



THE GENERAL DENTAL PRACTITIONER

VOLUME 42

MAY 2026

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The General Dental Practitioner is published annually by the College of General Dental Practitioners of Sri Lanka

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MAY 2026

*Council of the college of
General Dental Practitioners
of Sri Lanka 2025/2026*

EDITORIAL

Elevating Professional Standards: The MCGDP Membership Examination

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As the College matured, it sought to establish its own benchmark of excellence. This led to the development of the **Membership of the College of General Dental Practitioners (MCGDP)** examination. Under the leadership of **Prof. B.G. Nanayakkra**, and through the efforts of **Dr. Hilary Cooray**, the MCGDP was conceptualized as a postgraduate-level qualification that recognizes clinical proficiency in General Dental Practice. By early 2023, the CGDP had finalized the examination framework, covering diagnosis, treatment planning, restorative care, minor oral surgery, and preventive dentistry. The examination includes both written and clinical components and is modelled on prestigious qualifications such as the **Membership of the Faculty of General Dental Practitioners of the Royal College of Surgeons**.

In 2023, the **Sri Lanka Medical Council** formally recognized the MCGDP as a registrable postgraduate qualification under the **Medical Ordinance**. The College launched its first preparatory course in 2024, further strengthening its academic standing. To oversee this initiative, the **CGDP established the Committee on Postgraduate Dental Education**, chaired by **Dr. Hilary Cooray**. The College's commitment to the MCGDP reflects its belief that general practitioners deserve equal academic and professional recognition as specialists.

The inaugural examination was held at the **Faculty of Dental Sciences, Peradeniya**, in October 2025. The College acknowledges with gratitude the assistance given by the Dean Prof. Shyama Banneheka and the Faculty members in conducting the lectures and workshops, as well as in assisting the College to conduct the MCGDP examination, with **Dr. Gamini De Silva** serving as the **Chief Examiner**. The assistance given by **Prof. Priyake Palipana** and the staff of the **Faculty of Dental Sciences, University of Sri Jayewardenepura**, is also gratefully acknowledged.

Additionally, several **CGDP** members have pursued interdisciplinary education such as **MBAs and MScs** from foreign and local universities, thereby enhancing clinical management and contributing to health policy research. This holistic development has positioned the College at the forefront of thought leadership in both the clinical and managerial aspects of dental practice. The **MCGDP examination** is a milestone in the history of the **College of General Dental Practitioners**, representing a significant postgraduate programme for future generations. It may also serve as the precursor to the **MD (Family Dentistry) Programme** envisaged for the future.

Editor – Dr. Hilary Cooray

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Development, Structure, and Emerging Challenges of Private Dental Clinics in Sri Lanka

Abstract

Objective: To examine the development, structural characteristics, management practices, and emerging challenges of private dental clinics in Sri Lanka.

Materials and Methods: A descriptive cross-sectional study was conducted among private dental practitioners. Data were collected using a structured, pre-tested questionnaire distributed electronically. Information on clinic development, infrastructure, management systems, financial practices, and operational challenges was obtained. Data were analyzed using descriptive statistics and correlation analysis at a 95% confidence level.

Results: Private dental clinics in Sri Lanka have evolved significantly over recent decades, with increased adoption of basic digital technologies such as radiography. However, administrative systems remain largely manual, with the majority relying on paper-based records and informal financial management. Rising operational costs and patient-flow variability were identified as major challenges. A positive association was observed between experience in practice and income satisfaction.

Conclusion: While private dental clinics demonstrate satisfactory clinical development, there are gaps in structured management systems and digital integration. Strengthening managerial capacity and promoting technological adoption are essential for sustainable growth of the sector.

Keywords: Private dental practice; Sri Lanka; Practice development; Dental management; Health economics

Introduction

Sri Lanka's healthcare system is predominantly public sector-driven; however, the private sector plays an increasingly important complementary role [Ministry of Health-NHA 2022]. Within this context, private dental clinics have emerged as a rapidly expanding segment of oral healthcare delivery. Their growth reflects broader socio-economic changes, including urbanization, rising patient expectations, and increased demand for timely and specialized dental care.

Historically, dental services in Sri Lanka were largely delivered through government institutions. [De Silva 2023]. However, over the past two to three decades, private dental practice has undergone substantial transformation. The sector has progressed from small, individually operated clinics providing basic services to more diverse and patient-oriented practices incorporating modern technologies and specialized treatments.

Despite this growth, there is limited systematic evidence on how private dental clinics have developed in terms of infrastructure, management systems, and operational strategies. Furthermore, increasing economic pressures and evolving healthcare demands necessitate a better understanding of the sustainability and efficiency of these practices.

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General Dental Practitioner

This study aims to explore the development, structural characteristics, management practices, and challenges faced by private dental clinics in Sri Lanka, with a view to informing policy and professional development initiatives.

Materials and Methods

A descriptive cross-sectional study was conducted among private dental practitioners registered with the Sri Lanka Medical Council and actively engaged in clinical practice. Both full-time and part-time practitioners were included to capture a comprehensive representation of the private sector.

A structured questionnaire was developed following a review of relevant literature on dental practice management and healthcare systems. The instrument was pilot-tested to ensure clarity and validity. It included sections on:

- Demographic and professional characteristics
- Evolution and duration of private practice
- Clinic infrastructure and technology
- Administrative and financial management systems
- Patient management approaches
- Perceived operational challenges

The questionnaire was distributed electronically through professional networks using convenience sampling. Participation was voluntary and anonymous.

Data were analysed using SPSS version 25. Descriptive statistics (frequencies, percentages, means) were used to summarize findings. Correlation analysis was performed to assess relationships between selected variables, with statistical significance set at $p < 0.05$.

Ethical approval was obtained from the Faculty Ethics Review Committee of the Faculty of Dental Sciences, University of Peradeniya.

Results

A total of 72 responses were analyzed. The majority of participants were part-time practitioners, with a substantial proportion owning their clinics. The average duration of practice indicated a relatively experienced cohort.

Development and Growth Trends :Findings suggest a progressive expansion of private dental clinics over time. Earlier practices were primarily limited to basic dental procedures, whereas more recent establishments demonstrate increased service diversity, including cosmetic and restorative dentistry.

Infrastructure and Technology: Most clinics were equipped with standard dental units and sterilization facilities. Digital radiography was widely adopted, indicating moderate technological advancement. However, more advanced digital tools and integrated systems were less commonly reported.

Management and Administrative Systems :Administrative practices were predominantly manual:

- Majority maintained paper-based patient records
- Appointment systems were often informal or hybrid
- Financial management relied heavily on manual accounting methods

Operational Challenges

The most frequently reported challenges included:

- Rising overhead costs
- Fluctuations in patient flow
- Increasing competition among clinics

A moderate positive correlation was observed between years of practice and income satisfaction, suggesting greater financial stability among experienced practitioners.

Discussion

The findings highlight that private dental clinics in Sri Lanka have undergone notable development, particularly in terms of clinical services and basic infrastructure. This reflects responsiveness to increasing patient demand and evolving expectations. [De Silva. D 2024]

However, the persistence of informal and manual management systems indicates a significant gap in administrative modernization. Dentists often function as both clinicians and managers, which may limit efficiency and strategic growth. The lack of structured financial planning and digital recordkeeping systems may further constrain long-term sustainability.

Technological adoption appears uneven, with emphasis on clinical tools rather than administrative systems. While digital radiography is widely used, integrated practice management systems remain limited. This imbalance suggests that clinical modernization has not been matched by organizational development.

Economic pressures, particularly rising operational costs and competitive market dynamics, pose ongoing challenges [Levin 2004]. These factors disproportionately affect newer practitioners and smaller clinics, highlighting the need for improved financial literacy and strategic planning.

The study also underscores the importance of regulatory compliance, particularly in areas such as biomedical waste management, where inconsistencies persist.

Limitations

This study has several limitations. The use of convenience sampling and self-reported data may introduce bias. The relatively small sample size and low response rate limit the generalizability of findings. Additionally, more established practitioners may have been more likely to participate, potentially overrepresenting successful practices.

Future research with larger, randomly selected samples and mixed-method approaches would provide more comprehensive insights into the private dental sector.

Conclusion

Private dental clinics in Sri Lanka have evolved into an important component of oral healthcare delivery, demonstrating satisfactory clinical development and increasing service diversity. However, management systems remain largely informal, and digital integration is limited.

To ensure sustainable growth, there is a need to strengthen practice management capabilities, promote digital transformation, and enhance financial and regulatory frameworks. Incorporating practice management training into professional development programmes may support the advancement of a more efficient and resilient private dental sector.

Acknowledgements

The authors acknowledge all participating dental practitioners for their contributions. ChatGPT was used to improve language clarity. No external funding was received.

Conflict of Interest

The authors declare no conflict of interest.

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Shortened Dental Arch: A Pragmatic Approach for Sri Lankan Clinical Practice.

ABSTRACT

Shortened Dental Arch (SDA) concept which was originally proposed in 1981 is a well-accepted treatment protocol. With a better understanding of the concept, it is now universally adopted in treatment planning. Further refining of the SDA concept with the Extended Shortened Dental Arch Concept and minimal teeth replacement options can markedly improve the Oral Health-Related Quality of Life (OHRQL). In Sri Lanka, declining edentulous rates among the elderly and improved access to public dental services have created a favourable environment for the implementation of SDA. Better understanding and optimal adaptation are indispensable for the application of SDA.

