ORIGINAL RESEARCH PAPER

Dental Science

LATEST DEVELOPMENTS IN PEDIATRIC DENTISTRY: A REVIEW

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ABSTRACT

In recent years, pediatric dentistry has undergone significant advancements, with new technologies and techniques emerging that are specifically tailored to meet the unique needs of children's dental health. It is imperative to stay abreast of these developments to ensure that one is providing the best possible care to young patients. Science is making extraordinary changes, pushing people into the age of modern dentistry. Therefore, the purpose of this review article is to focus on various changes in pediatric dentistry.

INTRODUCTION

There have been some exciting recent developments in the field of pediatric dentistry that are sure to benefit children and their families. These developments include new technologies and techniques that have been specifically designed to meet the unique needs of children's dental health.

By focusing on early intervention and education, the latest advancements in pediatric dentistry are helping to promote healthy oral habits and prevent future dental problems in children. From preventive care to restorative treatments, pediatric dentistry is continuously evolving to ensure that children receive the best possible dental care. As a result, the current literature's goal is to summarize recent advancements in pediatric dentistry.

IMPROVED DIAGNOSTIC METHOD

Digital Imaging Fiber Optic Transillumination Imaging (DIFOTI)

DIFOTI is an improved instrument over its predecessor, Fiber Optic Transillumination (FOTI). It uses intense fiber-optic light to trans illuminate teeth and detect early lesions non-invasively. Caries lesions have different optical properties than sound dental tissues and DIFOTI increases the change in scattering and absorption of light photons in the carious tissue, making the caries lesion appear as a dark shadow. DIFOTI provides digital image capture that can be stored and compared to previously obtained images. Although it has some limitations, DIFOTI is advantageous as it is non-invasive.[1]

DIFOTI, is a dental diagnostic tool that has earned certification for its ability to detect incipient, frank, and recurrent caries.[2] Schneiderman A et.al discovered that the DIFOTI methodology has higher sensitivity for detecting approximal, occlusal, and smooth surface caries than standard radiography methods.[3]

ADVANCED CARIES REMOVAL TECHNIQUES

Chemo Mechanical Caries Removal (CMCR)

Minimally invasive dentistry is gaining recognition for preserving sound dental tissues and reducing patient anxiety, particularly in children and their mothers. Whenever feasible, preserving sound dentin should be prioritized and invasive management be minimized.[4]

Chemomechanical caries removal uses either sodium hypochlorite (Naocl) or enzyme based agents for minimally invasive excavation. Naocl based agents include GK-101, GK-101E (caridex), and carisolv, while enzyme based agents include papacarie, biosolv.

Brix 3000 was the recent enzyme based CMCR agents. In 2012, Brix Medical Science introduced Brix 3000, an enzyme based CMCR gel with increased papain concentration and Encapsulated Buffer Emulsion technology. The gel's ideal p^H immobilizes enzymes, enhancing their proteolytic effect on collagen fibrils in carious dental tisssues and improving storage resistance. Additionally, Brix 3000 toxicological safety features are enhanced as it does not contain chloramines.[4]

Smart Preparation Burs

Polymer bur is a special dental tool made of medical grade polyester-ketone-ketone. It removes decayed dentin while leaving healthy dentin intact, by cutting only infected dentin.[5] This prevents over cutting of tooth structure, which is common with conventional burs, and helps preserve the affected dentin's ability to remineralize.[6]

According to Freedman and Goldstep, these burs can selectively remove carious dentin without affecting healthy dentin. When the edges of the polymer come into contact with hard materials such as healthy dentin, the edges wear away and become dull.[7]

DEVELOPED PEDIATRIC ENDODONTICS

In 2000, Barr et.al first reported using 0.04 taper rotary instruments for children.[8] Ganesh Jeevanandhan (Reeganz Dental India) introduced Kedo-S, the first file system designed for primary root canal preparation in 2016. Kedo-S files have undergone several manufacturing modifications and are available in various generation such as Kedo-S, Kedo SG, Kedo SG Blue, Kedo S Square, Kedo S plus.[9]

Kedo –S plus (5th generation)

Kedo-S plus is a new file system by Kedo S, offering uniform cross-section and dual core material with heat treatment and titanium oxide coating. It allows apical region preparation without lateral perforation and one file can be used to prepare upto 14 molar canals.[9]

There are several rotary file systems available, including Pro AF Baby Gold™, Prime Pedo™, DXL-Pro Pedo™, Neolix™(France), Denco Kids files and Sani Kid rotary files.[9]

IMPROVED PEDIATRIC CROWNS

Stainless Steel Crowns (SSC) are a cost effective restorative material that is durable. However, their use is limited due to their poor aesthetics. Zirconia crowns are a more aesthetically pleasing alternative due to their translucency, anatomical contouring, and wear resistance. Bioflx crowns (Kids-e-dental, LLP, India) made of resin polymer are also gaining popularity as subgingival preparation is not required. Preformed aesthetic crowns are becoming a popular alternative to preformed stainless steel crowns.[10]

IMPROVED BEHAVIOUR MANAGEMENT TECHNIQUES

Audiovisual Distraction (AVD)

Audiovisual distraction (AVD) is an effective technique for addressing anxiety and enhancing cooperation among

children during dental procedures, especially those requiring local anesthesia. The use of virtual reality or audiovisual glasses has demonstrated positive results in mitigating discomfort and emotional distress during dental restorative procedures. However, this approach may not be as effective for children with Down Syndrome. Despite this, AVD can still be a valuable tool in dental practices to complement other behaviour management techniques.[11]

Animal Assisted Therapy (AAT)

Animal Assisted Therapy (AAT) is a non-invasive, non-pharmacological intervention that incorporates a qualified animal into the treatment process. Studies have shown that AAT can be a highly effective way to reduce anxiety levels in children undergoing dental treatments, as demonstrated by T.K.Thakkar et.al's research on children aged 5-10.[12] Furthermore Yuanyuan Zhang et.al's systematic review highlights AAT can reduce pain and behavioural distress in children while also influencing their physiological responses. As a non-drug intervention, AAT is a safe and practical choice for pediatric patients.[13]

ADVANCED SPACE MANAGEMENT TECHNIQUE

Digital Space Maintainers

Digital space maintainers are a type of space maintainers that use CAD-CAM or 3D printing technology with biocompatible materials such as Polyether Ether Ketone (PEEK) polymer, Bruxzir, and trilio. PEEK polymer offers strong mechanical properties, chemical resistance and thermal stability, and has a natural tooth- colored appearance, making it suitable for patients with metal allergies. Bruxzir has high fracture toughness and minimal thermal expansion, making it stable in varying oral cavity temperatures.[14]

CONCLUSION

In conclusion, staying up to date with the latest developments in pediatric dentistry is crucial for dental professionals who serve young patients. The advancements in this field have led to better patient outcomes, and it is essential to continue to explore new avenues for improvement.

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