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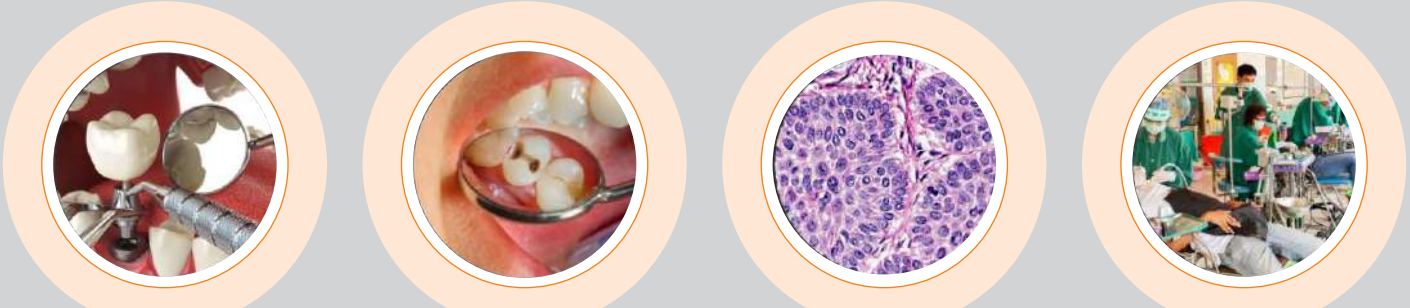

# ABOUT THE JOURNAL

Journal of MaxilloFacial Science and Research (JMFSR, ISSN 2348-9030) is the official publication of the PMS College of Dental Science and Research. The journal started with the aim of providing our students and faculty a platform to showcase their research projects and interesting clinical cases. We also accept articles from outside the institution on topics related to all the dental specialities and related sciences. Authors are encouraged to submit research papers, case reports (new / interesting / rare cases/ cases with clinical significance and interdisciplinary cases), and short communications. Special effort is made to ensure rapid publication. Articles written in English alone will be accepted provided they have not been and will not be published elsewhere. The editor and or its publisher cannot be held responsible for errors or for any consequences arising from the use of the information contained in this journal. The appearance of advertising or product information in the various sections in the journal does not constitute an endorsement or approval by the journal and or its publisher of the quality or value of the said product or of claims made for it by its manufacturer.

# JMFSR

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# A VISION FULFILLED

The grace of God Almighty is best reflected in parents with integrity and children who strive hard to realize their dreams. The late **Sri P. M. Shahul Hameed B.A (1920-1995)** gave his children the best gift in life, quality education, at a time when few realized the wonders that education could work in the lives of men and women. The PMS College of Dental Science and Research is a monument to the memory of that great soul. College was established in 2002 under the able guidance of **Dr. P.S.Thaha,** a visionary with over three decades of experience in dental education and patient care in India and abroad. This college is the first self- financing dental institution in Kerala State, the first to achieve the ISO 9001-2000 certification and NAAC accreditation among dental colleges in Kerala. In addition to undergraduate and postgraduate courses, college is currently conducting PhD programs in different specialities of dentistry recognized by Kerala University of Health Sciences and NITTE University. The college provides an excellent environment for students as well as faculty in developing knowledge, clinical skills and attaining academic excellence. PMS College is currently ranked among the best 40 dental institutions of the country as per the survey conducted by INDIA TODAY.

## Artificial Intelligence in Dentistry: Opportunities and Challenges

Artificial intelligence (AI) refers to the idea of building machines capable of performing tasks that are normally performed by humans.[1] The term Artificial Intelligence was first given in 1956 by John Mc Carthy, the father of AI. Last two decades visualised the development of AI in various fields of Medicine and Dentistry. The application of AI in dentistry initiated with Machine Learning (ML) which designs a system or machine using algorithms capable to learn and operate without dictating each action. Further more, Artificial Neural Networks (ANN) was introduced to develop information processing inspired by the human brain's neural network which can train computers to respond appropriately to events. Deep learning (DL) system uses several different layers of neural networks which analyses the input information and predict outcomes based on unlabelled and unstructured data.

Artificial Intelligence has the potential to revolutionize health care in dentistry with algorithms to provide more accurate and efficient diagnosis, reducing the reliance on human interpretation. Applications of AI include diagnosis, decision making, treatment planning and prediction of treatment outcome. Diagnostic imaging is central in the healthcare, with development of AI algorithms, can analyse radiographs to aid in detection of dental caries, periodontal diseases and pathologies in the maxillofacial region.[2] Automated deep learning tools offer diagnostic information to Specialists in early detection of periapical pathologies, alveolar bone loss, furcation involvement and changes in bone density. Neural networks in AI are capable of categorizing the morphological changes in early stages of Temporomandibular joint arthritis. In 3D printing and additive manufacturing, there is possibility of overhanging by printing in an empty space. Software in AI resolves the overhang problem by generating additional support layers to fill any gaps between layers. AI is a promising tool in Forensic dentistry in age and sex determination and bite mark analysis precisely.

Challenges do come along with advancements in technology, so is the case with Artificial Intelligence. There is growing concern about data protection and privacy, patient rights and ethical considerations. Maintaining confidentiality of medical records is crucial and standard guidelines for the use of AI in health care need to be implemented. Critical thinking and problem solving skills of students are at risk due to over dependence on AI. Many applications of AI are still in its infancy and require human supervision to minimise the errors. Artificial Intelligence is only a supplemental tool for Medical practitioners to reduce their workload and improve accuracy in diagnosis and predicting treatment outcomes. AI cannot replace the clinical judgement skills of Medical professionals. The expertise of the Dentist coupled with care and compassion is the key to a successful clinical practice.

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2. Bhavya Srivastava, Sunira Chandra, Siddharth Kumar Singh, Tanmay Srivastava. Artificial intelligence in dentistry: its applications, impact and challenges. Asian Journal of Oral Health and Allied Sciences. 2023 • 13(7)

**Dr. Sunila Thomas**
Issue Editor

# INNOVATIONS WHEN AI MEETS ENDODONTICS

**Raghu Ramya**[1], **K.L Nikhitha** [2]


## ABSTRACT

Artificial Intelligence (AI) represents a cutting-edge technology that leverages algorithms and software to emulate human thinking and rationality. By utilizing case-based reasoning and problem-solving capabilities developed through training and experience, AI is revolutionizing numerous sectors, including medicine and dentistry. In medicine, AI is a burgeoning field that integrates advanced computational techniques with expert medical insights to create tools that enhance healthcare delivery. Similarly, the dental field is experiencing a significant rise in the adoption of AI, particularly as a complementary tool for improving diagnosis, treatment, and prognosis. This review article explores the various forms, applications, and future prospects of AI in endodontics, highlighting its transformation potential in this field.


**Keywords**: Artificial Intelligence(AI), Dental Simulators, Nano-robots, Physical AI, Virtual AI

## INTRODUCTION

Artificial Intelligence (AI) is a wide ranging technology that simulates the natural human intelligence in machines which are programmed to think and act rationally. This field of science has revolutionized ever since 1956 after being highlighted by an American computer scientist, John Mc Carthy at Dartmouth workshop.[1] It can be considered as the fourth industrial revolution as it marks the convergence of human ability and computer technology to positively impact industry and health sciences.

AI is an umbrella term that encompasses huge variety of sub fields [Figure 1]. Machine learning (ML) and deep learning (DL) are the two main subdomains of comprehensive AI which focus on acquiring data and interpret the output based on set of rules, which are called algorithms.[2] ML and DL use Convolutional Neural Network (CNN), Artificial Neural Network (ANN) and other such applications as network architecture in order to learn directly from data that helps in solving complex problems.[3]

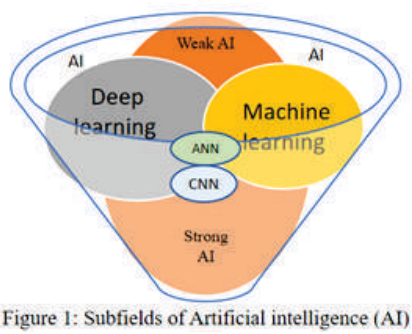


Figure 1: Subfields of Artificial intelligence (AI)

AI is fast emerging as a complementary tool in various sectors including the healthcare field. The healthcare sector has leveraged AI for analyzing vast amounts of data to enhance diagnosis, treatment and prognosis in medicine and dentistry.[4]

AI has recently been integrated with various disciplines of dentistry, to diagnose and classify periodontal diseaes, orthodontic treatment planning, early detection and diagnosis of various mucosal lesions, oral and maxillofacial pathologies and so on. In tandem with its applications in other fields of dentistry, AI is also making rapid strides in the field of endod ontics.[5]

The applications of AI can be broadly classified as virtual and physical forms. Virtual type is used for diagnosis, treatment planning and prediction of prognosis of various clinical conditions. The physical form deals with robotics for performing different treatment procedures and student education.[6]