Keywords: Shortened Dental Arch (SDA), Prosthodontics, Partial Edentulism, Cost-effective Dental Care

INTRODUCTION

The Shortened Dental Arch (SDA) concept offers a pragmatic, evidence-based approach to managing partial edentulism, prioritizing function and patient comfort over complete dental rehabilitation. Introduced by Kayser in 1981, SDA emphasizes the preservation of anterior and premolar/molar functional units to maintain oral function, aesthetics, and occlusal stability, with minimal or no replacement of molars. This model aligns with modern occlusal principles that value physiological adaptation and individual variability over mechanical perfection. In Sri Lanka, declining edentulous rates among the elderly and improved access to public dental services have created a favorable environment for SDA implementation. National survey data reflect a significant reduction in complete tooth loss among older adults, highlighting the increasing relevance of conservative treatment approaches. SDA is particularly suited for elderly, medically compromised, or financially constrained patients, offering reduced treatment complexity, better oral hygiene maintenance, and lower costs without compromising essential oral functions. Clinical outcomes demonstrate that maintaining a minimum of four posterior occlusal units, especially when symmetrically distributed, is sufficient for masticatory efficiency and quality of life. The concept has further evolved into the Extended SDA (ESDA) and is often integrated into combination therapy in complex cases. However, successful outcomes depend on appropriate case selection, patient education, and long-term maintenance. In the Sri Lankan context, SDA may provide not a compromise but a strategic, patient centered model that supports equitable, cost-effective dental care. Greater awareness and training among general dental practitioners are essential to fully harness its clinical and public health benefits.

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DISCUSSION

The concept of the Shortened Dental Arch (SDA) was first introduced in 1981 by Dutch prosthodontist Arnd Kayser and colleagues at the University of Nijmegen, the Netherlands. This approach emerged from clinical observations indicating that individuals can maintain acceptable levels of oral function in the absence of a full complement of posterior teeth (Fernandes & Chitre, 2008). Kayser's research demonstrated that sufficient adaptive capacity exists when at least four occlusal units remain—defined as one pair of occluding premolars per unit, with a pair of occluding molars representing two units. Functional needs at different ages are shown in table 1.

Table 1: Oral functional level needed in relation to age, expressed in minimum of occluding teeth

Age	Function Level	Occluding teeth
20 – 50	I – optimal	24
40 – 80	II– Suboptimal	20 (SDA)
70 – 100	III – Minimal	16 (SDA)

The SDA model challenges the traditional notion that restoring all missing teeth is necessary for optimal oral function. Instead, it suggests that the minimum number of occluding tooth pairs required to ensure satisfactory function varies with factors such as age, oral condition, and individual needs. Kayser and Witter identified the anterior and premolar teeth as the strategic zone of the dental arch, critical for maintaining function, aesthetics, and comfort.

Based on functional demands, Kayser proposed the following tooth requirements:

- Biting: 12 anterior teeth and 4 premolars
- Mastication: 8 premolars and 4 molars
- Speech: 12 anterior teeth
- Aesthetics: 12 anterior teeth and 4 maxillary premolars
- Mandibular stability: 12 anterior teeth, 8 premolars, and in some cases, 4 molars

Accordingly, treatment guided by the SDA concept emphasizes the preservation of anterior and premolar teeth. Replacement of molars should be considered only in the absence of limiting factors such as poor dental history—particularly involving molars—or financial constraints. In such cases, Witter recommended tailoring treatment goals toward achieving an SDA configuration, which, though suboptimal, can still offer acceptable oral function and quality of life for many patients. Schematic diagram of SDA adopted from Witter et al., is shown in Figure 1.

Kayser established a functional classification for partial dentitions by proposing that a pair of occluding molars constitutes two occlusal units (OUs), while a pair of occluding premolars represents one occlusal unit. This framework provides a standardized approach for evaluating the functional adequacy of shortened dental arches. The SDA concept classifies dentitions based on both the number of occlusal units and the symmetry of arch shortening, emphasizing that a minimum of 10 opposing teeth or at least four posterior occlusal units is required to maintain acceptable oral function.

distribution of occluding units. Evidence suggests that maintaining four or more occlusal units, especially when placed symmetrically, supports stable function. In contrast, patients with fewer than two pairs of occluding teeth report significantly reduced ability to process harder foods. Although distal extension RPDs are often prescribed, they may not always enhance comfort or function. In such cases, resin-bonded Fixed Partial Dentures (FPDs) with distal cantilevers have shown superior patient satisfaction contrary to previous teachings (Eswaran et al., 2024).

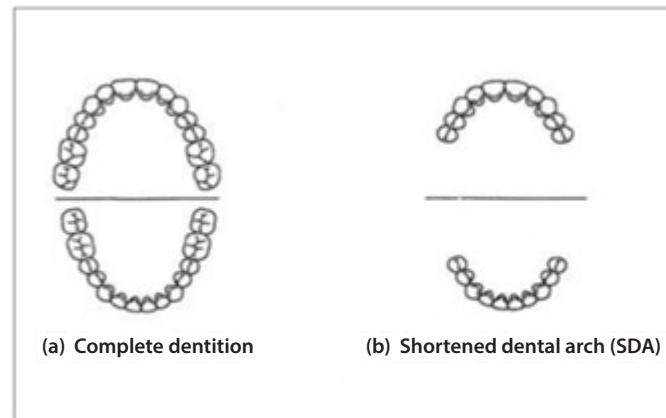


Figure 1 Schematic diagram of SDA adopted from Witter et al.

Advantages of SDA

The SDA model streamlines prosthodontic treatment, simplifying both clinical procedures and oral hygiene maintenance. It provides a favourable long-term prognosis for the remaining dentition when supported by good hygiene practices. Functionally, it ensures adequate mastication, enhances patient comfort, and reduces overall treatment costs. Long-term studies validate that a 20-tooth dentition (10 opposing pairs) is sufficient for maintaining oral function, aesthetics, and occlusal balance—especially through preservation of anterior and premolar teeth.

Clinical Indications

The SDA concept is most appropriately applied in elderly or medically compromised patients, in individuals with financial or anatomical constraints, and in partially dentate patients who maintain a stable anterior–posterior occlusion.

Limitations and Considerations

Despite its advantages, SDA may lead to chewing inefficiency, dietary changes, or an increased risk of TMJ symptoms. Potential complications include tooth mobility, advanced tooth wear, and further tooth loss, particularly in patients with pre-existing periodontal disease. These risks underscore the need for thorough patient assessment, ongoing monitoring, and case selection to ensure long-term treatment success.

Failures and Preventive Strategies

Treatment failures may result from poor planning, inappropriate case selection, or inadequate follow-up. Figure 2 shows such a failing dentition. These risks can be mitigated through comprehensive assessment, clear patient communication, and long-term maintenance.



Figure 2 In Failing dentitions where caries risk is high existing teeth need further extraction replacement of minimal number of teeth is beneficial

Extended SDA (ESDA): Concept Evolution

The extended shortened dental arch (ESDA) concept refines the original model by aiming at minimal replacement to maintain four functional occlusal pairs and compensate the existing shortfall. Thus, prosthetic rehabilitation is done with minimal teeth replacement to enhance the masticatory capacity, improving force distribution, and promoting long-term occlusal stability.

In complex cases, combination therapy enables the integration of multiple prosthodontic approaches to address diverse clinical challenges, optimizing retention and support while maximizing the use of the remaining dentition. Whilst prescribing different modes of prosthetic options, adherence to ESDA is mandatory.

Additionally, this strategy enhances cost-effectiveness by allowing treatment to be delivered in a staged and adaptable manner. Furthermore, they provide mutual protection for the natural dentition while facilitating effective oral hygiene maintenance. Figure 3 shows a patient who was treated with multiple modes of prosthetic rehabilitation.

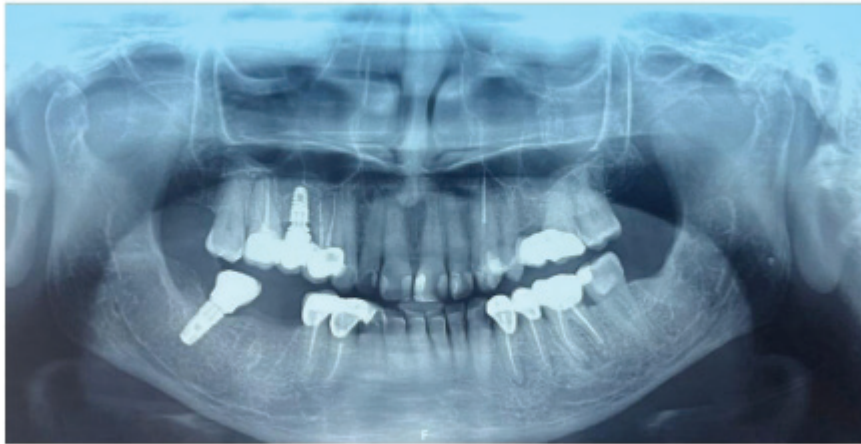


Figure 3 A patient managed with multiple treatment options ranging from crowns, RBBs, conventional bridges and implant retained crowns

The World Health Organization (WHO) outlined in 1992 that the retention of a healthy, natural, and functional dentition consisting of at least 20 teeth—without the need for prosthetic replacement should be considered a key goal in oral health (Fernandes & Chitre, 2008). This reflects a departure from the traditional philosophy of always restoring a complete dentition, regardless of individual need.

The primary objective of dental care is to preserve a natural, functional dentition throughout life, supporting not only biological functions such as chewing and taste perception, but also social aspects like aesthetics, self-esteem, speech, and overall oral comfort. Since the 1970s, there has been a shift in occlusal concepts—from a rigid, morphology- and mechanics-based approach to one that emphasizes physiological principles (Witter et al., 1999).

This modern perspective, as articulated by Mohl et al. and Ramfjord and Ash, is grounded in key criteria for a healthy or physiological occlusion, including the absence of pathological signs or symptoms, adequate function encompassing aesthetics, mastication, and oral comfort, and stability of the occlusion. It also recognizes the inherent variability in the form and function of the stomatognathic system and emphasizes its adaptive capacity to respond to changing conditions (Mohl et al., 1988; Ash and Ramfjord, 1995).

