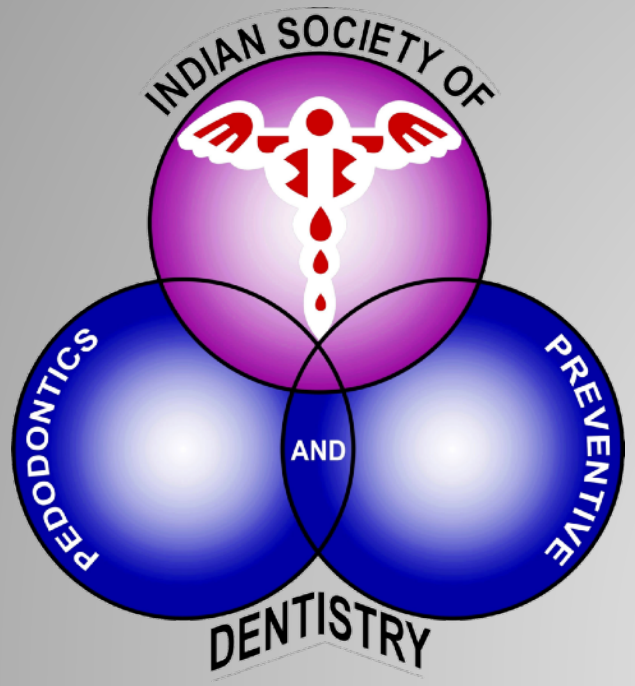
Dr Prasad Musale (MDS, MLD)

- Graduate from Bharati Vidyapeeth Dental College & Hospital, Pune(1994), Postgraduate from Government Dental College & Hospital, Mumbai(1999) and Masters in Laser Dentistry from Med- ical University of Vienna, Austria(2010)
- Teaching experience of 19 years
- Core interest in Pediatric Endodontics, Microscopic Pediatric Dentistry, MID and Laser assisted Pediatric Dentistry
- Published more than 25 International and National scientific papers
- Contributed many chapters in leading Pediatric Dentistry textbooks of authors like Dr Damle and Dr Shobha Tondon.
- Invited as Speaker/Faculty for National and international conferences
- Director of “Little Ones Big Smiles” Laser and Microscope Integrated Pediatric Dentistry in Pune since 1999



PEDIATRIC ENDODONTICS

VITAL AND NON-VITAL PULP THERAPY

Dr Prasad Musale (MDS, MLD)
Pune,India

SCOPE OF PEDIATRIC ENDODONTICS

To understand the developmental and biomedical aspects of primary and permanent pulp

Comprehensive clinical and radiographic diagnosis of the pulp and periradicular lesions

Vital pulp therapy and Nonvital pulp therapy including Regenerative Endodontics

Selective surgical removal of pathological tissues resulting from pulpal pathosis

Intentional replantation and replantation of avulsed teeth

Surgical removal of tooth structure, such as root-end resection and root-end filling; hemisection, and root resection

Bleaching of discolored dentin and enamel

Retreatment of teeth previously treated endodontically

Coronal restorations by means of post and/or cores involving the root canal space

LIMITATIONS OF PEDIATRIC ENDODONTICS

Is the tooth needed or important? Could serve as an abutment for prosthesis or space maintainer?

Is the tooth salvageable, or is it so badly damaged it cannot be restored?

Threat to the underlying successor or surrounding teeth

Any associated pathology ?

Any systemic contraindications ?

Is the tooth serving esthetically, or would the patient be better served by its extraction?

Is the practitioner capable of performing the needed endodontic procedures?

Patient Related Factors: Age related, Poor oral hygiene habits, Cooperativeness , Parental expectations etc.

IMPORTANT REFERENCES

Fuks A, Peretz B. Pediatric Endodontics: Past and present perspectives and future directions, Pediatric Endodontics: Current concepts in pulp therapy for primary and young permanent teeth, Springer Publications, 1st edition.

Schröder U. Pediatric Endodontics, Pediatric Dentistry: A clinical approach, Wiley-Blackwell, 2nd edition.

Ingle's Endodontics 6 : Modern Endodontic Therapy; Past, Present and Future BC Decker Inc.

ENDODONTIC CONSIDERATIONS IN YOUNG PERMANENT TEETH

- Introduction
- Crown restorability
- Root end maturation (Diameter)
- Crown:Root ratio (Root length)
- Root dentine thickness
- Associated pathology
- Morphologic variations
- Orthodontic consideration
- Child and/or Parental compliance

IMPORTANT REFERENCES

Hargreaves KM, Law AS. Regenerative Endodontics. Chapter 16. Pathways of the Pulp 10th ed. Eds, Hargreaves KM, Cohen S. Mosby Elsevier, St Louis, MO, 2011: 602-19.

AAE Clinical Considerations for a Regenerative Procedure, 2018.

AAPD guidelines on Pulp Therapy for Primary and Immature Permanent Teeth.
AAPD Reference manual 2019-2020.

ENDODONTIC PROCEDURES IN PRIMARY TEETH

VITAL PULP THERAPIES

(Normal pulp or reversible pulpitis)

PULP CAPPING

INDIRECT PULP TREATMENT

DIRECT PULP CAP

PULPOTOMY

DEVITALIZATION

PRESERVATION

REGENERATION

PARTIAL PULPECTOMY

NON VITAL PULP THERAPIES

(Irreversible pulpitis or necrotic pulp)

PULPECTOMY

REGENERATIVE ENDODONTICS

ENDODONTIC PROCEDURES IN YOUNG PERMANENT TEETH

VITAL PULP THERAPIES

(Normal pulp or reversible pulpitis)

PULP CAPPING

INDIRECT PULP TREATMENT

DIRECT PULP CAP

PULPOTOMY

PARTIAL

- CARIOUS EXPOSURE (<2MM)
- TRAUMATIC EXPOSURE (CVEK)

COMPLETE

- MTA
- BIODENTINE

APEXOGENESIS (ROOT END FORMATION)

NON VITAL PULP THERAPIES

(Irreversible pulpitis or nonvital pulp)

REGENERATIVE ENDODONTICS

APEXIFICATION (ROOT END CLOSURE)

ROOT CANAL TREATMENT

ENDODONTIC PROCEDURES IN PERMANENT TEETH

VITAL PULP THERAPIES

(Normal pulp or reversible pulpitis) pulp)

PULP CAPPING

INDIRECT PULP TREATMENT

DIRECT PULP CAP

PULPOTOMY

PARTIAL

- CARIOUS EXPOSURE (<2MM)

- TRAUMATIC EXPOSURE (CVEK)

COMPLETE

MTA

NON VITAL PULP THERAPIES

(Irreversible pulpitis or nonvital

ROOT CANAL TREATMENT

APICOECTOMY/ APEXECTOMY

(RETROGRADE PLUG)

VITAL PULP THERAPIES IN CHILDREN

- Introduction
- Types
- Indications/Contraindications
- Diagnosis
- Stepwise Protocol
- Outcomes

PROCEDURE TYPES

Primary Teeth

PULP CAPPING

INDIRECT PULP TREATMENT

DIRECT PULP CAP

PULPOTOMY

DEVITALIZATION

PRESERVATION

REGENERATION

PARTIAL PULPECTOMY

Young Permanent Teeth

PULP CAPPING

INDIRECT PULP TREATMENT

DIRECT PULP CAP

PULPOTOMY

PARTIAL

- CARIOUS EXPOSURE (<2MM)
- TRAUMATIC EXPOSURE (CVEK)

COMPLETE

- MTA
- BIODENTINE

APEXOGENESIS (ROOT END FORMATION)

IMPORTANT REFERENCES

Primary Tooth Vital Pulp Therapy: A Systematic Review and Meta-analysis

James A. Coll, DMD, MS[1] • N. Sue Seale, DDS, MSD[2] • Kaaren Vargas, DDS, PhD[3] • Abdullah A. Marghalani, BDS, MSD, DrPH[4] • Shahad Al Shamali, BDM[5] Laurel Graham, MLS[6]

PEDIATRIC DENTISTRY V 39 / NO 1 JAN / FEB 17

Indirect Pulp Capping and Primary Teeth: Is the Primary Tooth Pulpotomy Out of Date?

James A. Coll, DMD, MS

JOE — Volume 34, Number 7S, July 2008

Dhar V, Marghalani AA, Crystal YO, et al. Use of vital pulp therapies in primary teeth with deep caries lesions. Pediatr Dent 2017;39(5):E146-E159

PULPOTOMY VS INDIRECT PULP CAPPING IN PRIMARY TEETH

Indirect Pulp Capping and Primary Teeth: Is the Primary Tooth Pulpotomy Out of Date?

