the anxiety management technique used . viz , Group 1 ,Emotional freedom technique group , Group 2 , Magnetic finger induction , Group 3, Tell show do and Group 4 was taken as control.

The evaluation for anxiety has been done using vital stats like systolic blood pressure , diastolic blood pressure, pulse rate . Anxiety was evaluated using venham's picture test. These evaluation was done pre and post intervention. All the subjects were evaluated for their behavior rating scale by frenkel's behavior rating scale prior to the study and the subjects falling under grade 3 and 4 were chosen as the candidates.

Evaluation of Pulse Rate , Blood Pressure And Anxiety Rates

The pulse rate, systolic and diastolic blood pressure for each subject has been noted before and after the procedure. A visual version of Venham's picture test was displayed to the patient to gauge the anxiety component. The scale comprises 8 paired images. Each image depicted 2 figures, one displaying signs of anxiety and the other appearing non-anxious.The participants were given instructions to point out the figure they were most strongly attached to in every one of the paired pictures by gesturing at it . If the participant identified the concerned figure, they received a score of 1, while if they indicated the non-anxious figure, they obtained a score of 0. The total score is calculated by counting all the instances in which the youngster indicated a worried figure. Fig.1

Group 1, Procedure for anxiety management done by emoti-onal freedom technique

The participants in the Emotional freedom technique group were initially instructed on the fundamentals of the technique's application.The subject is asked to consider their fear and provide a number on a scale of 0 to 10. A setup statement, such as "I have a fear of needles and I accept my fear and I wish to remove this fear from my mind," was made in accordance with the fear. The subject was guided through the tapping procedure by the operator. For instance, tapping on predefined tapping spots is done with the forefinger and middle fingertip of both hands. The places were the collar bone, underarm, karate chop point, forehead, underarm, beneath the eye, beneath the nose, and beneath the mouth. Following the demonstration, the participant was told to repeat the exercise on their own by focusing and relaxing at each area, receiving 7 to 9 taps. On a scale of 1 to 10, participants were asked to rate how uncomfortable they were expressing their feelings on their present anxiety after every EFT cycle. Sequential tapping was performed until the distress rate dropped to at least five points. Fig. 2

Group 2, Procedure for anxiety management done by magnetic finger induction method

Patients in the 2nd experimental group received the magnetic finger induction technique. The patient is instructed to close his or her eyes and take two breaths. They were then told to keep their hands straight in front of them and imagine that their forefingers were rotating in the direction of each other as though there was a magnet between them. The patient should count from 1 to 5 while performing this; their fingers will be so tightly held together that they will be unable to separate them even if they wanted to. In order to finally separate the fingers, the counting should be done in reverse, and the fingers should be removed slowly. Fig.3

Group 3, Procedure for anxiety management done by tell show do

Patients in the 3rd experimental group underwent tell show do . Fig. 4

Group 4, No anxiety management technique was done

There was no implementation of any anxiety management methods in the control group. Post-intervention assessments of Venham's anxiety rating, systolic and diastolic blood pressure, and pulse rate were taken again after the particular patients had finished receiving the appropriate treatment.

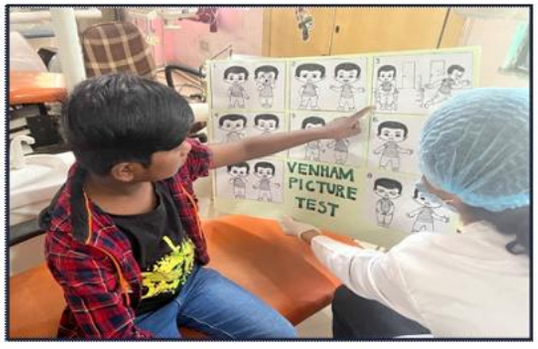

Figure :1. Evaluation of anxiety using Venham's picture test

Figure : 2. Educating a patient how to do EFT

Figure : 3. Performing magnetic finger induction in a child patient

Figure : 4. Tell show do in a child patient

Results

On statistical analysis it was found that ,The mean change in the pulse rate ,in both systolic and diastolic blood pressure and the mean change in anxiety level evaluated by Venham's picture test shows maximum reduction after the intervention with Emotional freedom followed by the Magnetic finger induction and least by the Tell show do method. The pulse rate, blood pressure and anxiety measured by Venham's picture test was raised in a statistically significant manner where no anxiety management technique was used. (Table 1,2,3,4)

Groups	Pre-Intervention	Post Intervention	Mean Change	P value
Group 1 (Emotional Freedom)	111.45±7.70	79.35±7.95	32.10±9.29	0.001 (Sig)*
Group 2 (Magnetic Induction)	108.20±11.496	87.90±6.43	20.30±10.48	0.001 (Sig)*
Group 3 (TSD)	109.25±11.497	97.45±8.73	11.80±15.14	0.001 (Sig)*
Group 4 (Control)	107.55±9.907	111.60±6.84	-4.95±12.65	0.301 (non-Sig)

Table 1 : Mean values of pulse rate for various groups *p value <0.05

Groups	Pre-Intervention	Post Intervention	Mean Change	P value
Emotional Freedom	2.55±1.39	1.00±0.72	1.55±1.39	*0.001 (Sig)
Magnetic Induction	2.85±0.81	2.15±0.87	0.70±0.81	*0.001 (Sig)
TSD	3.85±1.13	3.20±1.28	0.65±0.59	*0.001 (Sig)
Control	4.35±1.08	4.95±1.37	-0.60±1.08	0.283 (non-Sig)

Table 2 : Mean values of venham's picture test for various groups

	Pre Intervention	Post Intervention	Mean Change	P Value			
	Systolic blood pressure	Diastolic blood pressure	Systolic blood pressure	Diastolic blood pressure	Systolic blood pressure	Diastolic blood pressure	
Emotional freedom technique	112.25±6.78	72.45±9.47	97.00±5.32	61.80±7.12	15.25±9.90	10.65±8.06	Sig*
Magnetic induction	110.45±5.01	74.85±7.08	105.10±3.94	68.55±7.81	5.35±6.54	6.30±9.72	Sig*
TSD	110.60±6.15	77.00±2.53	107.30±3.24	74.90±5.03	3.25±4.97	2.10±3.85	Sig*
Control	111.60±7.34	74.40±7.08	112.15±7.61	77.75±2.93	-0.55±4.24	-3.35±6.59	Non - Sig

Table 3 : Mean Values of Systolic And Diastolic Blood Pressure For Various Groups

Discussion

A person with dental anxiety is described as aroused and prepared for anything to happen, with a generalized uneasiness associated with unusual situations. 4 . Twenty percent of adults experience dental anxiety, and half of them report having had a dread of dental operations as a child. (Locker et al., 1999) 5 According to a study published in 2021[6] by Grisolia BM et al., dental anxiety primarily affects children. The cumulative prevalence of dental anxiety in children was 23.9%. The pooled prevalences for preschoolers, school-age children, and teenagers were 35.5%, 25.8%, and 13.3%, in that order. A child's incapacity or difficulty communicating and participating during dental treatment and the imparting of oral hygiene instructions are examples of behavioral management concerns that may arise from fear and anxiety during dental consultations. A doorway to paediatric dentistry's anxiety-free, laid-back treatment environment was made possible by behavior management. Anxiety management techniques have been used since ages to some extent but still the prevalence for fear and anxiety is increasing day by day. For a stress free dental treatment the demand for the need of an innovative effective and efficient distraction technique which will reduce the fear in children and in turn making the treatment fun filled and play full is very much necessary. The emotional freedom technique is one of its kind which is a psychological technique based on energy flow and distortion of energy lines in the body. EFT consists of three components: imaginal exposure, cognitive restructuring, and tapping on acupressure points to promote relaxation. This procedure aids in lowering anxiety and fear .According to Taylor et al. (2001) 7, EFT (Emotional Freedom Technique) provides benefits not only because of its physical tapping process but also because of its psychological mechanisms.[7] By engaging in the tapping process, individuals can focus on the traumatic event and expose themselves to various aspects of it through imagination . This repeated exposure may have the effect of desensitizing the distress associated with traumatic memories .According to the findings of Cabyoglou et al. (2006)[8], activating meridian points raises serotonin, beta-endorphin, endomorphin-1, and enkephalin levels in brain tissue and plasma, which has a sedative effect. Based on a 2003 study by Wells, Polglase, Andrews, Carrington, & Baker, people with phobias could successfully lower their stress and anxiety levels by using EFT[9]. Furthermore, anecdotal evidence points to the potential benefits of EFT in the treatment of anxiety disorders. Research by Carrington and Craig (2000)[10], and Hartman-Kent (1999a, 1999b)[11] produced encouraging results. In medical psychiatric practice, EFT is often employed in conjunction with other interventions as an adjunctive therapy, as observed by E.H. Boath in (2012)[12]. No such study has been done in dentistry to find the relevance of anxiety reduction using Emotional freedom technique .This has been very well found in our study which shows that maximum reduction of blood pressure and pulse rate has been seen when emotional freedom technique was used as an intervention pre and post. The statistical analysis confirmed that the Emotional Freedom Technique group exhibited a more favorable mean change, The decrease in anxiety is attributed to the balance between the right hemisphere, which mediates the person's whole experience, and the left hemisphere of the brain, which is mostly linguistic and analytical. Greater suggestibility results from the intellectual hemisphere not developing to the point where it interferes with the proper operation of the holistic analogue hemisphere during childhood.In contrast to previous methods, Emmanuel BJ (2020)[13] stated that pedodontists can effectively use magnetic finger induction in conjunction with careful patient planning and selection to affect a child's thinking towards treatment, promoting a positive mentality. Hypnosis may help reduce children's discomfort and anxiety during dental procedures, according to research. Calipel et al. (2005)[14] compared the effects of midazolam and hypnosis on children undergoing surgery; the hypnosis group showed lower levels of anxiety. Furthermore, Gokli et al. (1994)[15] reported that children undergoing local anesthesia under hypnosis cried less.

Although magnetic finger induction gives good results in anxiety management , magnetic finger induction performed to a lesser degree than emotional freedom technique in our study .On the other hand, magnetic finger induction produced better outcomes when evaluated using tell show do.

Conclusion

Given the study's boundaries, anxiety was reduced in subjects when evaluated by measuring systolic blood pressure , diastolic blood pressure , pulse rate and VPT most efficiently when using Emotional freedom technique followed by Magnetic finger induction and least by the Tell show do method .

Henceforth Emotional freedom technique is found to be the most efficient, effective and economical method in paediatric dentistry for the management of a fearful child

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Lasers In Dental Implantology : A New Era of Precision And Healing

Jaspreet Singh Khurana[1], Neelu Verma[2], Shipra Singh[3], Farzana Wasi[4]

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PG Student[1]
Department of Periodontology
Career Post Graduate Institute of Dental Sciences & Hospital
Lucknow

Reader[2]
Department of Periodontology,
Career Post Graduate Institute of Dental Sciences & Hospital
Lucknow

PG Student[3]
Department of Periodontology
Career Post Graduate Institute of Dental Sciences & Hospital
Lucknow

PG Student[4]
Department of Periodontology
Career Post Graduate Institute of Dental Sciences & Hospital
Lucknow

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Abstract

In recent decades, dental implantology has emerged as a therapy approach with a high rate of acceptability and success. In 1989, lasers were first used in clinical dentistry in an effort to address some of the issues with traditional dental practices. Over the past few years, their application in implant dentistry has increased. Lasers can especially be useful in dealing with complications from implant therapy and treatment of peri-implantitis. This article aims to provide an understanding of lasers with different wavelengths for specific dental implant situations and to describe the characteristics, merits and demerits and clinical applications .

Keywords : Lasers, Dental implants, Peri-implantitis

Introduction

Laser technology has significantly advanced the field of implant dentistry, offering a range of benefits that enhance both the efficiency and precision of treatments. In recent years, lasers have become increasingly popular for various dental procedures, including implant placement, soft tissue management, and bone healing. By harnessing focused light energy, lasers allow for minimally invasive techniques that reduce patient discomfort, promote faster recovery, and improve the overall success rates of implants. In the field of dentistry, laser can be used for various surgical and nonsurgical procedures since its introduction by Maiman in 19601. The carbon dioxide (CO2) laser has been used in oral and maxillofacial surgery since its development in 1964. Lasers were brought to general practice in 1989 by Drs. William and Terry Myers2 who modified an ophthalmic Nd:YAG laser for dental use. This unit (dLase 300, American Dental Laser, Southfield, Michigan) pioneered the development of lasers dedicated to the field of dentistry rather than medicine. In 1985, the publication of Tissue Integrated Prostheses: Osseointegration in Clinical Dentistry by Branemark et al ushered in the era of osseointegration.

In this regard, laser technology not only enhances conventional techniques but also offers new solutions to commonly encountered issues in implant dentistry. Lasers are revolutionizing the placement of dental implants, whether for tissue cutting, disinfection, or bone development stimulation, assuring more consistent and efficient results for patients. Depending on the range of wavelengths and the simultaneous absorption by biological chromophores, OMFS uses a variety of laser types. Increased hemostasis, better visualization of the surgical site, less injury to the surrounding tissue, reduced swelling, and a decreased risk of infection due to the photosterilization effect are some benefits of employing lasers in implant dentistry. The use of lasers depends on the situation to which it is applied and the particular wavelength suitable for that.

Light Amplification Of Stimulated Emission Radiation(laser):

A device that transforms light of various frequencies into an intense, small, and nearly non divergent beam of monochromatic radiation within the visible range.[3]

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Laser - Tissue Interaction

Lasers have four types of interactions with the target tissue which depends on the optical properties of that tissue: Absorption, transmission of laser energy, reflection and scattering of the laser light. (Fig-1)

In relation to implant dentistry lasers have various advantages including increased hemostasis, improved visibility of surgical site, minimal damage to the surrounding tissue, reduced swelling, and decreased infection due to photo sterilization effect and in turn less pain postoperatively.

The use of lasers depends on the situation to which it is applied and the particular wavelength suitable for that. The clinical application of lasers can be broadly categorized into two modalities: nonsurgical use (laser-welded titanium framework technology, laser micropatterning of dental implants, computer-assisted laser-cured surgical template, and laser-oriented recording on dental prostheses) and surgical use (removal of granulation tissue, biomodulation, implant placement, second-stage recovery and gingival management, treatment of peri-implantitis, and low-level laser therapy [LLLT][5].

