Indian Dental Association
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UTTAR PRADESH



Message from the President, IDA, Head Office
Dr. Manoj Srivastava

As President of the Indian Dental Association Head Office, Mumbai, and being deeply connected to the cultural and academic roots of Varanasi, I am pleased to share that the forthcoming issue of the Journal of the Indian Dental Association Uttar Pradesh State Branch will focus on informative scientific knowledge and the latest material research in dentistry.

This special issue aims to bring together contemporary advancements, evidence-based clinical practices, and innovative research relevant to modern dental professionals. Topics will include recent developments in restorative and esthetic materials, implantology, prosthodontics, digital dentistry, biomaterials, and emerging technologies influencing present-day dental care.

Our objective is to provide clinicians, academicians, researchers, and students with meaningful academic content that enhances clinical understanding, encourages scientific thinking, and supports excellence in patient care and professional growth in dentistry.

Dr Manoj Srivastava
President IDA, HO



Message from the Hon. Secretary, IDA, Head Office
Dr. Ashok Dhoble

It brings us great joy to know that IDA U.P. State Branch will be releasing a journal. I believe a lot of effort has gone into collating all the news etc covering the various programmes, Oral Health activities, Scientific articles, Interviews, Awards and celebrations etc. This requires dedicated team effort and I am sure the journal will appeal and benefit the members.

I am sure IDA U.P. State branch will maintain high standards of quality and IDA Members, members from the scientific community and the dental trade industry should be encouraged to contribute content matter to ensure continued success of the journal. I wish the collective contribution of all of them will take your journal on a long journey to success and greater heights.

Wishing you all the success in your endeavours.

Best wishes,

Dr Ashok Dhoble
Hon. Secretary General
IDA, HO



Message from the National Vice President, IDA Head Office
Prof T P Chaturvedi

I would like to congratulate the Editor U.P. State Dental Journal. It gives me immense pleasure and is a matter of great pride about publication of Ist issue of volume 6 of U.P. State Dental Journal Hopefully scientific articles published in the journal will be helpful for academicians, dental practitioners, and dental students. I congratulate you and the entire editorial team members for it and wish for the success of the journal.

Thanking You.

Prof T P Chaturvedi
National Vice President, IDA Head Office



Message from the President, IDA Uttar Pradesh
Dr Sudhakar Singh

It gives me immense pleasure to see that you have fulfilled the responsibility entrusted to you in an excellent manner. For this, I extend my heartfelt gratitude to you.

Along with this, I would also like to thank the former President of IDA Uttar Pradesh, Prof. T P Chaturvedi Sir. He provided invaluable support to the editorial board in reviving the publication of the UP State Dental Journal, which had been discontinued for several years. As Chairman of the Editorial Board, I am committed to supporting and carrying forward the important work initiated by him.

I once again express my sincere thanks to the Chairman of the Editorial Board and to the former President of Uttar Pradesh, Prof. T P Chaturvedi Sir. I will diligently carry forward the work started by you.

With sincere regards, Thank you.

Dr Sudhakar Singh
President, IDA Uttar Pradesh



Message from the Hon. Secretary, IDA UP State
Dr. Sachin Prakash

I extend my heartfelt congratulations to the Editor and his dedicated team for their commendable effort in compiling this edition of the journal. The comprehensive documentation of events from 2026, along with well-curated articles, reflects a strong commitment to academic excellence and professional growth.

The clinical content and case-based discussions presented will undoubtedly serve as a valuable reference for practitioners in managing complex cases.

I hope such initiatives continue in the future, further strengthening the knowledge base and unity of our dental community.

I hope, Doctors join IDA, and make our organisation even more strong and we rise to higher levels.

With best wishes.

Dr. Sachin Prakash
Hon. State Secretary
IDA – Uttar Pradesh



Message from the President Elect. IDA UP State Dr Sandeep Shukla.

Education imparts humility — with this very commitment to humility and the dissemination of knowledge, the IDA Uttar Pradesh journal continues to move steadily forward on the path of progress. As an active professional organization, it is our responsibility not only to keep our members united but also to keep them acquainted with new horizons of knowledge.

This issue is specifically dedicated to our young colleagues who are beginning their professional journeys. When the experience of senior doctors meets the modern perspective of the youth, new milestones are achieved in the medical world. The pages of this journal are a testament to the fact that there is no dearth of talent in our state; the only thing needed is a proper platform, which the IDA is continuously providing.

I congratulate all the authors and researchers who have enriched this issue with their invaluable time and knowledge. Come, let us all work together to build an Uttar Pradesh where every citizen possesses a healthy and confident smile.

Dr Sandeep Shukla
President Elect. IDA UP State



Message from the Hon. Editor, IDA UP State

Dr Vivek Shah

Dear Readers,

It is with great pride that I present this edition of the Uttar Pradesh Dental Journal, capturing the dynamic developments in dentistry across the state this year.

A key milestone was the successful Annual State Dental Conference held in Noida, which served as a hub of knowledge exchange, innovation, and professional networking. Additionally, State CDE programs in Deoria and Lucknow enriched clinical insight and encouraged academic collaboration across specialties.

Our presence at the month-long Dental Awareness Camp during the Mahakumbh Mela in Prayagraj was a defining moment—bringing preventive oral healthcare to thousands and reinforcing our commitment to community service.

Equally inspiring was the UP State Dental Sports Conclave held in Meerut, which brought together professionals and students in the true spirit of sportsmanship and unity.

This issue features a wide spectrum of scholarly articles—from original research to rare clinical case studies—reflecting the rich diversity of our profession. I extend sincere thanks to all authors, reviewers, and the editorial team for their unwavering dedication.

May this journal continue to serve as a platform for academic excellence and collaborative growth.

Warm regards.

Dr Vivek Shah
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Bioceramics in Vital Pulp Therapy: Bridging Biological Regeneration and Clinical Excellence—A Narrative Review

Dr. Trisha, Dr. Pragya Pandey, Dr.Ramesh Bharti, Dr.Promila Verma
King George's Medical University, Lucknow

ABSTRACT:

Background: Bioceramic materials have transformed vital pulp therapy (VPT) by promoting pulp preservation and reparative dentin formation through their bioactivity and biocompatibility.

Aim: This review aims to summarize the properties, mechanisms, and clinical applications of bioceramic materials in VPT.

Results: Calcium silicate-based materials such as MTA, Biodentine, and newer hydraulic cements demonstrate excellent sealing ability, calcium ion release, antimicrobial effects, and stimulation of odontogenic differentiation, improving treatment outcomes.

Conclusion: Bioceramic materials provide predictable and biologically favorable outcomes in VPT and represent promising alternatives for maintaining pulp vitality and enhancing conservative endodontic treatment.

Keywords: Bioceramics; Vital pulp therapy; MTA; Biodentine; Calcium silicate cement.