James A. Coll, DMD, MS

JOE — Volume 34, Number 7S, July 2008

MEDICAMENTS AND TECHNIQUES OF PULPOTOMY IN PRIMARY TEETH

- **DEVITALISATION**

  Buckley's Formocresol

- **PRESERVATION**

  Ferric sulfate

- **REGENERATION**

  MTA, BioDentine

MEDICAMENTS AND TECHNIQUES OF PULPOTOMY IN PRIMARY TEETH

- **PHARMACOTHERAPEUTIC TECHNIQUES (CELL INDUCTIVE AGENTS)**

  MTA, BioDentine, Bioceramic Putty

- **NON PHARMACOTHERAPEUTIC TECHNIQUES (CONTROLLED ENERGY)**

  LASERS- Both Soft and Hard Tissue

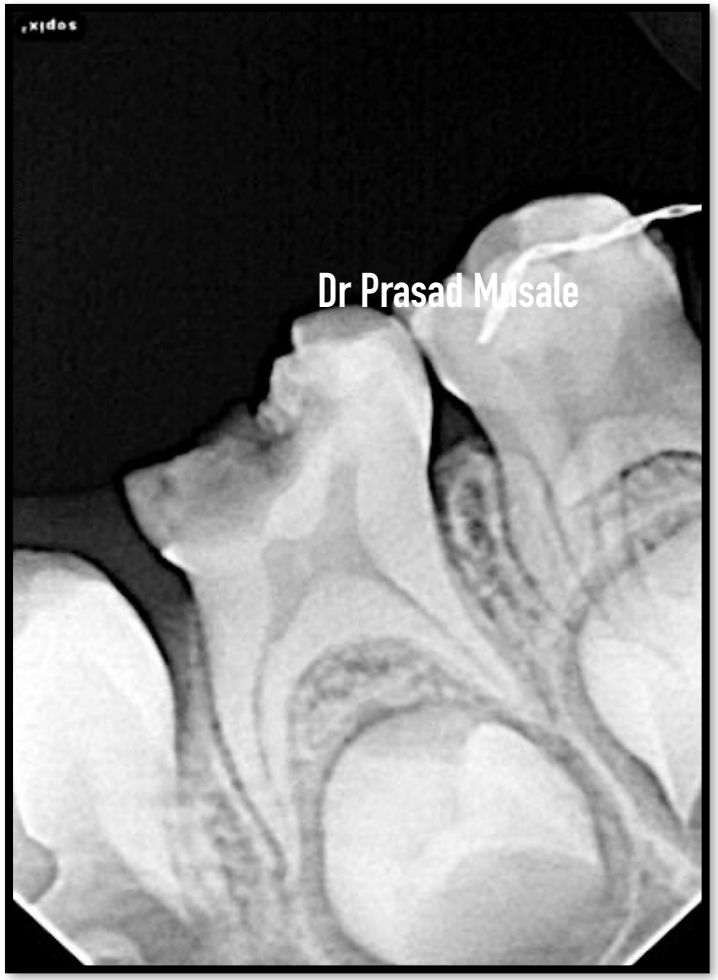
- **COMBINATIONS OF THE ABOVE**

  Nd:YAG + MTA

CLINICAL CRITERIA

- Deep carious lesion with restorable crown
- No history of systemic diseases or allergies
- No obvious signs of pulpal degeneration
- Carious or iatrogenic pulpal exposure
- Successful hemorrhage control within 3-5 min
- Color of hemorrhage (Bright Red)

RADIOGRAPHIC CRITERIA



- Remaining dentin thickness (ICDAS score 5 and 6)
- Physiologic root resorption not more than 1/3rd of the total root length
- Widened lamina dura
- Presence of periradicular or furcal radiolucency
- Pathologic root resorption
- Previously treated primary molars
- Primary teeth without a permanent successor

CLINICAL PROTOCOL (MTA PULPOTOMY)

1. Informed consent, L.A. and Rubber Dam Application
2. Tooth Preparations and SS Crown selection
3. Excavation of dental caries is initiated with a large, slow-speed, round bur
4. Elimination of the roof of the pulp chamber (# 330 carbide bur)
5. Removal of the coronal pulp tissue (# 6 or # 8 round bur or sharp spoon excavator)

5. Disinfection of the pulp chamber

6. Mixing of the MTA and placement and compaction with moistened cotton pellet

7. Core Restoration and SS Crown cementation

8. Oral hygiene instructions and regular follow-up

Musale PK, Kothare SS, Soni AS. Mineral trioxide aggregate pulpotomy: patient selection and perspectives. Clin Cosmet Investig Dent. 2018;10:37-43 https://doi.org/10.2147/CCIDE.S134315

OUTCOMES

MTA pulpotomy outcomes

Outcomes	Successful	Failure
Clinical outcomes	Asymptomatic	Long-lasting chewing sensitivity
	Natural exfoliation	Spontaneous pain
	Exfoliation prematurely due to ectopic eruption	Gingival swelling approximating the furcation area
	Physiologic mobility	Periodontal pocket formation
	Gingival inflammation due to poor oral hygiene	Pathologic mobility >2 mm
	Short-lasting chewing sensitivity	Sinus tract/fistula formation
		Premature tooth loss due to pathology
Radiographic outcomes	Normal taper of root canals	Widened periodontal ligament space
	Normal width of periodontal ligament space	Furcation radiolucency
	No trabecular changes	External root resorption
	Nonperforating internal resorption	Perforating internal resorption
	Dentin bridge formation	Osseous radiolucency involving the permanent successor crypt
	Pulp canal obliteration	
Patient-oriented outcomes	Asymptomatic	Nocturnal pain
	Short-lasting tenderness on chewing	Long-lasting tenderness on chewing
		Swelling - gingival or extraoral
		Purulent discharge
		Halitosis
		Marked mobility

IMPORTANT REFERENCES

Different Pulp Dressing Materials for the Pulpotomy of Primary Teeth: A Systematic Review of the Literature

Maurizio Bossù [1,†], Flavia Iaculli [2,†], Gianni Di Giorgio [2,*], Alessandro Salucci [3], Antonella Polimeni [3] and Stefano Di Carlo [3]

J. Clin. Med. **2020**, *9*, 838; doi:10.3390/jcm9030838

Clinical and radiographic outcomes of laser pulpotomy in vital primary teeth: a systematic review and meta-analysis

H. Nematollahi[1,2] · A. Sarraf Shirazi[2,3] · M. Mehrabkhani[1,2] · S. Sabbagh[2,4]

European Archives of Paediatric Dentistry
https://doi.org/10.1007/s40368-018-0358-4

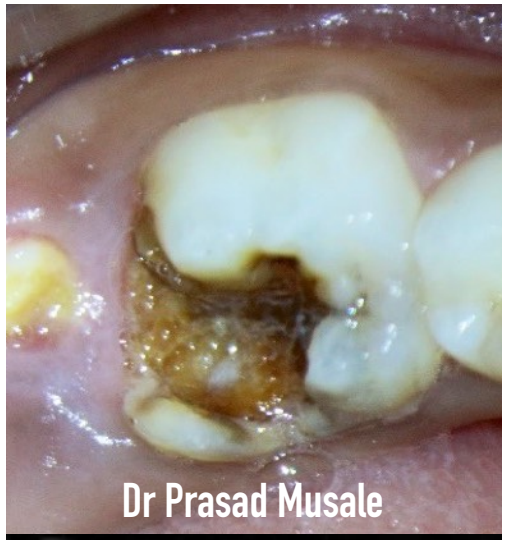
Lin P-Y, et al. Primary molar pulpotomy: A systematic review and network meta-analysis. Journal of Dentistry (2014), http://dx.doi.org/10.1016/j.jdent.2014.02.001

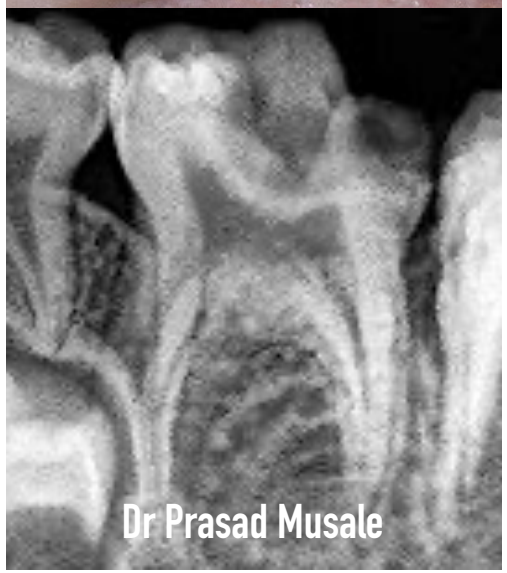
MTA and biodentine for primary teeth pulpotomy: a systematic review and meta-analysis of clinical trials

Emyr Stringhini Junior [1] · Manuela Gouvêa Campêlo dos Santos [1] · Luciana Butini Oliveira [1] · Montse Mercadé [2]