The virtual type of AI takes an input, generates a "heatmap" and provides a prediction. This generated heatmap helps in visualizing which input variables have decided the result prediction [Figure 2]. The neural networks help in processing the input data to give an output [Figure 3]. The input data might be voice data (sounds of hand-piece), text data (medical or treatment records, experimental parameters), or picture data (spectral or radiographic images, photos). The result might be a prognosis, diagnosis, treatment, or disease prediction.[7]

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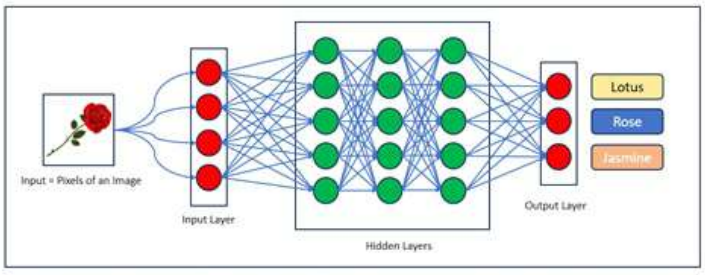


Figure 2: Deep learning (DL) and machine learning (ML) leverage neural networks for analyzing input data and making outcome predictions

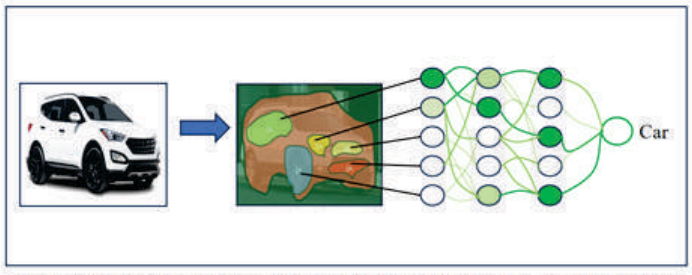


Figure 3: The CNN examines an image depicting a car, isolating crucial features to determine its classification.

AI uses panoramic radiographs, Cone Beam Computed Tomography, hrCBCT etc., paired with deep learning for virtual applications in endodontics. Here, image patches extracted from conventional radiographs and algorithms are applied for analyzing root canal morphology, detecting pathologies and crown/root fractures, prediction of viability of stem cells and assessing prognosis following treatment and re-treatment.[7] Its significance in endodontic treatment planning and disease diagnosis is increasing, as AI-based networks can detect minuscule changes at the level of a single pixel that the human eye might miss.[4,6,8]

## APPLICATIONS OF VIRTUAL AI IN ENDODONTICS

**Prediction of periapical pathologies** - The detection of a early periapical lesion by a radiograph is subject to large variations between examiners. The use of AI technologies to diagnose a periapical pathology from X-rays and CBCT diagnostic tests could aid clinicians in achieving identification precision and decreases the dentist's diagnostic time and effort.[9-11] AI system reduces the evaluation time by allowing semi-automated documentation which can be verified by clinician. Endres et al[12] reported that a deep learning algorithm model can match the diagnostic performance of 24 oral and maxillofacial surgeons in detecting periapical radiolucencies on panoramic radiographs.[12]

**Detection of vertical root fractures** - AI can be a promising aid in detecting the vertical root fractures where the lack of definitive diagnosis may result in an unnecessary surgical procedure or tooth extraction. Here 3D wavelets are used to analyze the synthetic data extracted from radiographic imaging. In the machine learning method, these mathematical operations enable weak signal recovery from noisy settings, thereby detecting the fracture segment.[13,14]

**Assessment of root canal morphology** - The performance of the of AI is excellent in determining the root canal morphology where the DL system classifies images that could aid in understanding images by inexperienced doctors. Hiraiwa et al[16] developed an AI algorithm using the deep learning information analysis, that demonstrated the ability to measure the root canal curvature and its 3-dimensional modification after the instrumentation. Lahoud et al[17] reported an automated 3-dimensional tooth segmentation using the CNN approach after evaluating 433 CBCT radiographic segmentations to analyse the root canal morphology.[17,18]

**Determining the working length and locating apical foramen** - The prognosis of root canal treatment can be guaranteed when the instrumen tation precisely ends at the apical constriction of the root. The accuracy of working length assessment can be improved by employing ANNs and can be used as a adjunct to the conventional methods to locate the radiographic apical foramen.[19] The AI-based model demonstrated an accuracy of 96% in determining the working length and these results were even better than the experienced endodontists who demonstrated 76% accuracy.[20]

**Re-treatment prediction** - AI can also be applied to perform case-based reasoning to predict the outcome of nonsurgical root canal re-treatment with risks and benefits. Here the system would indicate the success rate of re-treatment and suggest the practitioner if the procedure can be attempted. However, the ability of the system is limited only to the information in the data.[21]

With the continuous inclusion of new data, the virtual AI models improve the predictive performance incrementally. Various studies are attempted till date, to analyse these applications of AI in endodontics, further research is required to confirm the results of these studies [Figure 4].

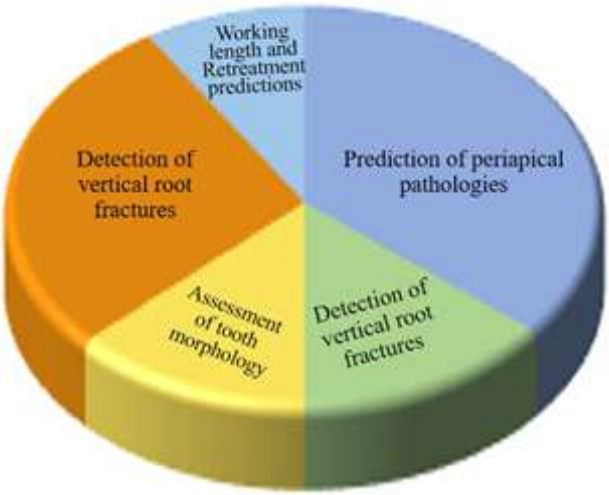


Figure 4: Applications of virtual AI in endodontics

## APPLICATION OF PHYSICAL AI IN ENDODONTICS

### Nano-robots

The physical type of AI uses nano-robots for performing various procedures like management of dentine hypersensitivity, inducing local anaesthesia, root canal disinfection, cavity preparation and pulp regeneration. Nanorobots can provide permanent cure to hypersensitivity by selectively binding to open dentinal tubules with increased diameter.[22] Nanobots with nanometric resolution of $10^{-9}$ µm are instilled into the pulp to induce fast acting and reversible anaesthesia by desensitizing the sensory nerves.[23] These can be safely retrieved after the treatment procedure. Recently, magnetically driven nanorobots were designed by Indian Institute of Science (IISC), Bangalore, for root canal debridement. These bots penetrate the tubules to the depth of 2000 µm and generate heat to destroy resident bacteria.

### Micro-robot

Endodontic micro robot is a computerized machine that was introduced by Dr. Hong Seok at Columbia University. It is miniature robot which is mounted on the tooth to perform automated root canal treatment by accurate navigation within the canal space.[24] This device moves in rotational as well as linear motion in X, Y, Z axes to perform automated drilling and filling under the control of micro sensors.

## ROLE OF AI IN DENTAL EDUCATION

Together, the virtual methods and robotics have an important role in dental education. Dental simulators introduced in the 1990s are virtual means that aid students and clinicians to hone their skills greatly. Traditional preclinical training methods have many limitations, since the procedures are irreversible, force applied on models vary from clinical practice and multiple tooth morphologies cannot be experienced. In contrast, simulators provide individual learning guidance by creating haptic environment with virtual reality and force feedback mechanism.[25,26]

Showa Hanako II is a robotic patient developed by Tokyo's Showa University in 2010 which mimics human responses. This allows dental students to have realistic experiences during preclinical training.

Studies show that these AI-powered automated systems provide successful outcomes in various scenarios. With so many innovative applications, the use of AI in endodontics is still in its nascent stages. The productivity by utilizing artificial intelligence systems may uplift the work efficiency and task automation in daily practice. However, the implementation of this novel technology requires adequate understanding of the complex mechanisms as well as considerations regarding increased cost and surplus data necessary to train computer systems.

## CONCLUSION

The rapid evolution of AI and improved applications unlocks numerous possibilities to delve deeper for a versatile range of usage. Utilizing this technology will greatly contribute in shaping the future of endodontics. This aids in easing the day-to-day practice of endodontics by saving time, providing early diagnosis, enhancing decision-making skills and improving the quality of treatment. Therefore, clinicians must update their knowledge and evolve with the current technology for making the best out of the available resources.

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**Conflicts Of Interest** : There are no conflicts of interest

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# PATIENT PERCEPTION AND AWARENESS ON RADIATION SAFETY IN DENTAL RADIOGRAPHS: A QUESTIONNAIRE SURVEY

**Dhanya Kumar[1], Sunila Thomas[2*], Jincy Thomas[3]**


## ABSTRACT

**Introduction**: X-rays are the ionizing radiation that are frequently used for therapeutic and diagnostic purpose in medicine and dentistry. Despite the tremendous benefit from radiographic investigation, exposure of patients to radiation comes with a subtle risk.