This functional and physiologic approach acknowledges that healthy occlusion and satisfactory oral function can exist in various dental configurations—not strictly limited to a full complement of 28 teeth (Witter et al., 1999). Consequently, the number of teeth required for health and function may be fewer than traditionally assumed.

Partial tooth loss presents multiple challenges, including aesthetic, psychological concerns, speech impairment, tooth migration, and occlusal instability. Functional issues such as reduced chewing ability, loss of vertical dimension, and the risk of TMJ dysfunction further complicate rehabilitation. Poor oral hygiene in partially edentulous cases may also increase the risk of gingival inflammation, periodontal breakdown, and nutritional deficiency—all of which impact systemic health. Managing long edentulous spans requires advanced prosthetic solutions and may increase the load on remaining teeth, potentially leading to wear, mobility, or fracture. These challenges demand thoughtful planning and, in some cases, a multimodal treatment approach.

Sri Lankan context

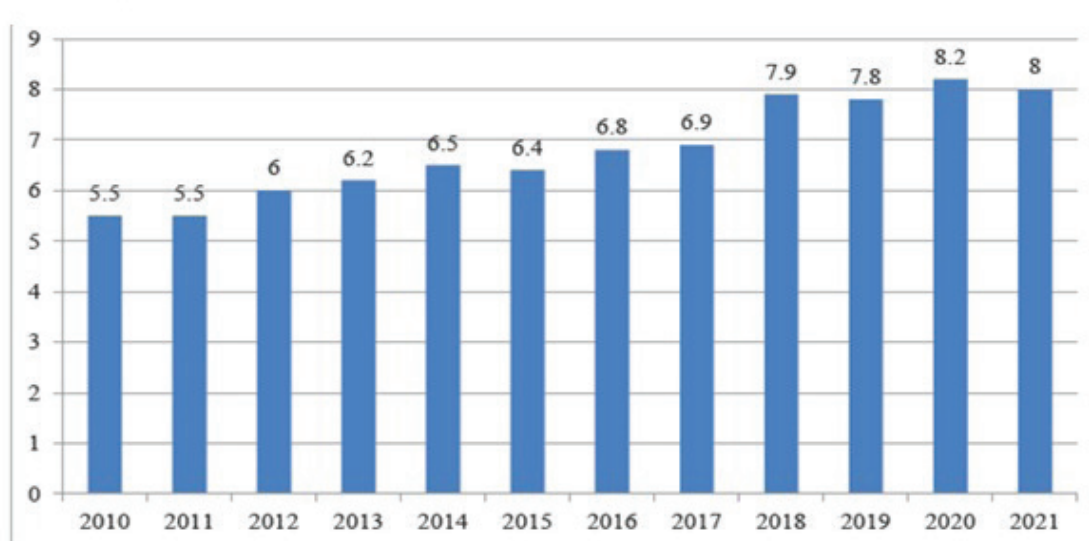
According to the 2015–2016 National Oral Health Survey in Sri Lanka, the percentage of edentulous individuals aged 65–74 years has shown a significant decline over the past two decades. In 1994–1995, the edentulous rate in this age group was 36.9%, which decreased to 21.8% by 2002–2003, indicating a positive trend in the retention of natural teeth among the elderly population (Table 2). This reduction in complete tooth loss supports the growing relevance and clinical applicability of the SDA concept in current practice. As more elderly patients retain a functional number of anterior and premolar teeth, the SDA approach that focuses on maintaining oral function and comfort with a reduced but strategic dentition becomes an increasingly practical and evidence-supported treatment strategy in prosthodontics today.

Table 2 Oral disease trends in Sri Lanka, National Oral Health Survey Sri Lanka 2015 - 2016. Colombo

Category	Age group	National Oral Health Survey		
		1983-1984 ¹⁵	1994-1995 ¹⁶	2002-2003 ¹⁸
Mean no. of teeth present	5 years	17.9	17.7	19.6
	12 Years	24.9	25.4	25.7
	15 years	-	27.6	27.8
	35-44 years	25.8	25.8	26.4
	65- 74 years	-	11.5	12.2
Edentulous (%)	35-44 years	1.1	1.6	0.1
	65- 74 years	-	36.9	21.8

According to the Oral Health Report 2020/2021, Sri Lanka has shown a gradual increase in the number of government dental surgeons per 100,000 population from 2010 to 2021. Although slight variations were noted in 2015 compared to 2014, 2019 compared to 2018, and 2021 compared to 2020, the overall trend indicates improved accessibility to dental care services (Oral Health Report 2020/2021, 2023- Table 3). This increase is particularly significant for low socioeconomic status groups, who rely heavily on public sector dental services. In this context, the emphasis on the SDA concept as a cost-effective and appropriate prosthetic solution is especially commendable.

Table 3 Distribution of government dental surgeons per 100,000population from 2010, Oral Health Report 2020/2021' (2023). 385, Rev. Baddegama Wimalawansa Thero Mawatha, Colombo10, Sri Lanka: Ministry of Health



It is being observed that Sri Lankans have a tendency to ignore the loss of posterior teeth. They do not replace the posterior teeth unless there is a dire need of aesthetics. This has led to extensive reduction in the occlusal table leading to severe tooth wear. Figure 4 shows such a case scenario where all subtypes of tooth wear is evident. Thus, it is essential to optimize the case selection and appropriate treatment planning with minimal prosthodontic intervention that would be beneficial for the maintenance of the natural dentition.



Figure 4 *A case scenario where all subtypes of tooth wear are evident.*

SDA provides a practical treatment option for patients who may not be able to afford more complex or expensive prostheses. Its focus on affordability and accessibility aligns well with national oral health goals, making it a timely and essential strategy in the delivery of equitable dental care. This will further enhance oral health in the elderly while reducing the burden of extensive healthcare expenditure.

CONCLUSION

The Shortened Dental Arch (SDA) concept presents a practical, evidence-based approach to managing partially edentulous patients, especially in the context of increasing tooth retention among the elderly and rising demand for cost-effective, functional treatments. Its emphasis on preserving anterior and premolar/molar functional units ensures adequate oral function, aesthetics, and comfort while minimizing the need for extensive posterior restorations. As demonstrated by its alignment with current occlusal theories and public health trends in Sri Lanka, SDA offers a conservative yet clinically effective strategy that can be particularly valuable in low-resource settings and for patients with economic or anatomical limitations. With the decline in edentulous rates among older adults, the SDA concept is more relevant than ever.

Clinical outcomes indicate that the SDA model can maintain sufficient masticatory function and stability with at least four occlusal units. The concept further evolves through the Extended Shortened Dental Arch (ESDA) and combination therapies, which provide enhanced flexibility and adaptability for more complex cases. While SDA offers multiple advantages—including simplified hygiene, lower costs, and reduced treatment complexity—it requires thoughtful case selection, thorough planning, and ongoing maintenance to prevent complications such as TMJ issues or further tooth loss.

SDA is not merely a treatment compromise but a strategic, patient-centered approach that addresses both individual needs and broader public health objectives in contemporary prosthodontic care. Greater awareness, and continuing education are essential to optimize its application.

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Management of Supernumerary Teeth and Its Orthodontic Implications

Introduction

Supernumerary teeth, also known as hyperdontia, are defined as extra teeth or tooth-like structures that develop in addition to the normal series in the dental formula. They are one of the most intriguing developmental anomalies in dentistry. Although relatively uncommon, their presence can significantly impact the developing occlusion, eruption of permanent teeth, and overall dental aesthetics. The management of supernumerary teeth remains an important clinical consideration, particularly for general dental practitioners who often serve as the first point of diagnosis and referral.

Counting the Unusual: incidence of Supernumeraries

Supernumerary teeth may present unilaterally or bilaterally and can occur either as isolated teeth or in groups. They are found in both the permanent and deciduous dentitions. Interestingly, the presence of a supernumerary tooth in the primary dentition often predicts its occurrence in the permanent dentition as well(1). The incidence of supernumerary teeth in the Caucasian population ranges from 1–2% in the permanent dentition(2), with a male-to-female ratio of up to 3:1, indicating a higher prevalence in males(3). In contrast, the incidence in the primary dentition is lower, at approximately 0.06–0.8%, and shows no significant sexual dimorphism. Anatomically, around 80% of supernumerary teeth are found in the anterior maxilla, out of which 51.2% are found in the central incisor region. Less commonly, around 10% are observed in the premolar and molar regions(4).