INTRODUCTION

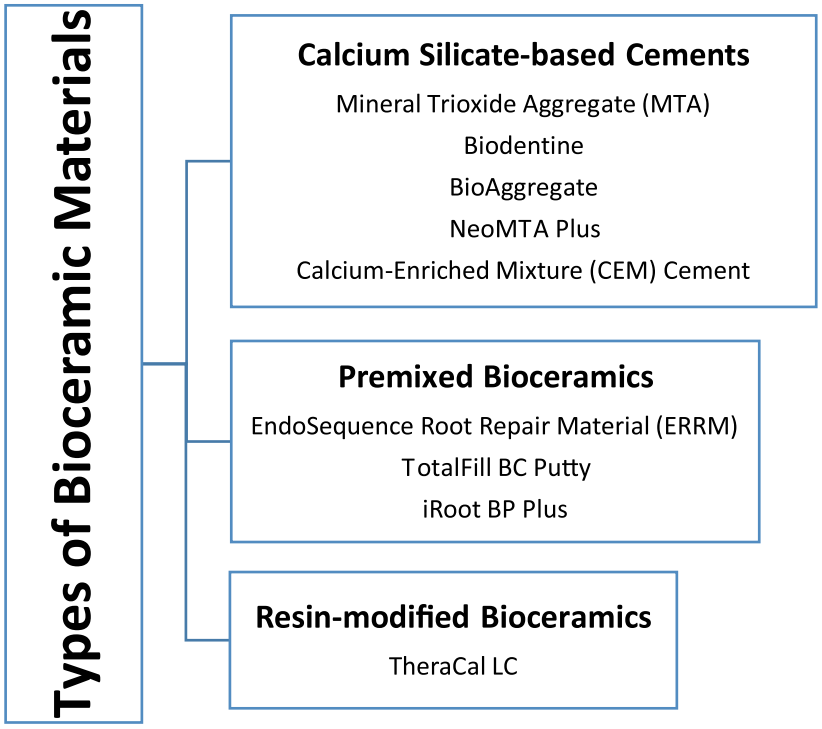
Vital pulp therapy (VPT) is a minimally invasive treatment aimed at preserving the health and function of the dental pulp after exposure caused by caries or trauma. The concept of VPT has changed considerably over the last decade. Earlier, irreversible pulpitis was considered an indication for root canal treatment; however, recent evidence suggests that the inflamed pulp has a significant capacity for healing when infection is controlled and appropriate bioactive materials are used. This shift has been driven by the introduction of bioceramic materials, which promote tissue repair and regeneration rather than simply sealing the pulp. Consequently, bioceramics have become the preferred materials for procedures such as direct pulp capping, partial pulpotomy, and full pulpotomy.

BIOCERAMIC MATERIALS

Bioceramic materials are bioactive, biocompatible ceramic-based materials, primarily composed of calcium silicate, that interact positively with living tissues. These materials set in the presence of moisture, release calcium ions, create an alkaline environment, and stimulate the formation of hydroxyapatite. Unlike traditional materials, bioceramics actively support pulp healing by encouraging the differentiation of odontoblast-like cells and the formation of reparative dentin.

TYPES OF BIOCERAMIC MATERIALS

Bioceramics used in vital pulp therapy can be classified as:

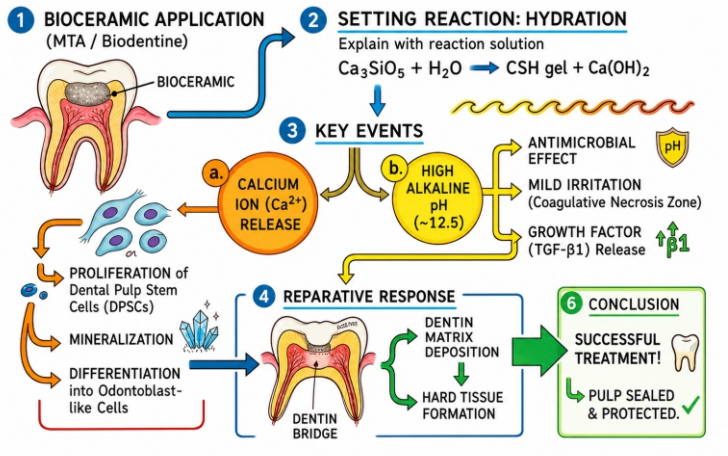


Among these, MTA and Biodentine are the most extensively studied and widely used materials because of their predictable clinical performance.

MECHANISM OF ACTION

The biological success of bioceramic materials is mainly attributed to their ability to interact with pulp tissue.

- Release calcium and hydroxyl ions after setting.
- Produce an alkaline pH that inhibits bacterial growth.
- Stimulate growth factors such as transforming growth factor-beta (TGF-β).
- Promote differentiation of dental pulp stem cells into odontoblast-like cells.
- Encourage deposition of reparative dentin (dentin bridge).
- Form hydroxyapatite at the dentin-material interface, improving the biological seal.



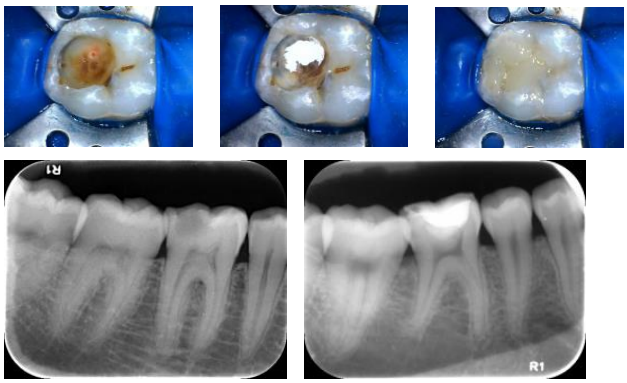
These actions help reduce inflammation and create favorable conditions for pulp healing and regeneration.

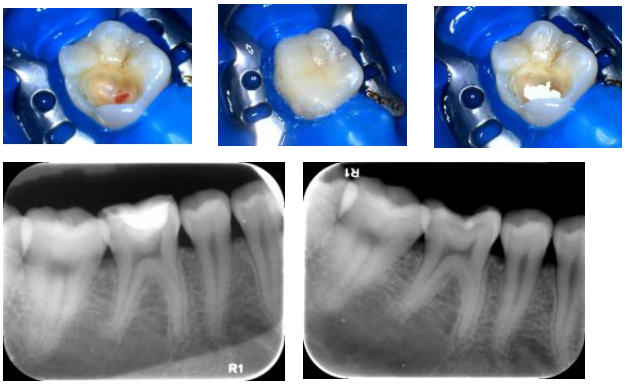
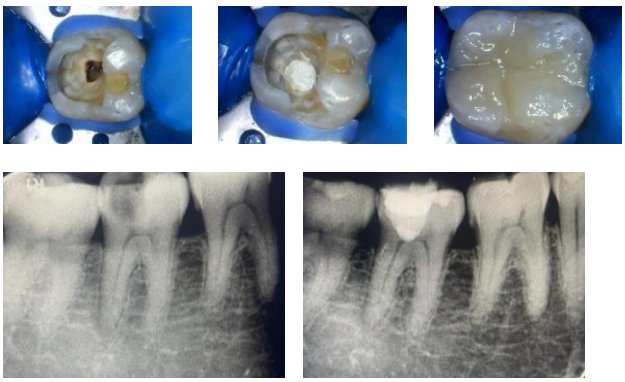
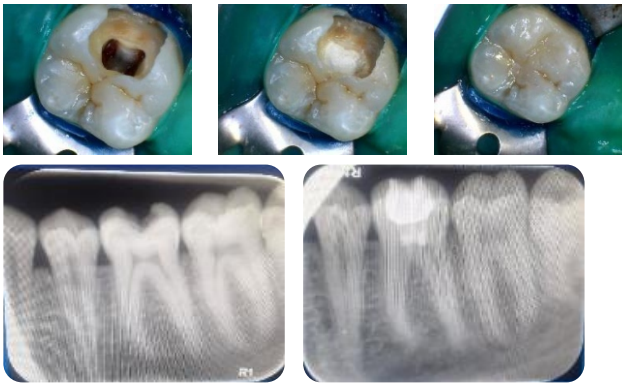
Properties of Bioceramic Materials

Property	Type	Clinical Impact
Biocompatibility	Biological	Prevents toxic or adverse inflammatory reactions when in direct contact with vital pulp tissues, supporting long-term tissue survival and healing.
Bioactivity	Biological	Stimulating cells to differentiate and regenerate tissues.
Hard Tissue Induction	Biological	Triggers the formation of a protective dentin bridge
Superior Sealing	Physical	Blocks microleakage of bacteria and fluids into the pulp.
Dimensional Stability	Physical	Won't shrink or expand, keeping the seal intact over time.
Moisture Tolerance	Physical	Sets perfectly even in the presence of blood or tissue fluid.
Radiopacity	Physical	Clearly visible on X-rays to easily monitor the healing progress.
Calcium Ion Release	Chemical	Activates essential enzymes required for mineralization.
High Alkaline pH	Chemical	Kills bacteria and neutralizes harmful acidic byproducts.

Clinical Applications of Bioceramic Materials in Vital Pulp Therapy

Bioceramic materials are widely used in vital pulp therapy due to their biocompatibility, bioactivity, calcium ion release, and ability to promote reparative dentin formation. Their superior sealing ability and biological properties have expanded the use of VPT in both immature and mature permanent teeth.