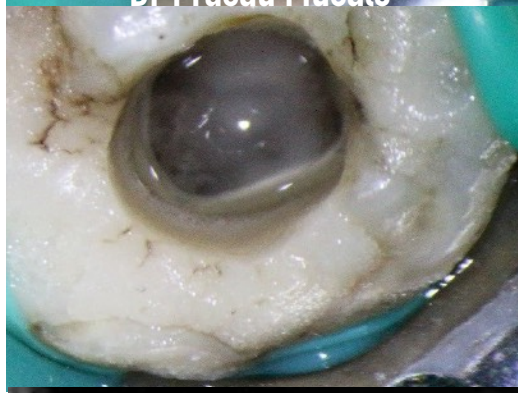
Clinical Oral Investigations
https://doi.org/10.1007/s00784-018-2616-6

MANAGEMENT OF ACUTE PULPITIS IN PRIMARY MANDIBULAR MOLARS





- Introduction
- Pathophysiology
- Single sitting
- Manage uncooperative behaviour
- Radiographic examination
- Local anaesthesia difficulty
- Tooth preparation for SSC and crown selection



- Rubber dam application
- Access opening and Hemostasis
- Working Length Determination
- Cleaning and Shaping
- Obturation
- Crown Cementation
- Post-operative Instructions
- Recall visit

CHEMO MECHANICAL PREPARATION PROCEDURAL ERRORS AND THEIR MANAGEMENT

- Introduction
- What to do?
- How to avoid them?(Guidelines)
- Various procedural errors
- Describe each in detail

INTRODUCTION

- Assess and inform the patient about the prognosis of a case before initiating the treatment
- Identify the given clinical problem with diagnostic acumen
- Anticipate problems in challenging cases
- Use appropriate materials and modifications in routine techniques in order to prevent procedural errors
- Identify clinical problems the moment they occur during the procedure and manage them positively

HOW TO AVOID THEM?(GUIDELINES)

- Establish a proper communication and rapport with the patient
- Thorough history and meticulous clinical examination of the tooth
- Ascertain the prognosis of the tooth in question.
- Knowledge of internal anatomy of pulp space and variations in the root canal configuration

- Investigations- Radiographic examination(CBCT)
- Operators specialised training, knowledge and experience
- Enhanced Vision
- Rubber Dam application
- Establishment of working length
- Rotary/Hand files must follow basic rules (Follow manufacturers instructions)

PROCEDURAL ERRORS DURING CLEANING AND SHAPING

- Canal blockage
- Ledge formation
- Deviation from normal canal anatomy
- Separation of instruments
- Obstruction by previous obturating materials
- Aspiration or Ingestion of Endodontic Instruments
- Hypochlorite accidents

EACH PROCEDURAL ERROR

- Introduction
- Why does it happen?
- How to prevent this?
- Management

IMPORTANT REFERENCES

Grossman's Endodontic Practice 12th Edition,B. Suresh Chandra, V. Gopi Krishna, Chapter 20, Procedural Errors: Prevention and Management.

Pathways of the Pulp 10th ed. Hargreaves KM, Cohen S. Mosby Elsevier, St Louis, MO, 2011.

ROOT CANAL IRRIGATION IN PEDIATRIC ENDODONTICS

- Introduction
- Rationale
- Irrigants for Pulpectomy/Root canal treatment
- Irrigation needles/ Equipments
- Recommenced Protocol (Primary/ Permanent teeth)
- Unwarranted Interactions
- Activation of Irrigant (Agitation Techniques)

INTRODUCTION

- Facilitate removal of necrotic tissue and dentin chips from the root canal
- Prevent packing infected hard and soft tissue apically in the root canal and into the periapical area
- Dissolve organic and/or inorganic tissue
- Exhibit antimicrobial activity by actively killing bacteria and yeasts when in direct contact

Ideal Characteristics of an Endodontic Irrigant[58,149,390]

The ideal irrigant should:

1. Be an effective germicide and fungicide.
2. Be nonirritating to the periapical tissues.
3. Remain stable in solution.
4. Have a prolonged antimicrobial effect.
5. Be active in the presence of blood, serum, and protein derivates of tissue.
6. Have low surface tension.
7. Not interfere with repair of periapical tissues.
8. Not stain tooth structure.
9. Be capable of inactivation in a culture medium.
10. Not induce a cell-mediated immune response.
11. Be able to completely remove the smear layer, and be able to disinfect the underlying dentin and its tubules.
12. Be nonantigenic, nontoxic, and noncarcinogenic to tissue cells surrounding the tooth.
13. Have no adverse effects on the physical properties of exposed dentin.
14. Have no adverse effects on the sealing ability of filling materials.
15. Have convenient application.
16. Be relatively inexpensive.

RATIONALE

- Because pulpal ramifications can not be reached mechanically, copious irrigation during cleaning and shaping must be maintained. (*Debridement of the primary root canals is more often accomplished by chemical means rather than mechanical means*)
- Deeper dentinal wall disinfection is achievable with appropriate irrigation protocol

Recommended Irrigants

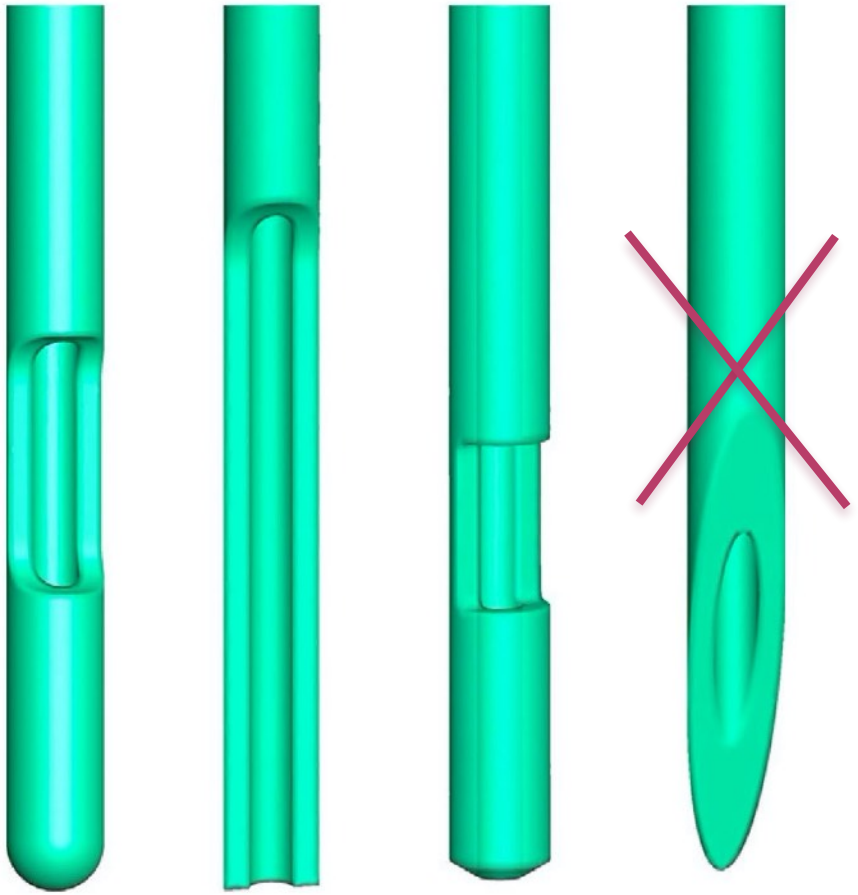
PRIMARY TEETH

- ✓Physiologic Saline
- ✓1% NaOCl
- ✓CITRIC ACID 6%
- ✓2% CHX
- ✓95% Ethanol

PERMANENT TEETH

- ✓Physiologic Saline
- ✓3-5% NaOCl
- ✓EDTA 17%
- ✓2% CHX
- ✓MTAD

Irrigation Needles



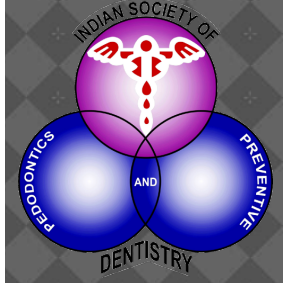
Irrigation Protocols

PRIMARY TEETH

- ✓ **1% NaOCl irrigant of choice** drop by drop during shaping
- ✓ **CITRIC ACID 6%** solution should be used for 1 minute
- ✓ **Final rinse with 2% CHX**

PERMANENT TEETH

- ✓ **5% NaOCl irrigant of choice**
- ✓ **EDTA 17%** should be used at the end of the procedure
- ✓ Another flush with **NaOCl** for maximum efficacy



Unwarranted Reactions

Saline after each irrigant is must !!!