The Mystery Behind Supernumeraries

The aetiology of supernumerary teeth remains multifactorial and not fully understood. Several theories have been proposed to explain their development. “*The dichotomy theory*” suggests that splitting of the tooth bud during development can result in an additional tooth. Fragmentation of the dental lamina can occur during embryological disturbances such as cleft formation where portions of the dental lamina may persist and initiate the development of additional tooth buds. Which is why we see multiple supernumeraries in the cleft region(5). Another such fascinating theory is “*the atavistic theory*”. This refers to the reappearance of a trait or characteristic in an organism that was present in its distant ancestors but absent in its more immediate ancestor. For example extinct primates and early human ancestors had greater numbers of teeth, particularly in the premolar and incisor regions. Modern humans may occasionally exhibit teeth that resemble those of their distant primate ancestors, indicating a reversion to an older, ancestral dental pattern which is also referred to as phylogenetic reversion. The third and the widely accepted explanation involves *localized hyperactivity of the dental lamina*. This hyperactivity is considered to be multifactorial, influenced by both genetic and

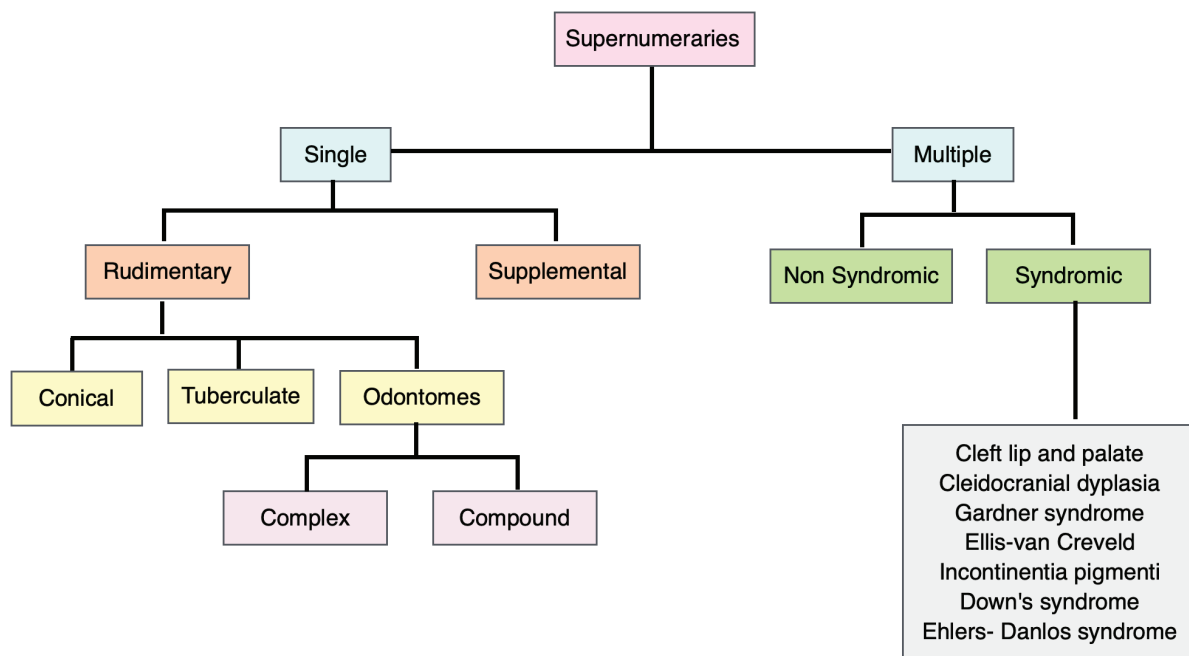
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environmental factors. A supernumerary tooth may arise either from the formation of an additional tooth germ derived from the epithelial band or from residual epithelial cells that remain after the disintegration of the dental lamina(6) (7).

Types of supernumeraries

Morphologically, supernumerary teeth can be classified into several types such as *conical*, *tuberculate*, *supplemental* and *odontomes*, each carrying unique clinical implications. Multiple supernumerary teeth are often associated with syndromes or genetic conditions such as Cleft lip and palate, Cleidocranial dysplasia, Gardner syndrome, Ellis-van Creveld, Incontinentia pigmenti, Down's syndrome and Ehlers-danlos syndrome. Non-Syndromic cases with multiple supernumeraries without any associated systemic or genetic disorder are relatively rare.



Why do supernumeraries matter

Supernumerary teeth are of significant clinical importance because they can lead to a range of unwanted effects and complications. They may remain unerupted and *asymptomatic* in the permanent dentition, often identified incidentally during routine radiographic screening. On the other hand their presence can lead to a variety of clinical consequences with the most commonest being *failure of eruption of permanent teeth*. Studies report that 23.1% of patients in the mixed dentition with supernumerary teeth present with impacted central incisors, and the risk of impaction more than doubles with each additional supernumerary tooth. They can also cause *localized crowding, irregularity, or displacement of adjacent teeth*. In some cases, they contribute to *spacing*. 10% of midline diastemas are attributed to supernumeraries, especially mesiodens. Other rare sequelae include

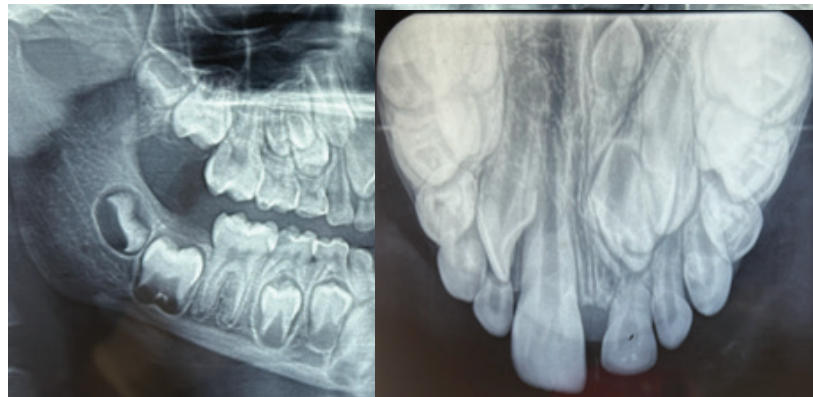




root resorption of adjacent teeth, cyst formation and in exceptional cases eruption of the supernumerary tooth into the nasal cavity.

Assessment involves thorough clinical assessment to detect spacing anomalies, asymmetric eruption, and palpable bulges, supplemented by radiographic imaging such as periapical, occlusal, or panoramic views. The parallax technique is particularly useful for determining the bucco-lingual position of impacted supernumeraries. It is important to note that very early stage calcification (<30%) may not be visible radiographically(8) (9). Also panoramic views are not always reliable for assessing suspected supernumerary teeth in the premaxillary region due to the superimposition of multiple anatomical structures in

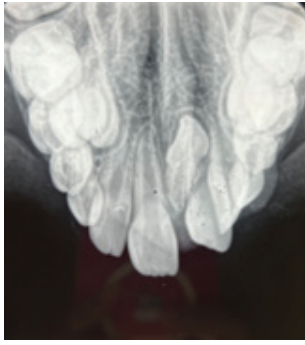
the anterior maxilla. To overcome these limitations, intraoral periapical radiographs (IOPAs) or upper standard occlusal radiographs (USOs) of the anterior maxilla are recommended (Fig 5). In complex cases, advanced imaging such as cone-beam computed tomography (CBCT) may be considered to obtain a three-dimensional assessment.



We will now explore how each type of supernumerary tooth can affect the dentition and the potential clinical implications that may arise

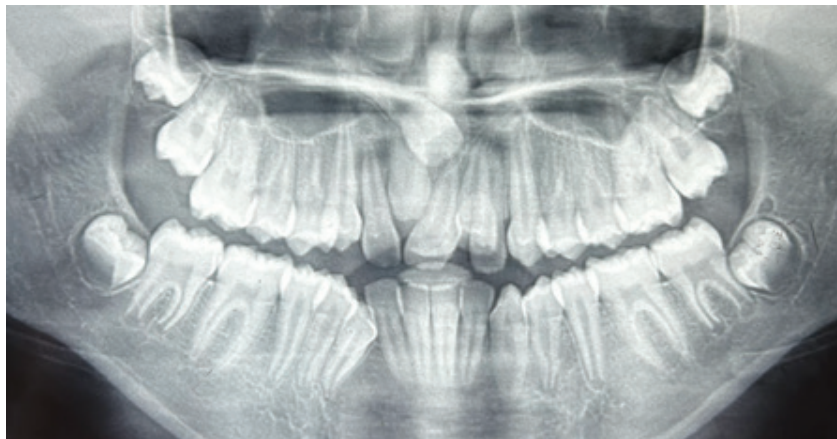
Conical supernumeraries are the most common type of supernumerary tooth in the permanent dentition, accounting for approximately 75% of all cases. Morphologically, they are small, peg-shaped teeth with well-developed roots. They may occasionally be positioned high in the palate, inverted, or even horizontally placed. Depending on their location, conical supernumeraries are classified into three types: **mesiodens**, which occur in the anterior maxilla in the midline and are often associated with a median diastema, **paramolars**, which appear in the maxillary molar region and may be positioned buccally, lingually, or interproximally between the second and third molars,





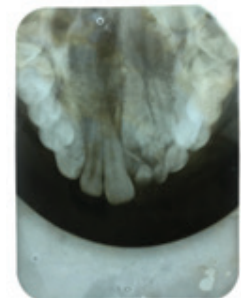
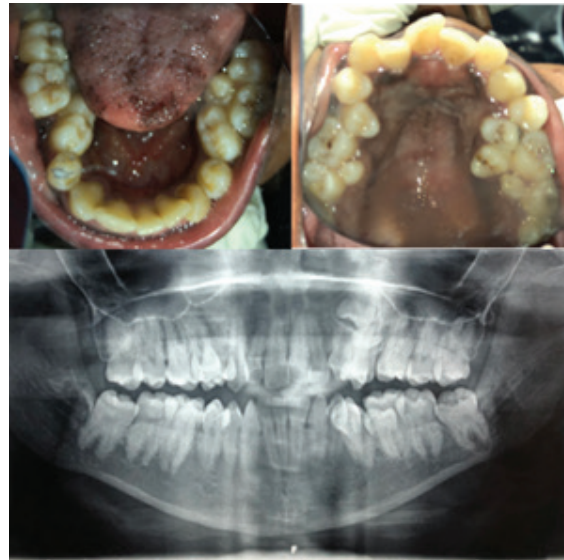
and *distomolars*, which are found distal to the third molars. The clinical effects of conical supernumeraries on permanent incisors include rotation or displacement and impact on eruption. The risk of associated complications such as cystic formation or root resorption is considered very low. Management typically involves extraction of the conical supernumerary tooth to prevent or resolve these complications. Extraction is typically indicated after the age of 8 years, particularly when the supernumerary is causing aesthetic or eruptive disturbances. (Fig 1, Fig 6, Fig 7)

Tuberculate supernumeraries account for approximately 12% of all supernumerary teeth and are typically characterized by a multicusped, barrel-shaped morphology, often with invaginations and incomplete root development. They are most commonly located on the palatal aspect of the maxillary permanent central incisors, usually occur in pairs, and tend to remain unerupted due to their delayed root formation compared with that of adjacent permanent incisors (Fig 8). Clinically, tuberculate supernumeraries are frequently associated with delayed eruption or obstruction of the maxillary central incisors. Importantly, they are 5 times more likely to obstruct the eruption of incisors than conical supernumeraries(10). Management involves removal of the tuberculate supernumerary teeth to facilitate eruption of the affected incisors; however, spontaneous eruption following extraction occurs in only about 50% of cases.



