

Relevance of minimal invasive dentistry during COVID-19 pandemic.

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Abstract

The outbreak of novel Coronavirus-Viral Disease-2019 (COVID-19) has spread rapidly across the globe and caused widespread public health and socio-economic concerns. Dental profession falls under very high risk category of virus transmission because of their close contact with the patient and production of aerosols during dental procedures. Therefore, to sustain dental practice, the dentists must find out different approaches which can minimize the risk of infection. One such approach is Minimal Invasive Dentistry (MID). This review aims to illustrate novel MID procedures as a possible alternative strategy to conventional dental treatment during this COVID-19 pandemic times.

Keywords: COVID-19 pandemic, Minimal invasive dentistry, Non-aerosol generating procedures.

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Introduction

The Covid-19 pandemic has brought with it many unprecedented challenges in the professional lives of all healthcare professionals and dentists are no exception. The dentists need to adopt such techniques which minimize the risk of viral transmission to their patients and to themselves. The procedures that require the use of high-speed handpiece, three-way syringe, ultrasonic sealers, and air polisher and abrasion units can be categorized as Aerosol Generating Procedures (AGPs). AGPs increases the viral load in the dental operatory many folds, hence, they should be avoided or minimized to reduce the chances of spreading COVID-19 from dental treatment. At present, we are unaware when the world will be free from this virus, therefore, our focus should be on prevention of oral diseases so that minimum curative care is required [1,2].

With the expansion of horizon new strategies have evolved in dentistry offering wonderful opportunities to dental diseases of global presence like dental caries and periodontal diseases. One such strategy is Minimal Invasive Dentistry (MID) also referred to as micro dentistry. It is a conservative, biological concept aimed at removing minimum natural tooth tissue. The concept of MID was introduced by Simonsen in 1987 [3]. It embraces a philosophy that incorporates prevention, remineralisation and minimum intervention [4]. The concept of MID is based on principles of early recognition, and reduction of risk factors associated with caries etiology, followed by application of materials and procedures that can help in regeneration and repair of damaged tooth structure. It basically includes procedures and techniques meant for intervention at an early stage of the disease. In this review, we will be discussing in a step-wise manner (from non-invasive to invasive) important MID procedures that can be used for treating dental patients during COVID-19 pandemic [5].

Caries Risk Assessment (CRA)

CRA forms a cornerstone of successful application of MID in the management of dental caries. Patients with evidence of

active dental caries require a CRA to identify those risk factors that will contribute to progression of caries. Some of the caries risk assessment methods suggested are CAMBRA *i.e.* Caries Management by Risk Assessment, CAMBRA PBRN *i.e.* Caries Management by Risk Assessment Practice Based Research Network, Cariogram *i.e.* a computer based program for caries risk assessment. These non-invasive methods can reduce chances of future caries occurrence in an individual or community [6].

Topical fluorides

Topical application of fluoride vehicles such as gel, varnish, mouth rinse and dentifrices on the tooth surface are effective method in preventing caries and remineralizing incipient carious lesions. As fluoride had been focus of dental research for the last 70 years there are high quality randomized controlled trials conducted on various fluoride vehicles, hence, the evidence on preventive effect of fluoride is strong. Application of these topical fluoride agents along with patient education can reduce the caries risk of an individual [7].

Non- fluoride re-mineralizing agents

It is a minimal intervention technique involving application of chemical agents aim at restoring minerals which are lost due to demineralization caused by caries producing bacteria. Remineralizing agents recommended for use include Casein Phosphopeptide-Amorphous Calcium Phosphate (CPP-ACP), nova mine, nano-hydroxyapatite, titanium fluoride, tricalcium phosphate, resin infiltrant technology, enamel on (combination of un-stabilized calcium and phosphate salts with sodium fluoride). These compounds can be helpful in arresting caries, remineralizing non-cavitated lesions and preventing future carious lesion by reducing caries risk, thereby reducing need for dental appointments [7,8].