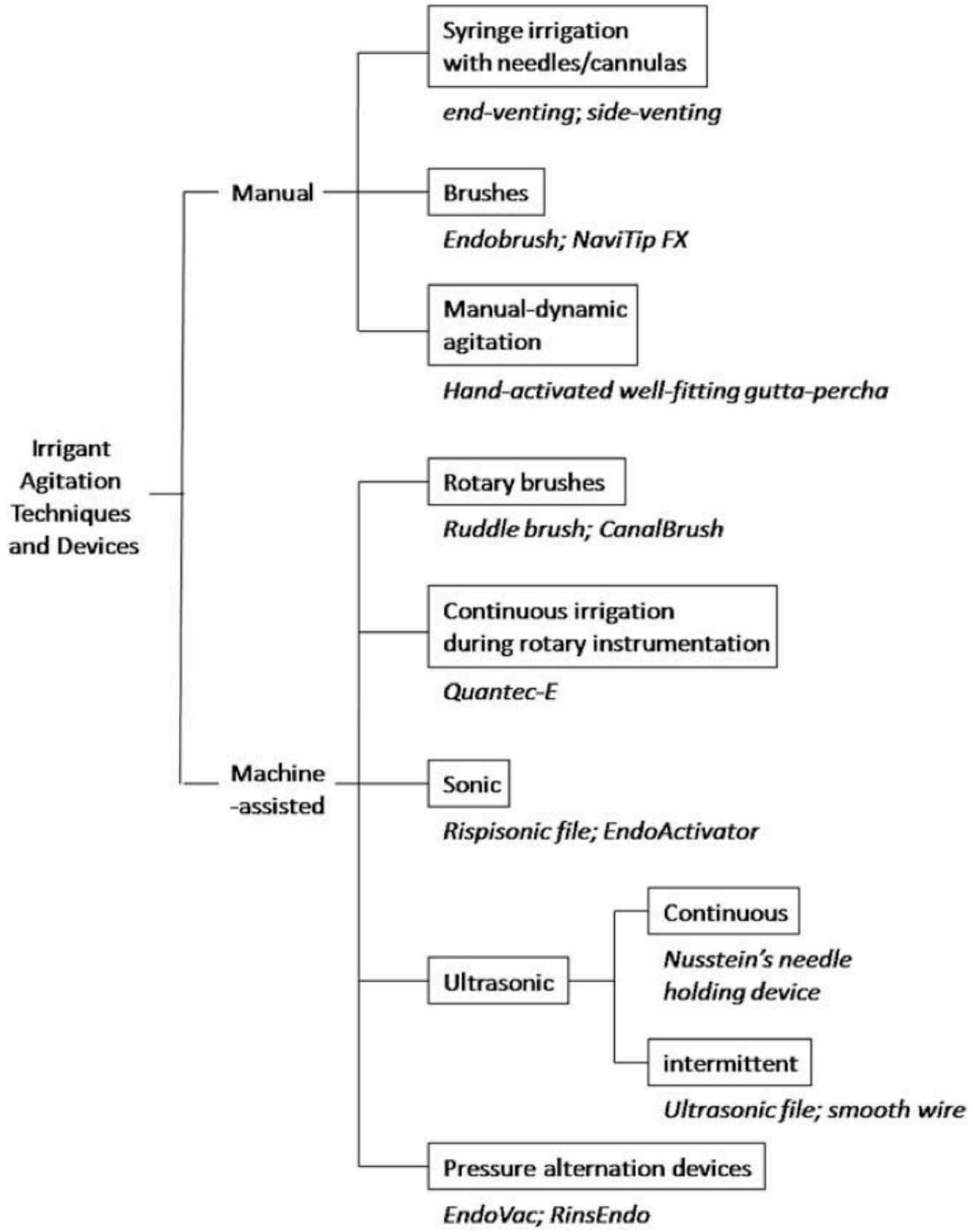
+

Parachloroaniline

+

Chlorine

Agitation Techniques and Devices



IMPORTANT REFERENCES

Review of Contemporary Irrigant Agitation Techniques and Devices

Li-sha Gu, DDS, MS, Jong Ryul Kim, DMD, PhD,† Junqi Ling, DDS, PhD,* Kyung Kyu Choi, DMD, PhD,† David H. Pashley, DMD, PhD,‡ and Franklin R. Tay, BDSc (Hons), PhD§*

JOE — Volume 35, Number 6, June 2009

Thiruvenkadam G, Asokan S, John B, Geetha Priya PR. Effect of 95% Ethanol as a Final Irrigant before Root Canal Obturation in Primary Teeth: An in vitro Study. Int J Clin Pediatr Dent 2016;9(1):21–24

Toyota Y, et al., Removal of smear layer by various root canal irrigations in primary teeth, Pediatric Dental Journal (2017), http://dx.doi.org/10.1016/j.pdj.2016.05.001

Ahmed HMA. Anatomical challenges, electronic working length determination and current developments in root canal preparation of primary molar teeth. Int Endod J. 2013;46(11):1011–1022. doi:10.1111/iej.12134

Ahmed HMA. Pulpectomy procedures in primary molar teeth, European Journal of General Dentistry:Vol 3 Issue 1 January-April 2014.

MATERIALS USED FOR PULPECTOMY IN PRIMARY TEETH

- Introduction
- Ideal Requirements
- Types
- Application Techniques
- Comparative Evaluation
- Conclusion

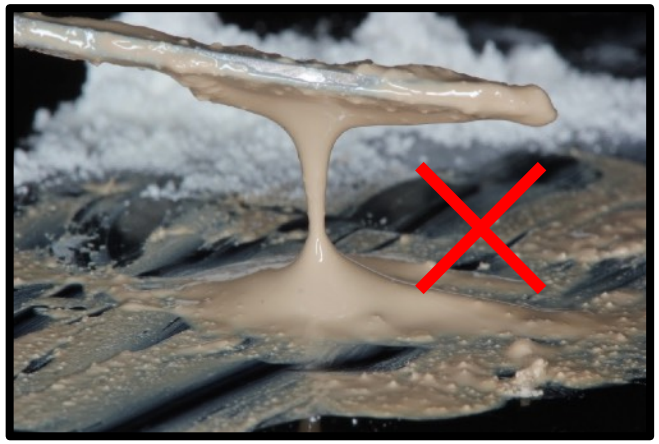
PULPECTOMY MATERIALS AND METHODS

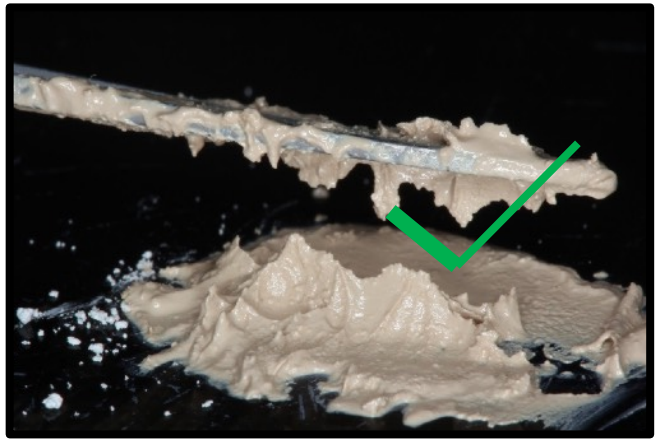
MATERIALS

- ✓ Zinc oxide eugenol paste(ZOE)
- ✓ Calcium hydroxide
- ✓ Iodoform
- ✓ Combinations of the above

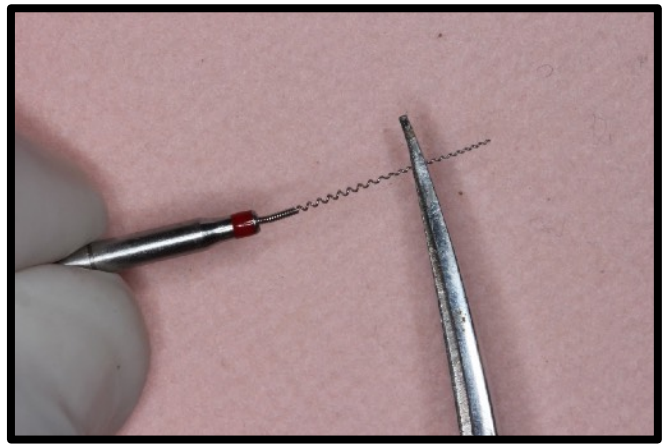
METHODS

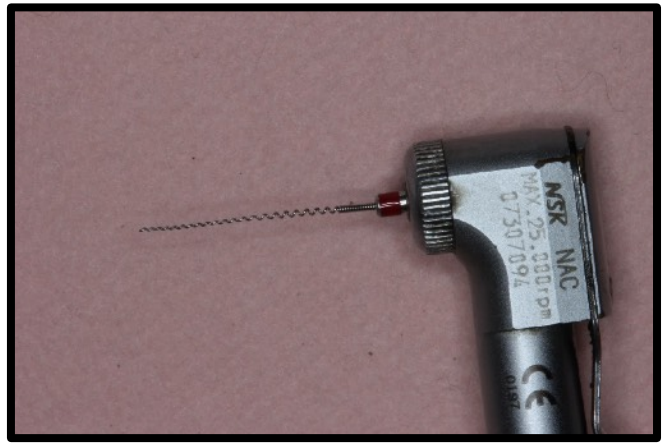
- ✓ Lentulo spiral
- ✓ Bidirectional spiral
- ✓ Reamer coating and bulk pushing with cotton pellets or endodontic pluggers
- ✓ Endodontic pressure syringe
- ✓ Obturations Tips






PULPDENT®
Root Canal Sealer
PULPDENT®
Root Canal Sealer
Liquid
PULPDENT®
Root Canal Sealer
Powder




NSK
NAC


Vitapex
Vitapex
NEO DENTAL
INTERNATIONAL INC.