Supplemental supernumeraries account for about 7% of all supernumeraries and are the most common type seen in the primary dentition. They represent a duplication of a tooth within a series and closely resemble the crown morphology of the adjacent tooth, often making it difficult to distinguish them from the normal dentition. Typically, supplemental supernumeraries erupt into the oral cavity and may contribute to crowding. They are usually located at the end of a tooth series and can occur in various regions, such as an additional lateral incisor, a third premolar, or a fourth molar. Management is based on careful evaluation of the teeth involved, with the decision to extract depending on factors such as tooth size, colour, morphology, and position relative to adjacent teeth. In general, the tooth that is best aligned with the planned final position and is free from pathology or morphologic discrepancies should be retained, while the supplemental tooth is extracted(11) (Fig 9, Fig 10)

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Odontomes constitute about 6% of all supernumerary teeth. They are more frequently associated with the permanent dentition and are rarely seen in the primary dentition. Odontomes are considered hamartomatous developmental malformations composed of enamel, dentine, and pulp, and they are classified into two main types. Complex odontomas appear as large, disorganized masses of dental tissues and are most commonly found in the posterior regions of the jaws, with nearly 50% of cases interfering with the eruption of adjacent teeth. Compound odontomas, on the other hand, are four times more common and consist of multiple small, tooth-like structures (discrete denticles) containing enamel, dentine, and pulp, and they are more frequently located in the anterior region. 71.4% of odontomas in the premaxillary region showed delayed eruption of the adjacent incisors(12). (Fig 11,12)



Management - Balancing Risks: Avoiding Iatrogenic Damage vs. Preventing Complications

The treatment approach for supernumerary teeth depends on several key factors: Such as the age of the patient, position and type of the supernumerary tooth, its effect on adjacent teeth, and the patient's overall orthodontic treatment needs.

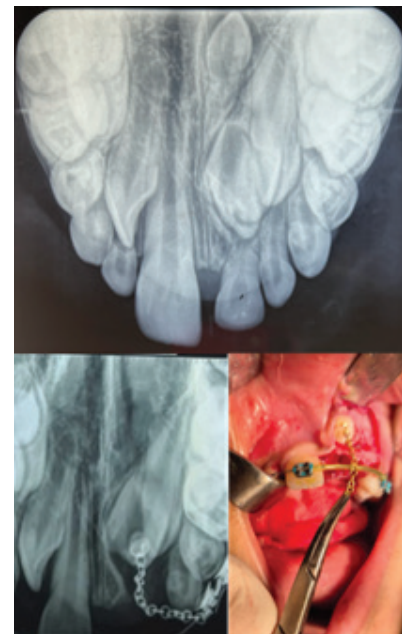
Based on the above, there are three main treatment options available.

1. Extraction of Supernumerary teeth
2. Monitoring with periodic Radiographic review
3. Utilization and Orthodontic Alignment

Extraction remains the most common management option, especially when supernumerary teeth cause delayed eruption, crowding, resorption, or are associated with cystic changes. In younger patients with incomplete root formation of the affected permanent tooth, early removal of the obstructing supernumerary often facilitates spontaneous eruption. Studies report that spontaneous eruption of incisors after supernumerary extraction occurs in about 54–78% of cases, typically within 16–18 months, provided there is adequate space and minimal displacement of the impacted tooth(13).

There have been long-standing debates regarding the optimal timing for removal of supernumerary teeth and whether or not surgical exposure and orthodontic traction of the impacted permanent tooth is necessary. With regards to timing, some studies advocate immediate surgical removal after diagnosis to encourage spontaneous eruption of the permanent incisors and to prevent potential orthodontic complications. Others recommend a delayed approach to reduce the risk of iatrogenic damage to developing adjacent teeth with immature roots. However it is important to weigh the risks and benefits. *Immediate removal is generally indicated when the likelihood of complications from leaving the supernumerary tooth untreated is high. In such instances, precise radiographic localization must be done prior to surgical removal of supernumeraries to prevent devitalization of permanent teeth with incomplete root development.*

The second debate is whether impacted incisors associated with supernumerary teeth should be managed conservatively, without surgical exposure, or with surgical exposure combined with orthodontic traction. Di Biase reported that 75% of incisors erupted spontaneously following removal of the supernumerary, with eruption occurring on average within 18 months. In contrast, Witsenburg and Boering observed a lower spontaneous eruption rate of 54% in similar cases(14). If adequate space is available but the incisor fails to erupt spontaneously, a second surgery for surgical exposure and orthodontic traction of the permanent tooth may be required. Therefore to minimize the need for repeated surgery, a common approach is to bond an attachment with a gold chain to the unerupted incisor at the time of supernumerary removal, allowing orthodontic traction to be applied if necessary. A recent systematic review and meta analysis also confirms that adjunctive use of orthodontics and removal of supernumerary tooth might be associated with greater chances of a successful eruption of an impacted incisor compared with removal of the supernumerary alone (15). (Fig 13)



Guidelines by the **Royal College of Surgeons of England**, recommend individualized treatment planning based on patient age and stage of dental development(16).

- **For children under nine years** with incomplete root development of the permanent incisor, extraction of the supernumerary and maintenance of adequate space is followed by an 18-month observation period before considering surgical exposure and orthodontic traction if spontaneous eruption does not occur.
- **In children around nine years of age**, when the incisor root is complete or nearly complete, the recommended approach is to remove the supernumerary tooth atraumatically and monitor eruption for up to 12 months. If spontaneous eruption does not occur surgical exposure of the impacted incisor followed by bonding and orthodontic alignment is indicated.
- **For children over 10 years**, simultaneous extraction, exposure, and bonding for orthodontic traction may be warranted.

The presence of supernumerary teeth in patients with cleft lip and palate adds further complexity, as they may interfere with planned secondary alveolar bone grafting. In such cases, erupted supernumeraries are usually extracted before grafting, whereas unerupted teeth within the cleft site are removed at the time of grafting, always in consultation with the multidisciplinary cleft team (Fig 14)

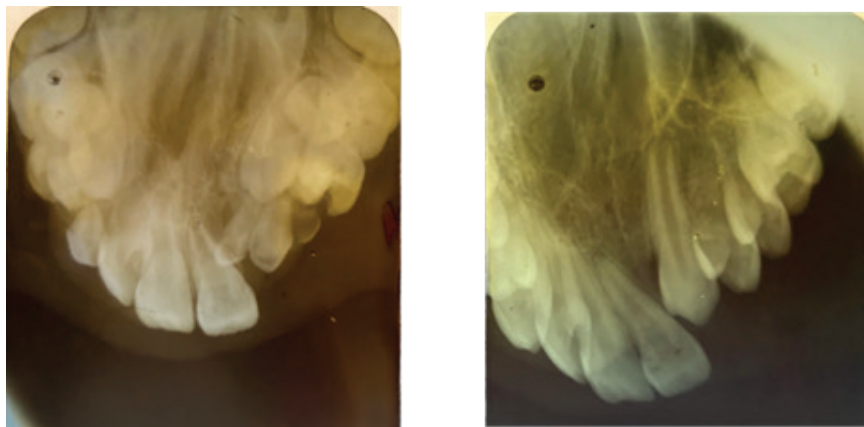
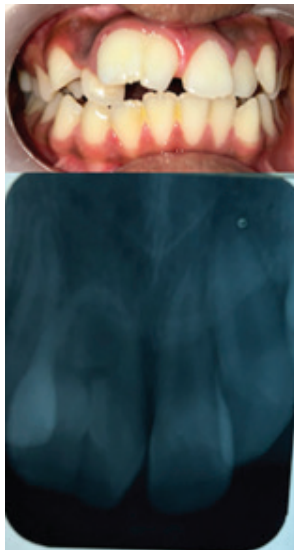


Fig 14 (Before and after Alveolar bone grafting)

Extraction is not always the only management option for supernumerary teeth. When the tooth is asymptomatic, does not interfere with occlusion, and shows no associated pathology, **careful observation with periodic radiographic review** may be appropriate. In rare and carefully selected cases, a supernumerary tooth may be **deliberately retained and orthodontically aligned**. This unique approach is considered when the supernumerary is well-formed and favourably positioned, especially if the corresponding permanent tooth is absent, malformed, or unfavourable for alignment.