Classification of Laser

A. According To Light Spectrum[5]

U.V Light	100nm-400nm	Not used in dentistry
Visible Light	400nm-750nm	Most commonly used in dentistry (argon & diagnodent laser)
Infrared Light	750nm-10000nm	Most dental lasers are in this spectrum

B. According To Material Used[5]

Gas	Liquid	Solid
Carbon dioxide	Not so far in clinical use	Diodes,Nd:YAG,Er:YAG, Er,Cr:YSGG

C. Laser Wavelengths And Their Benefits In Clinical Implant Dentistry[6]

Laser Systems			
Diode	810 or 980nm	Soft tissues	++
Nd:YAG	1640nm	Soft tissues	+
Er:YAG	2940nm	Hard tissues	+++
Er:YAG	2940nm	Soft tissues	+
CO_2	10,600nm	Soft tissues	++++

Application Of Laser In Dental Implants

a. Laser-welded Titanium Framework Technology

Laser-welded technology is considered as an alternative to the conventional lost wax-casting technique in the field of implant dentistry. The titanium has various characteristics that are advantageous for its use in bar superstructures. In addition to this, laser energy allows for a much stronger, passively fitting superstructure.[7]

b. Laser Micropatterning of Dental Implants

Laser peening is a form of cold working, produces a surface with refined grain structures, compressive residual stresses, and increased hardness in metallic materials.[8] It is performed using precision laser micromachining (excimers or Nd:YAG laser) on implant surface, which creates a controlled surface roughness and has shown to stimulate bone growth at the surface. (Fig 2)

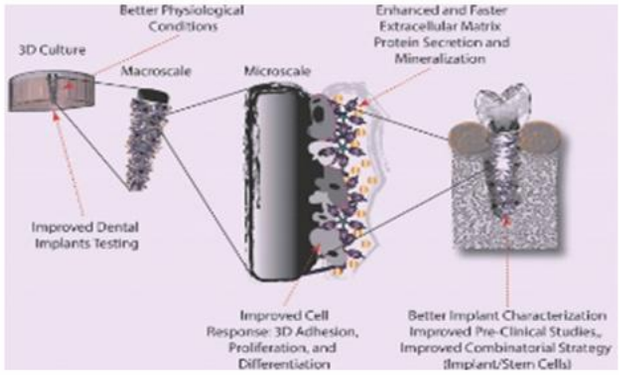

Fig 2: Considering the value of 3D cultures for enhancing the understanding the adhesion, Proliferation, and Osteogenesis on Titanium Dental Implants

a. Computer-aided Laser Cured Surgical Template

Guided implant placement offers superior precision and control relative to freehand insertion. Physical models can be created using rapid prototyping techniques based on virtual computational models. The various rapid prototyping technologies that are currently in use are stereolithography (SLA), inkjet-based system (three dimensional printing), selective laser sintering (SLS), and fused deposition modeling, of which the SLA uses an ultraviolet laser to "laser cure" cross sections of a liquid resin. SLS models are opaque as compared to SLA ones that are translucent.[9]

b. Laser-Assisted Osteotomy

The effects of laser on the bone ablation and in general the use of lasers for traditional osteotomies have been examined. The usage of drills has caused patients concern and suffering. Handpieces, bone files, and other tools have been employed in bone removal techniques for a long time.When using lasers to remove bone, no pressure needs to be applied, which may be advantageous when doing an osteotomy. Numerous researcheres have proven that the Er:YAG laser

can cut bone precisely while causing the least amount of heat damage.

A study by Kesler et al[10] has shown Er:YAG to be a safe option for use in osteotomy procedures. Keller et al found a slo-wer recovery time and tissue healing after laser osteotomy in rabbits. During osteotomy procedures, an increase in temperature of the bone increases the risk for developing postoperative complications. Possibility of overheating the bone is high when conventional drill systems are used due to difficulty in getting the coolant between the drill and the bone.

c. Laser Assisted Implant placement

Minimally invasive implant placement, using the tissue punch method, has become a popular way to place implants when proper bone height and width are available. Hard tissue lasers like Er: YAG can be used to obtain the initial breach for implant placement rather than using micromotor. A laser is used to remove the soft tissue, and the cortical plate of bone in a circular pattern to approximately 2–3 mm and rest of the osteotomy site can be prepared using a handpiece drill. Unlike conventional drills, the laser tip has less tendency to slip. This leads to quick healing time, fast integration, minimal patient discomfort, and superior bone-to-implant contact. This also eliminates the need for trauma during flap elevation and suture placement.[11]

d. Use of Laser Irradiation to Accelerate Osseointegration

The ultimate and the most ideal result desired after implant placement is osseointegration. Osteoblast attachment to the surface of the titanium implants is important for new bone formation and better implant healing. This has been extensively studied, and constant efforts are made to improve the integration of the implant at the surrounding bone. Lasers are being investigated for possibly improving osseointegration.

Kesler et al[10] have shown that use of laser has improved osseointegration around titanium implants when compared with traditional osteotomies. It was also reported that healing rate was almost comparative for both Er:YAG laser and bur drilling.

e. Use of Laser as a Heamostatic Tool

There are a large number of patients receiving implants, who are on long term anticoagulant therapy or other systemic medical problems and could benefit from a quick and effective hemostasis; therefore, the use of laser in this aspect is being evaluated especially for better blood clot stabilization in the surgical site. In a study by Ackermann12, an Nd: YAGlaser was applied with a handpiece and was deemed effective in bringing about hemostasis.

f. Uncovering Implants in the Second Stage

The different wavelengths of laser can be used to uncover implants in stage-II implant surgery. The most commonly used lasers in this case are the CO2 lasers, and Er:YAG lasers are used with success, whereas Nd:YAG laser is contraindicated as this causes temperature buildup around the implants and also melting of the implant surface. Lasert reated tissue margins do not recede after healing.

g. Peri-Implantitis Management[17]

Peri-Implantitis is a rapidly progressive failure of osseointegration, and there is the production of bacterial toxins that lead to inflammatory changes and bone loss. In the case of peri-implantitis, the implant surface is contaminated with soft tissue cells, bacteria and other bacterial by-products. Complete removal of endotoxins and bacterial plaque between implant threads with mechanical instruments is challenging. A laser wavelength that is safe to bone can be used to degranulate and debride the compromised implant surfaces. It has been demonstrated that Er: YAG, CO2 lasers, and diode lasers may all efficiently remove calculus and plaque from implant abutments without causing surface damage. Nd: YAG lasers even with their excellent sterilization qualities are contraindicated for use in the treatment of peri-implantitis as they cause an increase in the surface temperature and also changes of the implant surface.

h. Lasers to Repair Ailing Implants

One of the most interesting uses of lasers in implant dentistry is the possibility of salvaging compromised implants by decontaminating their surfaces with laser energy. A number of clinical studies have been done to examine how, when, and whether lasers can be used successfully to help these situations. Diode lasers were used in a study by Bach et al who found a significant improvement in the 5-year survival rate when integrating laser decontamination into the approved treatment protocol.

Advantages[18]

The advantages of using lasers in implant dentistry are the same as for any other soft tissue dental procedure. These advantages include increased hemostasis, minimal damage to the surrounding tissue, reduced swelling, reduced infection, and reduced pain postoperatively. Due to the hemostasis provided by lasers, there is the significant advantage of improved visibility during surgery. The increasing popularity of the erbium family of lasers, with their hard tissue ablation capability, has added the potential for its use for osteotomy and decontamination of infected and ailing implant bodies. In general, the laser gives therapists numerous advantages over classical surgical interventions, including

- Faster recovery
- Reduced chance of infection
- Decreased sensitivity
- Reduced number of visits after oral surgery
- Shortened intervention time
- Less postoperative pain
- Less bleeding

- Accelerated bone healing

Conclusion

The incorporation of laser technology into laser implant technology has broadened the scope of available treatment modalities, offering clinician more precise, effective and minimally invasive solutions. From pre-surgical planning and implant site preparation to second-stage recovery ,soft tissue management and implant surface decontamination, laser have proven valuable across various clinical applications. Furthermore, evidence based use of specific laser wavelengths promises to enhance both therapeutic outcomes and patient experiences, contributing to safer, quicker and more predictable implant procedures.

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Prevalence and Severity of Dental Fluorosis Among School Children In Deobhog Block, Chhattisgarh : A Comparative Cross-Sectional Study

Sunny Yadav[1], Udita Samanta[2], Khushbu Gupta[3], Apurva Chadha[4], Farhat Khan[5]

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Dental Surgeon[1]
Govt. Hospital, Gariaband
Chhattisgarh

PG Student[2]
Department of Paediatric and
Preventive Dentistry
Divya Jyoti College of Dental Science
And Research

Dental Surgeon[3]
GAIL India Ltd
Utter Pradesh

PG Student[4]
Department of Paediatric and
Preventive Dentistry
Divya Jyoti College of Dental Science
and Research,

MDS[5]
Department of Paediatric and
Preventive Dentistry
Divya Jyoti College of Dental Science
and Research,

Abstract

Background : Fluorosis remains a public health concern in several Indian states due to excessive fluoride in groundwater. Dental fluorosis, particularly among children, is an early indicator of chronic fluoride exposure. Deobhog block in Gariaband district, Chhattisgarh, has been identified as a fluoride-affected region, though limited systematic data exists on its prevalence and severity among children.

Aim : To assess and compare the prevalence and severity of dental fluorosis among primary (6-9 years) and middle school (10-13 years) children in Deobhog block and correlate these findings with village-level groundwater fluoride concentrations.

Materials and Methods : A comparative cross-sectional study was conducted among 2,928 schoolchildren from 56 schools across 33 villages. Participants were categorized into two age-based groups: Group 1 (6–9 years; n = 1,464) and Group 2 (10–13 years; n = 1,464). Dental fluorosis was assessed using Dean's Fluorosis Index under natural daylight by trained dental professionals. Groundwater fluoride levels were obtained from the Central Ground Water Board's 2023 report.

Results : The prevalence of dental fluorosis was higher among middle school children (63.7%) compared to primary school children (54.0%). Moderate to severe fluorosis was observed in 8.3% of middle school children and 5.4% of primary school children. A significant correlation was found between age, severity of fluorosis, and village-level fluoride concentration ($p < 0.05$).

Conclusion : The study highlights a substantial burden of dental fluorosis among children in Deobhog block, with increasing severity observed in older age groups. These findings underscore the need for regular screening, community awareness, and implementation of safe water practices to prevent further progression of fluorosis in affected regions.

Keywords - Fluorosis, Groundwater, School children, Dean's Index

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INTRODUCTION

Fluorosis is a pressing public health concern in various regions of India, especially in areas where drinking water contains high levels of naturally occurring fluoride1. While fluoride plays a critical role in preventing dental caries at optimal concentrations[2] (approximately 0.7–1.2 ppm), chronic exposure to elevated levels during early childhood can lead to dental fluorosis, a condition characterized by hypo-mineralization of tooth enamel[3]. In severe cases, skeletal fluorosis may also develop, resulting in serious bone and joint deformities[4].

India is among the most severely affected countries globally, with more than 20 states reporting fluoride contamination in groundwater[5]. Emerging evidence points to central and eastern regions, including Chhattisgarh, as being increasingly impacted. Deobhog block in Gariaband district has been identified by local health authorities as an endemic fluorosis zone, based on field reports

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and complaints from communities, particularly concerning dental discoloration in children. However, systematic studies documenting the burden and severity of fluorosis in this region, particularly among school-aged children, are limited.

Children aged 6-13 years are particularly susceptible to the effects of fluoride, as their permanent teeth are still developing[6]. Dental fluorosis in this population serves not only as a clinical marker of excessive fluoride intake but also as a social concern due to the impact on facial aesthetics and self-esteem[7].

Early identification and monitoring of dental fluorosis in schoolchildren are essential to mitigate long-term health effects. Schools offer a practical and efficient setting for mass screening and potential implementation of oral health interventions.

MATERIALS AND METHODS

A comparative cross-sectional study was conducted in Deobhog block, Gariaband district, Chhattisgarh - A region officially classified as fluoride-affected by the Central Ground Water Board (CGWB). The study aimed to determine and compare the prevalence and severity of dental fluorosis in primary (6–9 years) and middle school children (10-13 years).

Study Population

A total of 2961 school children were examined across 56 schools in 33 villages, A census method was adopted. All students present during the school visits and meeting the inclusion criteria were screened.

Inclusion Criteria

- Children within 6 to 13 years age were selected
- Enrollment in government or private schools in Deobhog block
- Resident of the respective village
- Present during the school visit

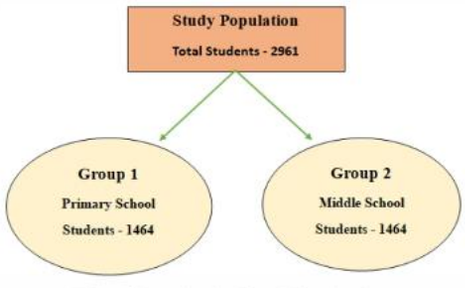
Exclusion Criteria

- Recent migrant students
- Children with non-fluorotic enamel defects (e.g., enamel hypoplasia)
- Children with developmental or systemic conditions affecting enamel

Participants were divided into two age-based groups (Flow chart 1)

Group 1: Primary school (6–9 years)

Group 2: Middle school (10–13 years)



Flow Chart 1 - Subject Distribution

These groups were compared in terms of:

- Prevalence and severity of dental fluorosis (using Dean's Index)
- Village-level fluoride exposure

Oral examinations were carried out by a trained dental team using Dean's Fluorosis Index under natural daylight, with sterile mouth mirrors and probes (Fig 1).

Fig 1 - Diagnosing fluorosis index

Findings were recorded on structured proformas (Fig 2). Each school was visited once according to a predetermined schedule.

Fig 2 - Recording the Findings

Groundwater fluoride levels for each village were obtained from the CGWB's 2023 report. Villages were stratified into three categories based on fluoride concentration:

- 1.5–3.0 ppm
- 3.0–5.0 ppm
- 5.0 ppm

These categories were used to correlate village water fluoride levels with the prevalence and severity of dental fluorosis.

Ethical Considerations

- Permission was obtained from the District Education Office and Block Health Department.
- Verbal consent was taken from school authorities.
- Only non-invasive examinations were conducted.

- Identified cases were referred for further management or counselling.