**Objective**: The aim of the study is to assess the knowledge and perception of patients on dental radiography and safety measures of radiation.

**Materials and Methods**: 100 patients were randomly selected for a structured questionnaire-based survey with 16 questions regarding dental radiography and radiation safety. The data was tabulated and statistically analyzed based on the awareness and educational level of patients.

**Results**: There was 100% response rate. 43% of the patients were not aware of the harmful effect of X-rays used in dentistry. 93% of the patients were not informed about the hazards involved in dental radiography which includes 34% of the patients with higher education status. This indicates a lack of awareness on radiation hazards even in the educated people. 74% of the patients responded that they were not given any safety measures during radiographic examination among which 34% of educated individuals were unaware of the radiation safety measures like lead apron. There was significant association between education level and awareness on the harmful effects of radiation in pregnant women, presence of sign boards and light indication during exposure.

**Conclusion**: The results show that there is lack of awareness among the patients regarding the radiation hazards and the safety measures adopted in dental radiography.


**Keywords**: Awareness, dental radiographs, radiation safety, radiation hazards

## INTRODUCTION

In the modern world, humans are constantly exposed to different kinds of ionizing radiations, both from natural and manmade sources.[1] X-rays are ionizing radiations which are extensively used for diagnostic and therapeutic purposes in medicine and dentistry.[2] In dentistry, radiography plays a central role in identification and diagnosis of pathologies in the oral and maxillofacial region.[2]

Patients who come for dental treatment are often exposed to diagnostic dental x-rays. Even though the amount of radiation associated with dental x-ray is small, it comes with a subtle risk. Biological effect from radiation can be deterministic or stochastic.[3] In Deterministic effects, severity of response is directly proportional to threshold dose. Stochastic effects develop at random and not related to threshold dose and even a minute dose can cause harmful biological effects. Cancer and genetic mutations are examples of stochastic effect.[3] Since the effect of radiation is cumulative, a reduction in the effective dose is recommended.

The importance of these effects has led the International Commission on Radiological Protection (ICRP) to introduce the concept of effective dose as a measure of risk from various radiographical evaluations.[4]

The level of knowledge and information of patients regarding radiation hazards associated with dental x rays and radiation safety measures used in dental radiography might be varying. Some of the information can be misleading, confusing or incorrect. Thus, this study based on questionnaire survey was conducted with the aim of assessing the knowledge and perception of patients on dental radiography and safety measures of radiation.

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## MATERIALS AND METHODS

This study was conducted in Thiruvananthapuram, Kerala. One hundred patients who visited PMS Dental College and few local dental clinics from December 2022 to January 2023 were randomly selected and a structured questionnaire based on existing literature was given.[2] The questionnaire contained 16 questions designed based on the reviewed literature, regarding the demographic data, perception and awareness towards dental radiography and radiation safety measures. **(Table1).** Personal interview was done with the questionnaire after taking informed consent from the participants.

**Table 1: Questionnare**

**Patient Perception and Awareness on Radiation Safety in Dental Radiographs: A questionnaire survey**

(Please tick the appropriate box)

1. **What is your age?**
   a) 15-24 years ¡% b) 25-34 years ¡%
   c) 35-44 years ¡% d) 45-54 years ¡%
   e) Above 54 years ¡%
2. **Which gender do you identify with?**
   a) Male ¡% b) Female ¡%
3. **What is your highest educational qualification?**
   a) Primary education ¡% b) Secondary education ¡%
   c) Bachelor's degree ¡% d) Master's degree ¡%
4. **What is your occupation?**
   a) Student ¡% b) Unemployed ¡%
   b) Employed – please specify: Outdoor workers ¡% Govt employees ¡% Pvt employees ¡%
5. **Are you taking a radiograph for the first time?**
   a) Yes ¡% b) No ¡% If yes to question 5, please specify, how frequent you have been exposed to radiation?
   a) Daily ¡% b) Weekly ¡% c) Monthly ¡% d) Based on the requirements ¡%
6. **Do you think that X-rays used in dentistry are harmful?**
   a) Yes ¡% b) No ¡% c) Don't know ¡%
7. **Is the clinical and patient history taken before the dentist prescribes radiography?**
   a) Yes ¡% b) No ¡%
8. **Did the doctor tell you the reason for taking radiograph?**
   a) Yes ¡% b) No ¡%
9. **Is the benefit explained before taking a radiograph?**
   a) Yes ¡% b) No ¡%
10. **Has your dentist informed you about the type of radiograph to be taken?**
    a) Yes ¡% b) No ¡%
11. **Was any consent taken from you before any radiographic procedure?**
    a)Yes ¡% b) No ¡%
12. **Were you informed about the radiation hazards before the procedure?**
    a) Yes ¡% b) No ¡%
13. **Were you given any safety measures such as lead apron/thyroid collar during the radiographic examination?**
    a) Yes ¡% b) No ¡% c) Don't know ¡%
14. **Do you believe that radiographic examination is harmful in pregnant women?**
    a) Yes ¡% b) No ¡% c) Don't know ¡%
15. **Have you noticed any signboards outside the x-ray room?**
    a) Yes ¡% b) No ¡% c) Don't know ¡%
16. **Have you noticed red light indication "ON" while radiography is seen in progress?**
    a) Yes ¡% b) No ¡% c) Don't know ¡%

Data was analyzed using Statistical package SPSS 22.0 (SPSS Inc., Chicago, IL) Level of significance was set at $p<0.05$. Descriptive statistics was performed to assess the proportion of each category of the respective groups. Inferential statistics was done using Pearson Chi square test for proportion.

## RESULTS

All 100 questionnaires were returned because the interviews were done personally. 100 % response rate was thus obtained. Out of 100, 61 were females and 39 were males.

Among 100 participants, 53% were above 35 years of age. All the participants had at least primary school education. Majority of the patients had education up to bachelor's degree (38%) Only 16% of the participant had master's level education.

47% of the participants were employed whereas 29% were unemployed.

With regard to frequency of taking radiograph, 38% had taken radiograph for the first time. Among rest of 62%, 58% of the participants had taken the radiograph only based on requirements.

**Patient perception:** The subsequent questions were based on the knowledge and perception of patients in dental radiography. 43% of the participants believed that x rays are not harmful. Among them, 15 % were with the bachelor's degree **(Figure 1)**.

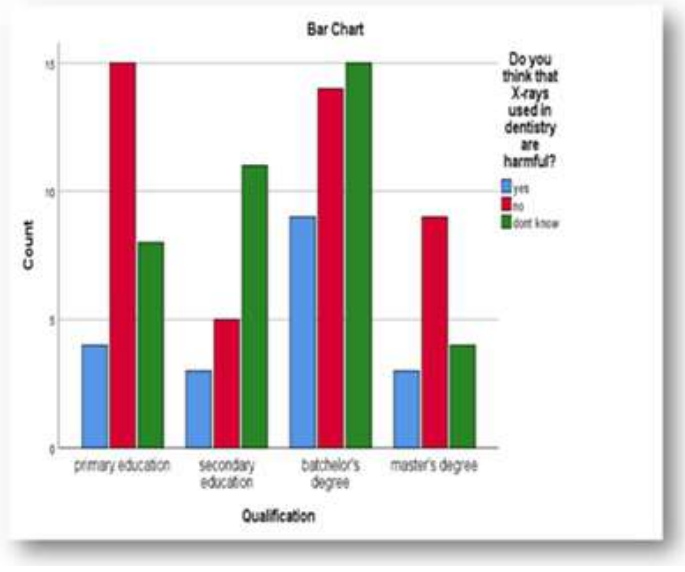


**Fig 1: Knowledge on whether X - rays are harmful**

100% of the patients said that clinical and patient history was taken before the dentist prescribed radiography. 98% of the patients knew the reason for taking the radiograph which was told by the dentist. Only a small group (2%) did not know the reason. 95% of the participants said that consent was taken from them before the radiographic procedure, where as 5% were not aware of the informed consent.

95% of the participants said that the benefit of taking a radiograph was explained to them, out of which 36% with the bachelor's degree were aware of the benefit of taking a dental radiograph. Only 5% were not explained about the benefit. 54% of the participants said that they were not informed by the dentist about the type of radiograph to be taken, out of them 20% with the bachelor's degree were not aware of the type of radiograph before the procedure.