VITAL PULP THERAPY	CLINICAL AND RADIOGRAPHIC PICTURE
Indirect Pulp Capping (IPC) Bioceramics such as Biodentine and MTA are used in deep carious lesions to protect the remaining dentin and stimulate tertiary dentin formation. Their sealing ability prevents bacterial leakage and supports pulp preservation.	

Direct Pulp Capping (DPC) Following pulp exposure and hemorrhage control, bioceramic materials are placed directly over the exposed pulp.	
Partial Pulpotomy Partial pulpotomy involves removal of superficial inflamed pulp while maintaining healthy pulp tissue. Bioceramics provide a favorable environment for healing, reparative dentin formation, and long-term pulp vitality preservation	
Full Pulpotomy Full pulpotomy removes the entire coronal pulp while maintaining radicular pulp vitality	

Overall, bioceramic materials have transformed VPT by shifting treatment goals from pulp protection to biological healing and preservation of natural tooth vitality

MERITS AND DEMERITS

- Excellent biocompatibility with pulp tissue.
- Promotes natural healing and dentin bridge formation.
- Superior sealing ability, reducingmicroleakage. Antibacterial activity due to high pH.
- Better long-term clinical outcomes than calcium hydroxide.
- Suitable for minimally invasive treatment approaches

- Higher cost than conventional materials
- MTA has a long setting time.
- Some MTA formulations may cause tooth discoloration.
- Technique-sensitive placement.
- Limited long-term clinical evidence for several newer bioceramic formulations.

FUTURE PERSPECTIVES

Research on bioceramic materials is moving toward developing next-generation bioactive materials with improved handling characteristics and enhanced regenerative potential. Future directions include nanobioceramics, injectable calcium silicate cements, growth factor-loaded biomaterials, stem cell-based regenerative therapies, and 3D-printed scaffolds for pulp tissue engineering. In addition, long-term randomized clinical trials are needed to establish standardized treatment protocols and evaluate the clinical performance of newly introduced bioceramic materials.

CONCLUSION

Bioceramic materials have transformed vital pulp therapy by shifting treatment from simple pulp protection to biological regeneration. Their excellent biocompatibility, bioactivity, sealing ability, and capacity to stimulate reparative dentin formation make them the current materials of choice for preserving pulp vitality. Although challenges such as cost and limited long-term evidence for newer products remain, current research strongly supports their use in contemporary vital pulp therapy and suggests an even greater role in regenerative endodontics in the future.

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Consent Forms & Their Implications in Dental Practice

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ABSTRACT:

Informed consent has become an indispensable part of contemporary dental practice. Beyond documentation, it represents a communication process that ensures patient autonomy, shared decision-making, and medico-legal safety. This article highlights the ethical foundation of consent, its legal relevance in India, practical challenges faced by dental practitioners, and the value of adopting standardized consent templates such as those provided by the Indian Dental Association (IDA).

Introduction: Informed consent is widely regarded as an ethical cornerstone and a legal necessity in healthcare. In dentistry, where procedures often involve complex decisions, irreversible interventions, or aesthetic expectations, obtaining proper consent is crucial for maintaining transparency and trust between dentist and patient.

ETHICAL AND LEGAL IMPORTANCE OF CONSENT :

The principle of autonomy requires that patients participate actively in decisions regarding their oral health. Indian law reinforces this through interpretations of the Indian Contract Act and various Supreme Court judgments emphasizing "real consent,"3 meaning ***consent must be informed, voluntary, and given by a competent adult.***

Reid (2017)1 and others have noted that informed consent in dentistry goes beyond signatures—it requires shared understanding, patient interaction, and communication tailored to the patient's level of comprehension. Similarly, Kakar et al.2 argue that consent represents not only a legal shield but a moral obligation for clinicians.

In India, the **Consumer Protection Act, 2019** applies to dental services, and failure to take appropriate consent has been a common reason for adverse judgments against dentists 7. Therefore, maintaining well-structured consent protocols is no longer optional—it is a mandatory part of clinical governance.

CURRENT CHALLENGES IN INDIAN DENTAL PRACTICE:

Multiple studies highlight gaps between theoretical understanding and actual practice. A cross-sectional survey8 among dentists in Karnataka reported that although most recognized the importance of consent, fewer than half routinely obtained written consent except for major procedures.

Other qualitative analyses from South India show that time constraints, perceived patient disinterest, and lack of standardized templates often hinder proper implementation of consent processes.

COMPONENTS OF A VALID CONSENT PROCESS:

A legally sound and ethically meaningful consent must meet the following criteria:

1. Competence/Capacity — patient can understand and decide (if not, obtain consent

from legally authorised representative).5

2. Disclosure — nature of diagnosis, proposed treatment, reasonable risks and benefits, alternatives (including no treatment), and likely prognosis. Keep language simple and relevant to the patient.1
3. Understanding & Voluntariness — confirm the patient's comprehension (ask them to repeat key points) and document that consent was not coerced.2
4. Specificity — consent should refer to the specific procedure (e.g., "extraction of 46" or "root canal treatment of 11") and not a generic or blanket authorization. The IDA guidance reiterates that written consent should be procedure-specific.
5. Documentation — dated form, patient signature (or thumbprint), interpreter/translator or witness signatures when needed, and notation in clinical notes about the discussion.

The Indian Dental Association emphasizes that "discussions determine whether consent is valid" rather than merely obtaining a signature.[11]

SPECIAL CONSIDERATIONS:

For minors, the parent or legal guardian must provide consent, although assent from older children is recommended.

For elderly or cognitively impaired individuals, a capacity assessment and involvement of legally authorized representatives are necessary. Treatment refusals must be documented with equal care.4

Consent for photography, teaching, or publication requires separate authorization, as treatment consent alone is insufficient.

DIGITAL CONSENT AND TELE-DENTISTRY:

The growing use of digital platforms in dental practice has led to increased reliance on e-consent forms, scanned signatures, and teleconsultation confirmations.

Studies on electronic consent highlight the need for secure data handling, proper identity verification, and clear timestamping. When properly structured, digital consent can serve as an efficient and legally acceptable system.10

IDA'S INITIATIVE: STANDARDIZED CONSENT FORMS

The Indian Dental Association provides procedure-specific consent templates for general dentistry, endodontics, implants, paediatric dentistry, oral surgery, and periodontal therapy. These forms include essential disclosures, patient-friendly wording, and legally relevant sections. Adopting these templates helps practitioners maintain consistency and avoid accidental omissions.11

CONCLUSION:

Informed consent is much more than a document—it is a clinical dialogue and a professional commitment. By ensuring clear communication, proper documentation, and adherence to standardized formats such as those developed by the IDA, dental practitioners can significantly reduce medico-legal risk and enhance patient satisfaction. Strengthening consent practices ultimately reflects respect for patient autonomy and reinforces the ethical foundation of our profession.

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NON-VITAL BLEACHING AND DIRECT COMPOSITE REHABILITATION: A CONSERVATIVE ESTHETIC APPROACH FOR MANAGEMENT OF TRAUMATIZED AND DISCOLORED ANTERIOR TEETH – A CASE SERIES

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Dr. Sachin Yadav
Department of Conservative Dentistry & Endodontics, Kalka Dental College, Meerut

ABSTRACT:

Introduction: Discoloration of endodontically treated anterior teeth is a common esthetic concern. Although full-coverage restorations are frequently advised, minimally invasive approaches that preserve natural tooth structure are preferred whenever possible. Non-vital bleaching provides a conservative method for improving the shade of discolored teeth, while direct composite restorations can restore associated structural defects.

Case Series: This case series describes the management of two patients presenting with discolored endodontically treated anterior teeth. Both cases were treated using intracoronal non-vital bleaching. Additional direct composite rehabilitation was performed to restore fractured incisal edges associated with previous traumatic injuries.

Results: Both patients demonstrated satisfactory improvement in tooth color and esthetics following bleaching and adhesive restoration. The treatment approach preserved tooth structure and avoided the need for full-coverage restorations.