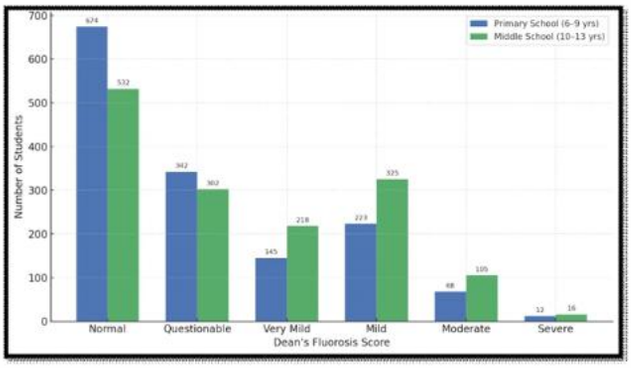
RESULTS

Data were compiled in Microsoft Excel and analysed using SPSS v25 and R software. Descriptive statistics (n, %, mean prevalence). In the primary school group, 46.0% of children showed no signs of fluorosis, whereas in the middle school group, only 36.3% were fluorosis-free.The prevalence of moderate to severe fluorosis (grades of clinical concern) increased from 5.4% in primary children to 8.3% in middle school children.Mild and very mild fluorosis were also more frequently observed in the older age group. (Table 1)

Dean's Fluorosis Score	Primary School (n = 1464)	Middle School (n = 1464)
Normal	674 (46.0%)	532 (36.3%)
Questionable	342 (23.4%)	302 (20.6%)
Very Mild	145 (9.9%)	218 (14.9%)
Mild	223 (15.2%)	325 (22.2%)
Moderate	68 (4.6%)	105 (7.2%)
Severe	12 (0.8%)	16 (1.1%)

Table 1 - Distribution of Dental Fluorosis According to Dean's Fluorosis Index

Overall prevalence of dental fluorosis was found to be significant across both age groups.The middle school group (10–13 years) showed a higher prevalence and greater severity of fluorosis compared to the primary school group (6–9 years).



Graph 1 - Distribution of Dental Fluorosis Among School Children in Deobhog Block

A positive correlation was observed between fluoride levels in drinking water and both the prevalence and severity of dental fluorosis. Villages with >5.0 ppm fluoride levels had the highest number of children with moderate to severe forms of fluorosis based on Dean's Index. The Chi-square test indicated a statistically significant difference ($p < 0.05$) in fluorosis prevalence between the two age groups.Spearman's correlation confirmed a strong association ($r > 0.6$, $p < 0.05$) between water fluoride content and fluorosis prevalence. (Graph 1)

DISCUSSION

This study reveals a substantial burden of dental fluorosis among schoolchildren in the Deobhog block of Chhattisgarh, a region increasingly recognized for endemic fluoride exposure. The significantly higher prevalence and severity of fluorosis in middle school children (10–13 years) compared to primary school children (6–9 years) suggests a pattern of cumulative fluoride exposure over time. This is consistent with the established pathophysiology of dental fluorosis, which primarily affects developing teeth during enamel mineralization. Dean (1947) was one of the earliest to establish this developmental relationship, showing that the duration and concentration of fluoride exposure are critical in determining the severity of fluorosis[8].

Our study further confirmed a positive correlation between village-level groundwater fluoride concentrations and the severity of fluorosis among children. Villages with fluoride levels ≥5 ppm reported notably more moderate to severe cases, in line with findings from other parts of India. For example, J Hussain, KC Sharmaet al. (2004) reported that regions in Rajasthan with high fluoride levels had similarly elevated rates of dental and skeletal fluorosis[9]. Likewise, N Arveti, MRS Sarma, et al. (2011) documented a direct relationship between fluoride levels and clinical severity of fluorosis in the populations of Andhra Pradesh[10].

The findings of the present study highlight the urgent need for community-level public health interventions. Essential measures include routine monitoring of fluoride levels in drinking water, theprovision of defluoridated or alternative safe water sources, and mass awareness campaigns to educate communities about the health risks of excess fluoride. These interventions are supported by WHO guidelines (2004), which emphasize the importance of maintaining fluoride concentrations in drinking water below 1.5 ppm to avoid adverse health effects[11].

Moreover, the success of this school-based survey underscores the utility of educational institutions as effective platforms for early detection and monitoring of dental health issues in vulnerable populations. Similar strategies were recommended by Ayoob and Gupta (2006), who advocated for school-based oral health programs as efficient tools for both surveillance and preventive education[12].

In terms of public health implications, although most children in this study had mild to very mild forms of fluorosis, the proportion of moderate to severe cases-particularly among older children-is clinically important. These forms can have aesthetic, psychological, and functional consequences, potentially affecting a child's self-esteem and quality of life. H.Siddiq, KC Pentapati, et al. (2020) pointed out that children with visible dental fluorosis often face social stigma, further justifying the need for timely intervention[13].

In conclusion, our study reinforces the need for early identification, age-targeted educational interventions, and systemic public health responsesto combat fluorosis in affected regions.

Implementing routine school-based oral screening, coupled with broader fluoride mitigation strategies, can play a pivotal role in reducing the long-term impact of fluorosis in children exposed to high-risk environments like Deobhog.

CONCLUSION

The Deobhog block exhibits a high burden of dental fluorosis among schoolchildren, with a clear link to elevated groundwater fluoride levels. The results highlight the need for urgent public health interventions aimed at mitigating fluoride exposure and managing its oral health consequences in affected communities.

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Aesthetic Rehabilitation of Congenitally Missing and Traumatically Lost Maxillary Incisors : A Case Report

Manu Rathee[1], M Stalin[2], D.Prabhavathi[3], Sarthak Singh Tomar[4], Balavignesh S[5]

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Senior Professor and Head[1]
Department of Prosthodontics,
Pt. B.D. Sharma University of Health Sciences
Post Graduate Institute of Dental Sciences
Rohtak, Haryana, India

Post Graduate Student[2]
Department of Prosthodontics
Post Graduate Institute of Dental Sciences
Rohtak, Haryana, India.

Post Graduate Student[3]
Department of Prosthodontics,
Post Graduate Institute of Dental Sciences,
Pt. B.D Sharma University of Health Sciences
Rohtak, Haryana, India.

Post Graduate Student[4]
Department of Prosthodontics,
Post Graduate Institute of Dental Sciences
Rohtak, Haryana, India.

Post Graduate Student[5]
Department of Prosthodontics,
Post Graduate Institute of Dental Sciences,
Pt. BD Sharma University of Health Sciences
Rohtak, Haryana, India.

Corresponding Author

D. Prabhavathi
Post Graduate Student
Department of Prosthodontics,
Post Graduate Institute of Dental Sciences,
Pt. B.D Sharma University of Health Sciences
Rohtak, Haryana, India.

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Abstract

The anterior maxillary region, often referred to as the aesthetic zone, plays a crucial role in facial harmony and function. Congenitally missing and traumatically lost maxillary incisors, particularly lateral incisors, account for approximately 20% of all dental anomalies, significantly affecting speech, appearance, and self-confidence. Advances in prosthodontic rehabilitation and an interdisciplinary treatment approach enable the effective management of such cases. By integrating patient expectations with functional and aesthetic considerations, an optimal restorative plan can be developed. This case report illustrates the successful rehabilitation of a patient with a trauma-induced central incisor loss and congenitally missing lateral incisors using a porcelain-fused-to-metal crown prosthesis, ensuring an aesthetic and functional outcome.

Keywords : Aesthetic Rehabilitation, Fixed Dental Prosthesis, Congenitally Missing Teeth, Prosthodontic Rehabilitation, Multidisciplinary Approach.

Introduction

Congenitally absent teeth are among the most common developmental dental anomalies, resulting from improper differentiation of tooth germs and leading to the absence of one or more teeth. This condition can affect both primary and permanent dentition, with significant implications for dental aesthetics and function. When one to six teeth (excluding third molars) are missing, the condition is termed hypodontia, whereas the complete absence of teeth is referred to as anodontia [1]. The prevalence of permanent tooth agenesis varies widely across different populations and ethnic groups, with the maxillary lateral incisor being the most frequently missing anterior tooth. The congenital absence of these incisors, combined with trauma-induced loss of central incisors, presents significant challenges in restoring the aesthetics and function of the anterior maxillary region, commonly referred to as the aesthetic zone [2].

Restoring aesthetics in the anterior maxillary region requires an interdisciplinary approach that integrates functional, cosmetic, and patient-centred considerations. Treatment planning must address factors such as occlusion, soft tissue harmony, phonetics, and long-term stability[3]. The choice of restorative solutions depends on the extent of the missing teeth, available space, and overall patient expectations. Fixed prosthetic options, including conventional bridges and implant-supported restorations, offer predictable outcomes in such cases. However, managing multiple missing teeth with limited interproximal space necessitates precise space analysis, careful selection of restorative materials, and an individualized treatment approach [4].

This case report presents the aesthetic rehabilitation of a patient with congenitally missing maxillary lateral incisors and trauma-induced loss of central incisors using a fixed dental prosthesis. Through comprehensive treatment planning and a multidisciplinary approach, an aesthetic and functionally stable outcome was achieved, effectively addressing the complexities of this case.

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Case Report

A 20-year-old female patient reported to the prosthodontics department complaining mostly of an unpleasant smile caused by lost teeth in the upper front teeth region (figure 1a). There was no significant medical history for the patient

Figure 1 : 1a. Extraoral view 1b.Intraoralview 1c. Panoramic X-ray view

The patient said that six months prior, she had fallen, resulting in the loss of her central incisor and a congenital absence of her lateral incisor. An intraoral examination identified a class I malocclusion, which included a right-side crossbite and insufficient mesiodistal width to enable the replacement of teeth 12, 11, 21, and 22 (figure 1b, 1c).

Clinical Procedure

Irreversible hydrocolloid material (Algitex DPI, India) was used to make the diagnostic impression, and a type-II gypsum product (dental plaster; Kalabhai) was used to pour the impression. Diagnostic cast mounted using a mean value articulator. A diagnostic wax-up was performed using blue inlay wax according to the Digital smile design (BEGO, Germany) (figure 4a),and a silicone index was fabricated for clinical mock-up (figure 4b). The maxillary right canine, left central incisor, and canine were prepared for PFM crowns with a shoulder finish line and subgingival margins (figure 4c). The gingival deflection was carried by a gingival retraction cord (Size #000, Sure Endo Sure Cord - Knitted Gingival Retraction Cord) (figure 4d), The final impression was made using elastomeric impression material (Neopure-Orikam Healthcare India) a two-stage putty wash technique (figure 4e) poured in Type-IV dental stone (Kalrock, Kalabhai) (figure 5a). Provisional restorations were made from a tooth-coloured acrylic resin and cemented with temporary cement (Prevest Oratemp) (figure 4f).

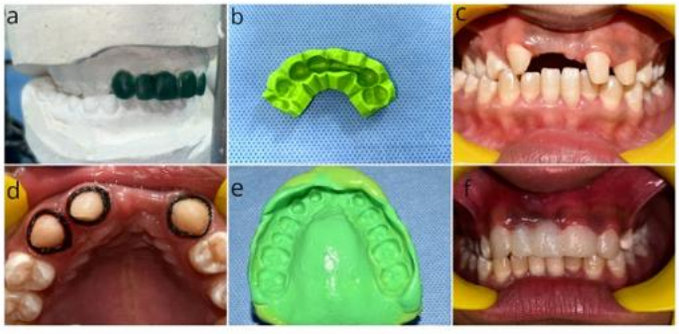

Figure 4: 4a. Mode wax-up 4b. Model wax-up impression taken 4c. Tooth preparation done 4d. Gingival deflection cord placed around prepared tooth 4e. Two-stage putty wash impression taken 4f. Temporary crown

The shade selection process was carried out. Wax patterns were fabricated, and thenthe investing, casting, and ceramic firing phases of the PFM crown were done (figure 5b,c). The final prosthesis was placed, incisal contacts were checked using articulating paper for maximum intercuspation, and any lateral interferences were adjusted using a porcelain polishing kit.

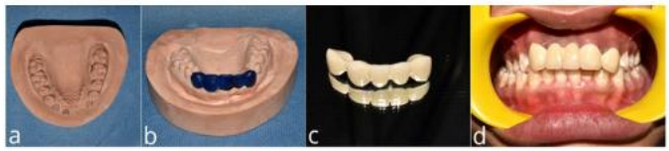

Figure 5 : 5a. Working cast 5b. Wax up 5c. Final prosthesis 5d.Post-operative intraoral view

The prosthesis was then cemented using type-I glass ionomer cement (GC Gold Label 1 - Luting & Lining GIC) (figure 5d). Post-treatment instructions were provided to the patient, including the need for periodic follow-up and oral hygiene maintenance(figure 6a,b).

Figure 6: 6a. Pre-operative extra oral view 6b. Post-operative extra oral view

Discussion

The congenital absence of teeth results from environmental or genetic factors affecting dental lamina development. Hypodontia impacts both function and aesthetics, often complicating treatment. In cases of congenitally missing teeth, a vestigial ridge may develop, further challenging the restoration process. Additionally, the loss of maxillary incisors, particularly in the aesthetic zone, can significantly affect an individual's confidence and social interactions. The treatment approach depends on several factors, including the size of the edentulous space, occlusion, skeletal structure, and the condition of the remaining dentition. Other considerations include bone availability, financial feasibility, and patient preferences [6].

Prosthetic rehabilitation offers various options based on patient needs, such as resin-bonded fixed dental prostheses, conventional fixed dental prostheses, removable partial dentures, and implant-supported restorations. Managing cases with multiple missing anterior teeth and inadequate space requires precise evaluation of occlusal harmony, facial aesthetics, and functional stability. In this case, a porcelain-fused-to-metal (PFM) fixed dental prosthesis was chosen to restore the missing maxillary incisors, ensuring a natural appearance and optimal function. The

framework was fabricated using nickel-chromium (Ni-Cr) alloy, providing strength and durability, while the veneering porcelain offered enhanced aesthetics[7].

Following tooth preparation, the final impression was taken using the two-stage putty-wash technique with polyvinyl siloxane (PVS) impression material. This technique offers several advantages, including improved accuracy, better marginal adaptation, controlled material thickness, reduced distortion, and clinically acceptable marginal gaps (less than 120 μm)[8]. The putty impression serves as a custom tray, ensuring uniform material thickness and detailed capture of oral structures. However, it has some limitations, such as increased chairside time, potential misalignment during the wash stage, material wastage, and the need for precise execution to avoid inaccuracies[9].