**Radiation hazards**: 93% of the patients were not informed about the radiation hazards before the radiographic procedure. Among them, 34% were with the bachelor's degree **(Figure 2).** 48% of the patients believed that radiographic examination is harmful in pregnant women. Among them, 21% of the participants were with the bachelor's degree. Pearson chi square analysis (p=0.023) showed significant association between education and awareness regarding harmful effects in pregnant women **(Table 2).**

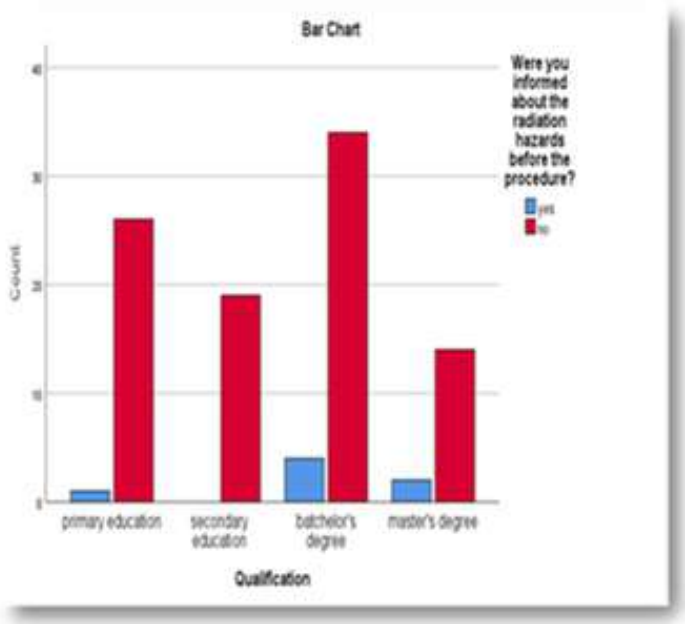


**Fig 2: Informed about radiation hazards**

**Chi-Square Tests**

| | Value | df | Asymptotic Significance (2-sided) |
|---|---|---|---|
| Pearson Chi-Square | 14.676[a] | 6 | .023 |
| Likelihood Ratio | 18.388 | 6 | .005 |
| N of Valid Cases | 100 | | |

a. 3 cells (25.0%) have expected count less than 5. The minimum expected count is 2.40.

**Table 2: Association between education and awareness regarding harmful effects in pregnant women**

**Radiation safety**: Few questions were asked to the participants regarding radiation safety. When we inquired whether they were given any safety measures such as lead apron/thyroid collar during the radiographic examination, 74 % of patients said that they were not given any such measures during the procedure **(Figure 3)**.

When asked if the patients had noticed any sign boards outside the X-ray room, 54% had noticed the sign boards while 46% had not. Out of 54%, 27% with the bachelor's degree knew the relevance of sign boards, which shows that it was significantly associated with education (p=0.037) **(Table 3).**

68% of the participants had noticed the red light indication "ON" while radiography was in progress. Out of this, 28% with the bachelor's degree had noticed the red light indication.

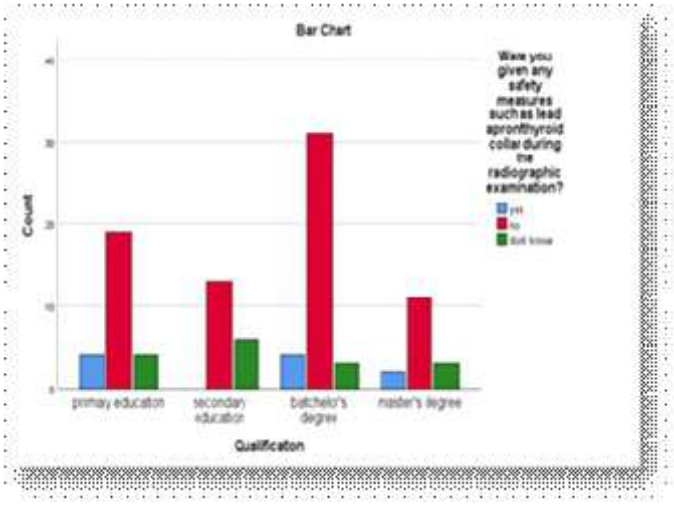


**Fig 3: Provision of radiation safety measures**

**Chi-Square Tests**

| | Value | df | Asymptotic Significance (2-sided) |
|---|---|---|---|
| Pearson Chi-Square | 13.394[a] | 6 | .037 |
| Likelihood Ratio | 13.873 | 6 | .031 |
| N of Valid Cases | 100 | | |

a. 4 cells (33.3%) have expected count less than 5. The minimum expected count is 1.76.

**Table 3: Association between education and relevance of sign boards**

## DISCUSSION

Questionnaire given to the patients was simple and easy to understand. Personal interview was also done along with it. Most of the patients were females (61%). More than half of the participants were 35 years of age. 47% were employed and 38% were with the bachelor's degree.

62% of the patients had taken radiograph more than once, out of which, 54% of the patients were exposed to radiation, only based on the requirements.

43% of the patients believed that x-rays used in dentistry are not harmful, whereas 19% believed thatx-rays in dentistry are harmful. 38% did not know the harmful effects of x-rays used in dentistry, out of which 14% were with the bachelor's degree. This shows that even educated people are not aware of the harmful effects of x-rays. Previous studies indicate a much higher proportion of patients (63%) unaware of the harmful effects of radiation.[5] Even though there is only a low risk associated with dental x-rays, if the benefit outweighs the risk, patient should be educated on the importance of diagnostic x-rays, and strictly following the ALADA principle (As Low As Diagnostically Acceptable).

100% of the patients said that the clinical & patient history was taken before the dentist prescribed radiography. This highlights the importance of clinical evaluation prior to prescribing dental radiographs, which is supported by previous studies showing that radiographs are requested based on clinical need only.[2]

Most of the patients (98%) were informed by the dentist about the reason for taking a radiograph, which is in accordance with the study by Ashok and Kumar where 99 % of patients were informed, indicating the role of dentist in imparting awareness to the patients on the necessity of dental radiographs in their clinical diagnosis.[5]

When asked about consent 95% of the participants informed that consent was taken before any radiographic procedure. Participants belonging to all educational level were aware of the benefit of taking a radiograph.

About 95% of the patients were given explanation regarding the benefit of taking a radiograph. Only 54% of the patients were informed about the type of radiograph to be taken before the procedure. Dentist must provide adequate information to the patient regarding the type of radiograph whether its intra oral or extra oral and the reason for prescribing the particular type of radiograph.

A few questions regarding radiation hazards and radiation safety measures were put forward. 93% of the participants indicated that the hazards associated with radiation were never explained to them by the dentists. The dentist must educate the patients about the hazards of dental radiography and describe the benefit versus the risk while reassuring the patients.

Common safety measures that need to be adopted during the radiographic examinations are use of lead apron and thyroid collar. In this study, majority of the patients (74%) reported that they were not given any safety measures during the radiographic procedure. Most of the educated participants were unaware of the use of safety measures such as lead apron and thyroid collar to protect them from harmful effects of radiation. Reports from previous studies indicate that only 14% patients were protected with lead apron.[5] There has been controversial reports in the literature on the use of lead apron and thyroid collar for patients taking dental radiographs. Thyroid-absorbed dose from panoramic imaging is less than 0.1 m Gy. There are practical issues related to the use of thyroid collar during dentomaxillofacial imaging. It is challenging to place a thyroid shield to yield effective radiation dose reduction without creating artifacts.[6]

Current recommendation from American Association of Oral and Maxillofacial Radiology indicates that Patient thyroid shielding during diagnostic intraoral, panoramic, cephalometric, and CBCT imaging should be discontinued as routine practice.[6]

The red light indication seen when the radiography was in progress was noticed by 68% of the people. Majority of the patients with bachelor's qualification had noticed the red light indication during the exposure. Statistical analysis shows a significant association between education and awareness.

When asked about the presence of signboards, half of the total patients interviewed reported that they had

noticed sign boards outside the x-ray room. Statistical analysis shows a significant association between education and level of awareness regarding the relevance of sign boards.

When the participants were interviewed and asked specifically to give their opinion regarding whether the radiographic examination is harmful in pregnant women, 48% believed that it is harmful in pregnant women. There was significant association between the level of education and awareness on the ill effects of radiation in pregnant women which is similar to the findings in the study by Purmal K, Alam MK, Nambiar P.[7]

## CONCLUSION

The study shows a definite lack of knowledge among patients on the possible harmful effects of dental x-rays, the hazards associated with the radiographic examination and radiation safety measures adopted during the procedure. More emphasis must be laid on educating the patients about the radiation hazards and safety measures implemented to reduce them. Result of the study indicate that patients had considerable level of awareness regarding the reason and benefit of taking a radiograph and the harmful effects of radiation in pregnant women. Dentist must inform the patients about the type of radiograph before the procedure and provide them with radiation safety measures during the procedure. Hence we recommend that scientific information about radiation safety measures and radiation doses must be disseminated to the public through media to create awareness.

Limitation of this study was that the questionnaire was not prevalidated, but was based on available literature. There was variation in the percentage of patients belonging to different category of educational status. We suggest that further studies need to be carried out in larger groups to get a better representation of the patients' perception to dental radiography.

