DASMESH INSTITUTE OF RESEARCH AND DENTAL SCIENCES

DEPARTMENT OF CONSERVATIVE DENTISTRY AND ENDDONTICS

LIST OF PUBLICATIONS

Year of publication	
2026	A comparative evaluation offsetting time in the presence of blood contmination of four root end filling biomaterials(MTA angelus, biodentine, endosequence root repair material, bio-C repair) An in- vitro study. Endodontology 2026;38:50-5
2026	Two distinct five- canal patterns in Maxillary First Molars: A Case Series. BFUDJ, Volume 16; Issue 1 (June) 2026
2026	Guided Dentistry and Endodontics, LAP, 2026

4/4/26

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Original Article

A comparative evaluation of setting time in the presence of blood contamination of four root end filling biomaterials (MTA angelus, biodentine, endosequence root repair material, bio-C repair) An *in-vitro* study

Dament Kesarwani, Sunandan Mittal, Tarun Kumar, Vanita Keshav, Vidushi Gilhotra, Arisha Jain
Department of Conservative Dentistry and Endodontics, Dasmesh Institute of Research and Dental Sciences, Faridkot, Punjab, India

ABSTRACT

Aim: This research compared and evaluated the setting time of four different biomaterials Mineral Trioxide Aggregate (MTA) Angelus, Biodentine, EndoSequence Root Repair Material (ERRM), and Bio-C Repair used for root-end filling in the presence of blood contamination.

Methods: One hundred and sixty freshly extracted human teeth with single roots were selected for this research and root canal treatment was carried out on each tooth, followed by a root-end resection and preparation of a root-end cavity. The teeth were then randomly assigned to one of four groups, based on the biomaterial to be tested. The root end cavity was filled with biomaterial and the tooth were placed in an experimental setup with more than half of the roots submerged in blood. The setting time was estimated using the Vicat needle apparatus, which was used to measure and record the penetration depth of the needle at specific time intervals, starting from the initial setting time specified by the manufacturer for each material. Measurements were taken at 5-min intervals for each sample. The data collected were analyzed using a two-way analysis of variance.

Results: The findings showed that MTA had the shortest setting time between 10 and 15 min when blood contamination was present, followed by ERRM 25–30 min. Bio-C Repair and Biodentine took notably longer to set which is more than 45 min and 27 min, respectively.

Conclusion: It is essential to choose biomaterials with the shortest setting time when dealing with blood contamination.

Keywords: Biomaterials, blood contamination, root-end filling, setting time, vicat needle apparatus

INTRODUCTION

The primary goal of periradicular surgery and traditional root canal therapy is to establish the conditions that support the healing and regeneration of periapical tissue. This involves eliminating necrotic tissue and other decay byproducts from the root canal system and sealing the root canal.[1]

The success rate of surgical endodontics can vary depending on the protocol used, ranging from 37.4% to 92.4%.[2,3] The surgical procedure consists of several steps to ensure the successful outcomes: (a) conducting periapical resection (apicoectomy), (b) preparing a root end cavity, and (c) restoring the root end cavity with a biocompatible and bioactive material.[4,5]

The purpose of root-end filling is to create a long-lasting, hermetic seal for all apical openings in the tooth, thus preventing any communication between the root canal

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Submitted: 30-Nov-2024 Revised: 06-Dec-2025
Accepted: 26-Dec-2025 Available Online: 26-Feb-2026

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How to cite this article: Kesarwani D, Mittal S, Kumar T, Keshav V, Gilhotra V, Jain A. A comparative evaluation of setting time in the presence of blood contamination of four root end filling biomaterials (MTA angelus, biodentine, endosequence root repair material, bio-C repair) An *in-vitro* study. Endodontology 2026;38:50-5.

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IRFJDM, Volume 16e Issue 1 (June) 2026

Case Report

DOI:10.5958/2230-7273.2026.00025.6

Two Distinct Five-Canal Patterns in Maxillary First Molars: A Case Series

[1]Dr. Muskaan Garg, [2] Dr. Tarun Kumar, [3]Dr. Sunandan Mittal, [4] Dr. Vanita Keshav

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[2,3,4] Professor, Department of Conservative Dentistry and Endodontics, Dasmesh Institute of Research and Dental Sciences, Faridkot, Punjab, India.