After the impression was taken, a provisional restoration was provided using bis-acryl composite resin to protect the prepared teeth and maintain gingival health. Provisional restorations play a critical role in preventing tooth sensitivity, bacterial contamination, and space loss due to adjacent teeth drifting. Additionally, they contribute to shaping the gingival architecture, ensuring a better fit for the final prosthesis. However, provisional restorations are not as durable as permanent ones and require careful handling to avoid fractures or displacement[10].

The final prosthesis was fabricated with a Ni-Cr metal framework and layered with feldspathic porcelain to achieve optimal aesthetics and function. Proper occlusal adjustments were made to ensure functional harmony and patient comfort. Thorough postoperative instructions were provided, and regular follow-ups were scheduled to monitor prosthesis stability and gingival health[11].

The primary objective of treatment remains the preservation of healthy dental structures while restoring aesthetics and function. By addressing both biological and mechanical aspects, a comprehensive treatment approach can successfully rehabilitate patients with congenitally missing and traumatically lost maxillary incisors, significantly improving their quality of life[12].

Conclusion

In prosthodontic rehabilitation, congenitally absent anterior teeth combined with anterior tooth loss present a difficult obstacle. The successful aesthetic rehabilitation of congenitally missing and traumatically lost maxillary incisors using a fixed dental prosthesis demonstrates the importance of interdisciplinary collaboration and meticulous treatment planning. Several variables, including the malocclusion, anterior relationship, necessary space, and state of the adjacent teeth, influence the clinical situation's solution. A concerted and coordinated effort that prioritizes achieving an equilibrium that minimizes the patient's concerns is necessary to achieve optimal aesthetics.

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Single Rotary File Systems in Endodontics

Barkha Idnani[1], Dipti Choksi[2]

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Professor[1]
Pursuing PhD
Department of Conservative Dentistry and Endodontics,
FODS DDU, Nadiad

Professor and Head[2]
Pursuing PhD
Department of Conservative Dentistry and Endodontics,
FODS DDU, Nadiad

Abstract

The evolution of endodontic instrumentation has seen a paradigm shift with the introduction of single rotary file systems. Traditionally, root canal shaping involved sequential use of multiple instruments, which often increased chair time, operator fatigue, and potential procedural errors. Single rotary file systems aim to simplify the cleaning and shaping process, ensuring efficiency while maintaining canal anatomy. They are engineered with superior metallurgy, unique cross-sectional designs, and reciprocating or continuous rotation motion, providing optimal flexibility, cutting efficiency, and fracture resistance.

This article reviews three prominent single rotary systems: Waldent FlexiWave Reciprocating Files, MicroMega One Curve Files, and WaveOne Gold Files. Each system brings unique advantages in terms of file design, movement dynamics, and clinical application, offering clinicians diverse options based on case difficulty and anatomical variations. The discussion emphasizes features such as alloy modifications, tip designs, reciprocating angles, and efficiency in shaping complex canals. With reduced procedural steps, minimized risk of iatrogenic errors, and enhanced patient comfort, single rotary file systems represent a significant advancement in contemporary endodontics. An understanding of the comparative performance and indications of each system is critical for their effective use. Continued research and clinical trials are essential to further refine their applications and address limitations. The review underscores the need for individualized case selection and careful technique to maximize outcomes using these modern endodontic innovations.

Keywords : Single Rotary File System, Reciprocation, Root Canal Shaping, FlexiWave Files, One Curve Files, WaveOne Gold, Endodontic Instrumentation

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Introduction

Root canal therapy is fundamentally reliant on three core procedures: cleaning, shaping, and obturation. Of these, shaping the canal not only ensures adequate disinfection but also facilitates effective three-dimensional obturation. Traditional instrumentation techniques required the sequential use of multiple files of increasing diameter and taper, often resulting in procedural complications such as ledge formation, transportation, canal blockage, or file separation.

The advent of Nickel-Titanium (NiTi) rotary instrumentation heralded a new era in endodontics. However, the complexity of multiple-file sequences remained a limiting factor, especially in curved and anatomically complex canals. Single rotary file systems emerged to address these concerns, offering an efficient, simplified, and predictable method for canal preparation.

A single file system refers to an approach where one primary file is used for the majority (if not the entirety) of the canal preparation. These systems significantly reduce instrumentation time, decrease the learning curve for clinicians, minimize cross-contamination risks, and enhance patient comfort. With the application of enhanced NiTi metallurgy, such as M-Wire, Gold Wire, and Controlled Memory (CM) alloys, these instruments demonstrate superior flexibility, increased resistance to cyclic fatigue, and

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greater safety in clinical use.

Single file systems are designed either for continuous rotation or reciprocating motion. Reciprocating systems, such as WaveOne Gold and Waldent FlexiWave, utilize a bidirectional movement that mimics natural canal curvatures and reduces torsional stress on the file. Continuous rotation systems, like MicroMega One Curve, offer predictable cutting efficiency with pre-curved shaping ability due to their heat-treated design.

This article provides an in-depth review of three significant single file systems: Waldent FlexiWave Reciprocating Files, MicroMega One Curve Files, and WaveOne Gold Files. A detailed exploration of their composition, design rationale, clinical performance, and comparative advantages will be discussed to assist clinicians in making informed decisions for optimal endodontic outcomes.

Review of Single Rotary File Systems

1. Waldent FlexiWave Reciprocating Files

Waldent FlexiWave Files are made using advanced NiTi alloys with Controlled Memory (CM) treatment. They offer high flexibility and excellent resistance to cyclic fatigue, ideal for curved and complex root canal anatomies. FlexiWave Files employ reciprocating motion - counter-clockwise and clockwise movements - reducing torsional stress and preventing instrument separation.

Their variable cross-section along the file length optimizes debris removal, and enhanced flexibility helps preserve the original canal anatomy. FlexiWave files are especially recommended for primary treatments and retreatments, where they reduce procedural errors like ledging and zipping.

Advantages include

Single file usage reducing cost and inventory.

- Effective in curved canals cleaning.
- High fracture resistance.

2. MicroMega One Curve Files

MicroMega One Curve Files are fabricated using C.Wire heat treatment, allowing them a unique pre-bent shape and exceptional flexibility. The design enables clinicians to negotiate complex and highly curved canals with ease, using continuous rotation motion.

Key features include variable pitch to avoid the screwing-in effect, constant 6% taper, and Controlled Memory properties that allow pre-bending without permanent deformation. One Curve Files are ideal for narrow, curved, or calcified canals, particularly MB2 canals and complex molar systems.

Advantages

- Single usage file so more efficient and no chances of cross contamination
- Better adaptability in curved canals.
- Reduced operator fatigue.
- High safety margin due to superior cyclic fatigue resistance.
- Limitations include single-use recommendations which may increase cost.

3. WaveOne Gold Files

WaveOne Gold Files are manufactured with Gold Wire technology, a specialized heat treatment that provides enhanced flexibility and fatigue resistance. Their parallelogram cross-sectional design enhances cutting efficiency and debris removal.

WaveOne Gold uses reciprocating motion with a greater counter-clockwise angle to maximize cutting while reducing fracture risk. They come in four sizes (Small, Primary, Medium, Large) and are highly suitable for curved canals and retreatments.

Advantages

- Simplified single
- File usage.
- Superior flexibility.
- Enhanced cyclic fatigue resistance.

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Cracking The Code of The Third Root : A Non-surgical Strategy For Radix Entomolaris

Darshana Baruah[1], Parul Bansal[2], Nabanita Sarma[3], Iti Gupta[4], Nitin D Palakal[5], Prishita Malani[6]

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PG Student[1]
Department of Conservative Dentistry and Endodontics
Shree Bankey Bihari Dental College and Research Centre
Ghaziabad

Professor & HOD[2]
Department of Conservative Dentistry and Endodontics
Shree Bankey Bihari Dental College and Research Centre
Ghaziabad

PG Student[3]
Department of Conservative Dentistry and Endodontics
Shree Bankey Bihari Dental College
Ghaziabad

PG Student[4]
Department of Conservative Dentistry and Endodontics
Shree Bankey Bihari Dental College
Ghaziabad

PG Student[5]
Department of Conservative Dentistry and Endodontics
Shree Bankey Bihari Dental College
Ghaziabad

PG Student[6]
Department of Conservative Dentistry and Endodontics
Jaipur Dental College
Rajasthan

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Abstract

Radix entomolaris (RE) is a rare anatomical variation characterized by a supernumerary distolingual root in mandibular molars. Its presence complicates endodontic treatment due to increased chances of missed canals and altered morphology. This case report presents the successful nonsurgical management of a mandibular first molar with RE and a large periapical lesion. Through precise diagnosis, modified access design, calcium hydroxide dressings, and use of bioceramic sealer, complete healing was achieved without surgical intervention. Early detection and a biologically guided protocol are key to managing such anatomical complexities.

Introduction

The true outcome of endodontic treatment ultimately depends on the capacity to locate, cleanse and obturate the entire root canal system. Nonetheless, anatomic anomalies, such as existence of an additional root, radix entomolaris (RE), present a great difficulty in mandibular molars. RE is the presence of a supernumerary distolingual root and most frequently observed in the mandibular first molar. Although less frequent in Caucasians and Indians (incidence <5%)[1,2,] its detection is necessary to prevent endodontic failure secondary to untreated canals. First described by Carabelli, RE calls for practitioners to modify and tailor both diagnostic and treatment regimens, especially with respect to access cavity morphology and contact-point exploration.[1,3]

When RE is linked to periapical pathology - such as granulomas, cysts, or abscesses - which frequently arises from a chronic bacterial infection of the pulp and root canal system, the complexity is increased.[4] Non surgical endodontic therapy is still the first-line treatment for periapical lesions, which can range in size from tiny radiolucencies to massive cystic entities.[5] When appropriate nonsurgical protocols are used, such as adequate chemomechanical debridement, intracanal medications like calcium hydroxide, and long-term follow-up, studies have shown success rates as high as 85–94%.[6-8]

Due to changed canal morphology, negotiation challenges, and the possibility of missed anatomy, the presence of RE makes nonsurgical management of such lesions more difficult. However, even complex cases can be resolved conservatively with biological approaches to periapical healing combined with careful diagnostic tools like CBCT imaging, angled radiographs, and magnification.[1,2,9]

The management of a mandibular first molar with radix entomolaris and a large periapical lesion is demonstrated in this case study, highlighting the importance of accurate diagnosis and biologically oriented endodontic procedures in achieving full healing without the need for surgery.

Case Report

A 21-year-old female patient, Shahin, reported to the Department of Conservative Dentistry and Endodontics, Shree Bankey Bihari Dental College, Ghaziabad, with a chief complaint of severe pain in the lower left back tooth region for the past five days.

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The pain was intermittent, exacerbated by the intake of hot food and beverages, and persisted for 2-3 hours. Clinical examination revealed deep proximal caries in the left mandibular first molar, with otherwise satisfactory oral hygiene. A preoperative radiograph showed a radiolucency involving enamel and dentin, approaching the pulp, along with the presence of an additional distolingual root - confirming the diagnosis of Radix Entomolaris. A periapical radiolucency was also evident around both the distal and mesial roots, indicating periapical pathology.

Figure 1 : Preoperative radiograph

Treatment Procedure

Access Cavity Preparation : Local anesthesia was administered, and rubber dam isolation was achieved. Access cavity was modified to a trapezoidal shape to locate all canals, including the distolingual root canal (RE). Canal orifices were identified using a DG-16 explorer.

Working Length Determination : Patency was established using a #10 K-file. Working length was determined using an apex locator and confirmed radiographically (Figure 2).

Figure 2: Working Length Determination

The root canals were instrumented using K-files to create a glide path for the rotary instrumentation. Cleaning and shaping were performed using endostar rotary files upto 25/06 in each canal. During cleaning and shaping, the root canals were irrigated with copious amounts of 2.5% sodium hypochlorite solution (UPS Hygienes Pvt. Ltd., Mumbai, Maharashtra, India). The canals were then rinsed with EDTA (DeSmear, Ahmedabad, Gujarat, India).

Saline was used for the final rinse of the canals and dried using paper points.

After thorough cleaning and shaping of all canals— A creamy paste of calcium hydroxide was placed in all canals using a Lentulo spiral.

The access cavity was sealed temporarily with Cavit-G. The patient was recalled after 7 days.

Second Appointment : After 7 days the temporary restoration was removed, and the canals were irrigated with normal saline and NaOCl to remove the previous dressing. Fresh calcium hydroxide was reapplied in the canals. The patient was asymptomatic and scheduled for the next recall in 10 days.

Third appointment : After The dressing was removed again with copious irrigation using NaOCl and EDTA. Calcium hydroxide was reapplied for the third and final time. The patient showed clinical signs of improvement and radiographic signs of initial healing. The patient was recalled after 7 days.

Following three cycles of intracanal medication over approximately 3 weeks, the periapical lesion had begun to regress radiographically, and the patient remained asymptomatic.

The master cone was selected and confirmed radiographically. (Figure 3)

Figure 3: Master Cone

Obturation was done using single cone technique with guttapercha and bioceramic sealer sealer.

The quality of obturation was confirmed with a final radiograph. (figure : 4)

Figure 4 : Obturation

Discussion

In mandibular molars, the supernumerary distolingual root known as Radix entomolaris (RE) presents a notable anatomical variation that, if not correctly identified, may jeopardize endodontic results. The prevalence of RE is considerably higher (5–30%) in populations with Mongoloid traits, such as Chinese, Eskimos, and Native Americans, but it is comparatively low (<5%) in Indian and Caucasian populations. Additionally, more than 50% of cases have been reported to have bilateral occurrence, highlighting the significance of assessing the contralateral molar when one RE is found.[1,2,3,10]

The intricacy of RE in clinical practice is due to its additional canal as well as its morphological variations and curvature, which frequently make access, cleaning, and shaping more difficult. Classification schemes like Carlsen and Alexandersen's (based on cervical location) and De Moor et al.'s (based on root curvature) offer a helpful framework to predict the canal's course and direct the clinician's approach.[1,11] With cervical positioning that varies between distal, mesial, or central orientations, RE can present as straight (Type I), coronal-curved (Type II), or double-curvatured (Type III).