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# THE PERIOESTHETIC-RESTORATIVE APPROACH FOR THE MANAGEMENT OF GINGIVAL RECESSION WITH NON-CARIOUS CERVICAL LESION- A CASE REPORT

**Nisha K J[1]*, Suhail Ahmed Choudhury[2]**

## ABSTRACT

**Introduction:** Gingival recession often accompanies non-carious cervical lesions (NCCLs), posing challenges in both functional and aesthetic aspects. Successful management of such combined lesion is challenging and requires a thorough understanding of the periodontal and restorative aspects of treatment. This case report illustrates a comprehensive perioesthetic-restorative approach for managing gingival recession associated with NCCL, aiming to restore both form and function.

**Methodology:** A case of RT1 gingival recession with NCCL was treated using composite restoration and subepithelial connective tissue graft (SCTG) with coronally advanced flap (CAF).

**Results:** At the end of one year, there was complete root coverage with an excellent esthetic score at the surgical site.

**Conclusion:** Restoration of NCCL followed by surgical root coverage of gingival recession using coronally advanced flap along with connective tissue graft is a viable option in treating RT1 recession with NCCL.

**Keywords**: Gingival Recession, Dental Abrasion, Connective Tissue Grafts, Cementoenamel junction, Composite Resins.

## INTRODUCTION

Gingival recession is the exposure of root surface due to the apical migration of the gingiva. The success of root coverage depends on various factors such as elimination and/ or control of the etiological factors.[1] Adequate root planing gets hindered when there is cervical abrasion as it could compromise the tooth.[2] Successful management of gingival recession(GR) along with non carious cervical lesion (NCCL) is challenging and requires a thorough understanding of the periodontal and restorative aspects of treatment. Many studies have reported successful clinical, histologic and microbiological results treated with different restorative materials before surgical procedures. [3,4] The present case evaluates the efficacy of coronally advanced flap (CAF) along with connective tissue graft (CTG) on composite restored root surface in treating RT1 gingival recession with non carious cervical lesion.

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## CASE REPORT:

A 50-year female patient reported to the Department of Periodontics complaining of unaesthetic appearance of her upper left front tooth. On examination, it was observed that there was RT1 gingival recession on maxillary left canine which was labially prominent and was associated with Class B + root discrepancy according to Pini Prato's classification of dental surface defects (Figure 1).[5]

Figure 1 Preoperative view. RT1 gingival recession with class B+ root discrepancy in relation to maxillary left canine.

Gingival zenith of maxillary left lateral incisor was kept as the reference point where apical position of the gingival zenith in relation to the zenith of maxillary lateral incisor would indicate partial root coverage whereas as if it is in line with the zenith would indicate complete root coverage. The probe visibility method revealed a thick gingival biotype. The patient underwent phase I periodontal therapy, which included scaling, root planing and oral hygiene instructions. On achieving satisfactory level of plaque control, dentin and enamel were etched using 35% phosphoric acid gel (3M ESPE Multipurpose Etchant) for 15 and 30 seconds respectively, rinsed for 30 seconds, and the excess moisture blotted. An adhesive system (Coltene One Coat Bond SL), was applied according to the manufacturer's instructions and cavity was restored with resin composite (3M ESPE Valux Plus Composite). All the overcontoured areas were removed and finishing was done using diamond burs to prevent plaque accumulation (Figure 2).

Figure 2 Preoperative view. Non carious cervical lesion restored with resin composite in relation to maxillary left canine.

One week after the restorative procedure, surgical root coverage procedure was performed. Anaesthesia was obtained by local infiltration of 2% lidocaine combined with 1:100,000 epinephrine. A no.15 scalpel was used to outline the surgical site with two horizontal incisions, on the mesial and distal aspect of the recession site followed by two vertical incisions extending into the alveolar mucosa were given Figure 3(a).

Figure 3 (a) Intraoperative view. Preperation of recipient site.

Figure 3 (b) Intraoperative view. Tin foil template placed over the recipient site.

The resulting trapezoidal-shaped flap was elevated. Careful finishing and polishing of the restoration is done prior to mucogingival surgery as it is a critical factor to the success of therapy.[6] The composite restoration was polished and smoothened using a tapered, multi fluted, carbide finishing bur under abundant saline solution irrigation to ensure the smoothest possible surface. Tin foil template was placed over the recipient site to determine the area to be grafted Figure (3b).

An autogenous connective tissue graft from the palate was obtained using trap door technique and the donor site was sutured (Figure 4 a, b, c).

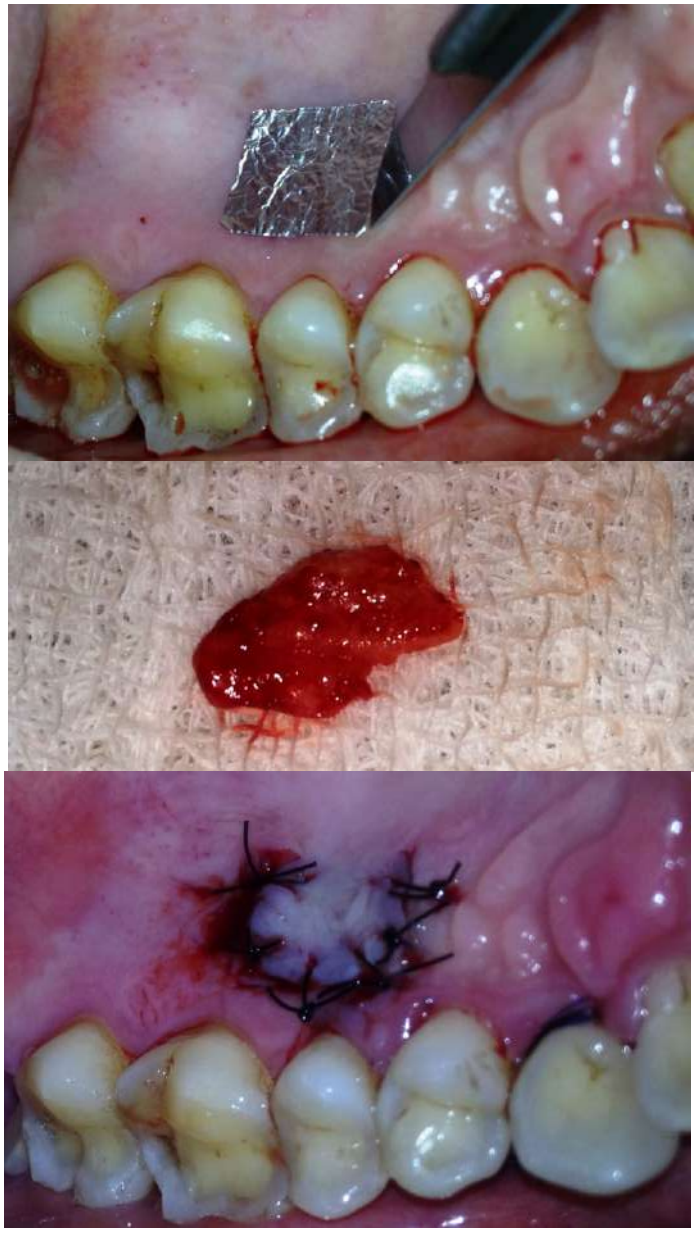

Figure 4 (a) Intraoperative view. Donor site prepared using trap door technique.

Figure 4 (b) Intraoperative view. Connective tissue graft graft procured.

Figure 4 (c) Intraoperative view. Donor site sutured.

After de-epithelializing the papillae, the graft of the required size was trimmed and placed over the defect and sutured with vicryl 4-0 absorbable silk suture (Figure 5).

Figure 5 Intraoperative view. Connective tissue graft placed over the recipient site and sutured.

The flap was repositioned 1 mm coronal to the restoration, covering the tip of the de-epithelialized papillae and sutured with 4-0 non absorbable suture (Figure 6).

Figure 6 Intraoperative view. Flap coronally repositioned and sutured.

A non eugenol surgical dressing was applied over the surgical site (Figure 7).

Figure 7 Intraoperative view. Periodontal pack placed over the recipient site.

The patient was given post-operative instructions and was put on systemic analgesics (Diclofenac sodium 50 mg twice daily for three days) and antibiotics (Amoxicillin 500 mg three times a day for 5 days). On day 07, patient was recalled for re-evaluation; periodontal pack was removed and wound healing index (WHI) described by Landry et al was recorded (Figure 8) and suture removal was done after 14 days (Figure 9). [7] Wound healing was found to be excellent with a WHI score of 5 (Table 1).

Figure 8 One week postoperative view.

Figure 9 Two weeks postoperative view.

Figure 10 Six month postoperative view.

Figure 11 One year postoperative view.

| Wound healing index One week post operative | | Root coverage esthetic score (RES) 6 months post operative | | | | | |
|---|---|---|---|---|---|---|---|
| Score | Inference | GM * | MTC† | STT‡ | MGJ§ | GC\|\| | TOTAL RES |
| 05 | Excellent | 06 | 01 | 01 | 01 | 01 | 10 |

**Table 1 Wound healing index and root coverage esthetic score**

* Gingival Margin, †Marginal Tissue Contour, ‡ Soft Tissue Texture, §Mucogingival junction alignment, || Gingival Color

The patient was instructed to continue regular home hygiene care, except in the operated area where tooth brushing and flossing was discontinued for the first three weeks.At the end of 6 months, the gingival zenith was in line with the gingival zenith of maxillary lateral incisor showing complete root coverage (CRC) (Figure 10). Root coverage esthetic score (RES) was evaluated as described by Cairo F et al 2009 with an excellent score of 10 one year postoperatively (Table 1). [8] At the end of one year, the result was stable with CRC (Figure 11).