Abstract

Variations in root canal anatomy are common and may significantly affect the success of endodontic treatment. Missed canals remain a major cause of endodontic failure, making a thorough understanding of root canal morphology essential. This case series presents the successful management of two maxillary first molars with rare five-canal configurations. The first case exhibited two mesiobuccal canals, two distobuccal canals, and one palatal canal, while the second showed two mesiobuccal canals, two palatal canals, and one distobuccal canal. These cases highlight the importance of careful exploration of the pulp chamber floor and knowledge of anatomical variations for successful endodontic outcomes.

Keywords: Maxillary first molar, root canal anatomy, five canals, anatomical variation, endodontic treatment.

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This article may be cited as: Garg M, Kumar T, Mittal S, Keshav V. Two Distinct Five-Canal Patterns in Maxillary First Molars: A Case Series. Baba Farid Univ Dental J 2026;16(1):161-163

Introduction

The primary objective of endodontic therapy is the thorough debridement, disinfection, and three-dimensional obturation of the root canal system. Successful root canal treatment depends on a comprehensive understanding of root and canal morphology. Despite advances in endodontic techniques and technology, treatment failures still occur, often due to anatomical variations, missed canals, lateral canals, and accessory foramina.

The permanent maxillary first molar typically presents with three roots and four canals, with a second mesiobuccal canal (MB2) being the most common anatomical variation. Weine et al. reported that untreated canals in the mesiobuccal root significantly compromise treatment outcomes and observed a higher prevalence of four-canalled maxillary molars compared to three-canalled teeth. Cleghorn et al. reported an incidence of 56.8% for a second mesiobuccal canal and 1.7% for a second distobuccal canal. Variations involving the palatal root have also been documented, including bifurcated canals, multiple foramina, and additional roots.

Awareness and careful exploration of such anatomical complexities are essential for successful endodontic management. This case series describes the diagnosis and management of maxillary first molars exhibiting five root canals within three roots.

Case Report 1

A 27-year-old male patient presented with intermittent dull pain in the upper right posterior region for 15 days. Medical history was non-contributory. Clinical examination revealed a carious maxillary right first molar (tooth #16) that was non-mobile and tender to percussion. Pulp vitality tests elicited a delayed response. Radiographic examination showed deep caries approximating the pulp without any apparent root canal anatomical variation (figure 1.1). Based on the clinical and radiographic findings, a diagnosis of chronic irreversible pulpitis with symptomatic apical periodontitis was established, and root canal treatment was planned.

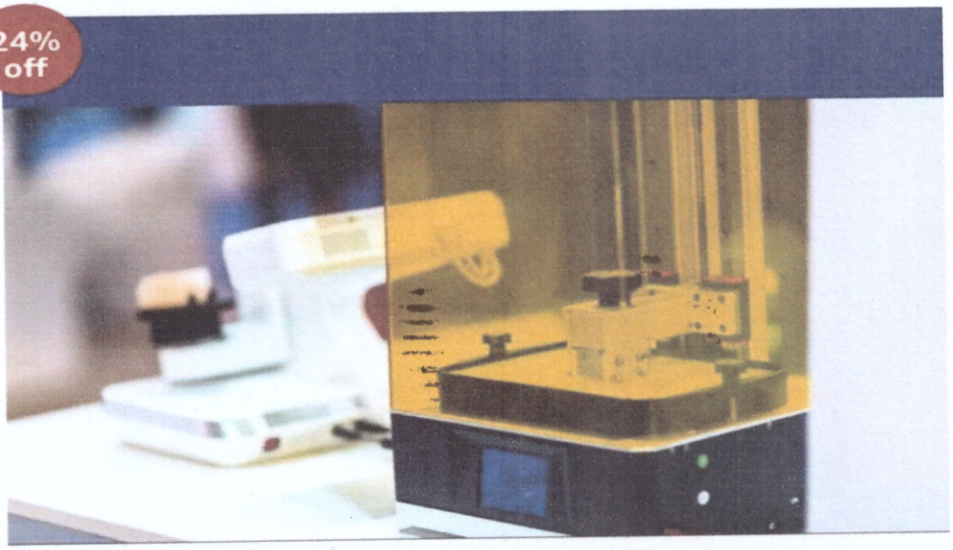
Following the administration of local anaesthesia and rubber dam isolation, access cavity preparation was performed. Initial exploration revealed the mesiobuccal (MB), distobuccal (DB), and palatal canal orifices. Careful examination of the pulpal floor using a DG-16 explorer identified an additional MB2 canal located palatal to the main MB canal. Similarly, a second distobuccal canal (DB2) was detected adjacent to the primary DB canal after removal of an overlying dentinal projection. The conventional triangular access cavity was modified to a pentagonal outline to facilitate access to all canal orifices. A total of five canal orifices were identified.