Rare variants of a rare entity

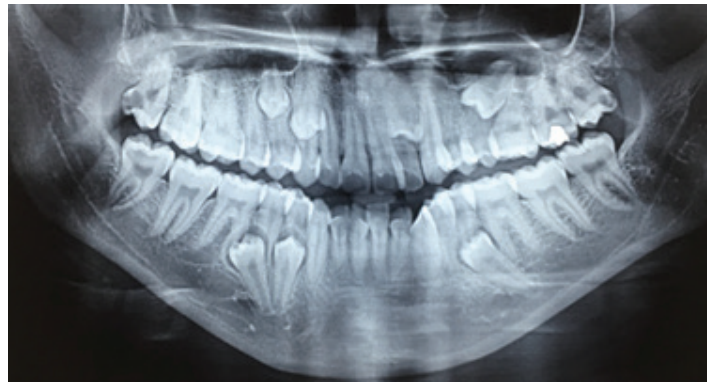
Supernumerary teeth are uncommon by themselves, and on rare occasions, they may be involved in other developmental anomalies such as **fusion** or **gemination**, making their clinical presentation even more unusual and intriguing. In cases of fusion, a supernumerary tooth may unite with an adjacent tooth, and this union can involve enamel, dentin, cementum, pulp, or any of their canals. Fusion is most commonly seen in the anterior region of the maxilla (Fig 15), while fusion involving molars is extremely uncommon. **Gemination**, on the other hand, results from the division of a single tooth bud, leading either to the formation of a large tooth with a bifid crown or to two incompletely or completely divided teeth that may share the same root canal or have separate crowns and roots (Fig 16). This condition is relatively uncommon in the permanent dentition and is considered extremely rare in the posterior region of the dental arch(17).



Another rare phenomenon associated with supernumeraries is a condition called **hypohyperdontia**. This is the simultaneous occurrence of missing as well as extra teeth and the aetiology of this condition is unknown. (Fig 17)



Delayed formation of supernumerary teeth is considered a special phenomenon. It occurs when the dental lamina is not completely resorbed and becomes reactivated at the time of crown completion of the normal permanent teeth, leading to the development of multiple supernumeraries, particularly in the premolar region. Studies have shown that patients with a previous history of supernumerary teeth in the anterior region have a likelihood of developing supernumerary premolars at a later stage(18). Therefore, it is important to obtain panoramic radiographs for follow-up, and late one-session treatment of the overall condition is often preferred due to the possibility of late development or recurrence of supernumerary premolars. (Fig 18)



In conclusion, early identification of supernumerary teeth is crucial to prevent complications and carryout timely management. Radiographic evaluation plays a vital role in accurate diagnosis and monitoring. Treatment must be carefully individualized, considering the patient's age, dentition, and clinical presentation. Interdisciplinary coordination among specialists is essential to ensure the best functional and aesthetic outcome for the patient.

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Bite Marks in Human Identification: Forensic Significance, Methodology, and Limitations

Abstract

Bite mark analysis has long been used in forensic science as a tool for human identification, particularly in cases of violent crimes such as homicide, sexual assault, and child abuse. Bite marks may be found on human skin, food items, or other objects at crime scenes, offering potential evidence linking a suspect to an offense. Forensic odontology applies dental science principles to examine, document, and compare bite mark patterns with the dentition of suspects. Despite its historical importance and continued use in some jurisdictions, bite mark analysis has been subject to increasing scientific scrutiny regarding its reliability, validity, and admissibility in courts of law.

This article reviews the role of bite marks in forensic identification, the biological basis, classification, methods of documentation and analysis, legal applications, and the limitations and controversies associated with this technique.

Keywords: Bite marks, forensic odontology, human identification, dental evidence, criminal investigation

1. Introduction

Human identification is a fundamental objective of forensic science. Among various biological identifiers, dental evidence has proven to be highly valuable due to the durability, individuality, and resistance of teeth to environmental destruction. Bite mark analysis represents a specialized branch of forensic odontology, involving the examination of patterned injuries or impressions caused by human teeth.

Bite marks have been used in forensic investigations for over a century. They are most commonly encountered in crimes involving close physical contact, including assaults, homicides, sexual offenses, and abuse cases. The underlying assumption in bite mark identification is that the arrangement, size, shape, and individual characteristics of a person's teeth can be transferred onto a substrate, creating a pattern that may be compared with a suspect's dentition.

However, the scientific reliability of bite mark analysis has been questioned in recent decades. While some courts continue to admit bite mark evidence, others have restricted or rejected it due to concerns over subjectivity and error rates. This article critically examines bite mark evidence as a tool for identification, highlighting both its forensic value and limitations.

2. Biological Basis of Bite Marks

A bite mark is defined as a patterned injury caused by the teeth of humans or animals. In forensic contexts, human bite marks are of primary interest. The adult human dentition consists of 32 teeth, each with distinct morphology. Factors such as tooth alignment, spacing, rotations, missing teeth, restorations, fractures, and wear patterns contribute to dental individuality.

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When teeth contact a surface, especially human skin, they may leave a recognizable pattern. Typically, a human bite mark presents as a circular or oval injury, measuring 25–40 mm in diameter, reflecting the dental arches. The injury may show individual tooth marks, abrasions, contusions, or lacerations depending on the force applied and the nature of the substrate.

Human skin, however, is a dynamic and elastic medium. Its response to biting is influenced by age, body location, and underlying tissue, movement during biting, healing, and postmortem changes. These factors significantly affect the accuracy of bite mark reproduction.

3. Types and Classification of Bite Marks

Bite marks may be classified based on appearance and severity:

- Pressure marks – caused by direct tooth pressure without skin penetration.
- Abrasion marks – superficial scraping of skin by teeth.
- Contusions – bruising caused by ruptured blood vessels.
- Lacerations – tearing of tissue due to excessive force.
- Avulsion – complete removal of tissue in severe cases.

Bite marks may also be classified based on the substrate:

- Skin bite marks
- Bite marks on food substances (e.g., cheese, chocolate, fruits)
- Bite marks on inanimate objects (e.g., plastic, foam)
- Food bite marks are often considered more reliable than skin bite marks due to minimal distortion and better reproduction of tooth morphology.

4. Documentation of Bite Marks

Accurate documentation is critical for bite mark analysis. The recommended procedures include:

4.1 Photography

High-quality color photographs should be taken using a scale, with images captured at 90 degrees to the injury. Repeated photography over time is advised, as bite marks may become more distinct during healing or bruising evolution.

4.2 Impression Taking

If feasible, impressions of the bite mark may be taken using dental impression materials. This is more applicable for bite marks on food or inanimate objects.

4.3 Swabbing for DNA

Saliva deposited during biting may contain epithelial cells. DNA analysis from saliva swabs has become one of the most valuable aspects of bite mark evidence, often providing stronger identification than pattern comparison.

5. Analysis and Comparison Techniques

Bite mark analysis involves comparing the questioned bite mark with known dental records or dental casts of suspects. Common techniques include:

- Metric analysis: measurement of tooth widths, arch dimensions, and angles.
- Pattern association: visual comparison of bite mark patterns with dental models.
- Overlay techniques: creation of transparent overlays from dental casts or digital scans and superimposing them onto bite mark images.
- Digital analysis: use of computer software for image enhancement, alignment, and comparison.
- Traditionally, results are expressed using terminology such as “possible biter,” “probable biter,” or “reasonable dental certainty,” although these terms lack standardized definitions.

6. Role in Human Identification

Bite marks may assist forensic investigations in several ways:

- Linking a suspect to a victim or crime scene
- Excluding suspects
- Supporting or corroborating other evidence
- Identifying abuse patterns in child or elder abuse cases

It is important to emphasize that bite mark evidence should not be used in isolation. Its greatest value lies in conjunction with DNA evidence, witness testimony, and other forensic findings.

7. Legal Admissibility and Courtroom Use

Historically, bite mark evidence has been admitted in courts under standards such as the Frye or Daubert criteria. However, wrongful convictions attributed partly to erroneous bite mark testimony have led to growing skepticism.

Several forensic and legal organizations have called for caution or reevaluation of bite mark evidence. Courts in some jurisdictions now require stronger scientific validation, peer-reviewed support, and acknowledgment of limitations by expert witnesses.

8. Limitations and Controversies

Major limitations of bite mark analysis include:

- Distortion of skin during biting and healing
- Subjective interpretation by examiners
- Lack of reproducibility
- Absence of population-based statistical models
- High potential for cognitive bias

Scientific reviews, including those by national forensic science bodies, have concluded that there is insufficient evidence to support the claim that bite marks can uniquely identify an individual with high certainty.

9. Current Trends and Future Directions

Modern forensic practice emphasizes:

- DNA analysis from saliva over pattern comparison
- Digital imaging and 3D scanning
- Standardized protocols and examiner training
- Research into error rates and reliability

There is a growing consensus that bite mark analysis should be used primarily as an exclusionary or investigative tool, rather than definitive proof of identity.

10. Conclusion

Bite mark analysis has played a significant historical role in forensic identification and criminal investigations. While dental individuality provides a theoretical basis for its use, practical limitations, especially related to skin distortion and subjective interpretation, challenge its reliability. Advances in DNA technology have shifted the focus from pattern analysis to biological evidence recovery. Forensic professionals must apply bite mark evidence cautiously, ethically, and in conjunction with other scientifically validated methods. Ongoing research, standardized guidelines, and judicial awareness are essential to ensure justice and prevent miscarriages of justice.

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Dental Trauma: Aligning Clinical Practice with Current Guidelines

Abstract

Traumatic Dental Injuries (TDI) present a significant clinical challenge due to their high prevalence, complex presentations, and potential long-term consequences. This paper presents a contemporary approach to TDI management, emphasizing the integration of International Association of Dental Traumatology (IADT) guidelines with clinical judgment.

It outlines structured, evidence-based approaches to diagnosis and treatment, addresses the management of both primary and permanent dentition, discusses the limitations of current digital tools such as the Dental Trauma Guide, and emphasizes the importance of clinician flexibility in real-world trauma scenarios. Special attention is given to the management of complicated injuries, multidisciplinary planning, and the emerging role of Artificial Intelligence (AI) in supporting trauma care.