Conclusion: Non-vital bleaching combined with direct composite restoration provides a conservative, esthetic, and biologically favorable approach for management of traumatized and discolored anterior teeth.

Keywords: Non-vital bleaching, walking bleach technique, tooth discoloration, trauma, composite restoration, esthetic dentistry

INTRODUCTION

Esthetics plays an important role in modern restorative dentistry, especially in the management of anterior teeth. Discoloration of anterior teeth can significantly affect patient confidence and quality of life. Endodontically treated teeth are more susceptible to discoloration due to several factors including pulpal necrosis, trauma, hemorrhagic products, and incorporation of restorative materials into dentinal tubules.

Management of discolored non-vital teeth ranges from conservative bleaching procedures to invasive restorative treatments such as veneers and crowns. Although prosthetic rehabilitation may provide acceptable esthetic results, it often requires removal of additional tooth structure. With the advancement of adhesive dentistry, conservative approaches have gained importance.

Non-vital bleaching, also known as intracoronal bleaching, is a technique used to improve the appearance of endodontically treated teeth by placing bleaching agents within the pulp chamber. The walking bleach technique is commonly used due to its simplicity, predictable results, and minimal invasiveness.

A successful bleaching procedure requires proper case selection, adequate root canal treatment, effective cervical sealing, and careful control of bleaching materials. The use of a cervical barrier reduces the risk of diffusion of bleaching agents into periodontal tissues.

Direct composite restorations have also become an important part of conservative esthetic rehabilitation. They allow restoration of fractured tooth structure while preserving maximum healthy tissue.

This case series presents two cases managed with non-vital bleaching combined with direct composite restoration, demonstrating a conservative approach for traumatized and discolored anterior teeth.

CASE SERIES

CASE 1

A 40-year-old male patient reported to the Department of Conservative Dentistry and Endodontics with the chief complaint of blackish discoloration in upper front tooth region since the past 3–4 years.

The patient had a history of root canal treatment approximately five years earlier. Clinical examination revealed discoloration of the endodontically treated anterior tooth. The tooth was asymptomatic, and radiographic evaluation showed unsatisfactory endodontic treatment with Amalgam as the post endodontic restorative material.

Since the tooth was not adequately treated endodontically, Re-RCT was performed followed by a conservative bleaching procedure and esthetic composite restoration for rehabilitation of the incisal edge was planned.



Figure 1: Pre-operative clinical image



Figure 2: Pre-operative Radiograph

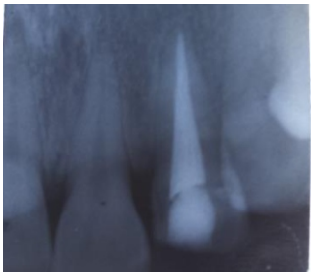


Figure 3: Re-RCT Radiograph

After isolation, Re-RCT was performed and in the subsequent visit the access cavity was reopened and the coronal gutta-percha was removed below the cemento-enamel junction. A cervical barrier(GIC) was placed to prevent leakage of bleaching materials. The bleaching agent(Sodium perborate and Hydrogen Peroxide in 1:1 Ratio) was made into a paste and placed inside the pulp chamber and the access cavity was temporarily sealed. Patient was advised to wait for some time to check for leaking of the Bleaching agent from the tooth and restorative margin. After evaluating the satisfactory seal the patient was sent with proper post treatment instructions.

The patient was recalled at regular intervals and bleaching sessions were performed until satisfactory shade improvement was achieved. After completion of the bleaching procedure,

the acidic environment in the tooth cavity was neutralized by placing calcium hydroxide suspension for 7 days. This duration is necessary for releasing the remaining oxygen and dentin remineralization to stabilize the colour and to provide adequate adhesion to the composite filling material. On the subsequent visit the fractured portion was restored using esthetic composite resin to restore morphology, function, and esthetics.



Figure 4: First Visit



Figure 5: Second Visit



Figure 6: Third Visit



Figure 7: Fourth visit



Figure 8: Final esthetic outcome



Figure 9: Six Months Follow -up

Follow-up examination showed stable shade and satisfactory restoration.

CASE 2

A 25-year-old male patient complained of unesthetic appearance of face due to broken tooth and blackish discoloration in upper front tooth region since approximately 2–3 years.

The patient reported a history of accidental fall resulting in trauma to the anterior region. Following trauma, root canal treatment was performed on the affected tooth. The patient had previously been advised a crown but wanted a more conservative treatment option.

Clinical and radiographic examination revealed a satisfactorily treated endodontic tooth with discoloration. Ellis Class I Fracture in the upper left central incisor was noted with no sensitivity, pain & tenderness on percussion was absent. Radiographic examination showed no periapical changes. Cold Test and Electric Pulp Test revealed a Vital Pulp hence esthetic composite restoration was planned for incisal edge buildup.



Figure 10: Pre-operative



Figure 11: First visit



Figure 12: Second visit



Figure 13: Third visit



Figure 14: Final visit & Composite Build-up



Figure 15: Six months follow-up

Non-vital bleaching was planned using a conservative intracoronal bleaching approach. The bleaching procedure was performed over multiple visits until acceptable shade correction was obtained.

The fractured adjacent tooth was restored using esthetic composite resin, providing a harmonious appearance with the bleached tooth.

The final result demonstrated satisfactory esthetics and preservation of tooth structure.

DISCUSSION

Discoloration of endodontically treated teeth remains a frequent esthetic challenge. Traumarelated pulpal changes and previous endodontic procedures are important causes of intrinsic discoloration.

Non-vital bleaching provides a conservative alternative compared with extensive restorative procedures. The walking bleach technique allows gradual whitening by placing bleaching material inside the pulp chamber.

Proper sealing of the cervical region is essential during intracoronal bleaching. A cervical barrier prevents penetration of bleaching agents into periodontal tissues and reduces the risk of external cervical resorption.

Following bleaching, definitive restoration should be delayed until shade stability is achieved and residual oxygen from bleaching agents has reduced, as residual oxygen may interfere with adhesive procedures.

Direct composite restoration offers several advantages, including minimal tooth preparation, preservation of enamel and acceptable esthetics. In the presented cases, composite rehabilitation allowed correction of traumatic defects while maintaining a conservative treatment philosophy.

The combination of bleaching and adhesive restoration provides a predictable approach for selected cases where patients prefer preservation of natural tooth structure.

CONCLUSION

Non-vital bleaching combined with direct composite rehabilitation provides an effective conservative approach for management of discolored anterior teeth. This technique improves esthetics while preserving tooth structure and avoiding unnecessary invasive procedures.

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Oral cancer diagnostics: Recent Advances and review for Practicing Dental Surgeons

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ABSTRACT:

Oral cancer is a common and serious head and neck cancer with a 5-year survival rate of less than 50%. It is often preceded by oral potentially malignant disorders (OPMDs), but predicting which OPMDs will develop into cancer is challenging. Although various diagnostic technologies, including approved in vitro diagnostic tests and medical devices, have been developed, early detection remains difficult. Emerging technologies such as novel biomarkers, electronic diagnostic systems, and artificial intelligence offer promising opportunities for earlier and more accurate diagnosis. Currently, visual oral examination is the standard first-line screening method, but its limitations can lead to late cancer diagnosis or failure to identify high-risk OPMD cases. The article reviews existing diagnostic methods and explores future technologies that may improve the early detection and treatment of oral cancer.