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LIST OF PATENTS

YEAR	APPLICATION NO.	PARTICULARS	STATUS
2026	504085-001	Dual Chamber Endodontic Irrigation Syringe	Published
2026	503715-001	Integrated endodontic File Cutter	Accepted
2026	504195-001	Innovative Approach for Irrigation and Simultaneous Suction	Filed
2026	515736-001	Endodontic Obturation Workstation	Filed

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ORIGINAL

पेटेंट कार्यालय, भारत सरकार The Patent Office, Government Of India

डिजाइन के पंजीकरण का प्रमाण पत्र | Certificate of Registration of Design

डिजाइन सं. / Design No. : 503715-001

तारीख / Date : 28/05/2026

पारस्परिकता तारीख / Reciprocity Date* :

देश / Country :

प्रमाणित किया जाता है कि संलग्न प्रति में चर्णित डिजाइन जो *INTEGRATED ENDODONTIC FILE CUTTER* से संबंधित है, का पंजीकरण, श्रेणी 24-02 में 1.DR. SUNANDAN MITTAL 2. DR. VANITA KESHAV 3.DR. TARUN KUMAR 4.DR. SHUBHANGI MITTAL 5.DR. SONALI BANSAL 6.DR. SALONI JUNEJA 7.DR. MUSKAAN GARG 8.DR. SUPRIYA 9.DR. JASDEEP KAUR के नाम से उपर्युक्त संख्या और तारीख में कर लिया गया है।

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डिजाइन अधिनियम, 2000 तथा डिजाइन नियम, 2001 के अध्यधीन प्रावधानों के अनुसरण में।
In pursuance of and subject to the provisions of the Designs Act, 2000 and the Designs Rules, 2001.

जारी करने की तिथि Date of Issue 18/09/2026

महानियंत्रक पेटेंट, डिजाइन और व्यापार चिह्न
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पेटेंट कार्यालय, भारत सरकार The Patent Office, Government Of India

डिजाइन के पंजीकरण का प्रमाण पत्र | Certificate of Registration of Design

डिजाइन सं. / Design No. : 504086-001

तारीख / Date : 01/06/2026

पारस्परिकता तारीख / Reciprocity Date* :

देश / Country :

प्रमाणित किया जाता है कि संलग्न प्रति में चर्णित डिजाइन जो *DUAL-CHAMBER ENDODONTIC IRRIGATION SYRINGE FOR SIMULTANEOUS DELIVERY & CONTINUOUS CHELATION* से संबंधित है, का पंजीकरण, श्रेणी 24-02 में 1.DR. MUSKAAN GARG 2. DR. TARUN KUMAR 3.DR. SUNANDAN MITTAL 4.DR. VANITA KESHAV 5.DR. KESHAV SINGLA 6.DR. RISHITA KAUSHAL के नाम से उपर्युक्त संख्या और तारीख में कर लिया गया है।

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Design Application Details

Application Number:	515736-001
CBR Number:	220362
CBR Date:	29-08-2026 16:54:55
Applicant Name:	1. DR. KESHAV SINGLA 2. DR. TARUN KUMAR 3. DR. SUNANDAN MITTAL 4. DR. VANITA KESHAV 5. DR. MUSKAAN GARG 6. DR. SALONI JUNEJA 7. DR. SONALI BANSAL 8. DR. RISHITA KAUSHAL