DiaDent
DiaPex® Plus
Premixed calcium hydroxide
paste with Iodoform


Jehno
Dent
Iodotin


POWDER
LIQUID

IMPORTANT REFERENCES

Review Article

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ISSN 2576-392X

2018
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DOI: 10.21767/2576-392X.100019

Obturating Materials Used for Pulpectomy in Primary Teeth- A Review

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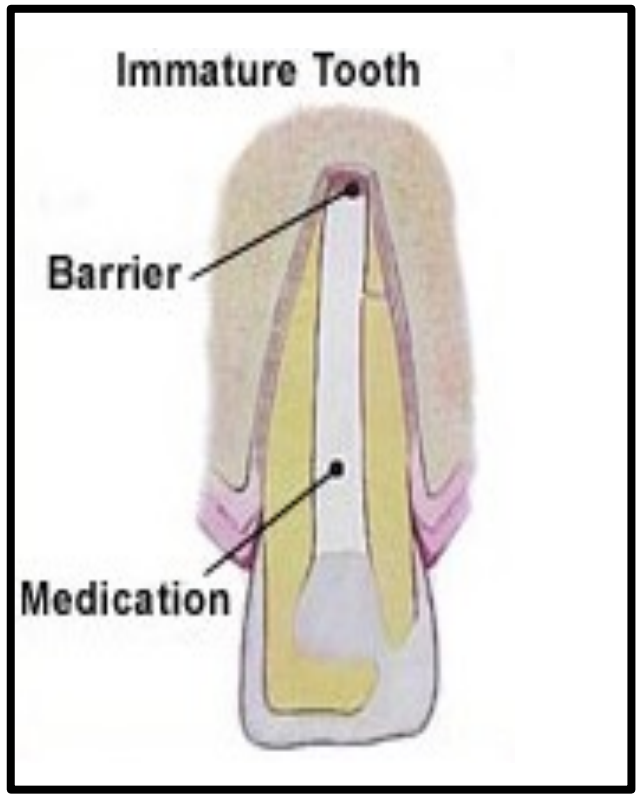
Rec date: February 20, 2018; **Acc date:** February 24, 2018; **Pub date:** March 2, 2018

Citation: Rajsheker S, Mallineni SK, Nuvvula S (2018) Obturating Materials Used for Pulpectomy in Primary Teeth- A Mini Review. J Dent Craniofac Res Vol.3 No.1: 3.

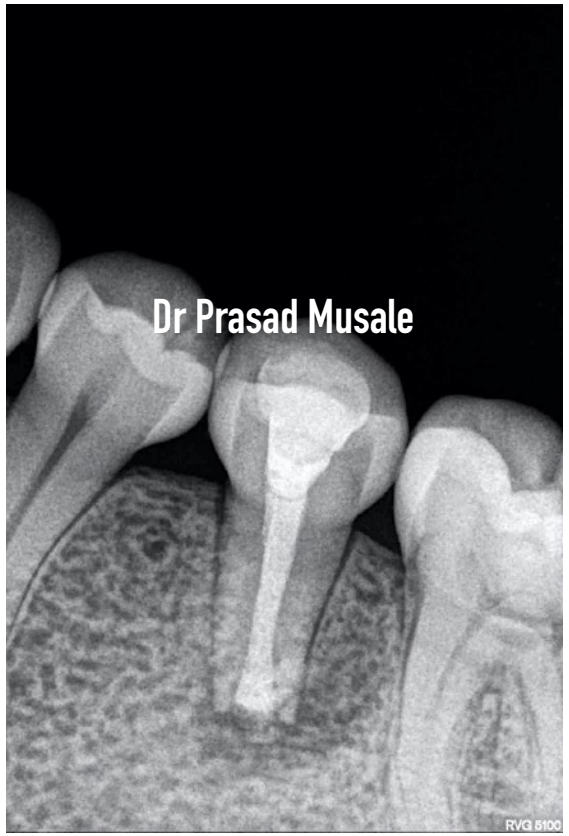
Chen, J.–W. and Jorden, M. (2010), Materials for primary tooth pulp treatment: the present and the future. Endod Topics, 23: 41–49. doi:10.1111/j.1601–1546.2012.00289.x

APEXIFICATION: MATERIALS AND METHODS



- Introduction
- Rationale
- Types
- Clinical Protocol
- Outcomes
- Comparative Evaluation

INTRODUCTION

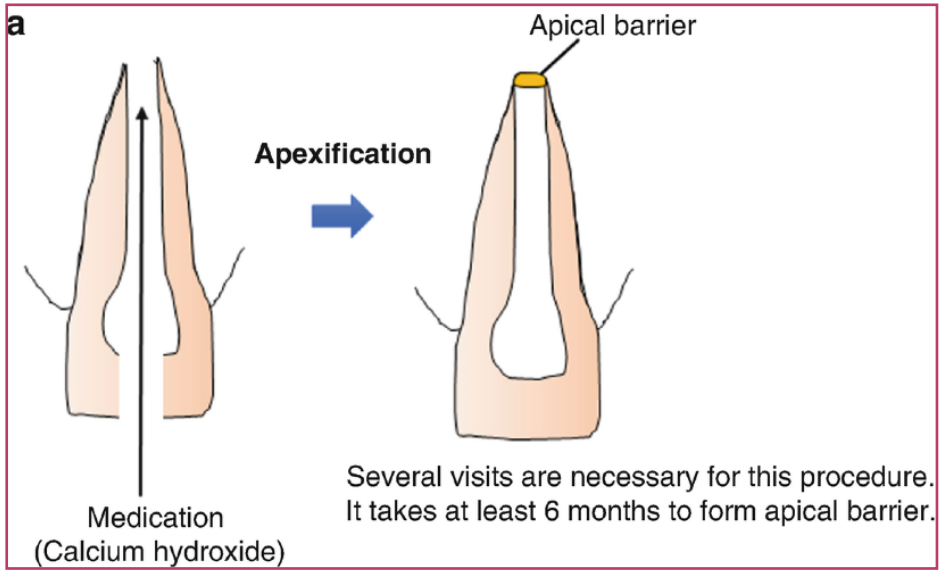


- Method of inducing apical closure by the formation of osteo-cementum or a similar hard tissue or continued apical development of the root of an incompletely formed non-vital tooth (Root End Closure)
- Other Options- Regenerative Endodontics should be 1st option..... and Apexification as the last option

RATIONALE

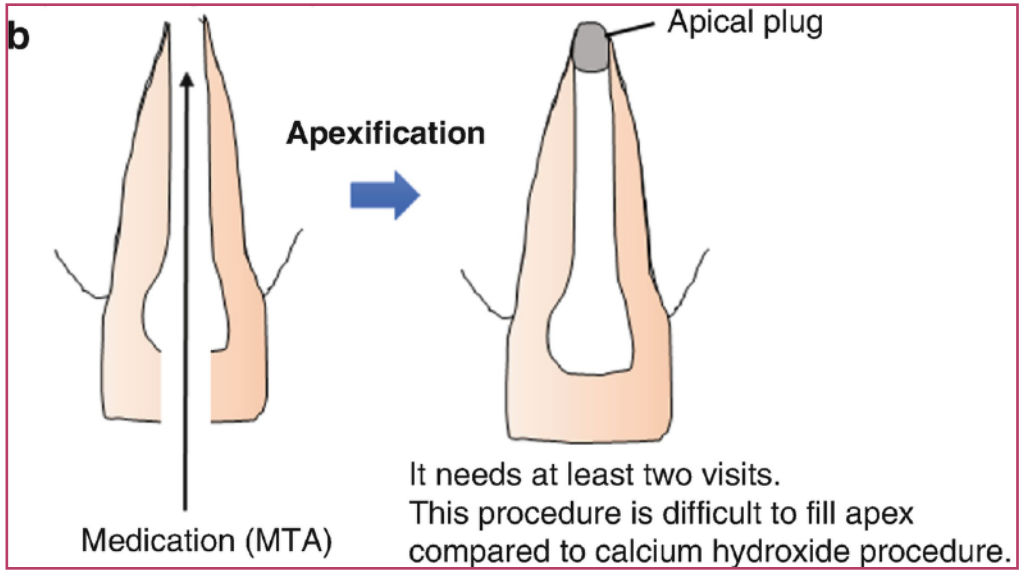
To induce formation of apical barrier in young permanent non-vital teeth so that root canal filling material may be condensed and confined to the root canal space