INTRODUCTION

India accounts for a third of the total cases of oral cancer in the world. The online database Globocan that provides the incidence and mortality for 36 major cancers worldwide pegs new cases of oral cancers in India at 119,992 leading to death of 72,616 Indians, annually. This means of all the cancers affecting India, oral cancer alone accounts for 30% cases. According to the Indian Council of Medical Research, more men than women die of oral cancer.1,2

The overall 1-year survival rate for patients with all stages of oral cavity and pharynx cancers is 81%. The 5- and 10-year survival rates are 56% and 41%, respectively. The term "head and neck cancer" refers to neoplasm arising from below the skull base to the region of thoracic inlet. It includes mucosal surface of the lip, oral cavity, pharynx, larynx, nose, Para-nasal sinuses, salivary glands, and cervical gland deposits. There are many histological types but squamous cell carcinoma is the most common one. Oral cavity extends from lips to the junction of hard and soft palate superiorly and the circumvallate papillae of tongue inferiorly and includes commissures, tongue, floor of mouth, gingivae, buccal mucosa, retromolar trigone, and hard palate. Oral cancer is a nonspecific broad term encompassing all neoplasms that involve the structures in this anatomical region. The most common cancer involving this area is the squamous cell carcinoma followed by verrucous carcinoma.[1,3,4]

The leading preventable cause for cancers in oral cavity is tobacco use. Fact Sheet of the India chapter of Global Adult Tobacco Survey 2 (2016–2017) shows that prevalence of tobacco use stands at 28.6%, i.e., 42.4% of males and 14.2% of females which means that 266.8 million adults in India use tobacco in one form or another. Other than chewing or smoking tobacco important predisposing factors for oral cancer are age, male gender, alcohol, sun exposure, ionizing radiation, betel (areca) chewing, immunosuppression and graft versus host disease, infections with human papilloma virus (HPV), low socioeconomic status, diet, certain

occupations, and poor oral hygiene. This review enlightens all the diagnostic modalities/technologies used in diagnosis of oral cancer very ranging from conventional to most advanced one.[1,3]

PATHOGENESIS

- Latest model to explain carcinogenesis: Molecular model of dysplasia and carcinogenesis (depends on LOH [loss of heterozygosity] at chromosomes.
- Dysplastic changes begin from the basal layer of the epithelium upwards.
- Major genes involved in head and neck squamous cell carcinoma (HNSCC) include proto-oncogenes and tumor suppressor genes (TSGs).
- Proto-oncogenes: Function in coding for growth factors, growth factor receptors, protein kinases, signal transducers, nuclear phosphoproteins, and transcription factors. Proto-oncogenes associated with HNSCC include ras (rat sarcoma), cyclin-D1,myc, erb-b (erythroblastosis), bcl-1, bcl-2 (B-cell lymphoma), int-2, CK8, and CK19.
- TSGs -negatively regulate cell growth and differentiation. Both copies of a TSG must be inactivated or lost (loss of heterozygosity [LOH]) for loss of function (the "two-hit" hypothesis). TSGs involved in HNSCC are p53, Rb (retinoblastoma), and p16INK4A. Other candidates include FHIT (fragile histidine triad), APC (adenomatous polyposis coli), DOC1 VHL (gene for von Hippel-Lindau syndrome), and TGF-R-II (gene for transforming growth factor type II receptor).
- LOH on 17p (the region of the p53 gene) is found in 50% of cases of HNSCC.

Predisposing causes of head and neck cancers are obscure but, in many cases, related to tobacco smoking and chewing, age, male gender, alcohol, sun exposure, ionizing radiation, betel (areca) chewing, immunosuppression, and graft versus host disease, infections with HPV, low socioeconomic status, diet, certain occupations, and poor oral hygiene appear to increase the risk for oral cancer. Among the potentially malignant lesions responsible are leukoplakia, erythroplakia, oral submucous fibrosis, melanoplakia, lichen-planus, sclerosing hemangioma. 5%–37% of leukoplakias develop into cancer as reported in various studies. The risk of malignant transformation has been reported to be between 6.6% and 36.4% although a recent meta-analysis indicated a rate of 12.1%.

Commonly, the tumor spreads by direct route along the facial planes to involve adjacent soft tissue structure and lymphatics. Hematogenous spread occurs late in the course of disease and lead to distant metastasis. Lung is the most common site of involvement in 50% of metastasis cases. Lymphatic involvement depends on various factors such as histology, grade, size, and site of primary tumor.5,6,7

PRESENTING SIGNS AND SYMPTOMS

Oral cancer is initially asymptomatic. Discomfort is the most common symptom. Others are: Lymphadenopathy, displaced teeth, loosened teeth over a short period, foul smell, ulceration, induration or rolled borders, exposure of underlying bone, sensory or motor neural deficits, weight loss, dysguesia, dysphagia, dysphonia, hemorrhage.6,7

Clinically it presents as Papillary(exophytic), Ulcerative, deeply infiltrative (scirrhous type), Plaque type (red/ white/mixed) as most common presentations.

DIAGNOSTIC AIDS IN SCREENING ORAL CANCER AND PRECANCER: ROLE OF IMAGING

- Routine radiology usually demonstrates evidence of floating tooth/ hanging drop appearance on radiographs and ill-defined destruction.
- Computed Tomography (CT) shows the extent of bone involvement.
- Nuclear scintiscanning (PET scan, SPECT, fusion imaging helps to rule out evidence of metastasis, evidence of bone involvement and necrosis after radiotherapy.
- MAGNETIC RESONANCE IMAGING(MRI) shows the extent of soft tissue involvement.
- Ultrasonography can demonstrate assessment of lymph node and salivary gland
- USG guided FNAC is used for assessment of head and neck masses.

OTHER SCREENING AIDS

- CYTOLOGY
- ORAL BRUSH BIOPSY
- TOLUIDINE BLUE
- COMPUTER ASSISTED CYTOLOGY OF ORAL BRUSH BIOPSY SPECIMEN
- LIGHT BASED DETECTION SYSTEMS
- SCALPEL BIOPSY [BIOS:LIFE; OPSIS: VISION]
- FNAC
- DNA Aneuploidy
- Molecular Analysis: AGNOR counts (Nucleolar organiser regions (NORs) are defined as nucleolar components containing a set of argyrophilic proteins, which are selectively stained by silver methods.)

EXFOLIATIVE CYTOLOGY

It is the microscopic examination of shed or desquamated cells from the epithelial surface usually the mucous membrane.

Imprint Cytology: The procedure involves a gentle grazing or skidding of a glass slide over the cut surface of a resected tumor immediately after surgery. This followed by PAP staining will detect tumor margin positivity in less than 20 minutes. The surgeon now gets a directive as to which site he should perform an extra clearance thereby avoiding majority of recurrences.

Indications for oral cytologic smears:

1. Clinically innocuous mucosal lesion
2. Evaluation of an extensive mucosal lesion when it is not possible to do a sufficient number of incisional biopsies for adequate sampling.
3. Follow-up for patients with prior diagnoses of either premalignant or malignant mucosal lesions.
4. Contraindication of surgical biopsy by the patient's medical status or patient refusal.
5. Assessment of potential oral candidiasis and viral infections.

ORAL BRUSH BIOPSY

- This biopsy method utilizes a brush to obtain a complete transepithelial biopsy specimen with cellular representation from each of the three layers of the lesion: the

basal, intermediate, and superficial layers, unlike cytology instruments, which collect only exfoliated superficial cells. The patented brush biopsy tool, together with analysis of oral brush biopsies assisted with sophisticated computers make the OralCDx test (Suffern) highly accurate.9,10

- Indicated for Epithelial abnormalities like leukoplakia, erythroplakia, chronic ulcerations, mucosa that is atrophic, thickened, traumatized or irritated
- Contraindications: Lesions with intact normal epithelium like fibromas, mucoceles, hemangiomas, submucosal masses, pigmented lesions, amalgam tattoos It is not for use on the vermilion border of the lip; generalized white or vesiculo-erosive lesions; highly suspicious lesions (immediate scalpel biopsy)

VITAL STAINS:

- metachromatic dye that binds to nucleic acids(DNA or RNA) and can help to better visualization of high-risk areas-with rapid cell proliferation of oral SCC or OPML.
- It is done by rinsing with acetic acid 1% followed by Vital iodine stain (3% lugol solution), toluidine blue(tolonium chloride 1%).
- Used to identify exact site of biopsy.