Accurate diagnosis through multiple angulated radiographs or CBCT imaging is essential to avoid missing this extra root. In this case, modifying the access cavity to a trapezoidal form was crucial in locating the RE canal, consistent with established recommendations. The canal was successfully negotiated using small hand files and prepared with rotary instruments. The use of sodium hypochlorite, EDTA, and calcium hydroxide as intracanal medicament over three appointments facilitated effective disinfection and promoted healing of the associated periapical lesion. Ultimately, obturation with bioceramic sealer and gutta-percha ensured a hermetic seal in the complex canal morphology.[2,4,9]

This case emphasizes how crucial it is to comprehend the anatomical variations of root canals and use a step-by-step, biologically oriented protocol to manage RE. Even complex cases like RE can be successfully managed conservatively with careful chemomechanical preparation, access modification, and appropriate diagnosis.

Conclusion

This case shows that even though radix entomolaris is uncommon, it can be effectively treated with careful canal instrumentation, a modified access preparation, and an accurate diagnosis. The related periapical lesion was able to heal without surgery thanks to the application of calcium hydroxide dressings over several visits. When done precisely and with biological consideration, conservative endodontic therapy is still effective for complex anatomical variations.

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Review on Dynamic Abutments: A Solution to Angulated Implant Challenges

Vedanti V. Mundhada[1], Rajeev Srivastava[2]

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PG Student[1]
Department of Prosthodontics and Crown and Bridge and Implantology
Index Dental College
Indore

Professor and HOD[2]
Department of Prosthodontics and Crown and Bridge and Implantology
Index Dental College
Indore

Abstract

This review aims to provide a comprehensive overview of dynamic abutment systems in implant prosthodontics, focusing on the mechanism and components, biomechanical principles, clinical indications, advantages and limitations. Implant angulation issues often complicate prosthetic rehabilitation, especially when screw-retained restorations are desired. Dynamic abutment systems offer a solution by allowing angulated screw channels - typically up to 30° - enabling aesthetic and functional screw access in challenging implant positions. Dynamic abutments demonstrate favourable results in both single and full-arch restorations, providing improved esthetic outcomes, retrievability, and tissue health. While biomechanical limitations exist at higher angulations, appropriate case selection and adherence to protocol significantly reduce complications. Integration with CAD/CAM technology has further enhanced precision and efficiency. Dynamic abutments represent a reliable and innovative approach to managing non-ideal implant positions, preserving the benefits of screw-retained restorations. Continued research and technological advancements are expected to broaden their clinical utility and long-term success.

Keywords : Dynamic abutments, screw-retained restorations, implant angulation, CAD/CAM, prosthodontics, angulated screw channels.

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Introduction

Dental implant therapy has revolutionized the rehabilitation of partially and completely edentulous patients. However, one of the most significant challenges in achieving optimal prosthetic outcomes is the angulation of the implant, especially in anatomically compromised sites. Malpositioned implants can compromise prosthetic design, aesthetics, function, and even long-term prognosis [1,2]

Traditionally, angled abutments and custom abutments have been employed to correct these discrepancies, but they come with limitations such as restricted angulation options, aesthetic compromises, and potential mechanical complications[3,4]. In recent years, dynamic abutments have emerged as a promising solution that allows for prosthetic screw channel redirection without altering the implant position surgically or digitally 5.

Dynamic abutments provide angulation correction (typica-lly up to 30 degrees) by using a specially designed screw and screwdriver system that transmits torque at an angle. This techno-logy allows for screw-retained restorations even in cases with challenging implant orientations, offering improved aesthetics and retrievability compared to cement-retained restorations [6,7].

This review aims to provide a comprehensive overview of dynamic abutments, covering their design, mechanism, clinical indications, advantages, limitations, and current evidence from the literature. Additionally, future directions in the application of dynamic abutments within digital workflows will be explored.

Background and Evolution of Abutment Systems

The abutment serves as a critical interface between the den-tal implant and the prosthesis, directly influencing the biomechanical performance, aesthetics, and long-term success of implant-supported restorations. Over the years, abutment designs have evolved significantly to accommodate

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diverse clinical scenarios and prosthetic demands.

Initially, implant abutments were limited to standard prefabricated forms, which often necessitated precise implant placement to ensure optimal prosthetic alignment. However, due to anatomical limitations and variations in alveolar bone availability, implants could not always be positioned ideally. To address this challenge, angled abutments were introduced, allowing for correction of minor deviations in implant angulation. Despite their utility, these components have inherent drawbacks, including limited angulation options (typically up to 15–25 degrees), increased stress on the implant-abutment interface, and potential compromises in aesthetics, particularly in the anterior maxilla [8,9].

Advancements in CAD/CAM technology facilitated the development of custom abutments, which improved emergence profile control and aesthetic outcomes. Nevertheless, they did not fully resolve the issues related to screw channel access in cases of severely angulated implants. Additionally, most custom abutments are cement-retained, which introduces the risk of residual cement and peri-implant inflammation [10,11].

The dynamic abutment system represents a further innovation, designed to redirect the prosthetic screw channel while maintaining a screw-retained approach. This system enables angular correction up to 30 degrees without compromising the structural integrity of the implant - prosthesis complex. By employing a unique screw design and a torque-transmitting dynamic screwdriver, clinicians can achieve both functional and aesthetic prosthetic reconstructions even in challenging cases [12,13].

This evolution from standard to dynamic abutments reflects the ongoing efforts in implant prosthodontics to optimize clinical outcomes, reduce complications, and simplify restorative procedures.

Mechanism and Components of Dynamic Abutments

Dynamic abutments are innovative prosthetic components designed to compensate for non-ideal implant angulations by allowing the redirection of the screw access channel. The key advantage of this system lies in its ability to preserve the benefits of screw-retained restorations - namely retrievability, reduced cement-associated complications, and simplified maintenance - while addressing aesthetic and functional concerns in malpositioned implants.

Principle of Function

The dynamic abutment system operates on the principle of angular correction, typically up to 30 degrees from the implant's long axis (figure 1). This is achieved without altering the implant platform or requiring additional angled components. The torque required to secure the prosthetic screw is transmitted through a specialized angulated screwdriver, which aligns with the repositioned screw channel rather than the implant's true axis [14,15].

This mechanism enables clinicians to position the screw access hole on the palatal or occlusal surface of the prosthesis, even in cases where the implant is placed buccally or lingually due to anatomical constraints. The correction occurs entirely at the abutment level, allowing a screw-retained restoration to be used where otherwise a cement-retained prosthesis might be necessary.

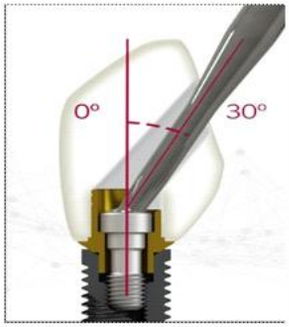

Figure 1: Sectional view showing dynamic abutment and screw connection

System Components

A typical dynamic abutment system comprises the following components (figure 2):

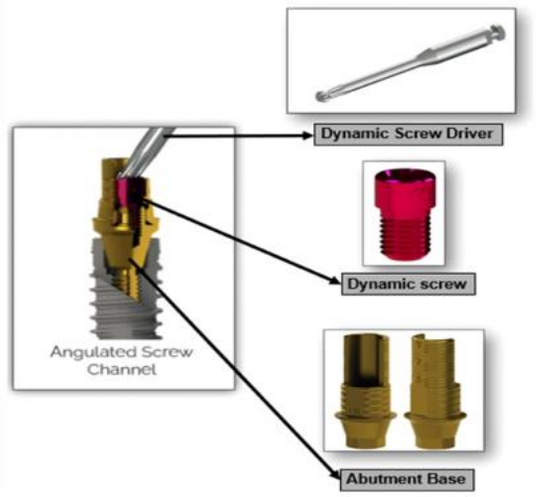

Figure 2: Components of dynamic abutment

- Dynamic Abutment: A titanium or titanium-alloy abutment with an internal screw channel that is designed to receive a specialized prosthetic screw at a corrected angle(figure 3).

Figure 3: Dynamic Abutment

- Prosthetic Screw: Engineered with a spherical or conical head to facilitate angled engagement with the abutment's screw channel (figure 4).

Figure 4: Prosthetic Screw

- **Dynamic Screwdriver :** A torque-transmitting tool capable of engaging the prosthetic screw at an angle, allowing the delivery of sufficient torque (usually up to 35 Ncm) despite the offset from the implant's central axis(figure 5).
- **Abutment Base :** It has asemi-sphere on which a burnout chimney sits and which can be freely moved to deviate from the axis by up to 28 degrees(figure 6).

Figure 5: Dynamic Screwdriver

Figure 6: Abutment Base

- CAD/CAM or Prefabricated Restoration: Compatible crowns or frameworks that are either digitally designed or milled to accommodate the redirected screw access.

Some systems are compatible with both zirconia and metal frameworks, and are integrated into CAD/CAM workflows to enhance precision and fit.

Angular Correction and Biomechanical Considerations

While dynamic abutments allow angular corrections up to 30 degrees, clinical judgment is required to assess the biomechanical implications. Excessive angulation may increase lateral forces on the implant-abutment interface and could influence screw loosening or micro-gap formation under function[16]. Fin-ite element analysis studies have indicated that, when used appropriately, dynamic abutments demonstrate stress distribution patterns comparable to conventional screw-retained solutions[17].

Careful case selection, accurate torque application, and appropriate restorative material choices are essential to the long-term success of restorations using this system.

Clinical Indications and Applications of Dynamic Abutments

Dynamic abutments have expanded the clinical possibilities in implant prosthodontics, particularly in cases where implant angulation presents challenges to conventional restorative strategies. Their ability to facilitate screw-retained prostheses, even in suboptimal implant positions, renders them highly valuable in both aesthetic and functional zones.

Malpositioned Implants

One of the most common indications for dynamic abutments is the correction of screw access in implants placed at non-ideal angulations. This often occurs due to:

- Anatomical limitations (e.g., sinus proximity, bone concavities)
- Surgical constraints in fully edentulous or atrophic ridges
- Pre-existing implants placed by other clinicians

Instead of resorting to cement-retained crowns or angled multiunit abutments, dynamic abutments allow the clinician to redirect the screw channel to a more favourable location (e.g., the palatal surface in the maxillary anterior region), improving both aesthetics and hygiene access [18,19].

Esthetic Zone Restorations

In the anterior maxilla, aesthetic demands are high and screw-access emergence through the facial surface is unacceptable. Dynamic abutments provide a method to relocate this emergence profile without the need for cementation, which is associated with risks of peri-implantitis due to excess cement[20].

The retrievability of screw-retained restorations is particularly beneficial in these cases for maintenance, hygiene, and managing soft tissue stability over time.

Full-Arch and Hybrid Restorations

Dynamic abutments have also demonstrated utility in full-arch implant-supported prostheses, where implants are often tilted to avoid anatomical structures such as the mental foramen or maxillary sinus. These tilted implants result in screw access holes that emerge at awkward angles - often facial or buccal.

Using dynamic abutments in such cases enables the clinician to maintain a unified screw-retained protocol across the arch, even when individual implants are angulated differently. This simplifies retrieval and improves the aesthetic and functional outcome of hybrid dentures or fixed complete dentures[21,22].

Digital and CAD/CAM Workflows

Dynamic abutments are increasingly compatible with digital workflows, including intraoral scanning and CAD/CAM fabrication of crowns and bridges. This integration allows for improved precision in prosthetic design, and streamlines the process of generating crowns with corrected screw access paths. Some manufacturers provide specific digital libraries for their dynamic abutment systems, ensuring restorative accuracy in the digital environment[23].

Advantages and Limitations of Dynamic Abutments

The adoption of dynamic abutment systems in implant prosthodontics has offered several clinical and technical advantages,

yet these systems are not without limitations. A thorough understanding of both aspects is essential for informed clinical decision-making and successful restorative outcomes.

Advantages

Preservation of Screw-Retained Protocols

One of the most significant advantages of dynamic abutments is the ability to maintain screw-retained restorations in situations that would otherwise necessitate cementation. This improves:

- Retrievability of the prosthesis for maintenance and hygiene
- Avoidance of excess cement, thereby reducing the risk of peri-implantitis [24]

Improved Aesthetics

By redirecting the screw access channel, dynamic abutments enable emergence on the lingual or occlusal surface, avoiding unsightly facial screw holes - especially important in anterior restorations[25].

Enhanced Flexibility in Complex Cases

Dynamic abutments are especially beneficial when working with malpositioned or angled implants, allowing clinicians to fabricate restorations without the need for complex angled multi-unit abutments or cementation strategies.

Integration with Digital Workflows

Modern dynamic abutment systems are CAD/CAM-compatible, streamlining the design and fabrication of restorations. This allows for increased accuracy, reduced chair time, and consistent aesthetic outcomes [26].

Simplified Full-Arch Restorations

In full-arch or All-on-Four® cases, dynamic abutments allow all screw access points to be redirected to functional or aesthetically acceptable locations, improving patient satisfaction and facilitating long-term maintenance [27].

Limitations

Biomechanical Risks with Excessive Angulation

Although the system supports up to 30° of angulation correction, extreme angulations may compromise:

- Torque delivery efficiency
- Screw preload
- Long-term prosthesis stability 28

This could potentially lead to screw loosening or increased stress at the implant-abutment interface.

Technique Sensitivity

The use of dynamic abutments requires:

- Accurate prosthetic planning
- Precise digital or analog workflows
- Proper handling of angulated screwdrivers, which differ from conventional torque tools

Inadequate technique can result in improper seating or suboptimal torque application.

Cost and Availability

Dynamic abutment systems may incur higher material and laboratory costs, especially when customized or CAD/CAM components are required. Availability may be limited in some regions or with certain implant systems.

Limited Long-Term Clinical Data

While short- and mid-term outcomes are promising, long-term clinical evidence on the performance of dynamic abutments - especially in high-load posterior regions or complex full-arch rehabilitations - is still evolving[29].

Clinical Evidence and Case Studies on Dynamic Abutments

The growing application of dynamic abutment systems has been supported by a number of clinical studies, case series, and retrospective analyses. These provide insights into their success rates, complication profiles, and overall clinical utility in a range of prosthetic scenarios.

Survival and Success Rates

A prospective clinical study by Mangano et al. (2018) evaluated the performance of dynamic abutments in 87 patients over a period of 36 months. The authors reported a prosthetic survival rate of 98.9%, with minimal technical complications and no statistically significant difference in bone loss compared to conventional abutments[30]. This study supports the use of dynamic abutments as a reliable solution, even in moderately to severely angulated implant positions.

Similarly, Prasad et al. (2021) reviewed multiple clinical cases using dynamic abutments and found that, when applied correctly, the systems maintained both functional and esthetic integrity without compromising marginal bone levels or soft tissue health[31].