Apexification Types

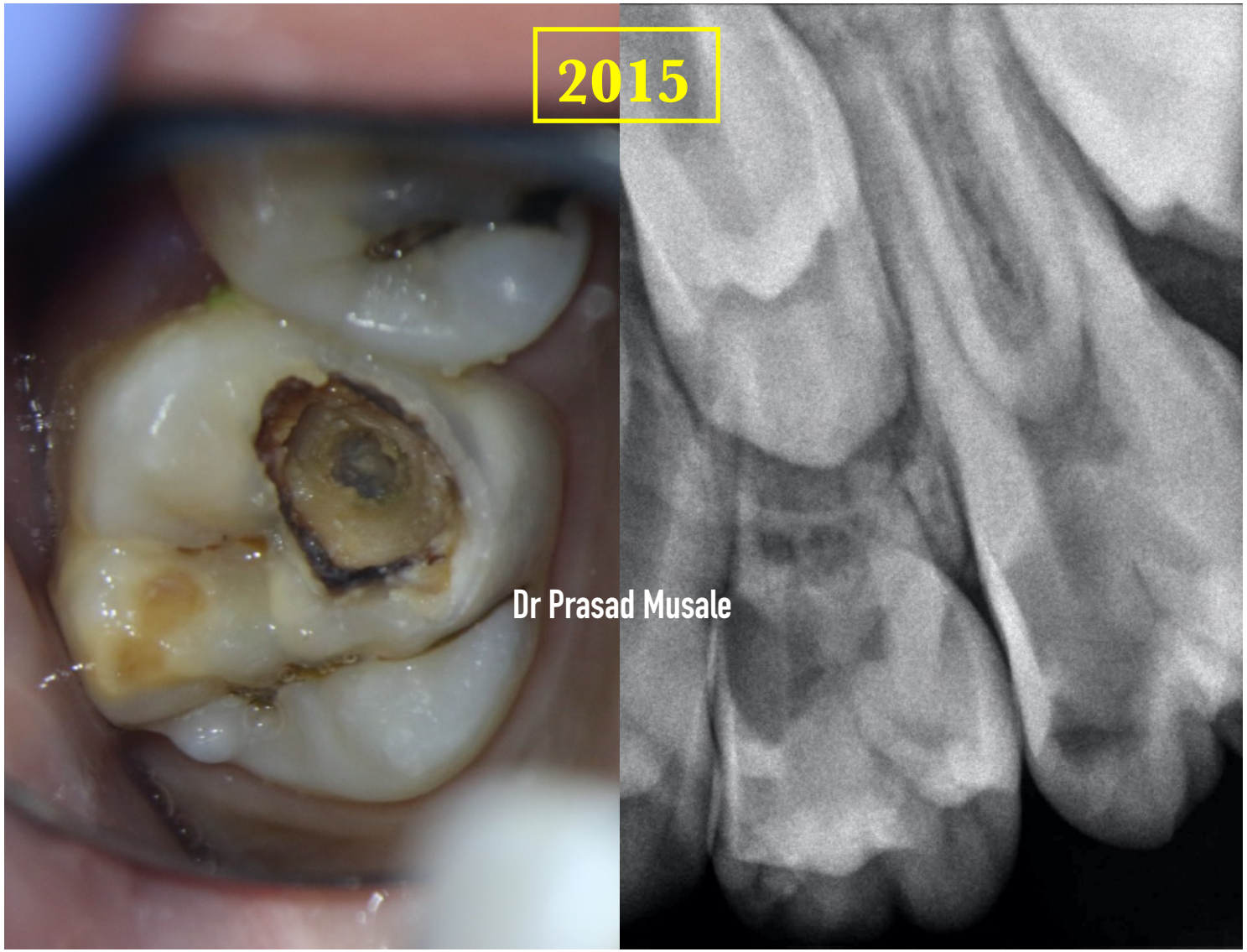


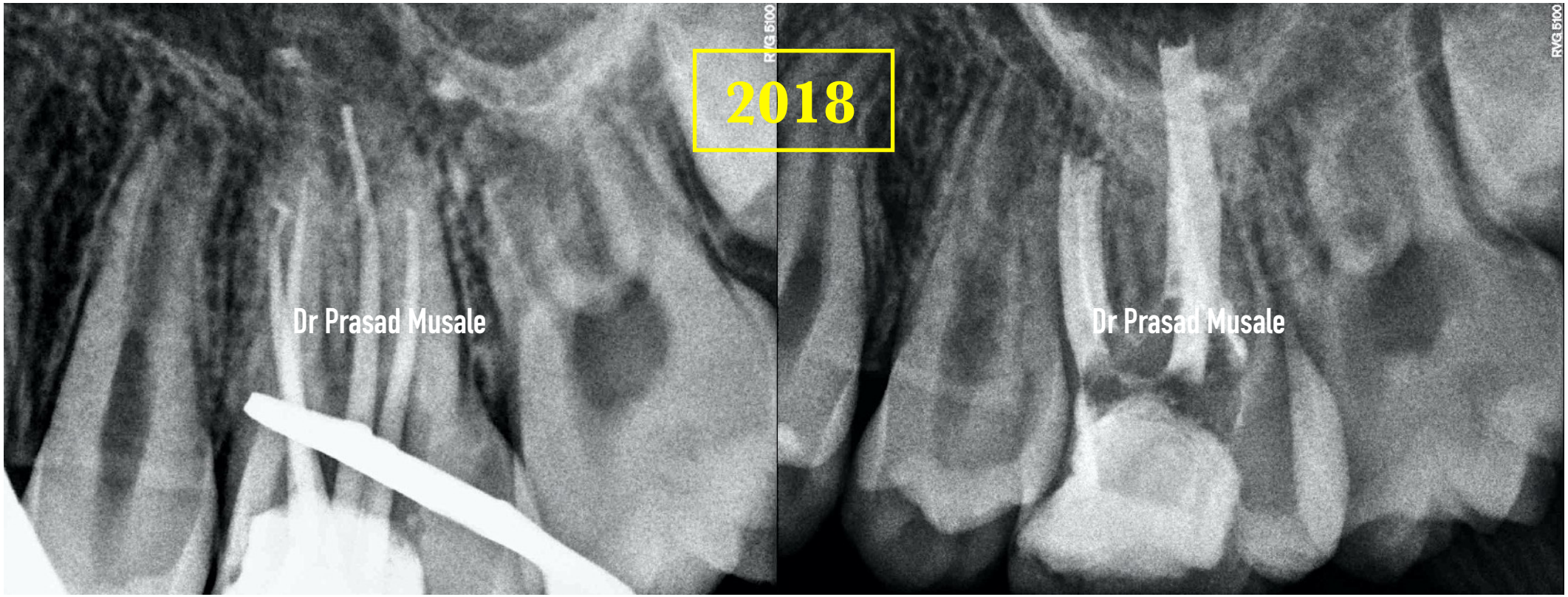
1. Traditional apexification with Calcium Hydroxide and/or Combinations (Multiple Visits)