LIGHT BASED SYSTEM:

1. **CHEMILUMINESCENCE:**
   VIZILITE
2. **TISSUE FLUORESCENCE IMAGING**

- LIGHT EMMISSION TECHNIQUE:

I. MICROLUX DL

II. ORASCOPTIC DK

- NARROW EMISSION TISSUE FLORESCENCE(VELscope)
- MULTIPLE FLUORESCENCE & REFLECTANCE (IDENTAFI 3000)
- NEWER LIGHT-BASED TECH

I. CONTACT ENDOSCOPY

II. ENDOSCOPIC HIGH FREQUENCY ULTRA SOUND

TISSUE REFLECTANCE OR CHEMILUMINESCENCE BASED: VIZILITE

- First rinse with acetic acid 1%, then mucosa subjected to examination with Bluish white light(430-580nm)
- Normal healthy tissue will absorb the light and appear dark
- Abnormal tissues: white.

ViziLite Plus and MICROLUX DL - combination of Vizilite with toluidine blue for staining suspicious areas so that exact site of biopsy can be determined.

AUTOFLUOROSCENCE BASED: VELscope

- Based on the direct visualization of tissue □ uorescence
- Under intense blue excitation light (400–460 nm) provided by the unit, normal oral mucosa emits a pale green autofluorescence.
- Abnormal cell/ dysplastic cell appear: irregular, dark areas

TISSUE FLUORESCENCE SPECTROSCOPY:

This technique consists of a small optical fiber that produces various excitation wave lengths and a spectrograph which receives and records on a computer and analyzes via a dedicated software, the spectra of reflected fluorescence from the tissue.11,12,13

IDENTAFI 3000

Increased vascularization, a hallmark of malignancy leads to changes in reflectance between normal and potentially malignant tissue and this spectroscopic difference is the basis for the Identafi device which is manufactured by Star Dental-Dental EZ, Lancaster (USA). The device is portable and multiuse. Based on the underlying principles of autofluorescence and confocal microscopy, Identafi 3000 uses fiber-optic light sources housed in a mouth mirror like casing and three wavelengths are used to examine the mouth, white conventional light-405 nm for autofluorescence and 445 nm green amber light for spectroscopic differences.13,14

OPTICAL COHERENCE TOMOGRAPHY

n optical coherence tomography (OCT), light is sent into tissues and it is reflected back just as sound waves are used in ultrasonography but unlike sound waves light travels fast and therefore direct measurements as with ultrasound are not feasible in practice. Hence, the light beam is split with half the beam directed into tissue being examined and the other half toward a reference mirror. Light is reflected from mirror and tissue specimens and reflected beams undergo interference. This phase difference is picked up by radial scanner and a two-dimensional image is generated. Alternative light sources are being explored to improve the resolution of these images. Advancement in this technology called the "Femtosecond transillumination tomography" has been shown to image up to a depth of 15 mm in experiments.7

Cellular and molecular techniques:

- cytomorphometric and histomorphometric analysis
- molecular analysis
- genetic alteration assessment.

BIOPSY:

- The most definitive, accurate, and reliable method for diagnosing oral mucosal lesions is the biopsy.
- Contraindications: Suspected vascular lesions such as hemangiomas, multiple neurofibromas

Recommendation Statements from National Bodies

Several national organizations have evaluated the available evidence on oral cancer screening and published clinical guidelines whether to screen or not to screen for oral cancer/OPMDs. Based on the evidence available up to 2015, the UK National Screening Committee recommended against screening for oral cancer and is currently under rereview (UK National Screening Committee 2020). The committee based this recommendation on the evidence that 1) only a small percentage of OPMDs progressed to malignancy, 2) it was unclear which individuals with OPMDs progressed to oral cancer, 3) there was insufficient evidence to determine the accuracy of screening tests in the general UK population, and 4) it was not clear which individuals detected through screening should be offered treatment. The committee reaffirmed an earlier report that effectiveness of early treatment for oral cancer in leading to

better outcomes than late treatment had been established.

The US Preventive Services Task Force (USPSTF) also concluded that the available evidence was insufficient to assess the balance of benefits and harms of screening for oral cancer in asymptomatic adults. Counterarguments to the USPSTF have been proposed (Edwards 2013). The recommendation was intended for primary medical care providers and did not pertain to dental providers or otolaryngologists, who, it was conceded, may conduct a comprehensive examination of the oral cavity during a clinical encounter.

The American Cancer Society recommends that adults aged 20 y or older who have periodic health examinations should have the oral cavity examined as part of a cancer-related checkup. The American Dental Association recommends that clinicians perform a VOE in all adult patients during initial, routine, or emergency visits.

Indian Dental Association launched National Oral Cancer Registry (NOCR) in January 2018.

The centralized digital registry aims to pool data on oral cancer cases and precancerous lesions to help track trends, plan treatments, and build strategies to combat the disease in India

CONCLUSION

Screening for oral cancer has been researched using several models. It is important to select the best model that suits a particular population based on the disease incidence, available resources, and the health system of the country. Screening studies performed to date demonstrate potential strengths and weaknesses but are useful to provide a general framework to help inform clinicians and policy makers when considering recommendations for oral cancer screening. We outline some challenges and offer solutions for future research. Screening high-risk populations or introducing telemedicine for consultation with specialists may reduce costs and increase efficiency. Combining adjunctive aids to enhance visual examination or using salivary/blood-based testing using proven biomarkers has not been investigated in primary care and could be incorporated into future oral cancer screening research programs.

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Reciprocating File Systems in Contemporary Endodontics: A Narrative Review

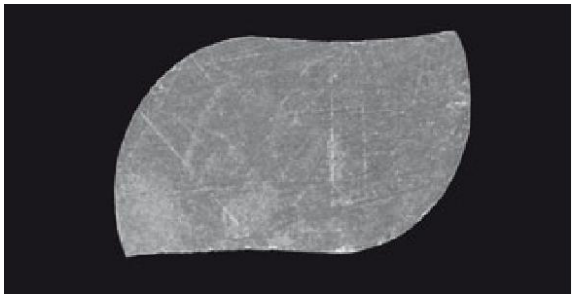
Dr.Ananya Karmakar, Dr. Pragya Pandey, Dr.Ramesh Bharti, Dr.Promila Verma
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ABSTRACT:

Nickel-titanium (NiTi) reciprocating file systems have significantly influenced contemporary endodontic practice by simplifying root canal preparation and improving instrument safety. Unlike continuous rotary systems, reciprocating instruments operate through alternating clockwise and counterclockwise movements that reduce torsional stress and cyclic fatigue, thereby decreasing the risk of instrument separation. Advances in heat-treated NiTi alloys, including M-Wire, Gold Wire, Blue Wire, and Controlled Memory (CM) alloys, have further enhanced the flexibility and fatigue resistance of these instruments. Commercially available systems such as Reciproc, Reciproc Blue, WaveOne, and WaveOne Gold have demonstrated predictable shaping ability, preservation of canal anatomy, and improved clinical efficiency. Although reciprocating systems offer several advantages, including reduced instrumentation time and simplified clinical protocols, concerns remain regarding debris extrusion, dentinal defects, and retreatment efficacy. This narrative review summarizes the evolution, metallurgy, clinical performance, advantages, limitations, and future prospects of reciprocating file systems based on current evidence.

INTRODUCTION

Successful root canal treatment depends on effective cleaning, shaping, and disinfection of the root canal system while preserving its original anatomy. Nickel-titanium (NiTi) rotary instruments revolutionized endodontic practice because of their superior flexibility and ability to negotiate curved canals with fewer procedural errors than stainless steel files. However, continuous rotary instrumentation remains susceptible to cyclic fatigue and torsional fracture, particularly in complex root canal anatomy. To overcome these limitations, reciprocating instrumentation was introduced as a safer and more efficient alternative. Reciprocating file systems use alternating rotational movements that reduce mechanical stress on the instrument while maintaining effective dentin cutting. Combined with advances in heat-treated NiTi alloys, reciprocating systems have improved shaping efficiency, fatigue resistance, and clinical safety. Consequently, they are widely used for both primary root canal treatment and nonsurgical retreatment. This review highlights the evolution, clinical performance, advantages, limitations, and future perspectives of reciprocating file systems in contemporary endodontics.