Silver diamine fluoride

It is a non-restorative caries control method. Biannual application of 38% silver diamine fluoride solution has been

shown to prevent and/or arrest coronal caries in primary teeth in preschool children as well as on root surface of permanent teeth in adults. Blackish discoloration of tooth is a disadvantage of this procedure hence it may not be acceptable to all the patients especially in anterior teeth [9-11].

Pit and fissures sealants

Pit and fissure caries account for majority of carious lesions in children, adolescents and young adults. Sealing these pit and fissure on the occlusal surface of tooth with a low- viscosity composite material can help in arresting or reversing non-cavitated carious lesions. It has been found bacteria found in a sealed tooth were less than what is excavated from a normal carious lesion. Usually cutting the tooth surface is not required; therefore, dentists can minimize aerosol generation before placing the sealants. There is moderate-quality evidence available to prove effectiveness of sealants in preventing caries. This preventive procedure may be adopted in during and post-Covid-19 era as it can prevent or delay of new carious lesion [12,13].

The hall technique

It is a non- invasive and non-aerosol generating technique used for restoration of carious but asymptomatic primary molar in a child patient. It involves placement of stainless steel crown over a carious posterior primary tooth without removal carious tissues. In absence of nutrition the bacteria in the carious lesion die and caries is arrested. Hall technique can be very beneficial in current scenario where we aim to minimize aerosol generation [14].

Chemo-mechanical cavity preparation

Chemo-mechanical caries removal is a technique of cavity preparation where a chemical agent is applied into the carious lesion causing softening of carious dentine. This softened material can then be removed by gentle excavation with hand instruments such as excavators. Preparations commonly available for chemo-mechanical cavity preparation are caridex, carisolv, papacarie (papain gel). This technique is useful in dental treatment of anxious and medically compromised individuals; in patients where administration of local analgesics is contraindicated. Chemical softening of carious tissue can minimize the use of arotor for final restoration of the tooth [15].

Resin infiltration

It is the technique where low-viscosity composite resin is filled into interproximal areas of tooth affected with non-cavitated carious lesion. The resin material creates a diffusion barrier inside the lesion. This procedure doesn't require the cavity cutting and temporary tooth separation. Although, the evidence is moderate on its long-term benefit and effectiveness in preventing or arresting carious lesions, resin infiltration method can be useful in current scenario [16].

Atraumatic Restorative Treatment (ART)

ART technique involves caries removal using hand instruments alone and restoring the prepared cavity with high viscosity glass ionomer cement. Initially, ART was developed for situations where there is limited access to traditional dental care. In the present scenario of COVID-19 pandemic, it can be considered as a first treatment option for restoring carious lesions in in primary and permanent teeth due to minimal chances of aerosol generation [17]. A recent meta-analysis reported survival percentages of ART restorations in the range of 77.1%-94.3%, depending type of tooth and surfaces restored which can be considered satisfactory. But the use of ART technique is restricted to cases where there is no obvious pulpal exposure; no history of painful tooth; deep carious lesion where dentist feel excavating carious tissue will not lead to exposure of pulp and tooth areas accessible to hand instruments [18]. In spite of these limitations, the ART technique is a safe and effective method of restoring teeth during COVID-19 pandemic as it falls in the category of minimal AGP [19].

Interim Therapeutic Restorations (ITR)

ITR procedure involves removal of caries with hand instruments or slow speed rotary instruments without exposing the pulp and then restoring it with an adhesive restorative material *i.e.* self-setting or resin modified GIC. It is used for young and uncooperative patients and also patients with special health care needs. Use of ITR should be encouraged in the current pandemic situations, as it is a non-aerosol generating procedure [20].

Conclusion

The current health scenario requires dental professionals to take necessary universal precautions which can minimize spread of Severe Acute Respiratory Syndrome Coronavirus-2 (SARS COV-2). Clinical dental practice has to be reorganized and conventional clinical approach needs to be modified and replaced with more prevention-based, non-invasive, minimal intervention approach. The MID procedures discussed here involves minimal use of aerosol generating equipment's like air turbine, hence, they are more suitable treatment alternatives for dental patients in current times as they help in control of spread of infection. As a healthcare professional we need to update ourselves with these novel preventive strategies and be flexible enough to use them routinely in our dental practice.

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