Keywords: Traumatic dental injuries, IADT guidelines, Dental trauma management, Clinical judgment, Artificial intelligence

Management of TDIs is often urgent, and clinically demanding, as patients frequently present with pain, anxiety, and uncertainty. Clinicians are therefore, required to undertake rapid yet comprehensive assessment and initiate appropriate emergency care, and formulate both short term and long-term management strategies to optimize outcomes (Diangelis et al., 2012). The IADT offers evidence-based, periodically updated, guidelines that serve as an essential framework for the diagnosis, management and follow up of TDIs (Bourguignon et al., 2020; Day et al., 2020).

Despite their value, these guidelines cannot be applied rigidly, as each trauma case is influenced by a unique combination of biological, clinical and patient related variables. Effective trauma management therefore relies on careful interpretation of guideline recommendations, supported by sound clinical judgment and adaptability to real world challenges inherent in trauma care. Timely, evidence-based intervention, guided by the IADT framework and informed clinician experience remains fundamental to achieving favourable functional and esthetic outcomes in the management of dental trauma.

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Classification of Dental Trauma

The World Health Organization (WHO) classifies TDIs into four broad categories:

- Injuries to the hard dental tissues and pulp
(e.g., Enamel infraction, uncomplicated crown fracture, complicated crown fracture, crown-root fracture, root fracture)
- Injuries to the periodontal tissues
(e.g., concussion, subluxation, extrusion, lateral luxation, intrusion, avulsion)
- Injuries to the supporting bone
(e.g., alveolar process comminution/fractures, alveolar socket fractures, fracture of maxilla/mandible)
- Injuries to gingiva or oral mucosa
(e.g., lacerations, contusions, abrasions)

These injuries can occur singly or in combination, complicating diagnosis and requiring multifaceted treatment strategies.

Clinical Assessment and Management Principles

Management begins with systematic patient evaluation using the ABCDE approach (Airway, Breathing, Circulation, Disability and Exposure), particularly in cases with facial or systemic involvement. Once systemic stability is confirmed dental assessment proceeds. A detailed history should be obtained, including the time, place, and mechanism of injury, any associated loss of consciousness, and tetanus immunization status. This should be followed by a thorough clinical examination, with careful visual and tactile assessment of both hard and soft tissues. Appropriate investigations are essential and include pulp sensibility testing using thermal or electrical methods, radiographic assessment with periapical and occlusal views, Orthopantomogram, Skull radiographs or cone beam computed tomography where indicated, and photographic documentation. Accurate and detailed records are critical not only for monitoring healing and identifying complications over time, but also for medico legal purposes.

Management of Specific Dental Injuries

Management strategies should be tailored to the type and severity of injury, taking into account the type of the dentition affected, patient's age, root development stage, and time since trauma.

Uncomplicated crown fractures: Managed by fragment reattachment or direct resin composite restoration. If the fractured fragment is intact, it should be rehydrated in saline or water and reattached using adhesive techniques to preserve tooth anatomy, aesthetics, and function (figure 1a: maxillary left central incisor). If the fragment is unavailable, a direct composite restoration is placed to restore form and seal dentine. When immediate restoration is not feasible due to bleeding, limited mouth opening, or other factors, exposed dentinal tubules should be sealed with a glass ionomer cement (GIC) bandage, with or without setting calcium hydroxide depending on proximity to the pulp. In primary teeth, a similar approach can be applied depending on the child's cooperation, with exposed dentine typically managed using a GIC bandage or light cured composite (LCC).

Complicated crown fractures: The primary goal is to preserve pulp vitality. In immature teeth, management depends on the size of pulp exposure and time since injury. Small, pinpoint exposures presenting within 1 hour may be treated with direct pulp capping, while larger exposures or delayed presentations typically require partial or cervical pulpotomy (figure 1). Necrotic immature teeth may be managed with apexification

using biocompatible materials such as mineral trioxide aggregate (MTA) or regenerative endodontics to allow continued root development (figure 2). In mature teeth, partial pulpotomy is preferred when pulp vitality can be maintained, while root canal therapy is indicated when pulp preservation is not feasible or when insufficient remaining tooth structure necessitates a post to retain a restoration. Similar principles are followed in managing primary teeth with complicated crown fractures, depending on patient cooperation, but calcium hydroxide without iodoform is preferred over calcium silicate materials for pulp therapy or apexification.



Figure 1 a.



Figure 1 b.



Figure 1 c.

Figure 1a: Complicated crown fracture of maxillary right central and lateral incisors with uncomplicated crown fracture of maxillary left central incisor

Figure 1b: Partial pulpotomy of maxillary right central and lateral incisors

Figure 1c: After the treatment

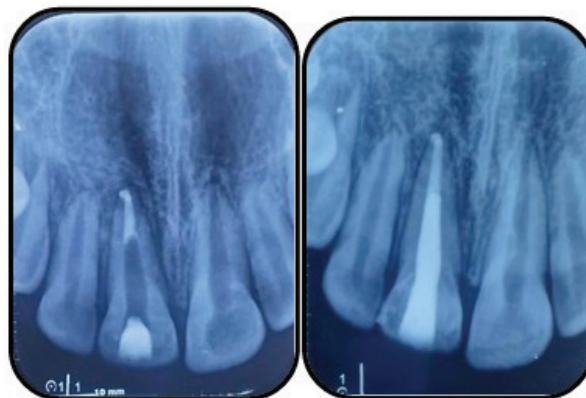


Figure 2: MTA apexification in an immature permanent incisor

Crown–root fractures: Require careful assessment of fracture location, pulp status, and overall restorability (figure 3 and 4). Any mobile coronal fragment should initially be temporarily stabilized to adjacent teeth until a definitive treatment plan is made or an immediate prosthesis is constructed. Supragingival fractures without pulpal involvement may often be restored with composite. Subgingival fractures, whether involving the pulp or not, may require surgical or orthodontic extrusion, crown lengthening, or extraction if the tooth is unrestorable. Endodontic treatment is indicated for pulp exposures and may also be necessary in unexposed cases when post placement is required. Immature teeth should undergo pulp preserving interventions.



Figure 3: Before removal of mobile fragment



Figure 4: After removal of mobile fragment

Root fractures (figure 5): Require prompt and careful repositioning of the coronal fragment to restore proper alignment, followed by flexible splinting to adjacent teeth. The duration of splinting typically ranges from 4 to 12 weeks, depending on the level of the fracture: cervical fractures may require longer splinting, while apical or middle third fractures often need shorter stabilization. Endodontic treatment is not performed routinely at the time of injury; it is only indicated if signs of pulp necrosis or signs of non-healing develop during follow-up. Root fractures in primary teeth are usually managed conservatively prioritizing natural exfoliation and minimal intervention. Splinting may be considered for patient comfort and stabilization. Extraction is indicated if there is significant mobility, severe displacement or risk to the permanent tooth germ.



Figure 5: Radiographic appearance of a horizontal root fracture in maxillary central incisors

Periodontal ligament injuries (figure 6): Managed according to severity and tooth maturity. Concussion is observed without splinting, while subluxation may require flexible splinting for 2 weeks if mobility or occlusal interference is present (figure 7). Extrusive luxation requires repositioning and splinting for 2 weeks, whereas lateral luxation requires repositioning and splinting for 4 weeks. In the presence of marginal bone fractures, additional splinting time is indicated. Endodontic treatment is only indicated if pulp necrosis develops.



Figure 6: Lateral luxation of a maxillary incisor showing clinical displacement and corresponding radiographic findings.



Figure 7: Splinting of traumatized anterior teeth for stabilization following dental trauma with a flexible composite wire splint

Intrusive luxation management depends on root maturity and the degree of intrusion (figure 8). Immature teeth are observed for spontaneous re-eruption; orthodontic repositioning is indicated if eruption does not occur within 8 weeks. Surgical repositioning is contraindicated in immature teeth as it will endanger pulp vitality. In mature teeth, intrusion < 3 mm may be observed for spontaneous alignment, whereas > 3 mm usually requires orthodontic or surgical repositioning, followed by flexible splinting for 4 weeks. Endodontic treatment is typically performed 3–4 weeks post-trauma, preferably before splint removal, and only if necrosis occurs in immature teeth.

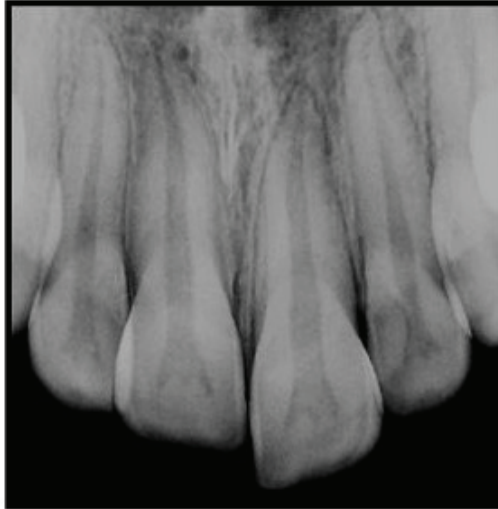


Figure 8: Radiographic appearance of intrusive luxation of maxillary right central incisor

Concussion and subluxation injuries in primary teeth are usually managed with observation only, as spontaneous healing is common. Luxation injuries often need careful repositioning if possible, but extraction is frequently indicated in cases of severe displacement or risk of trauma to the permanent successor.

Avulsion (figure 9): A true dental emergency, with prognosis largely dependent on extraalveolar dry time and storage conditions. Immediate replantation, ideally within 15 minutes, offers the best chance of success, but delayed replantation is still preferred, over no intervention. Replanted teeth should be stabilized with a flexible splint for 2 weeks, extended in cases of short immature roots or marginal bone fractures. Systemic antibiotics and tetanus prophylaxis should be administered as appropriate. In mature teeth, root canal therapy is typically initiated 7–14 days after replantation, while immature teeth are closely monitored for pulp revascularization or necrosis. Avulsed primary teeth are not replanted due to high risk of damaging the permanent tooth germ.