## DISCUSSION

Apical displacement of soft tissue with abrasion on a tooth may impair the patient's plaque control and complicate the restorative procedure, particularly ensuring a proper marginal fit and emergence profile of the restoration. On the other hand, restoring a cervical abrasion alone will not cure the patient's aesthetic problem, which will result in an excessive length of the tooth. [1]

The use of restorative materials has been shown to be a biocompatible alternative to restore deep caries or cervical abrasion prior to surgical root coverage. Martins et al, analyzed the histological response of periodontal tissues to subgingival class V resin composite and resin-modified glass ionomer cement restorations and reported the biocompatibility of all tested restorative materials.[3] The formation of a long junctional epithelium was the predominant type of healing, with absence of connective tissue attachment and new bone formation. Konradsson and Van Dijken, reported presence of IL-1 in GCF in areas where root coverage were performed following restoration with adhesive restoratives and concluded that restorative material do not alter gingival health or induce gingival inflammation.[4]

A systematic review concluded a better root coverage predictability for CAF+CTG and considered gold standard.[9] In the present case, gingival recession associated with deep cervical abrasion lesions was treated with a combination of composite restoration and coronally advanced flap + connective tissue graft.

In most of the reported cases of root coverage procedures, the post operative healing is not assessed using any objective parameter. In this case, wound healing index as described by Landry et al[7] was used to evaluate the healing period 1 week post operatively which demonstrated excellent healing of the grafted site.

The outcomes of root coverage procedures are generally evaluated on the basis of the percentage of root coverage and CRC. At the end of one year, the gingival zenith of maxillary canine was in line with the zenith of maxillary lateral incisor indicating complete root coverage. An objective esthetic evaluation should be useful when the outcomes of cosmetic surgery are assessed. Here, in this case root coverage esthetic score was used to assess the esthetic outcome at the end of one year.[8] Total RES was calculated for the site by assessing the five variables: Gingival margin (GM), marginal tissue contour (MTC), soft tissue texture (STT), MGJ alignment, and gingival color (GC). The RES score evaluated in this present case showed an ideal esthetic score of 10 which was in accordance to the study conducted by Cairo et al 2012.[10]

Resin composite restorations are always susceptible to physical and chemical challenges in the oral cavity along time. These challenges results in various patterns of degradation of collagen fibrils and resin components.[11] After continuous exposure to chemical agents, resin-based materials can undergo alterations making the surfaces more susceptible to the physical forces during abrasion and attrition.[12] Hence, longitudinal randomized controlled clinical trials with larger sample size has to be carried out to evaluate the clinical longevity of adhesive fillings and stability after mucogingival surgery.

This case highlights the importance of a collaborative perioesthetic-restorative approach in managing gingival recession associated with NCCLs, providing optimal outcomes in terms of both aesthetics and functional rehabilitation.

## CLINICAL RELEVANCE:

1. Management of gingival recession (GR) with non-carious cervical lesion (NCCL) requires a precise diagnosis and the choice of proper procedure with a thorough understanding of the hard and soft tissue characteristics of the involved site.
2. GR with NCCL in the anterior esthetic zone can be managed successfully using an interdisciplinary approach.
3. Restoration of the cervical lesion using resin composite along with coverage of the denuded root surface using sub epithelial connective tissue graft is a promising option.

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# DENTAL CONSIDERATIONS AND TREATMENT APPROACHES IN PRUNE BELLY SYNDROME: A RARE CASE REPORT

**Petluru Harika[1]*, S.V.S.G. Nirmala[2], Meerza Alam[1], Sivakumar Nuvvula[3]**

## ABSTRACT

Prune belly syndrome is a rare condition and is almost exclusive to males. It developed from an early mesodermal defect that causes abdominal abnor malities. This present case report suggests that dental abnormalities are part of the broad spectrum of clinical features of prune belly syndrome. Because the syndrome causes many serious medical problems, the early diagnosis of abnormalities involving the primary and permanent dentitions is recommended. This is a case report of a 13-year-old boy who was a known case of Prune belly syndrome. The adolescent presented typical dental findings such as high labial frenal attachment with enamel hypoplasia, high arched palate with proclined maxillary incisors and increased overbite, crowding of mandibular anterior teeth, calculus deposits observed for lower anterior teeth, retained primary 55, 65 teeth. The treatment provided was discussed (extraction of 55, 65 and topical fluoride applications). This original case report on prune belly syndrome highlights the possibility that dental abnormalities are part of the broad spectrum of clinical features of the syndrome. Therefore, an accurate intraoral clinical examination and radiographic evaluation are required for patients with this syndrome to provide an early diagnosis of abnormalities involving the primary and permanent dentitions.

**Keywords**: Prune belly syndrome (PBS), tooth abnor malities, child, adolescent

## INTRODUCTION

Prune belly syndrome (PBS) Otherwise known as Triad syndrome, Eagle-Barret syndrome. It is a rare condition defined by the triad of abdominal muscle deficiency, severe urinary tract abnormality, and bilateral cryptorchidism.[1,2] The incidence of the syndrome is between 1/35000 and 1/50000 live births, with 95% of cases affecting males.[3] The term originates from the clinical appearance of poor abdominal muscular structure that resembles the shape of a prune.[4] Though the cause is unknown, but one theory suggests that there is a mesenchymal insult to the fetus at ~6 weeks gestation secondary to a migrational defect of the lateral mesoblast resulting in deficient abdominal muscular development. A second theory suggests that the problem may be secondary to chronic intrauterine abdominal distention with subsequent pressure atrophy of abdominal muscles.[5]

Enamel hypoplasia with generalized hypocalcemic dental lines, demineralization of the trabecular bone of the jaw, loss of the lamina dura and discontinuity of the mandibular cortical bone were cited as secondary to CRF and hyperparathyroidism.[6] Furthermore, excessive calculus deposits were related to End Stage Renal Failure patients with prune-belly-syndrome.[7]

This is the report of a patient with PBS associated with dental anomalies. Given that PBS is a rare disease for which the oral and dental aspects are seldom described in the literature, the objective of the present case report is to contribute to a better understanding of this syndrome.

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## CASE PRESENTATION:

A 13-year-old boy visited the department of pediatric and preventive dentistry with a primary complaint of forwardly placed upper front teeth. The accompanying father reported that his child had a PBS during the anamnesis procedure and he had been undergoing regular medical checks since birth because of this finding. An ultrasound examination showed a gastrointestinal malformation of the fetus and was suggested for abortion at 5 months of gestational age for growth retardation. The baby boy was born at 35 weeks by cesarean section, with a weight of 1.6 kg along with facial dysmorphism. According to the father, postnatal examination revealed that the baby had a distended and wrinkled abdomen, resembling a dried prune. The form of the penis was abnormal, with an enlarged diameter and lax excess skin. During this period, numerous medical examinations were performed and the results combined with the clinical features resulted in a diagnosis of PBS. The adolescent does not have relatives with any type of syndrome. The child underwent left herniorrhaphy at the age of 5 months and descent of testes within 1 year. No pulmonary and cardiovascular complications were observed.

This is the first dental visit for the adolescent in which he was observed for short stature and underweight with 125 cm and 14 kg, respectively [Fig. 1].


Figure 1: View of short stature,

On general examination, the following findings were observed: potters facies with low set ears, beaked nose, and downward slant of eyes with prominent epicanthic folds and pot belly appearance [Fig.2]


Figure 2: Potter facies,

with grade 2 i.e. "Definitely above the average in intellectual capacity' score according to Raven's colored progressive matrices manual. Extraoral examination revealed a convex profile with incom petent lips [Fig.3].


Figure 3: Convex profile with incompetent lips

On intraoral examination, showed high labial frenal attachment with enamel hypoplasia of 11, 21 [Fig.4],


Figure 4: High labial frenal attachment with enamel hypoplasia of 11, 21

high arched palate with proclined maxillary incisors and increased overbite, crowding of mandibular anterior teeth, calculus deposits noted for lower anterior teeth, retained primary 55, 65 teeth.

[Figs. 5, 6 and 7] periapical radiographs also revealed retained primary 55, 65 with erupting succedaneous teeth.

Figure 5: Proclined maxillary incisors with increased overbite

Figure 6: High palatal vault with retained primary 55 and 65

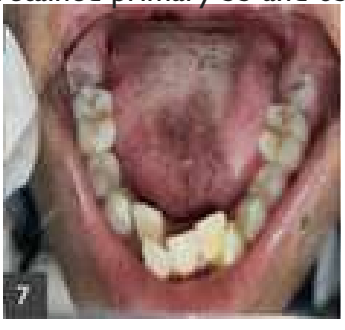

Figure 7: Crowding of lower anterior teeth

[Figs. 8 and 9] The adolescent received oral hygiene instructions followed by fluoride varnishes were applied topically to the teeth after professional dental prophylaxis. After that, the adolescent underwent extraction of 55, 65 under local anesthesia after physician consultation to obtain information about the patient's health and the degree of impairment of various organs, especially the kidney.