Design Application Status

Application Status:	Design Accepted and Published, Journal No is 44/2026 and Journal Date is 30/10/2026

Back

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CERTIFICATE OF NATIONAL PATENT FILING

TITLE OF THE INVENTION: INTEGRATED IRRIGATION SUCTION DEVICE

CLASS- 24-02

APPLICANT(S):

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DESIGNPATENT FILING DATE: 02.06.2026
DESIGN PATENT FILING NUMBER: 504195-001
Patent Agent: Er. (Mrs.)Kompal Bansal
BANSAL IP ASSOCIATES
#5568, Sector-38 West, Chandigarh-160036, India
Certified that the above given particulars are correct and duly verified by me.

KOMPAL BANSAL
Patent Agent for the applicant
(Regn. No.IN/PA/1754)

DATED: **02/06/2026**
PLACE: CHANDIGARH

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RESEARCH ACTIVITIES IN THE DEPARTMENT

	NAME	THESIS TOPIC
2023-2026	SALONI JUNEJA	A COMPARATIVE EVALUATION OF FRACTURE RESISTANCE OF SIMULATED OPEN APEX TEETH REINFORCED WITH DIFFERENT BIOMATERIALS USED AS AN APICAL PLUG – AN IN VITRO STUDY Supervisor- Dr. Sunandan Mittal Co- Supervisor – Dr. Tarun Kumar , Dr. Vanita Keshav
2023-2026	MUSKAAN GARG	A MICROBIOLOGICAL EVALUATION OF DISINFECTION OF THE ROOT CANAL SYSTEM USING SODIUM HYPOCHLORITE AND ITS COMBINATIONS AS IRRIGANTS - AN IN VIVO STUDY Supervisor- Dr. Tarun Kumar Co- Supervisor – Dr. Sunandan Mittal Dr. Vanita Keshav
2024-2027	SONALI BANSAL	A COMPARATIVE EVALUATION OF APICAL MICROLEAKAGE AFTER POST SPACE PREPARATION USING DIFFERENT ENDODONTIC SEALERS-AN IN VITRO STUDY Supervisor- Dr. Sunandan Mittal Co- Supervisor – Dr. Tarun Kumar, Dr. Vanita Keshav
2024-2027	KESHAV SINGLA	A COMPARATIVE EVALUATION OF CALCIUM HYDROXIDE AND TRIPLE ANTIBIOTIC PASTE WITH AND WITHOUT SILVER NANOPARTICLES ON MICROBIAL LOAD AND POSTOPERATIVE PAIN: AN IN VIVO STUDY Supervisor- Dr. Tarun Kumar Co- Supervisor – Dr. Sunandan Mittal, Dr. Vanita Keshav
2025-2028	RISHITA	A COMPARATIVE EVALUATION OF POST-OPERATIVE PAIN AND PERIAPICAL HEALING OF BIOSEALERS WITH DIFFERENT OBTURATION TECHNIQUES: AN IN VIVO STUDY Supervisor- Dr. Sunandan Mittal Co- Supervisor – Dr. Tarun Kumar, Dr. Vanita Keshav

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ACADEMIC EVENTS

Conferences / conventions attended

2026

IESCON CONFERENCE (LUCKNOW)

National level
Dr Tarun Kumar chaired the key note session
Dr Vanita Keshav chaired the delegate session
Dr Sonali Bansal presented paper presentation on topic "Navigating the unpredictable challenges in aberrant root canal morphology"
Dr Keshav Singla presented paper presentation on topic "Effect of simultaneous working length determination using integrated electronic apex locator endo-motors on postoperative pain : A systematic review and meta-analysis"
Dr Rishita Kaushal presented paper presentation on topic "Exploring the role of irrigation in complex apical root canal anatomy"