Figure 9:
Avulsed permanent tooth

Combination Injuries and Sequelae

TDIs frequently involve multiple teeth and tissues, with more than one type of injury affecting the same tooth or involving multiple teeth simultaneously, creating significant diagnostic and management challenges (figure 10). Such concurrent injuries often exhibit a negative synergistic effect, making healing patterns less predictable and adversely influencing prognosis.





Figure 10: Maxillary left central incisor with complicated crown fracture and a middle third root fracture

Potential complications include pulp necrosis, external inflammatory or replacement root resorption, tooth discolouration, and the development of ankylosis or infraocclusion, particularly in growing children where continued alveolar development may be compromised. Owing to the dynamic nature of these complications, careful long-term monitoring is essential, with frequent follow-up appointments and a willingness to modify treatment strategies as clinical and radiographic findings evolve in order to optimise outcomes.

Follow up and Review Protocols

Trauma patients require continuous monitoring beyond initial management and rehabilitation. Periodic clinical and radiographic assessments should be performed, with frequency and duration of follow-up tailored to the type and severity of injury as outlined by IADT guidelines, certain types of injuries require monitoring for up to 5 years. Follow-up assessments should focus on pulp vitality, periodontal healing, root resorption, discolouration, tooth stability, and root development, enabling timely intervention if complications arise. Typical review intervals include 2 weeks, 4 weeks, 3 months, 6 months, and 1 year, with additional visits as clinically indicated.

Challenges in Trauma Management

Dental trauma often presents in high-pressure clinical situations requiring rapid clinical decisions. Both diagnosis and management are challenging due to the involvement of multiple teeth and tissues, each with differing and sometimes competing treatment priorities, and are frequently compounded by delayed patient presentation. Clinical decision-making is further influenced by variations in patient age, stage of root development, as well as the need to deliver emergency care within the constraints of routine clinical practice. Paediatric patients may present additional difficulties due to limited cooperation, anxiety, and parental concerns. Patient-specific factors such as systemic health, expectations, and compliance further influence management. Furthermore, dental trauma carries significant medico-legal implications, necessitating meticulous assessment, documentation, and follow-up. Despite appropriate timely intervention, adverse outcomes such as those mentioned above may still occur reflecting the inherently unpredictable nature of traumatic dental injuries.

Role and Limitations of the IADT Guidelines in Clinical Practice

The IADT guidelines serve as a global standard for the management of traumatic dental injuries and provide a vital framework for evidence-based trauma care. Their online platform, the Dental Trauma Guide, offers user-friendly diagnostic support, stepwise treatment protocols, and structured follow-up schedules, facilitating efficient clinical decision-making while also supporting accurate documentation and medico-legal accountability. As peer reviewed and regularly updated recommendations, the guidelines promote consistency in clinical practice and aim to improve patient outcomes. However, important limitations remain. The guidelines cannot encompass every possible combination of traumatic injuries, nor can they guarantee favourable outcomes even when correctly followed, as prognosis is influenced by numerous biological and patient-specific factors. Their effective application therefore depends heavily on clinician interpretation, contextual adaptation, and sound clinical reasoning. Consequently, while the IADT guidelines are indispensable, they should be regarded as a dynamic and supportive tool rather than a rigid protocol, with clinical judgment remaining central to optimal trauma management.

Integration and Future Directions of Artificial Intelligence in Dental Trauma

Artificial intelligence (AI) is increasingly being explored as a supportive tool in the management of traumatic dental injuries, with platforms such as Dental Trauma Evo, ChatGPT, and Gemini Advanced incorporating IADT guidelines into interactive, decision support interfaces. These systems show potential in assisting with diagnosis, treatment planning, clinical training, and patient education, while emerging wearable AI and machine learning technologies may further contribute to real-time assessment and data-driven clinical decision-making. Despite these promising applications, AI tools currently function only as adjuncts to clinical care and cannot replace professional expertise. Their limitations include variable accuracy, restricted adaptability to complex or atypical clinical scenarios, lack of contextual and biological sensitivity, and unresolved medico-legal responsibilities. Consequently, while AI may enhance efficiency and support evidence-based practice, comprehensive clinical evaluation and sound professional judgment remain indispensable in dental trauma management.

Conclusion

Dental trauma represents an urgent and complex clinical condition that requires a structured, evidence-based approach to assessment and management. The IADT guidelines provide an invaluable framework for standardizing care and supporting clinical decision-making; however, their effective application depends on flexible interpretation, sound clinical judgment, and consideration of individual patient factors. Successful trauma management extends beyond protocol-driven care and demands clinician expertise, empathy, and adaptability, supported by meticulous documentation and multidisciplinary collaboration. Emerging artificial intelligence-based tools show promise in enhancing diagnosis, planning, and education, but they should be viewed as adjuncts rather than replacements for clinician led decision-making. Future advances in dental trauma care should focus on expanding and refining guideline coverage, improving digital decision-support systems, and reinforcing long-term, patient-centred management to optimise functional and aesthetic outcomes.

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Bridging the Divide: Insights into Medical–Dental Collaboration and Professional Perceptions in Sri Lanka

Overview

As healthcare systems worldwide move toward integrated, team-based care, the relationship between medical practitioners and dental surgeons has become increasingly important. In Sri Lanka’s government health sector, where multidisciplinary collaboration is essential for efficient patient management, understanding how these two professional groups perceive each other is critical. This study offers a fresh perspective by examining not just knowledge gaps, but the underlying disconnects that shape collaboration and professional trust.

Reframing the Problem

Rather than viewing this issue solely as a lack of knowledge, the findings suggest a broader “**interprofessional disconnect**”—a gap in shared understanding, communication, and expectations between medical and dental professionals.

Despite working within the same health system:

- Many medical practitioners have limited insight into dental education, training pathways, and specialization.
- There is uncertainty about referral systems, which can directly affect patient outcomes.
- Perceptions of professionalism among dental surgeons appear moderate but inconsistent, raising concerns about workplace dynamics rather than individual competence alone.

Key Insights

1. A System-Wide Knowledge Disconnect

While most medical practitioners interact with dental services, their understanding remains superficial. A large proportion demonstrated only **basic or incomplete knowledge** of:

- Dental training structure
- Licensing mechanisms
- Specialty-specific roles

This suggests that exposure exists—but structured learning and clarity are lacking.

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N.F. Safiya, K.S. Sanathani**

Faculty of Dental Sciences University of Peradeniya

2. Referral Practices Without Conceptual Clarity

Interestingly, although over 90% of practitioners had referred patients for dental care, many were:

- Unaware of appropriate specialties
- Uncertain about referral pathways

This indicates a system where practice precedes understanding, potentially leading to inefficiencies and suboptimal patient care.

3. Professionalism: Perception vs Reality

The evaluation of dental surgeons' professionalism revealed a moderate overall perception, but highlighted specific areas of concern:

- Punctuality
- Communication
- Responsiveness to feedback

These findings may reflect not only individual behaviors, but also:

- Workload pressures in government settings
- System inefficiencies
- Differences in workplace culture between professions

4. The Public vs Private Sector Contrast

A recurring theme was the perception that dental surgeons perform better in private practice than in government hospitals. This points toward:

- Possible resource constraints
- Variations in motivation and accountability structures
- The influence of systemic factors rather than purely individual professionalism

5. Educational Silos as a Root Cause

One of the most critical insights is that medical and dental professionals are trained largely in isolation from one another. This separation:

- Limits early exposure to interprofessional roles
- Reinforces misconceptions
- Weakens collaborative confidence in clinical settings

Implications for the Health System

This study shifts the focus from individual shortcomings to **system-level reform**, emphasizing that improving collaboration requires structural change:

- **Curriculum Integration**
Introduce foundational dental education into undergraduate medical training and vice versa.
- **Interprofessional Learning Platforms**
Joint workshops, case discussions, and clinical rotations can build mutual respect and understanding.
- **Standardized Referral Systems**
Clear, protocol-driven referral pathways can reduce confusion and improve efficiency.

- **Professional Development & Accountability**

Continuous training in communication, teamwork, and professionalism should be embedded in both fields.

A New Way Forward

The future of Sri Lanka's healthcare system depends not only on clinical expertise but also on how well different professionals work together. Strengthening medical–dental collaboration is not merely an academic exercise—it is a practical necessity for improving patient care, reducing system inefficiencies, and building professional trust.

By addressing educational gaps, aligning professional expectations, and fostering a culture of collaboration, Sri Lanka can move toward a more cohesive and patient-centered healthcare model.

Conclusion

This perspective reframes the issue from a “knowledge deficit” to a collaborative opportunity. The findings highlight that improving interprofessional relationships requires more than awareness—it demands intentional integration, systemic support, and cultural change within the healthcare ecosystem.

Acknowledgement

ChatGPT was used to improve the clarity and English language of the Report

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College News

SLMC Approval for MCGDP Examination

The College of General Dental Practitioners (CGDP) was successful in obtaining the Sri Lanka Medical Councils (SLMC) approval for Membership of the College of General Dental Practitioners as an additional qualification for the registered dental practitioners under the section 24(1) of the Medical Ordinance. The College of General Dental Practitioner's has commenced the course leading to this examination in October 2023.

MCGDP Examination Results 2025 Pass

1. Dr. Sathya Durairaj
2. Dr. Tharangini Asvinash
3. Dr. Gaythri Iraiven
4. Dr. Rajitharen Vijayasekaram
5. Dr. Shamil Navaratnaraja
6. Dr. Rimal Gunaratna
7. Dr. Eroshika Udatenne
8. Dr. Kasun Amarasinghe

MCGDP Examination (Repeat) 2026 Results Pass

1. Dr. Asanga Wijeratna
2. Dr. Bahardeen Girsy
3. Dr. Mariyampilla Mathuranayagam