Figure 8: Retained primary 55 with erupting Succedaneous tooth

Figure 9: Retained primary 65 with erupting Succedaneous tooth

[Figs. 10a,10b and 11a,11b] after a long discussion on the orthodontic treatment protocol, the adolescent father wants to visit after the growth hormone therapy competition, which was advised by the endocrinologist.

Figure 10a & 10b: Extracted 55

Figure 11a & 11b: Extracted 65

## DISCUSSION:

Although the etiology of PBS is unknown, the literature related to this disorder describes it as a mesodermal defect that consists essentially of abnormalities of the genitourinary tract [8,9]. However, the wide range of severities and previously reported alterations in other organs[10,11], including the association with some syndromes such as Down syndrome, cleft lip, trisomy of 18 and trisomy 13.[1,12-14] The differential diagnosis of PBS are pseudo prune belly syndrome, prune belly-like variant, megacystis microcolon intestinal hypoperistalsis syndrome, ureterocele, urethral atresia and posterior urethral valve. As the child presented with the classic triad characteristics of abdominal muscle deficiency, severe urinary tract abnormality, and bilateral cryptorchidism, the final diagnosis was made as PBS.[15,16]

This is the report of a child with PBS associated with dental anomalies in the literature. The importance of this anomaly tends to be underestimated because of the lesser incidence. The hypoplastic enamel observed in this case is the result of developmental disturbances commonly encountered in clinical practice and presents challenging problems of compromised esthetics, tooth sensitivity, and caries susceptibility.[17] In this case brownish discoloration of hypoplastic enamel resulted from urinary tract infection, which was one of the risk factors for enamel hypoplasia.[18] Since the patient haven't complained about teeth sensitivity to date, we assured to treat enamel hypoplasia after corrective orthodontic treatment. Hence, we provided oral prophylaxis in conjunction with topical fluoride applications in this visit.

## CONCLUSIONS:

PBS has a broad spectrum of clinical features with different levels of severity, and some oral findings such as enamel hypoplasia, proclined maxillary incisors, and retained primary teeth highlight the possibility that dental anomalies may be a part of this rare syndrome. The consensus is that treatment should be multidisciplinary. For the maintenance of oral health, accurate intraoral clinical and radiographic evaluations are required for patients with this syndrome to provide an early diagnosis of other abnormalities involving the primary and permanent dentitions.

## CONSENT:

Written informed consent was obtained from the parents for the publication of this case report and any accompanying images.

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# AN UNUSUAL CASE OF DIFFUSE ORAL PIGMENTATION

**Anju B S[1], Anna P Joseph[2*], Varun B Raghavan Pillai[3], Sunjith Sudhakar[4], Freeda Mary S[5], Santhu Sadasivan[5]**

## ABSTRACT

Oral melanoacanthoma is an uncommon diffuse pigmentation of the oral cavity which can be alarming for both the patient and the clinician. Here, we present a case of gradually fading diffuse pigmentation in the oral cavity which is presented in a young female.

**Keywords**: Oral melanoacanthoma, oral pigmen tation, trauma, chronic irritation

## INTRODUCTION

The oral mucous membrane in healthy individuals is of varying shades of pale pink to pale red. Areas of pigmentation are frequently a cause for concern when either the patient or the doctor detects them. Oral melanoacanthoma is an uncommon, benign pigmented lesion that is well circumscribed, brown-black in colour, and is characterized histologically by spinous keratinocyte and dendritic melanocyte hyperplasia. The buccal mucosa is the most reported intra-oral site of melanoacanthoma (51.4 %).[1] Clinically, oral lesions appear as smooth macules that can range in colour from brown to blue-black. Oral melanoacanthoma is usually seen with a female predilection and is most common between the third and fourth decades of life.[2] Here we present a case of diffuse oral pigmentation.

## CASE REPORT:

A 22-year-old female patient presented with a complaint of black pigmentation in her oral cavity noticed 3 weeks ago. She was unaware of the onset of the pigmentation initially and stated that 3 weeks prior, she first noticed black pigmentation in her mouth and was concerned by the sudden appearance of the pigmented lesion. No systemic conditions, hormonal problems, medication, or tobacco use were reported.

On intra-oral examination, the lower labial mucosa was found to have dark macular pigmentation (Figure 1). The pigmented area was smooth, with slightly irregular margins involving the labial mucosa, of approximate size 3 x 3.5 cm. No associated pain or discomfort was noticed. There was no cutaneous pigmentation and no reported association with food allergies, dental hygiene agents or tobacco products. On hard tissue examination, malposed lower incisors were noted and a possible history of trauma from malposed teeth was elicited.

The patient was apprehensive, and she was not willing for a biopsy procedure. A regular periodic review was done at 2 and 4 months to evaluate any alteration in colour, size and shape of the lesion. At 4 month follow-up, the pigmentation was seen to be receding (Figure 2) and a provisional clinical diagnosis of oral melanoacanthoma was given.

Figure 1: Diffuse pigmentation involving the lower labial mucosa, at initial visit.

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Figure 2: Regression of diffuse pigmentation of the lower labial mucosa, at 4 months recall visit.

## DISCUSSION

Cutaneous melanoacanthoma was first reported in 1927. In 1960, Mishima and Pinkus coined the term "melanoacanthoma" to describe this dermatological phenomenon.[3] However, it wasn't until 1978 that oral melanoacanthoma was formally described in the literature.[4] It is described as an asymptomatic, diffuse, solitary or multi-focal lesion, larger than 1 cm in diameter, with ill-defined regions of dark brown to black colour.

Oral melanacanthoma is a benign, reactive process and is unrelated to cutaneous melanoacanthoma. The buccal mucosa is the intraoral site most usually involved; in our case, the site was the labial mucosa. Oral melanoacanthoma often manifests as a single lesion, however it can also occasionally be multifocal or extensive. It was a single lesion in our instance. Some potential factors implicated in the development of oral melanoacanthoma include chronic irritation, trauma, hormonal changes, and genetic predisposition. Melanoacanthomas of the mouth are typically asymptomatic and non-neoplastic.[4]

The following lesions need to be taken into account when making a differential diagnosis: systemic conditions, focal melanotic macule, pigmented nevi, post-inflammatory pigmentation, hormone-induced melasma and oral melanoma. Physiologic racial pigmentation is another disorder linked to elevated melanin deposition.

We ruled out melanotic macule because the present lesion was diffuse and gradually fading over the time of recall visits at 2 and 4 months. Certain diseases like HIV, Peutz-Jeghers syndrome, neurofibromatosis, McCune-Albright syndrome, Addison's disease, Laugier-Hunziker syndrome can result in multifocal hyperpigmented melanocytic lesions. Because of increased adrenocorticotropic hormone production in the setting of failing adrenal glands,Addison's disease results in hyperpigmentation of oral mucosa. Laugier-Hunziker syndrome is an uncommon cause of oral and cutaneous hyperpigmentation; it is an exclusion diagnosis that usually affects older Caucasian males who do not have any concomitant hamartomas or malignancies. In the current case, there were no associated systemic conditions or hormonal problems. The lesion was similar to melanoma clinically in that it appeared suddenly and enlarged quickly. Oral melanoma should be suspected in instances of lesions displaying the ABCDE criteria, which include asymmetry, border irregularity, change in colour, diameter > 6 mm and elevation, or the presence of a raised lesion.[4] But the present lesion was not an elevated or raised lesion and doesn't comply with ABCDE criteria. Post-inflammatory pigmenta tion may be taken into consideration in the differential diagnosis, but it is quite uncommon at this age.

A pigmented lesion with an abrupt onset and receding behaviour raises the possibility of oral melanoacanthoma among the differential diagnoses. The sudden appearance followed by a reduction in size or recession is a characteristic feature, so this case was clinically diagnosed as oral melanoacanthoma.

Histologically, melanoacanthoma exhibits epidermal acanthosis with increased melanin pigmentation, involving both melanocytes and keratinocytes, with dendritic melanocytes dispersed throughout the epidermis. Special stains like Fontana-Masson or immunohistochemistry for melanocytic markers such as Melan-A, and HMB-45 aid in confirming the melanocytic origin and distribution of melanocytes within the lesion.[4]

Although the actual pathogenesis of oral melanacanthoma is unknown, the clinical signs and symptoms of the lesion point to a reactive origin because it mostly affects trauma-prone areas.[4] Most

oral melanoacanthomas occur on stress-bearing surfaces (e.g. the palate or alveolar ridge) or common sites of trauma such as the buccal mucosa. Prolonged irritation of the oral tissues may lead to an increase of dendritic melanocytes across the epithelium, which would increase the oral cavity's brown pigmentation. Pathogenesis related to chronic irritation due to the malposed lower incisors was likely to be the causative factor of our present case.