S- SHAPE CROSS SECTION OF RECIPROC BLUE

EVOLUTION OF RECIPROCATING INSTRUMENTATION

The development of reciprocating instrumentation originated from the balanced-force concept and was popularized by Yared in 2008 through the use of a single NiTi file in reciprocating motion. This innovation simplified root canal preparation and reduced instrument fatigue. Commercial systems such as Reciproc and WaveOne were subsequently introduced, followed by improved heat-treated instruments including Reciproc Blue and WaveOne Gold. Recent advancements in metallurgy and instrument design have enhanced flexibility, cutting efficiency, and cyclic fatigue resistance, making reciprocating systems a predictable option for routine endodontic practice.



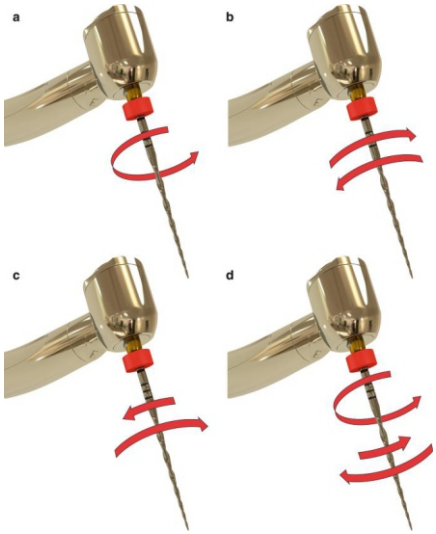
WAVEONE GOLD FILE SYSTEM



RECIPROC BLUE FILE SYSTEM

PRINCIPLE OF RECIPROCATING MOTION

Reciprocating file systems operate through alternating counterclockwise and clockwise rotations. The larger counterclockwise movement engages and cuts dentin, whereas the smaller clockwise movement disengages the instrument, thereby reducing torsional stress. This motion distributes mechanical stress more evenly, increases cyclic fatigue resistance, minimizes the screw-in effect, and decreases the likelihood of instrument fracture. The simplified single-file technique also reduces chairside time while maintaining effective canal shaping.



RECIPROCATING MOVEMENT

METALLURGY OF RECIPROCATING INSTRUMENTS

Advances in NiTi metallurgy have significantly improved the mechanical properties of reciprocating instruments. Conventional NiTi has been replaced by thermomechanically treated alloys such as M-Wire, Gold Wire, Blue Wire, and Controlled Memory (CM) Wire, which provide greater flexibility and resistance to cyclic fatigue. Instruments manufactured from these alloys better preserve canal curvature and are less susceptible to fracture during instrumentation. Heat-treated systems such as Reciproc Blue and WaveOne Gold have shown superior flexibility and fatigue resistance compared with earlier generations, contributing to safer and more predictable clinical performance.

COMMONLY USED RECIPROCATING FILE SYSTEMS

Several reciprocating file systems are currently available, differing mainly in alloy composition, cross-sectional design, taper, and heat treatment. Reciproc (VDW), manufactured from M-Wire alloy, was one of the first dedicated reciprocating systems and is available in R25, R40, and R50 sizes. Reciproc Blue incorporates Blue heat treatment, providing greater flexibility and cyclic fatigue resistance than the original Reciproc. WaveOne and its successor WaveOne Gold utilize M-Wire and Gold Wire technologies, respectively, with modified cross-sectional designs that improve cutting efficiency and flexibility. Newer systems such as R-Motion, EdgeOne Fire, and ProDesign R employ advanced heat-treated alloys and have demonstrated promising mechanical properties.

Instrument selection should be based on canal anatomy, clinical experience, and treatment objectives rather than on a single design feature.

CLINICAL PERFORMANCE

Shaping Ability

Reciprocating systems effectively maintain the original canal curvature while producing a continuously tapered preparation. Most studies have reported shaping ability comparable to that of rotary systems, particularly in curved canals.

Cyclic Fatigue Resistance

One of the greatest advantages of reciprocating instrumentation is its superior resistance to cyclic fatigue. The combination of reciprocating motion and heat-treated NiTi alloys significantly reduces the risk of instrument fracture, especially in severely curved canals.

Canal Transportation and Centering Ability

Heat-treated reciprocating systems generally exhibit minimal canal transportation and good centering ability. Instruments such as Reciproc Blue have shown improved flexibility and better preservation of canal anatomy compared with earlier generations.

Debris Extrusion

Apical extrusion of debris occurs with all instrumentation techniques. Several studies have reported slightly greater debris extrusion with reciprocating systems than with continuous rotary instrumentation, although the clinical significance remains uncertain. Appropriate irrigation and instrumentation techniques can minimize this effect.

Dentinal Defects

The relationship between reciprocating instrumentation and dentinal crack formation remains controversial. While some investigations have reported microcrack formation following

reciprocating instrumentation, micro-CT studies suggest that many of these defects may already exist before canal preparation. Therefore, current evidence does not conclusively establish reciprocating motion as the direct cause of dentinal cracks.

Retreatment Efficacy

Reciprocating instruments are widely used during nonsurgical retreatment because they efficiently remove root canal filling material while reducing treatment time. However, no reciprocating or rotary system is capable of completely removing filling material from the entire canal system. Supplementary irrigation activation or finishing instruments may further improve cleanliness.

ADVANTAGES

Reciprocating file systems offer several clinical advantages, including simplified single-file instrumentation, reduced chairside time, enhanced cyclic fatigue resistance, improved flexibility, and a lower incidence of instrument separation. They effectively preserve canal anatomy and are particularly useful in curved and narrow canals. Their ease of use also shortens the learning curve for clinicians and improves procedural efficiency.

LIMITATIONS

Despite their advantages, reciprocating systems are associated with certain limitations. Complete removal of debris and root filling material remains difficult, especially during retreatment. Some studies have reported increased apical debris extrusion, and concerns regarding dentinal crack formation continue to be investigated. Instrument selection should therefore be individualized according to canal anatomy and clinical requirements.

FUTURE PERSPECTIVES

Future developments in reciprocating instrumentation are expected to focus on advanced heat-treated alloys, adaptive motion technologies, surface modifications, and improved instrument designs that further enhance flexibility, fatigue resistance, and cutting efficiency. Integration of artificial intelligence, finite element analysis, and three-dimensional printing may also contribute to the development of safer and more customized endodontic instruments.