Aesthetic Outcomes in the Anterior Zone

In a case series by Fabbri et al. (2016), dynamic abutments were used in esthetically critical anterior maxillary restorations where facial screw access would have been unavoidable using conventional straight abutments. All patients in the study expressed high satisfaction with the final aesthetics, and the authors emphasized the role of dynamic abutments in preserving gingival zeniths and soft tissue contours due to the avoidance of excess cement[32].

Full-Arch Rehabilitations

A study conducted by Fabbri and Bologna (2017) investigated the use of dynamic abutments in full-arch immediate-loading rehabilitations. The angulated screw access correction allowed for screw-retained restorations in cases where implant inclination would have typically necessitated cementation or complex multi-unit abutments. The results showed stable peri-implant tissues and high prosthetic success over a 24-month follow-up period[33].

Technical Complications and Maintenance

Despite the positive outcomes, some studies have reported minor technical complications, such as:

- Screw loosening (particularly at higher angulation corrections)
- Wear at the screwdriver–screw interface
- Need for precise torque delivery and calibration of dynamic screwdrivers

Clelland et al. (1993) observed that the stress distribution in angled abutments tends to shift distally, which could theoretically influence long-term load-bearing outcomes in posterior restorations[34]. However, these risks are mitigated with proper case selection and adherence to manufacturer guidelines.

Future Perspectives and Innovations in Dynamic Abutment Technology

As implant dentistry continues to evolve through digital innovation and material advancements, dynamic abutment systems are poised for further development. Their growing adoption has prompted manufacturers, researchers, and clinicians to explore new designs, digital integrations, and biomechanical enhancements that could optimize both performance and clinical usability.

Integration with Fully Digital Workflows

One of the most significant trends is the increasing integration of dynamic abutments into complete digital prosthodontic workflows, encompassing:

- Intraoral scanning
- Virtual abutment design
- CAD/CAM fabrication
- 3D printing of models and surgical guides

Manufacturers have begun offering dedicated digital libraries compatible with leading CAD software, allowing clinicians to virtually plan screw-access redirection and simulate prosthetic emergence profiles with high precision. This ensures greater consistency and accuracy in complex restorative designs[35].

Improved Materials and Surface Treatments

Next-generation dynamic abutments are being developed using high-performance alloys and surface treatments to enhance mechanical resistance and biocompatibility. Coatings that reduce friction or improve torque transfer may reduce wear on components and extend clinical longevity, particularly in high-stress posterior regions or full-arch cases[36].

Titanium bases with anodized surfaces, and hybrid abutments combining zirconia esthetic sleeves with titanium connection bases, are also gaining popularity for use in the esthetic zone.

Expanded Angulation Capabilities

Although current systems generally allow for angulation corrections up to 30°, ongoing biomechanical testing and prototype development aim to increase this threshold while maintaining torque transfer reliability and mechanical integrity.

Innovations in screw geometry and screwdriver design such as conical or flexible drive systems - could allow secure torque delivery at steeper angles without compromising preload, further broadening clinical indications.

Smart Torque-Control Systems

The development of electronic torque drivers and smart tools capable of adapting torque values based on angulation and abutment geometry may soon become a practical asset in clinical settings. These tools could alert the clinician to torque loss or misalignment, ensuring more predictable prosthesis stability.

Long-Term Clinical Data and AI-Driven Planning

While short- and mid-term data are encouraging, future research will likely focus on longitudinal clinical outcomes, particularly in full-arch and posterior load-bearing cases. Additionally, AI-powered diagnostic platforms are being explored to assist in selecting optimal angulation correction and abutment configurations based on CBCT and intraoral scan data[37].

Conclusion and Clinical Recommendations

Dynamic abutments represent a significant advancement in modern implant prosthodontics, offering clinicians a versatile and predictable solution to overcome challenges posed by suboptimal implant angulation. Their ability to redirect the screw access channel up to 30° allows for the retention of screw-retained restorations in situations that would traditionally require cementation or complex multi-unit components.

Summary of Key Findings

- **Aesthetic and Functional Benefits :** Dynamic abutments enable ideal screw emergence profiles, especially in the anterior zone, without compromising aesthetics or tissue health.
- **Enhanced Prosthetic Retrievability :** Maintaining a screw-retained design improves long-term maintenance, hygiene, and prosthetic revisions.
- **Digital Compatibility :** The integration of dynamic abutments into CAD/CAM workflows enhances precision and streamlines clinical procedures.
- **Clinical Success :** Studies have demonstrated high survival rates, minimal biological complications, and favourable patient-reported outcomes.
- **Biomechanical Considerations :** While effective, their use in high-load scenarios or at maximum angulations must be approached with caution due to potential mechanical complications.

Clinical Recommendations

Based on the current literature and available evidence, the following clinical guidelines are suggested:

1. **Case Selection :** Dynamic abutments are most beneficial in single-unit anterior cases, tilted posterior implants, and full-arch prostheses where screw access needs correction.
2. **Angulation Threshold :** Limit use to within the manufacturer's recommended angulation (typically ≤30°). Avoid exceeding this range without validated biomechanical support.
3. **Proper Torque Application :** Use compatible torque drivers designed specifically for angulated access to ensure adequate preload.
4. Digital Workflow Adherence: When using CAD/CAM systems, ensure the correct digital library for the dynamic abutment system is used during prosthetic design.
5. Maintenance Planning: Educate patients about the potential need for screw retightening or component checks, particularly in bruxism or high-load cases.
6. **Continued Education :** Clinicians are encouraged to remain updated on manufacturer-specific protocols and innovations in dynamic abutment systems.

Future Directions

As digital dentistry and material science continue to evolve, dynamic abutment systems are expected to improve in terms of torque transmission, precision, and biomechanical performance. Ongoing clinical research and technological innovation will be critical in refining their indications and expanding their use across a broader range of implant scenarios.

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Special Care Dentistry for Developmentally Disabled Child

Ashish Kumar[1], Deepti Jawa[2], Shipra Jaidka[3], Dr. Avani. S[4], Apurva Chadha[5], Tanvi Gupta[6]

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Post Graduate Student[1]
Dept of Pediatrics and Preventive Dentistry
D. J. College of Dental Sciences and Research
Modinagar

Professor[2]
Dept of Pediatrics and Preventive Dentistry
D. J. College of Dental Sciences and Research
Modinagar

Professor and Head[3]
Dept of Pediatrics and Preventive Dentistry
D. J. College of Dental Science
and Research
Modinagar

Post Graduate Student[4]
Dept of Pediatrics and Preventive Dentistry
D. J. College of Dental Sciences and Research
Modinagar

Post Graduate Student[5]
Dept of Pediatrics and Preventive Dentistry
D. J. College of Dental Sciences and Research
Modinagar

Post Graduate Student[6]
Kothiwal Dental College
Moradabad

Corresponding Author

Dr. Ashish Kumar
Post Graduate Student
Dept of Pediatrics and Preventive Dentistry
D.J College of Dental Sciences and Research
Modinagar

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Website : www.healtalk.in

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Abstract

Special Care Dentistry (SCD) focuses on enhancing oral health for individuals with diverse impairments, including physical, sensory, intellectual, and medical conditions. It highlights the significant prevalence of disabilities in India and globally, as well as the complex nature of disability according to the WHO International Classification of Functioning. It discusses the extended lifespan of children with special healthcare needs (CSHCN) due to medical advancements, necessitating tailored dental care to manage associated oral health challenges. Despite global efforts to improve oral health, disadvantaged and disabled populations continue to face disparities. It concludes by outlining the scope of a forthcoming library dissertation, which aims to review prevalent oral conditions among individuals with special needs and propose general care recommendations to address their unique challenges in accessing dental treatment.

Keywords : Special Care Dentistry (SCD), Children with Special Healthcare Needs (CSHCN), impairment or disability, oral health challenges.

Introduction

Special Care Dentistry is concerned with providing and enabling the delivery of oral care to people with impairment or disability.

"Disabled" does not mean worthless... it's never about productivity; it's about humanity - Crane (998)[1].

"The maintenance of general and oral health in these children poses significant challenges, and their teeth are frequently compromised by extensive caries and periodontal conditions." Hence, the management of these "God's forgotten children" is a task that needs special effort on the part of the dental surgeon and pediatric dentist[1].The number of children with disabilities is increasing, largely due to advancements in medical technology and treatment. These medical break throughs have enabled the survival of children who, in the past, might not have lived, often resulting in long-term disabilities. Furthermore, modern medicine has significantly extended the life expectancy of children with complex conditions. As with all paediatric patients, delivering effective dental care to this group requires a holistic approach one that considers the overall well-being of the child and family, not just their oral health. Like all children, those with special needs are individuals with distinct personalities, interests, family dynamics, strengths, and challenges. While a diagnosis can offer valuable insight into a child's medical, dental, and behavioural considerations, it does not define the child entirely. Two children with the same condition - such as autism or cerebral palsy- may have vastly different needs. Providing dental care to these children is not only a challenge but also a privilege and a source of joy, as it involves understanding each child uniquely and tailoring an approach that supports lifelong oral health[2]. Thus, this library dissertation aims to discuss the factors and the techniques for managing special children in dental operatories.

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Definitions And Terminologies

The handicapped one umbrella term which has been given by the WHO in 1963 and different terminologies from then have been evaluated for special childlike impairment Handicap, Disable, Children with special health care needs, Gods Forgotten Child etc.

1. Special Care Dentistry

The improvement of oral health of individuals and groups in society who have a physical, sensory, intellectual, mental, medical, emotional or social impairment or disability or, more often, a combination of a number of these factors.[3]

According to the American Association of Paediatric Dentistry (2013)[4] defines special health care needs as "any physical, developmental, mental, sensory behavioural, cognitive or emotional impairment or limiting condition that requires medical management, health care intervention and/or use of specialized services or programs."

2. Impairment

Impairment is defined as any loss or abnormality in psychological, physiological, or anatomical structure or function-such as loss of vision or hearing. A primary impairment can give rise to secondary issues; for example, hearing loss may contribute to learning difficulties and reduced academic performance. Impairment often progresses to disability.

3. Disability

According to Centres for Disease Control and Prevention (2018)[5] Developmental disabilities refer to a group of conditions resulting from impairments in physical, cognitive, language, or behavioral functions. These conditions typically emerge during the developmental period, affect daily functioning, and are often lifelong.

4. Handicapped Or Challenged

According to World Health Organization (1980)[4] defines a handicapped individual as "one who, over an appreciable time, is prevented by a physical or mental condition from full participation in the normal activities of his age group, including those of a social, recreational education and vocational nature."

5. Children With Special Healthcare Needs (CSHCN)[6]

According to the American Academy of Paediatric Dentistry is an age-defined specialty that provides both primary and comprehensive preventive and therapeutic oral health care for infants and children through adolescence, including those with special health care needs.

Classification

The special child has been classified into various categories according to different authors which has listed below:

1. Frank and Winter (1974)[4]
a) Blind or partially blind
b) Deaf or partially deaf
c) Educationally subnormal
d) Epileptic
e) Maladjusted
f) Defective in speech
g) Senile

2.Agerholm (1975)[7]
a) Intrinsic
b) Extrinsic

3.Convenience of Management (1975)[4]
a) Developmentally disabled child
b) Medically compromised child

Flowchart : Classification of Special Child

4. According to Nowak(1976)[4]
a) Physically handicapped
b) Mentally handicapped
c) Congenital defects
d) Convulsive disorders
e) Communication disorders
f) Systemic disorders
g) Metabolic disorder

5. According to Damle(2000)[1]
a) Physical handicap e.g. monoplegia, paraplegia
b) Mental handicap e.g. Down syndrome
c) Sensory handicap e.g. Deafness, Blindness
d) Medically compromised e.g. Hemophilia, Leukemia
e) Multi-handicap Multiple handicapping conditions
f) Dentally handicapped with oral abnormality.

The Ethos of Special Care Dentistry[3]

The foundation of Special Care Dentistry lies in its comprehensive, patient-centered philosophy of care. It prioritizes a holistic approach to oral health by collaborating with all members of an individual's care team - whether dental, medical, or social - to develop the most suitable care plan through an integrated pathway. Special Care Dentistry is proactive in addressing the needs of individuals with disabilities, rather than responding only when issues arise. It acknowledges that certain individuals may face barriers to accessing oral healthcare independently or expressing their needs. Therefore, it emphasizes tailored screening, prevention, and treatment programs designed to meet the unique requirements of specific groups or individuals.

Common Oral Health Problems And Management In Special Needs Care Children

Erosion	**Tooth wear**		
	Periodontal disease **Biting**	**Oral**	**Dry mouth** **Halitosis**
Mucosal disease			

Oral Health Care For Special Child[8]

In addition to providing safe and adequate dental care, oral health care for people with special needs emphasizes the importance of enhancing these populations' oral health status through the implementation of efficient preventative measures. The creation of clinical guidelines and integrated care pathways to help remove obstacles to oral health treatment can help achieve these goals.

A) Barriers To Oral Health Care
- Barriers concerning the individual
- Barriers concerning the dental profession
- Barriers concerning**government**

B) General Consideration for the Treatment of Special Child in Dental Office
- Dental Office Access
- Behavior Management
- Dental Radiograph
- Special Modification for Invasive Dental Procedures
- Consideration For Sedation

Developmental Disability[9]

It is a severe, chronic disability that may impact physical functioning, cognitive abilities, or both. These disabilities are likely to last a lifetime and manifest before the age of 22. In addition to intellectual disabilities, physical disabilities are often included in the phrase "developmental disability."

Most common developmental disabilities which are encountered in paediatric dental clinics are:

1. Mental Retardation	2. Down Syndrome	3. Epilepsy
4. Cerebral Palsy	5. Autism	

Mental Retardation

Mental retardation (MR) is one of the most common developmental disabilities. It is a source of pain and bewilderment to many families. Sheerenberger (1983) classifies that disability of the brain and mind occurs due to brain damage. One of the major differences is that they are slow learners, thus these kids do not grow at an average rate and exhibit great difficulty in learning and productivity[10].