2. Apical Barrier Technique with Bioceramics- MTA, BioDentin (Single or two visit)

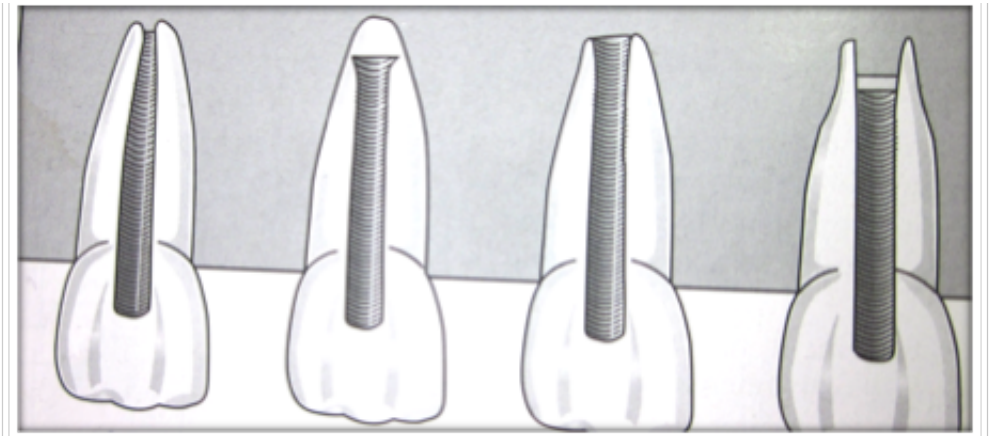


Traditional Apexification



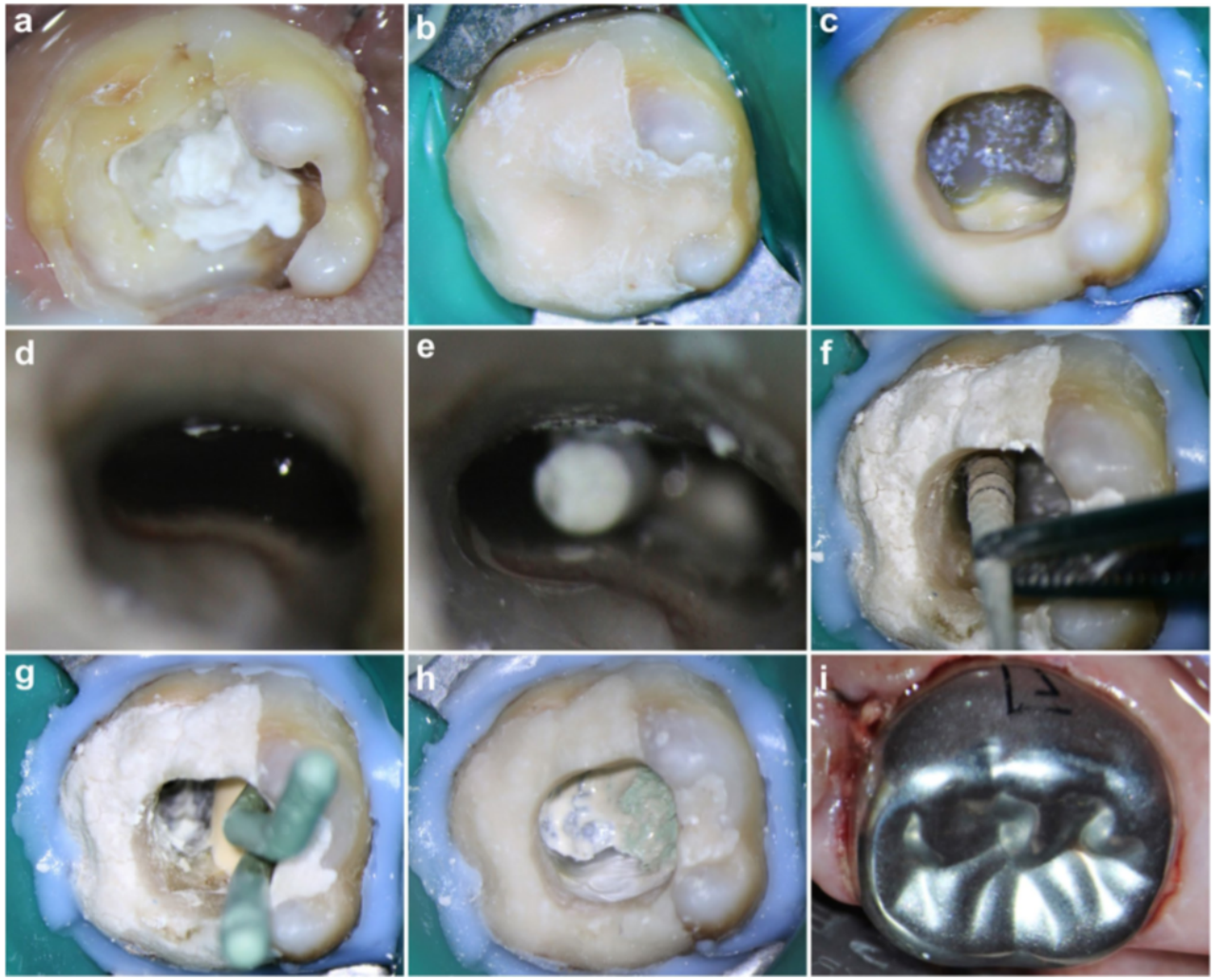

2018
Dr Prasad Musale
Dr Prasad Musale
RVG 6100
RVG 6100

Outcomes (Frank's Criteria)

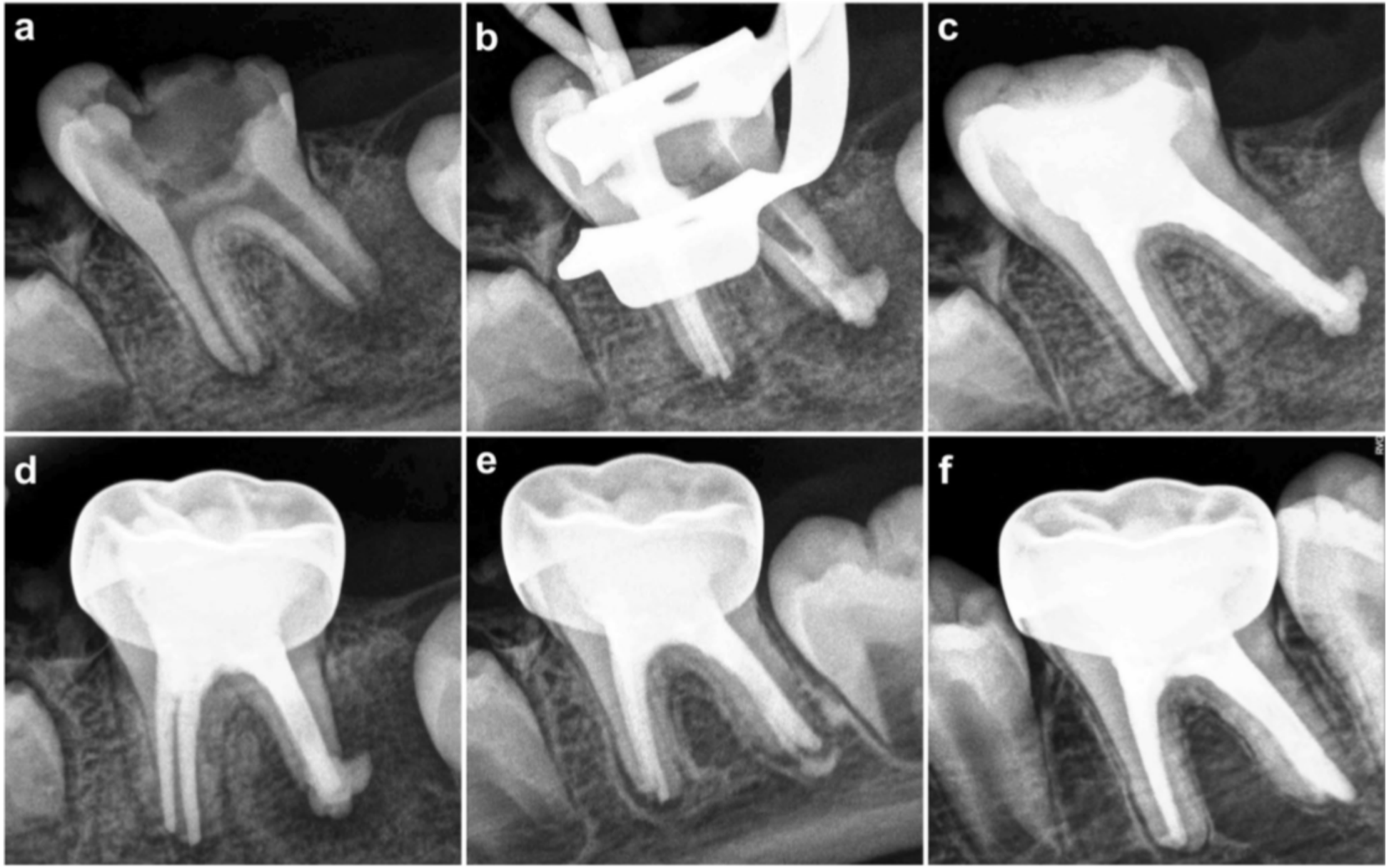


- Continued closure of the canal and apex to a normal appearance
- A Dome-shaped apical closure with the canal retaining a blunderbuss appearance
- No apparent radiographic change but a positive stop in the apical area
- A positive stop and radiographic evidence of a barrier coronal to the anatomic apex of the tooth

Apical Plug Placement



Musale PK, Kothare S. Non-surgical endodontic management of immature permanent mandibular first molar: a 3 year follow-up. Eur Arch Paediatr Dent 19, 373–377 (2018).