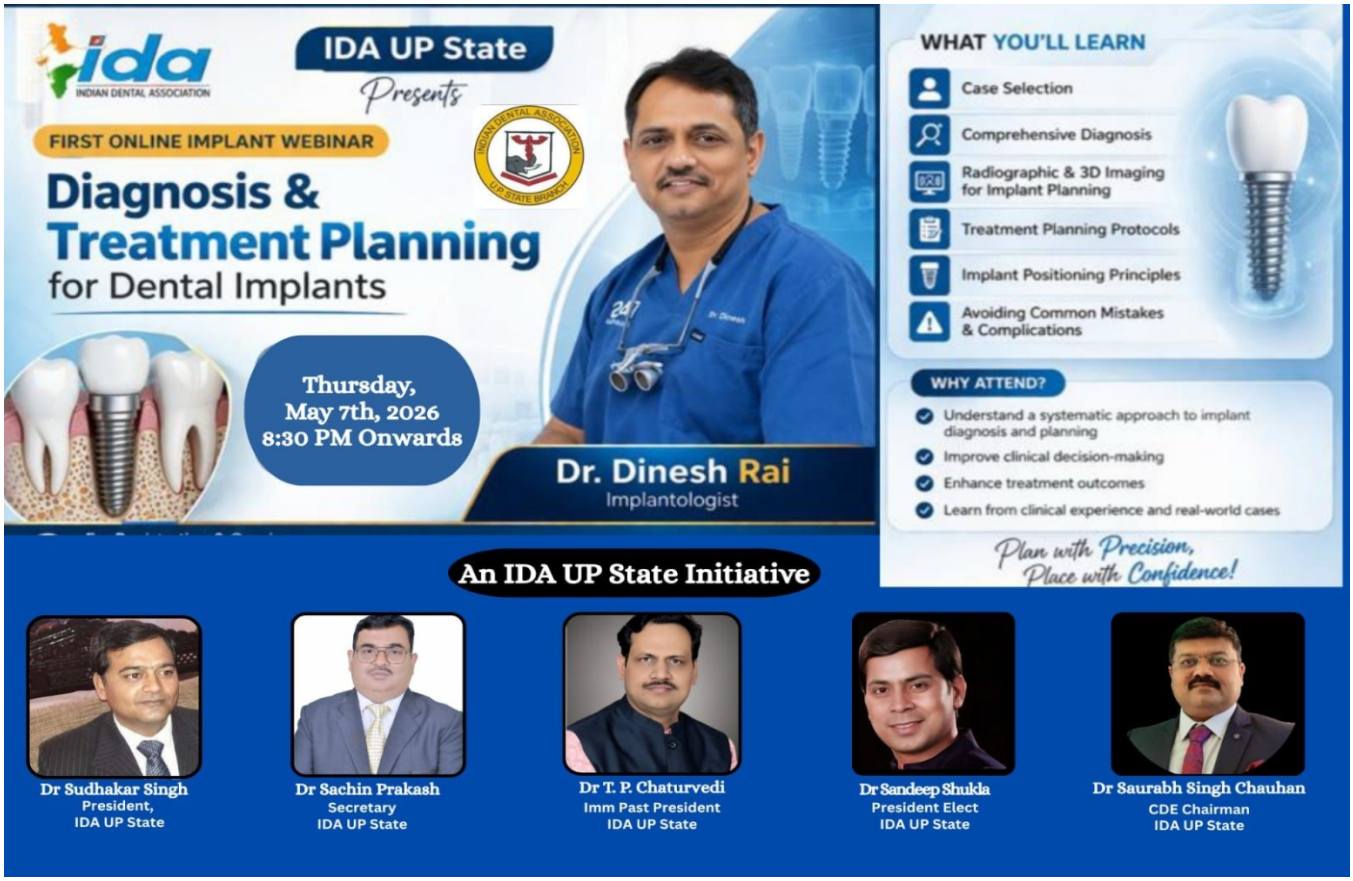
CONCLUSION

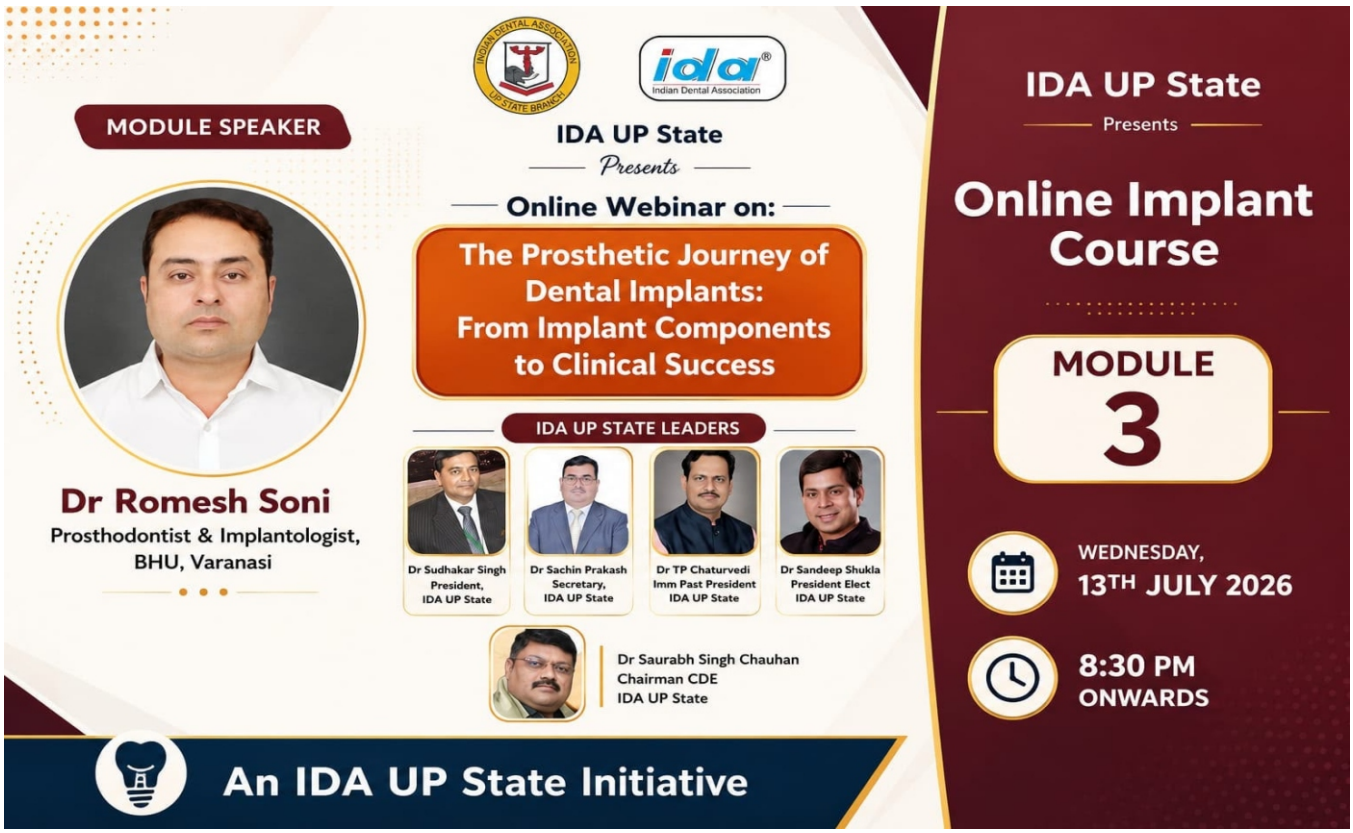
Reciprocating file systems represent a major advancement in modern endodontics by combining simplified instrumentation with excellent mechanical performance. Advances in NiTi metallurgy and reciprocating kinematics have improved flexibility, cyclic fatigue resistance, and shaping efficiency while reducing the risk of instrument separation. Although no system can completely eliminate procedural challenges, current evidence supports reciprocating instrumentation as a safe, efficient, and predictable approach for both primary root canal treatment and retreatment. Continued improvements in instrument design and metallurgy are expected to further enhance clinical outcomes.

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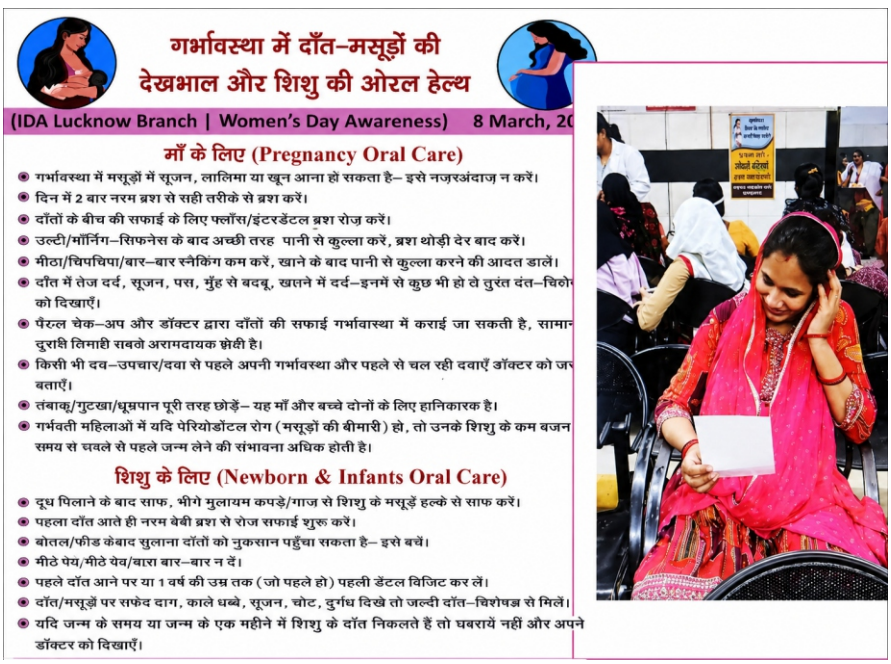

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