Classifications[1]

According to Degree
- Mild
- Moderate
- Severe
- Profound

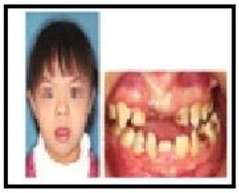
According to Origin

*Syndromic Mental retardation
- Down syndrome
- Prader-Willi syndrome
- Cri du chat syndrome
- Rett syndrome

*Non-syndromic Mental retardation

	According to IQ score
Mild MR	55-70
Moderate MR	40-54
Severe MR	25-39
Profound MR	Below 25

Prenatal	*Natal*	*Postnatal*
Genetic disorders	Birth injuries	Cerebral infections
Maternal and fetal infections	Infection	Cerebral trauma
Cretinism	Cerebral	Poisoning
	Haemorrhage	Cerebrovascular
Prenatal unknown	Hypoxia	
Fetal alcohol	Anoxia	
	Hypoglycaem	

Oral Manifestations[4]	
Baby-bottle tooth decay/early childhood caries, malocclusions	
Poor dental hygiene, dental plaque, and gingivitis,bruxism.	
Injurious behavior can arise in people with severe and profound Mental retardation. For example, lip biting or additionally biting the buccal mucosa. Lesch - Nyhan syndrome has the same features and includes biting the digits of the hand.	

Treatment consideration for mental retardation			
Dental management	**Behavioral Strategies**	**Management Aids**	**Radiographic Examination**
*Proper Medical History *Dental History *Behavioral History	*Avoiding/minimizing painful/fear-evoking stimuli *Reinforcement of appropriate response *Promoting relaxation using pre-medication. *Brief and early morning appointments are suitable *Get the patient familiar with the dentist, dental staff, and dental office before the treatment begins	*Papoose board for complete patient restraint *Tie-type arm and leg restraints *Seat belt-type straps *Extra personnel. *Intra-oral management aids such as Molt's mouth prop.	*Should be done on the second visit *Intra-oral films with bite tags *Films should be supported with dental floss *Proper radiation hazard protection
Follow-up Care	Individuals should be evaluated at least annually by a neurologist or a pediatrician for management		

Down's Syndrome

Down syndrome is a chromosome disorder associated with an extra chromosome (Trisomy 21) resulting in intellectual disability and specific physical features[11].

John Langdon Down (1862)[12] first characterized Down Syndrome as a distinct form of mental disability.

In 1959, the French physician Jerome Lejeune identified Down Syndrome as a syndrome as a chromosomal condition.

Incidence/Prevalence: It is found to occur 1 in every 700 live births (<1%).

Types

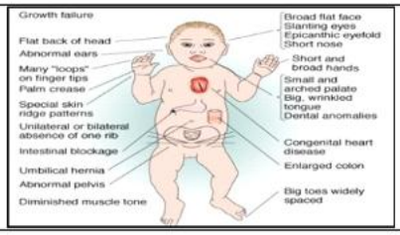
Three types of chromosomal abnormalities can lead to Down syndrome which is summarised in the below table.

- Medical complications seem to be similar in all three groups[9].

Down's syndrome	Nondisjunction-95%	(Males 59%, females 41%)
	Translocation-4%	(Females 74%, males 26%)
	Mosaicism-1%	(may have more subtle feature)

Predisposing Factors and Causes

1. Advanced maternal age 2. Uterine and placental abnormalities 3. Chromosomal aberrations

General Manifestations of Down's Syndrome	

Oral Manifestations		
Mouth *Small drooping mouth *Open mouth posture Tongue *Protrusive, fissured (scrotal) tongue.	***Lips*** *Thick, dry, fissured ***Occlusion*** *Anterior open bite and crossbite, class III tendency, small maxilla ***Occlusion*** *Anterior open bite and crossbite, class III tendency, small maxilla	***Palate*** *omega palate *Bifid uvula, cleft lip and palate ***Teeth*** *Hypodontia,Microdontia. *Hypocalcification and hypoplastic defects. ***Periodontium*** *poor oral hygiene, malocclusions and systemic factors such as decreased humoral response.
*Macroglossia	*Anterior open bite and crossbite, class III tendency, small maxilla	defects. ***Periodontium*** *poor oral hygiene, malocclusions and systemic factors such as decreased humoral response.

Management of Down Syndrome in Dental Office

Behavioral Management Considerations	Treatment Consideration
Early morning appointments Talk with the parent or caregiver- explain each procedure short and clear instructions. Avoid abrupt distractions, such as sights and sounds. Always use the tell-show-do approach	Pleasant, cheerful, affectionate and cooperative, and dental procedures can be provided without compromise. Work at a slower pace. Follow up visit to monitor oral hygiene like fluoride application, pit and fissure sealants, silver diamine fluoride, etc. Light sedation or severely resistant patients may require general anaesthesia.

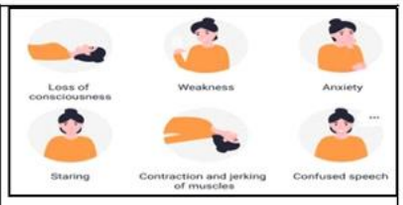
Epilepsy

The word "epilepsy" is derived from the Greek word "epilambanein" meaning to take or to seize.

Hippocrates recognized that seizu-res originated in the brain.[8]

Epilepsies are a group of disorders characterized by chronic, recurrent, and paroxysmal changes in neurolo-gical function caused by abnorma-lities in the electrical activity of the brain.

The incidence of epilepsy is appro-ximately 1%.



Classification of Epilepsy[13]

Partial	Generalized
Only part of the cortex is disrupted Simple Complex • Motor • sensory • Autonomic • Psychic	All of the cortex is disrupted • Tonic-clonic • Absence: - Typical & Atypical • Myoclonic • Atonic • Clonic • Tonic

	**Injuries Due to Drug Therapy** *Gingival hyperplasia • Recurrent aphthous-like ulceration. • Cervical lymphadenopathy. • Oral ulceration of the tongue 

Oral Manifestations of Epilepsy[9]

Dental Management of the Epileptic patient[13]

- Take a complete health history
- List medications the patient is taking* (any specific oral effects)
- Schedule proper frequency of oral hygiene
- Ensure proper dental lighting (no light directly in the eyes).
- Ensure medications have been taken properly – to minimize the risk of seizure.
- Perform proper periodontal and surgical treatment of gingival hyperplasia to minimize damage to teeth and supporting structures and to maintain proper aesthetics.
- If the epileptic seizure occurs at the time of dental treatment steps taken to minimise the risk.

Cerebral Palsy

- Cerebral palsy, which occurs in two to three out of 1,000 live births, has multiple aetiologies resulting in brain injury that affects movement, posture, and balance.
- Cerebral palsy (CP) is a group of disorders that affect a person's ability to move and maintain balance and posture.
- Cerebral palsy is the most common motor disability in childhood.

Nelson used the term Cerebral palsy to describe a group of nonprogressive disorders resulting from malfunctioning of the motor centres and pathways of the brain.

Etiology

Congenital	**Perinatal** • Hypoxic ischemic encephalopathy • Viral encephalitis
Genetic factors	**Prematurity** • Premature deliveries • Low birth weight • Maternal infections

Classification of Cerebral Palsy[1]

According to Degree of Affected Areas	According to Topography	According to Motor Function	Modified Swedish Classification
• Mild • Moderate • Severe • No Cerebral Palsy	• Monoplegia • Diplegia • Hemiplegia • Paraplegia • Triplegia • Quadriplegia • Tetraplegia	Spastic CP Nonspastic CP Ataxic CP Dyskinetic CP • Athetoid • Dystonic Mixed CP	Spastic • Hemiplegia • Tetraplegia • Diplegia Ataxic • Diplegia • Congenital (simple) Dyskinetic • Chore athetotic • Dystonic

Clinical Manifestations

(1) asymmetric tonic neck reflex, (2) tonic labyrinthine reflex, and (3) startle reflex Some of the common manifestations are: *Abnormalities of muscle tone *Delayed milestones *No control over movements *Muscle weakness *Spasticity and loss of coordination *Retention of primitive reflexes *Poor development of gross and fine motor control *Apraxia	**Oral Manifestations** • gastroesophageal reflux, as well as episodes of vomiting. • dental erosion, or loss of tooth structure. • Gingival overgrowth, due to seizure medications. • The head is tensely reclined • The mouth is open, and facial movements are tense. • The tongue is hypertonic and cigar-shaped (tongue thrust) • Misaligned and flared anterior 

Management[14]

Behaviour Modification	Modification In Radiographic Technique
*Early morning appointments. *Make the child comfortable by Sensory Adapted Dental Environment (SADE) environment. *Voice control, tell-show-do (TSD) modelling. *Distraction technique - decrease the anxiety level like audio distraction, audio visual distraction etc. *Emphasize the importance of diet.	 Extra-oral technique: Placement of reverse bitewing and 45° oblique head plate for patients having severe gag reflex.

Autism

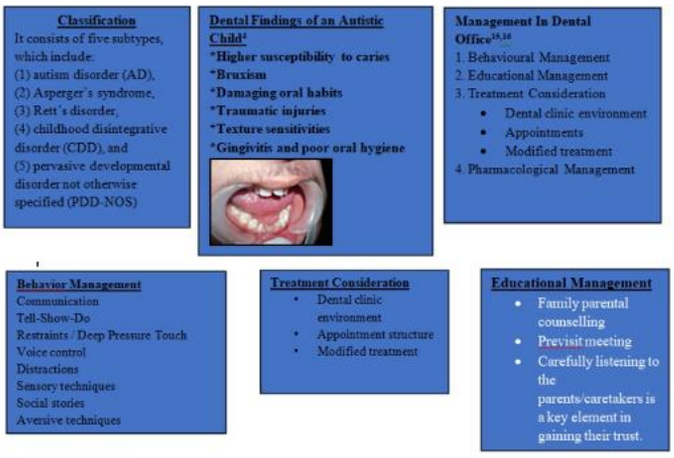
Autism Spectrum Disorders (ASD) are a diverse group of conditions. They are characterized by some degree of difficulty with social interaction and communication. Other characteristics are atypical patterns of activities and behaviors, such as difficulty with transition from one activity to another, a focus on details, and unusual reactions to sensations.

History

The word Autism originated from a description by Jean Marc Gaspard Itardin 1801.

Bleuler in 1911 expressed autism "as loss of contact with the real world thereby experiencing difficulty in communication".

Leo Kanner (1943), an American child psychologist, described autism "as neurodevelopmental disorder presenting within the first three years of life".



Conclusion

Children with special health care needs often face neglected dental health, linked to their disabilities. Improved medical care has increased their prevalence, yet dental care remains overlooked. Pediatric dentistry now emphasizes comprehensive oral health care, aiming to normalize lives and extend lifespans through proper treatment.

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National Oral Medicine and Radiology Day

D.J. College of Dental Sciences and Research (Modinagar, Ghaziabad)

Department of Oral Medicine and Radiology, D J College of Dental Sciences and Research celebrated National Oral Medicine and Radiology Day on 22nd of April, 2025. On this occasion following events were organized by Department HOD Manu Dhillon and his faculty members Dr Mahima Tyagi and Dr Soumendu Maiti

1. Guest Lecture on the topic 'The Wrath of Misdiagnosis' by Dr. Manisha Lakhanpal Sharma.
2. Extempore Competition for all Under Graduate Students
3. Best Out of Waste Competition on the theme – 'Designing of Radiology Department' for all Under Graduate Students
4. Quiz Competition for Third Year, Final Year and Intern Students
5. Felicitation of Winners
6. Rangoli Making by Final Year Students

The program was attended by Principal Sir, Head of the Departments, Faculty members, Interns and Final Year Under Gradute Students.

The chief guest for the function was Dr. Smiti Jassar Klaire, CEO, DivyaJyoti Group of Institutions, Modinagar, Ghaziabad.

The program started with introduction by Dr Manu Dhillon, HOD, Oral Medicine and Radiology followed by speech of Dr Pradeep Shukla, Principal. This was followed by felicitation of guest speaker and guest.

12 Under Graduate students participated in Extempore Competition and were given 3.5 minutes on the topic. Dr Ankur Mittal, HOD, Department of Oral Surgery and Dr. Chandrasekhar Joshi, Professor, Department of Periodontics were Judges for the Event. 6 teams of Under Graduate Students with each team comprising of 3 members participated in Best out of Waste Competition and were allotted 1 hour for designing of the Radiology Department. Dr Asit Vats, HOD, Department of Cons-ervative Dentistry and Dr. Ashish Singla, HOD, Department of Public Health Dentistry were Judges for the Event.

The events were followed by Lecture Session on the Topic 'The Wrath of Misdiagnosis' by Dr. Manisha Lakhanpal Sharma. The event was followed by Prize Distribution Ceremony for the winners of Extempore, Best out of Waste as well as for winners of Occlusion Fest held in ITS Dental College and Hospital. The winners were felicitated by Honourable CEO, Dr. Smiti Jassar Klaire, Principal, Dr. Pradeep Shukla and Dr. Manu Dhillon, HOD, Department of Oral Medicine and Radiology with trophies and certificates.

The Ceremony was followed by Refreshments for all Faculty members in the Board Room.

Quiz competition was then held where 5 teams comprising of 4 students each participated in the event. There were 4 different sections of the competition. Dr. Rupam Samra, HOD, Prosthodontics and Dr. Ruchi Gupta , Professor, Department of Conservative Dentistry were the judges for the program.

The event was followed by prize distribution by the judges and event was concluded by Dr. Manu Dhillon, HOD, Department of Oral Medicine and Radiology.

Department of Oral Medicine and Radiology

Institute of Dental Studies and Technologies, Modinagar

On April 23rd, 2025, the Department of Oral Medicine and Radiology at the Institute of Dental Studies and Technologies, Modinagar, in collaboration with the Indian Academy of Oral Medicine and Radiology (IAOMR), proudly celebrated National Oral Medicine and Radiology Day. Themed "Prevention of Oral Pre-Cancer and Cancerous Lesions," the event underscored the critical role of early detection in combating oral malignancies.

The celebration featured distinguished speakers, including Dr. Mandeep Kaur from Jamia Millia Islamia, New Delhi, who delivered an insightful lecture on the early detection of oral cancer. This was followed by an engaging online session by Dr. Abhishek Dubey from Maharana Pratap Dental Celaborated on the advancements in radiological technologies.

The event served as a vital platform for awareness and education, made possible by the unwavering efforts of the OMR faculty - Dr.Deepankar Misra, Dr. Akansha Budakoti, Dr. Arji Pandey - alongside the dedicated postgraduate students and enthusiastic undergraduates, whose collective contributions ensured the program's grand success.