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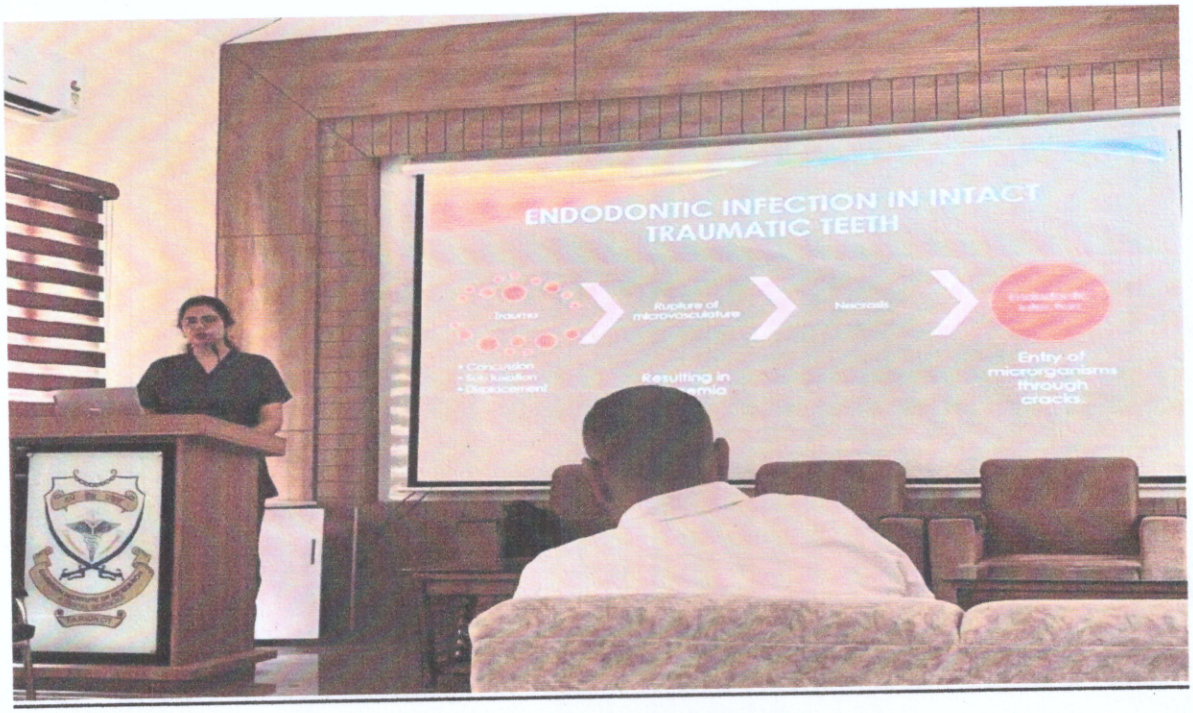
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CDE/CPC



Dr Rishita Kaushal presented CPC on "clinical pathology of periapical lesions"

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"Full mouth rehabilitation"
conference held by Dr Divij Khullar

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AWARDS / ACHIVEMENTS



Awarded best paper presentation to **Dr Sonali Bansal** for "Navigating the unpredictable challenges in aberrant root canal morphology" at IESCON conference held in Lucknow