Musale PK, Kothare S. Non-surgical endodontic management of immature permanent mandibular first molar: a 3 year follow-up. Eur Arch Paediatr Dent 19, 373–377 (2018).

Drawbacks of Apexification

- Tooth remains non-vital
- Short roots & prone for fracture
- Thin dentinal walls
- Apical barrier is weak & porous (CaOH Apexification)
- Altered Crown Root ratio
- Need for full coverage restoration

IMPORTANT REFERENCES

Endodontic Topics

Endodontic Topics 2012, 23, 105–130
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ENDODONTIC TOPICS 2012
1601-1538

Management of teeth with necrotic pulps and open apices

MAHMOUD TORABINEJAD & IBRAHIM ABU-TAHUN

Guerrero F, Mendoza A, Ribas D, Aspiazu K. Apexification: A systematic review. J Conserv Dent 2018;21:462-5

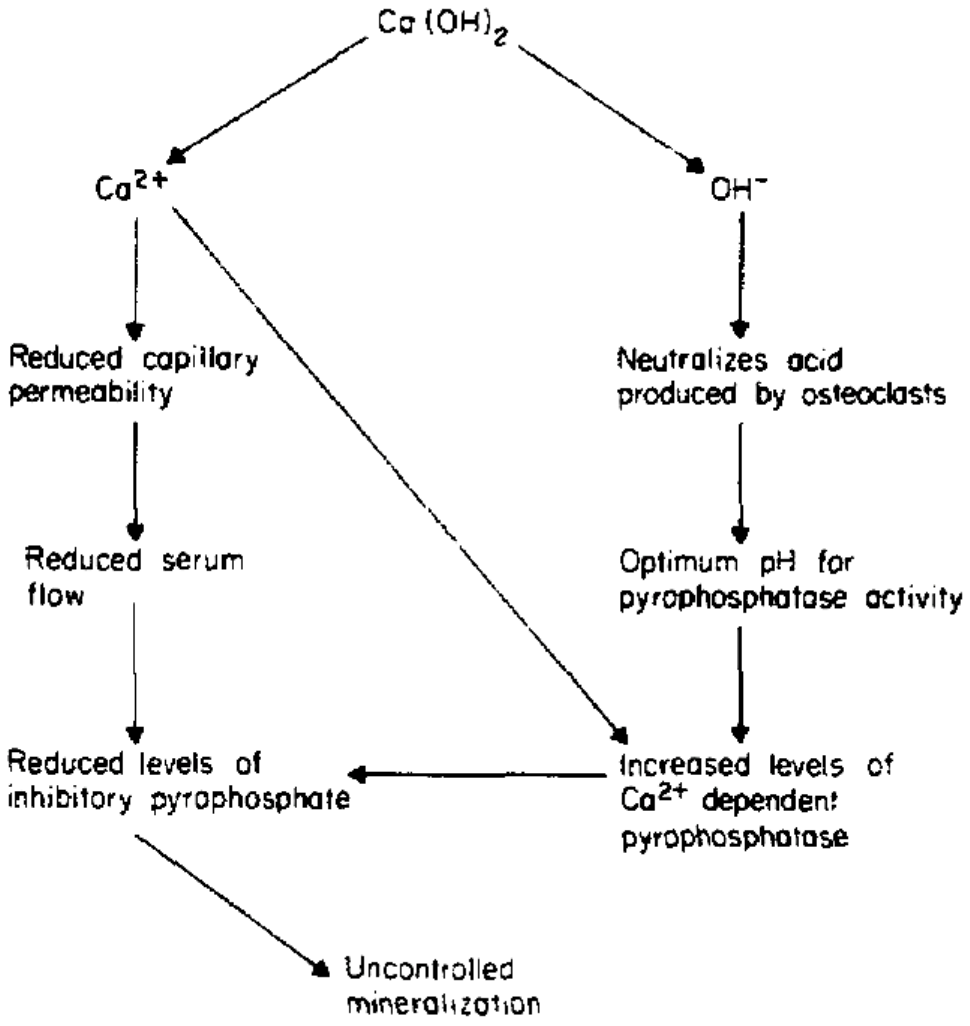
Rafter M. Apexification: a review. *Dent Traumatol*. 2005;21(1):1–8. doi:10.1111/j.1600-9657.2004.00284.x

Morse DR, O'Larnic J, Yesilsoy C. Apexification: review of the literature. *Quintessence Int*. 1990;21(7):589–598.

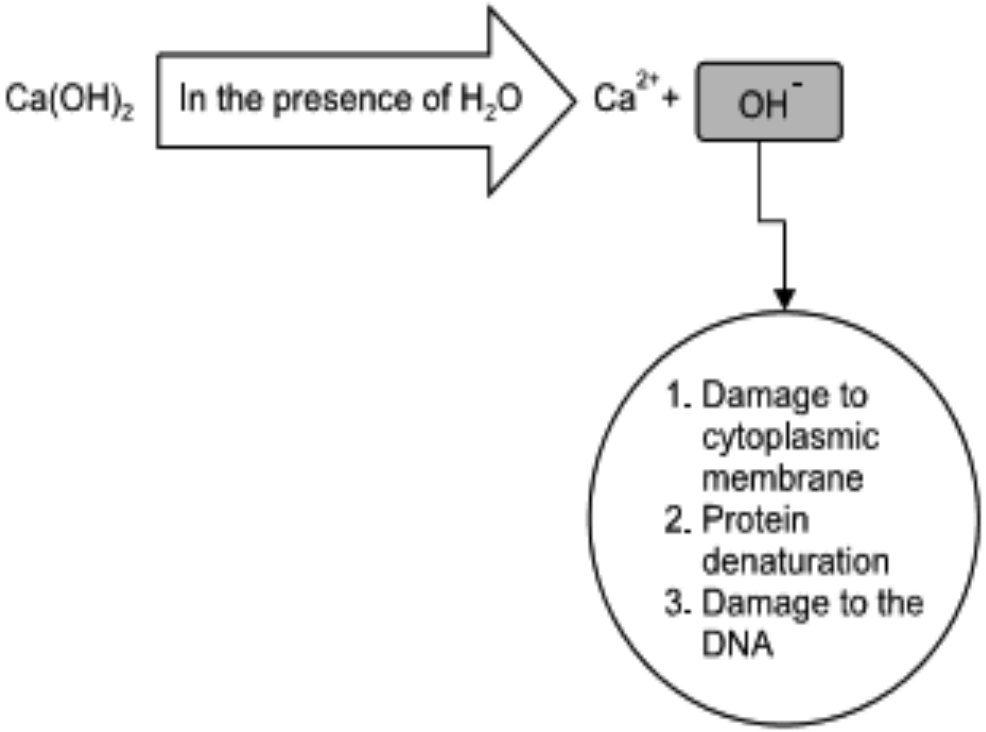
CALCIUM HYDROXIDE IN PEDIATRIC ENDODONTICS

- Introduction
- Mechanism of action
- Various Preparations
- Clinical Applications
- Conclusion

MECHANISM OF ACTION



Mineralisation



Antibacterial Action

VARIOUS PREPARATIONS

Non Setting calcium hydroxide

- **Powder**

  Calcium Hydroxide Powder(Pulpdent, USA)

- **Aqueous**

  UltraCal- XS, Diapaste, Multi-Cal

- **Oil based Combinations**

  Vitapex, Iodotin, Diapex Plus

Setting calcium hydroxide (Fisher & Shortall 1984)

- **Strong effect**

  Dycal (original formula), Reocap, Procal

- **Medium effect**

  Dycal (new formula), Life, Renew

- **No Effect**

  MPC, Hydrex

CLINICAL APPLICATIONS

1. Exudation control
2. Large periapical lesions
3. Intracanal medicament
4. Vital pulp therapy
5. Primary teeth obturation
6. Apical infective resorption
7. Internal root resorption
8. External root resorption
9. Transverse root fractures
10. Apexification

IMPORTANT REFERENCES

Heithersay GS. Calcium Hydroxide in the Treatment of Pulpless Teeth with Associated Pathology. Int Endod J. 1975;8(2):74–93.

Foreman PC, Barnes IE. Review of calcium hydroxide. Int Endod J. 1990;23(6):283–297. doi:10.1111/j.1365-2591.1990.tb00108.x

Fava LR, Saunders WP. Calcium hydroxide pastes: classification and clinical indications. Int Endod J. 1999;32(4):257–82.

Farhad A, Mohammadi Z. Calcium hydroxide: a review. Int Dent J. 2005;55(5):293–301. doi:10.1111/j.1875-595x.2005.tb00326.x

Mohammadi Z, Dummer PM. Properties and applications of calcium hydroxide in endodontics and dental traumatology. Int Endod J. 2011;44(8):697–730. doi:10.1111/j.1365-2591.2011.01886.x

Thank You

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