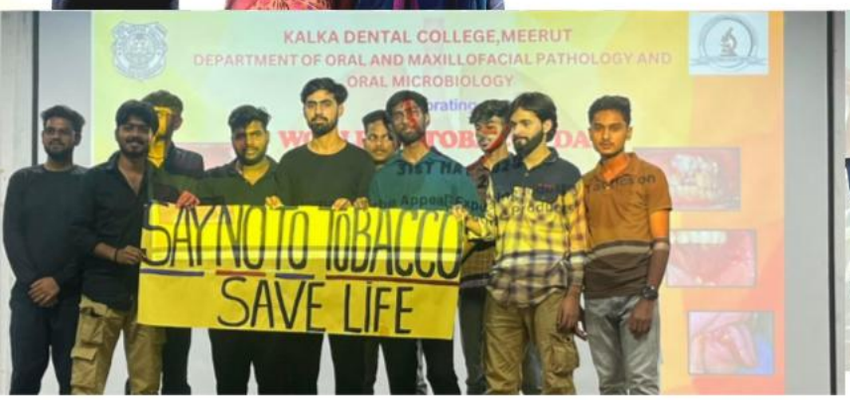
World No Tobacco Day

Kalka Dental College, Meerut

The Department of Oral Pathology successfully organized a Guest Lecture in observance of World No Tobacco Day on May 31st. The event aimed to raise awareness about the harmful effects of tobacco use and to promote tobacco cessation among students and staff.

Our guest speaker Dr. Swati Gupta is presently working in Subharti Dental College and Hospital as Professor in Department of Oral Medicine and Radiology and Incharge of a Mother Teresa Tobacco Cessation Centre.

The session was well-attended and included interactive discussions, hig-hlighting the importance of continued education and community involvement in combating tobacco-related health issues.



World No Tobacco Day

Kalka Dental College, Meerut

On the occasion of World No Tobacco Day, the Department of Oral Pathology and Public Health successfully organized an Oral cancer screening camp for early signs of tobacco-related diseases.

This awareness camp aimed at educating the community about the harmful effects of tobacco use and promoting a tobacco-free lifestyle. During the camp, over 70 patients were examined.

World Oral Health Day

Institute of Dental Studies and Technologies, Modinagar

World Oral Health Day is celebrated every year on 20th March to raise the global awareness about the importance of good oral hygiene and the impact of oral health on overall well being. The day encourages individuals, communities and governments to promote healthier habits, prevent oral diseases, and improve access to dental care.

Department of Periodontology and Department of Public Health Dentistry in association with ISP Study Group Delhi NCR conducted the World Oral Health Month from 20th March 2025 to 20 th April. The following activities were organized:

Community based free dental health screening and education Patient awareness activity included free dental check-up along with distribution of free toothbrushes and toothpaste Dental Health Screening was conducted as a part of School Dental education program. Proper Tooth brushing technique for effective oral hygiene was demonstrated to school children as a preventive oral health care. Oral Health Education was imparted regarding proper diet, oral hygiene measures and abstinence from harmful habits such as tobacco use.

The above activities were conducted in 10 villages and 8 schools and a total of 1020 school children and 1011 villagers were benefitted with this programme.

There was an enthusiastic participation from all faculty members, Postgraduate students, Interns and Undergraduate Students of the Institute

Under the flagship of Dr Nidhi Agarwal, Principal IDST, the exemplary execution of the entire event was done by Dr Mansi Bansal (Professor & Head, Department of Periodontology), Dr. Shilpi Singh (Professor & Head, Department of Public Health Dentistry), Dr Manish Khatri (Vice-Principal Administration, Professor, Department of Periodont-ology), Dr. Narender Yadav, Dr. Mohd. Rehan, Dr. Nisha (Reader), Dr Sakshi Gaind, Dr. Pratiksha Tripathi (Senior Lecturers, Department of Periodontology), Dr. Sumit Tewari(Senior Lecturer, Department of Public Health Dentistry.

Dental Health Screening Along With Free Distribution of Toothpastes And Toothbrushes

Campus Talk

About all Campus

World Orthodontics Day

DJ Dental College, Modinagar, Ghaziabad

On the occasion of World Orthodontics Day, a grand celebration was held with great enthusiasm on 15th May 2025 at DJ College of Dental Sciences & Research, Niwari Road, Modinagar.

The event was graced by the presence of Dr. Sanjay Labh, Secretary of the Indian Orthodontic Society, as the Chief Guest. Other esteemed guests included Dr. Shishir and Dr. Mayank Gupta (EC Member). The college's CEO, Dr. Smiti Jassar, and COO, Mr. Ritik Jassar, extended their best wishes on the occasion.

The college principal, Dr. Manu Dhillon, also addressed the gathering and marked his presence at the event. Dr. Vaibhav Mishra, Head of the Department of Orthodontics, played a key role throughout the program. Heads of other departments, including Dr. Ankur Mittal, Dr. Gaurav Malhotra, and Dr. Sanjeet Singh along with others were also present at the event.

World Orthodontics Health Day

Kalka Dental College, Meerut

Department of Orthodontics and Orthopaedics, Kalka Dental College, Meerut has been celebrating this global event of WOHD annually with immense grandeur .

Continuing the tradition, the Department witnessed a spectacular culmination of #WOHD2025 #A World of Smiles on 15th May.

There was humongous participation from more than a hundred BDS and MDS students to put up an exquisite array of creative skills through various competitions in sync with the theme of World FederationOf Orthodontists (WFO).

On May 15th, the Orthodontics Department at Kalka Dental College, Meerut, joyously commemorated World Orthodontic Health Day, in collaboration with the World Federation of Orthodontists (WFO). This global initiative aims to promote the benefits of specialist orthodontic care, emphasizing the vital role of specialized treatment in improving oral health and overall well-being.

The WFO, an international organization dedicated to advancing the art and science of orthodontics and promoting awareness.

This year's celebration at Kalka Dental College featured a diverse range of activities, including glass painting, quizzes, and poster presentations, showcasing the innovative spirit and artistic talents of our students.

These events provided a platform for students to demonstrate their understanding of orthodontic principles and their ability to apply them in innovative ways. The activities were well-organized, and the enthusiasm of the participants was palpable, making the celebration a resounding success.

As the Head of the Orthodontics Department, I am proud of our students and faculty for their dedication, creativity, and passion for orthodontics. This celebration serves as a reminder of the importance of orthodontics in enhancing the quality of life through improved oral health and aesthetics.

We look forward to continuing our pursuit of excellence in orthodontics and inspiring the next generation of orthodontists.

Key Highlights of World Orthodontic Health Day

- **Global Unity :** Uniting orthodontic professionals, patients, and the public to highlight the importance of proper alignment and oral health.
- **Excellence :** Committing to the highest standards of specialty orthodontic practice.
- **Beauty :** Appreciating the aesthetic benefits of orthodontic treatment.
- **Overall Well-being :** A well aligned bite reduces oral health complications and boosts self-esteem with improved Quality of Life.

World No Tobacco Day

Kalka Dental College, Meerut

Department of Public Health Dentistry proudly observes World No Tobacco Day on 31-05-2025, with a series of impactful events aimed at raising awareness about the harmful effects of tobacco use and promoting a healthier, tobacco-free future.

Under the Global Theme "unmasking The Appeal: Exposing Industry Tactics On Tobacco & Nicotine Product" The Department organized a range of educational and outreach programs that engaged students, faculty and wider community.

The day's events included

- Free Oral Screening Camp offering tobacco users a chance to assess their oral health and receive guidance on quitting tobacco. Therefore, we conducted free camps at various schools, colleges and villages from 21-05-2025 to 05-06-2025.
- Awareness rally led by medical professionals, students and staff on 28.05.2025 distributing educational leaflets and spreading anti-tobacco messages. Another rally was led by students and faculty through local neighbourhood at village Golabadh on 31.05.2025 by spreading anti-tobacco messages.
- Nukkad- Natak was organized at village Golabadh on 31.05.2025 at public square, aimed at raising awareness among the general public about the harmful effects of tobacco performed by under graduate students from various batches carried the message through sharp dialoguesand relatablecharacters and hereby we continue to empower future dental professionals as advocates for public health and a tobacco-free society.
- Guest Lecture and Health Talk a training and capacity-building session was conducted through a guest lecture delivered by Dr. Swati Gupta Professor Subharti Dental College to raise awareness about the harmful effects of tobacco use and to empower participants with knowledge and strategies to combat tobacco addiction within their communities.The health talk was also delivered by Principal Dr. Rakesh Krishan Gupta and Dr. Meetika Pahuja Head Of Department focused on ill effects of active and passive smoking to the young generation.
- Pledge Ceremony Kalka Dental College conducted a solemn and inspiring ceremony within the college campus, reaffirming the institution's unwavering commitment to a tobacco-free future.
- CompetitionsKalka Dental College organized a vibrant series of student competitions aimed at raising awareness and encouraging active participation in the fight against tobacco use. These events provided a creative and educational platform for students to express their understanding of the theme. It includes;
- Pamphlet Making, Best Out Of Waste, Meme Making, Quiz Competition.
- Certificate distributionas a fitting conclusion to its week long activities commemorating World No Tobacco Day 2025, we held a certificate Distribution Ceremony to honor the efforts and participation of the students who contributed to the success of the event.

Dr. Rakesh Krishan Gupta, Principal of Kalka Dental College ,emphasized the urgency of protecting younger generations from lure of tobacco. "As dental professionals, we witness firsthand the devastating impact of tobacco on oral and overall health. This day reinforce our commitment to preventive education and tobacco cessation support".

Kalka Dental College remains dedicated to providecommunity service, health education and fostering a generation that chooses health over harmful habits.

Breaking Barriers : Women Leading in Male-Dominated Fields

Save The Girl Child

"Girls are Diamonds. Shape them for the Betterment of the Generation" - Afzal A. Zaidi

Women have broken preconceptions, reshaped conventions, and emerged as trailblazers in sectors that have historically been controlled by males. With unyielding resolve, tenacity, and intelligence, women continue to shatter glass ceilings in a variety of fields, including politics, science, technology, law enforcement, and business leadership. Their journey represents not only individual achievement but also a group victory against ingrained social constraints. Women have been powerful change makers in spite of enduring obstacles like gender bias, discrimination in the job, and a lack of mentorship opportunities.

Future generations have benefited from the contributions of luminaries such as Marie Curie, who was awarded two Nobel Prizes, Kalpana Chawla, the first Indian woman in space, and Indra Nooyi, who turned PepsiCo into a multinational conglomerate. Numerous young ladies are motivated by their stories to dream big and pursue their goals without fear.

Women nowadays are thriving in a variety of fields while juggling their personal and professional obligations with ease. They are forming young brains in the classroom, maintaining law and order in the police department, and providing innovative leadership to multinational enterprises. In addition to succeeding professionally, they are also managing households, bringing up resilient, self-sufficient kids, and providing for their families with dignity and tenacity.

Dispelling stereotypes is becoming the rule rather than the exception. Women work night shifts with assurance, go through busy streets at all hours, and return home to take care of their families without hesitation. Even if they run multimillion-dollar companies, women entrepreneurs still like cooking for their families. Their natural ability to juggle several responsibilities with ease gives them a sense of fulfilment, pride, and independence.

Investing in education, encouraging skill development, and creating robust mentorship networks that enable women to take the lead are essential for ensuring long-lasting gender inclusion. Policies in the workplace must change to provide safe working conditions, equitable compensation, and fair opportunity.

Breaking down barriers for women is not just about empowering them; it's also about creating a fair and forward-thinking culture where hardwork, talent, and perseverance - rather than gender - determine success. We can build a future where men and women stand alongside as equals, advancing development and prosperity for everybody, by embracing diversity, providing support, and acknowledging accomplishments.

Submitted by : **Dr. Aakansha Sharma**
Senior Lecturer
Department of Pediatric and Preventive Dentistry
Institute of Dental Studies and Technologies

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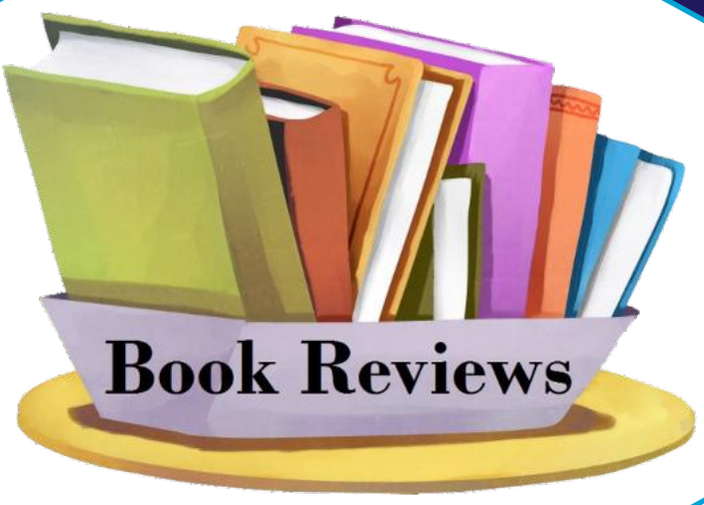

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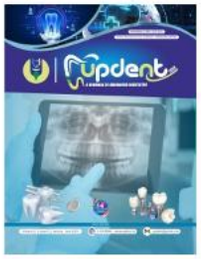

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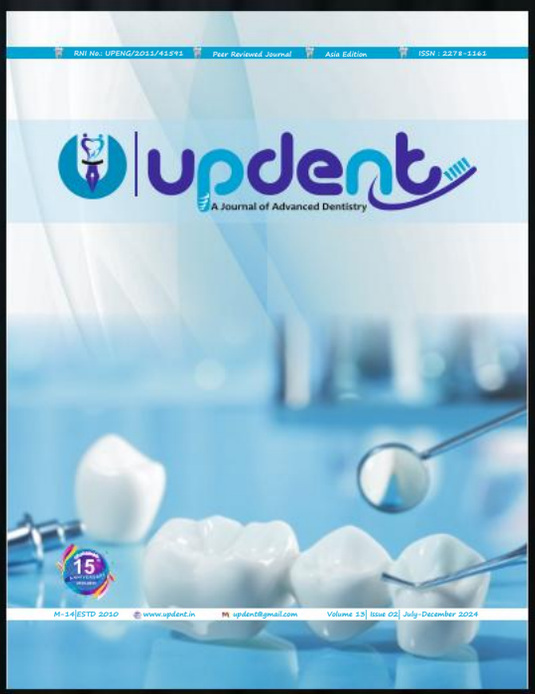

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