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WORLD ENDODONTIC DAY

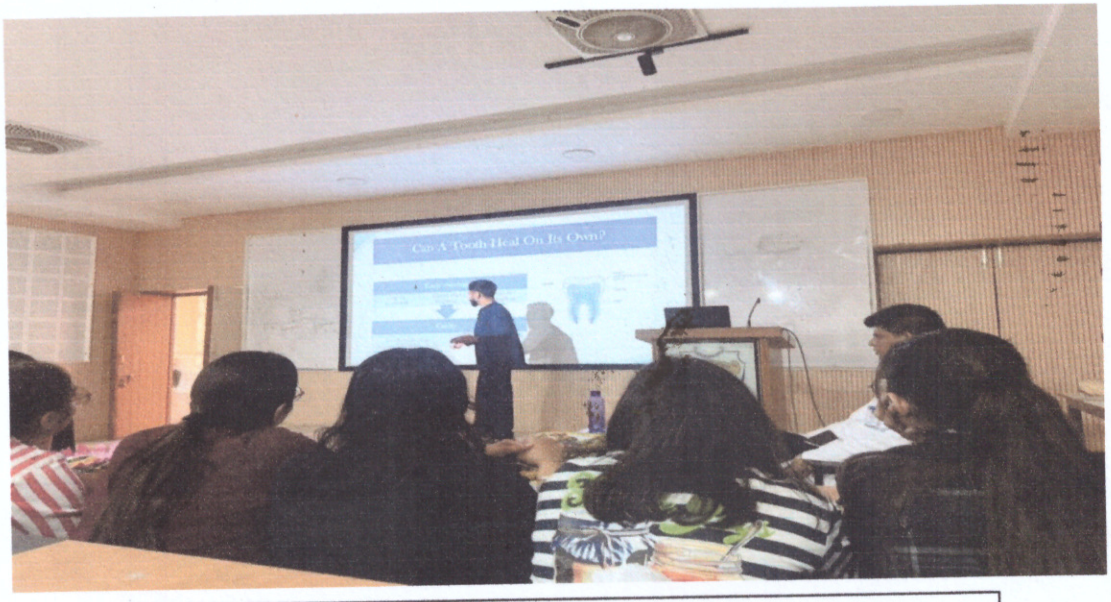
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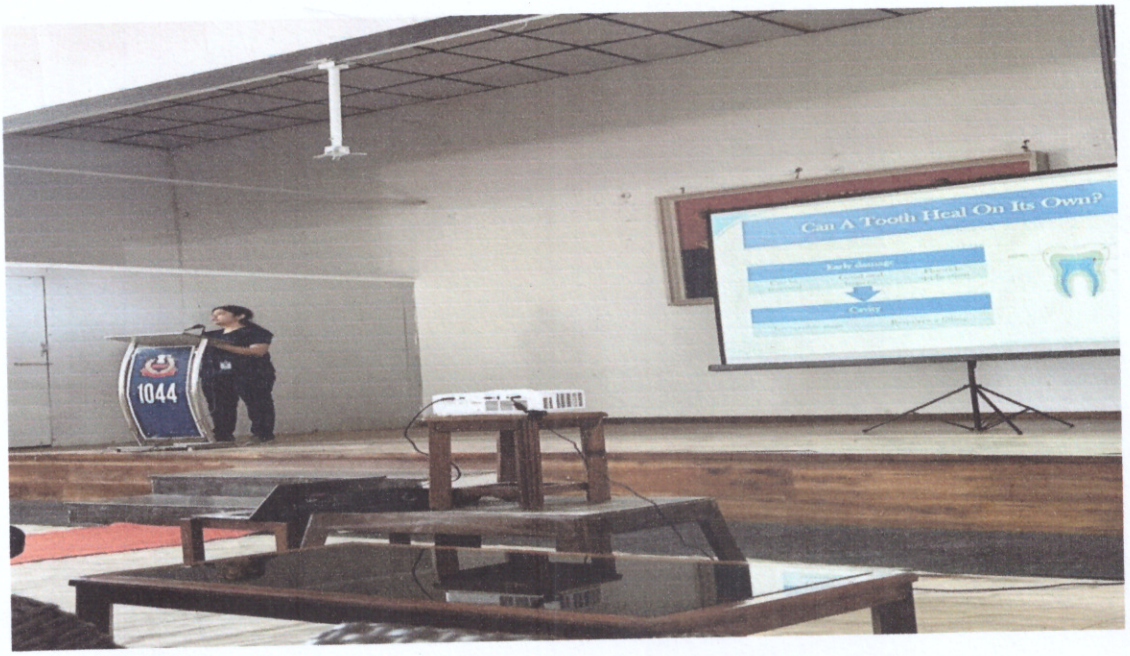
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AWARENESS LECTURE WAS GIVEN BY Dr Keshav Singla ON TOPIC "SAVE A TOOTH" TO BDS 1ST YEAR



AWARENESS LECTURE WAS GIVEN BY Dr Rishitia Kaushal ON TOPIC "SAVE A TOOTH" AT BSF CAMP

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POSTER PRESENTATION COMPETITION WAS CONDUCTED IN DEPARTMENT ON TOPIC "SAVE A TOOTH"

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