## CONCLUSION

Oral melanoacanthoma is a benign, reactive process. While the exact pathogenesis of oral melanoa canthoma is not fully understood, clinical observation of this case suggests a reactive origin.The lesions often appear in areas prone to trauma or chronic irritation, such as stress-bearing surfaces of the oral mucosa or sites commonly affected by biting/friction. This association with trauma or chronic irritation suggests that the development of oral melanoacanthoma may be triggered by tissue injury or inflammatory processes and may be considered in the differential diagnosis of pigmented oral lesion of abrupt onset. Understanding the potential role of chronic irritation or trauma in the pathogenesis of oral melanoacanthoma can help clinicians in both the diagnosis and management of this condition.

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# MANAGEMENT OF PATIENTS WITH SKELETAL CLASS – III MALOCCLUSION WITH BONE SCREW – ASSISTED MANDIBULAR MOLAR DISTALIZATION : A CLINICAL CASE REPORT

**Jijo M Jacob[1], Aparna T M[1], Roopesh R[2], Deepu Leander[3], Reshma Raveendran[4], Geethu Sunil[1]**

## ABSTRACT

In non-growing patients with skeletal Class-III malocclusion, premolar extraction or molar distalization in the lower arch can be done as a part of camouflage treatment. Temporary anchorage devices are widely used for this purpose because they do not produce undesirable reciprocal effects and do not depend on the patient's cooperation. However, most reported cases in this regard have used interradicular miniscrews in the mandibular arch and these have a risk of failure as they can loosen due to collision with adjacent roots. This article showcases mandibular molar distalization utilizing bone screws, inserted at the retromolar area to correct a Class-III problem. A 20-year-old girl with a skeletal Class-III malocclusion and unilateral dental Class-III molar and canine relationship was referred for orthodontic treatment. The treatment plan included distalization of the lower molars bilaterally followed by full fixed appliance therapy, after third molar extractions. For the lower molar distalization, the bone screws were inserted at the retromolar pad. At the end of 21 months, a Class-I molar and canine relationship, normal overjet and overbite were obtained. The average amount of distalization of mandibular first molar was 5mm at the crown level. In conclusion, placing miniscrews at the retromolar pad area for lower molar distalization was found to be a simple and effective method for correcting anterior cross bite and mandibular anterior crowding or protrusion, without the need for patient compliance.

**Keywords**: Bone screw, Class-III malocclusion, molar distalization, temporary anchorage device, retromolar area

## INTRODUCTION

The preferred choice of treatment in severe Class - III nongrowing patients is often surgical repositioning of the maxilla, mandible or both. A satisfactory dental occlusion can be obtained by mainstream orthodontic biomechanics, if residual growth and developmental changes are dismissible and the skeletal discrepancy is within the confines of camouflage treatment using orthodontic tooth movement.[1]

Different treatment approaches have been introduced to camouflage mild-to-moderate Class-III relation ships, including extraction treatment, Class-III elastics, high-pull J-hook headgear, maxillary molar protraction, and others.[2-8]

## CASE REPORT

A 20-year old female patient who had no significant medical problems reported to the Department of Orthodontics & Dentofacial Orthopaedics, PMS Dental College with a chief complaint of forwardly placed lower front teeth and clicking sound upon mouth opening. Her gingival health was good and initial radiographs did not reveal any periodontal problem. Clinical examination revealed deviated path of closure to left upon closing. Pre-treatment facial photographs indicated that she had a mild assymmetrical face, which the patient was not concerned about, a concave profile, anterior divergence with competent lips and adequate gingival display on full smile [Figure 1]. The maxillary midline is shifted to right by 1mm while mandibular midline is shifted to left by 3mm, making it a total of 4mm from the midline. The intraoral evaluation together with study model analysis divulged that she had a Class III molar relation on right side (6mm), super class I relation on left side and Class III incisor relationship, protruded and proclined maxillary and mandibular incisors [Figure 2]. The initial panoramic radiograph showed no missing teeth, adequate alveolar support and normal root lengths [Figure 3].

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## TREATMENT OBJECTIVES

- To establish bilateral Class I Molar and Canine relationship
- To obtain normal overjet and overbite
- To correct midline shift
- To correct incisor proclination

## TREATMENT ALTERNATIVES

Considering all aspects of the case in detail during the treatment-planning and discussion, the following treatment options were presented to the patient:

(1) Orthognathic surgery involving mandibular setback after arch coordination and decompensation; which would provide good esthetic results in a relatively shorter treatment time but with considerable treatment costs and risks.

(2) Extraction of only the lower premolars.

(3) Extraction of second upper and first lower premolars, to camouflage the mild Class-III skeletal profile of the patient.

(4) Distalization of mandibular teeth to alleviate the crowding and obtain normal overjet and overbite.
The patient rejected surgical therapy and was against extraction of healthy teeth for orthodontic purposes. So, the last treatment option was chosen.

Fig 1: Pre-treatment Extra oral

Fig 2: Pre-treatment Intraoral

Fig 3: Pre-treatment radiographs

## TREATMENT PROGRESS

After initial restorative and prophylactic measures, fixed orthodontic treatment was begun with 0.022 slot MBT prescription appliance. Banding of all molars done and Wire sequence followed in the order- 0.014 NiTi,0.016 NiTi, 16×22 Niti, 17×25 Niti,19×25 Niti, 19×25 SS [Figure 4,5].

Fig 4: End of alignment and levelling

Fig 5: End of alignment and leveling radiographs

Just prior to the insertion of bone screws, all third molars were extracted. Two self-drilling stainless steel bone screws (Fav Anchor 2 mm diameter, 12 mm length) were inserted in the retromolar area near the third molar extraction socket as bone anchors [Figure 6]. The bone screws were placed under local anaesthesia in the buccal shelf region bilaterally. Both bone screws had good primary stability that was assessed using a tweezer intraorally.

Bone screws were loaded immediately after insertion. Distalization of second molars was done by means of placement of active NiTi coil springs between first and second molars. To prevent any mesial movement of first molars, it was tied to the bone screw using a ligature wire.

Fig 6: Retraction.

After adequate distalization of second molars, they were ligated to the bone screws, creating the anchorage unit and then the mandibular first molars, bicuspids and canines using power chain. This was continued for about 7 months, till a Class-I canine and molars relationship was achieved bilaterally. During the active orthodontic treatment, the patient was seen every 4 weeks for appliance activation.

## DISTALIZATION RESULTS

Post-distalization evaluation showed that treatment objectives had been achieved; a Class-I molar and canine relationship in addition to acceptable overjet and overbite was obtained. The molars were distalized in a relatively short amount of time, at the rate of approximately 0.4 mm/month. Total treatment time was 21 months. The average amount of distalization of mandibular first molar was 5 mm at the crown level [Figure 7].

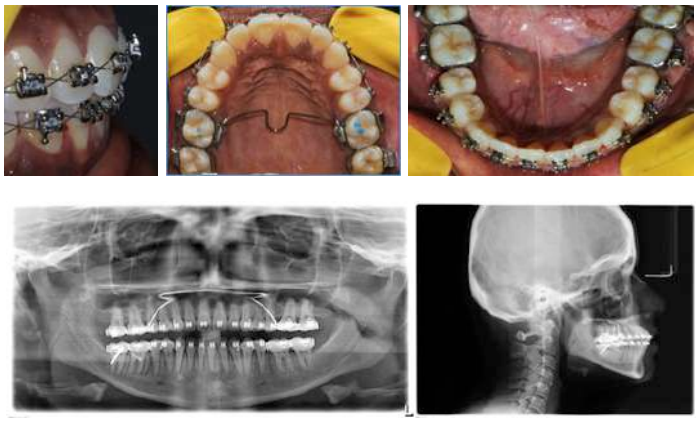

Fig 7: Post-distalization.

## DISCUSSION

This case report demonstrates the clinical application of bone screws inserted at the retromolar area for mandibular molar distalization. The Class-III molar and canine relationship was converted to a Class-I occlusion with sufficient overjet and overbite. A 5 mm molar distalization was achieved on right side. This technique can be used effectively in mild-to-moderate Class-III cases. This technique provides scope for camouflage treatment in borderline Class-III cases, thereby avoiding the costs and risks of the surgical approach.

Placement of bone anchored devices in the retromolar area has been reported in different studies for anteroposterior movements of mandibular molars. In most of them, dental implants or miniplates were used instead of screws. However, both implants and miniplates require complicated surgery for placement and also cost high. Bone-screws provide the same resistance against orthodontic load with advantages including: No need for osseointegration, minimal anatomic limitations because of smaller available sizes, lower costs, easier placement, and lesser discomfort. With microimplants as skeletal anchorage, orthopaedic growth modification became more effective, and it also incresed the scope of camouflage orthodontic treatment for patients who were not eligible for orthognathic surgery.

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