

## Dental Caries Treatment: Minimal Interventional Dentistry

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### Short Communication

Caries affects nearly 80% of the world population and is one of the public health problems in different countries but its treatment is mostly not covered under public health schemes. The microbial infection of the calcified tissues of the teeth results in the demineralization of the inorganic substance and degradation of the organic substance. This tooth decay is irreversible and further decay of the affected tooth needs to be prevented. The process of tooth restoration involves removal of the tooth substance that amounts to several times more than that which is actually decayed. In this process a lot of healthy tooth gets removed [1]. Dental caries occurs globally and is almost of the pandemic proportion. Once the infection sets in then the conservative approaches need to be followed that prevent the lesion and minimize further decay. This is done by removing the caries and preparation of the cavities using high speed hand-piece and burs. This involves the use of the local anesthesia, thermal effects, pressure on the pulp and removal of the health dentin of the remaining tooth. Among children the dental caries is the most prevalent with an average rate of 47 to 63%. Consumption of sugar in food, lack of oral hygiene practices and lack of access to the dental services are the main causes of the dental caries. Dental caries can reduce the growth and affect the quality of life among children [2].

The removal technique of the dental caries has evolved further with the introduction of the adhesive restorative material, development of the cavity designs thus compensating the destructive method of removal of the tooth material. The excavation of the caries using Carie-Care and polymer Bur are the most common minimal invasive approaches. The pulp capping material should be having good adherence to the tooth tissue, should be insoluble in the biological and other food matrices, should have dimensional stability, non-toxic, non-carcinogenic, with good biocompatibility and bioactivity. Calcium hydroxide is one such pulp capping material. It has anti-microbial activity. Most recently the drill-free silver diamine fluoride (SDF) approach has been developed and introduced as a part of the minimal invasive dentistry [3]. This also restricts the further extension of the carious lesion. Previous studies have proved that Carie-care was most effective than polymer burs in terms of the pain during the operative procedure and effective caries removal. SDF application was found to be easy and pain free and well tolerated and accepted by the patients. The silver ions are biocompatible and stable and are less toxic to the humans. The silver ions exert anti-microbial effect and are biocompatible and it also halts dental caries progression. SF also reduces the dental sensitivity to a great extent and provides resistance to the acid dissolution, enzymatic digestion on the decayed surface [4].

The traditional approaches include the management of the lesions by complete carious tissue removal and placement of the restoration material. For this clinical decision, need to be made for the extent of the removal of the carious tissue, cavity preparation and the selection of the material to restore the tooth. The previous methods were invasive and involved the destruction of the healthy tooth structure in order to access the carious lesions. The conventional restorations have limited lifetime and thus necessitating repetition of the restorations at frequent intervals. These conventional approaches also present lack of patient cooperation prolonged chair time of the patient and the need to

administer local anesthetics. Traditional methods of enamel drilling involved high speed drill. The debris of the drilled tooth if not removed in time results in the smearing of the cavity surface thus affecting the bonding of the restoration material filling. Such drilling also causes lateral damage to the soft tissue. This may also result in the swallowing or the aspiration of the drilled debris by mistake. The extent of heat that is generated during drilling may cause irreversible damage to the pulp causing the inflammation. The heat generally induces the synthesis of the proteins that mediate the immune response of the cells. Thermal stimulation up-regulates the TNF-alpha expression through TRPV1 activation in periodontal ligament cells [5].

Minimal invasive dentistry is preferred by the children and the parents as they have less pain and economical. The modern approach for the treatment of the tooth decay includes minimal invasive dentistry. This includes early detection, prevention and earliest cure of the disease at the micro scale level and repairing of the damage. Preservation and maintenance of the dentition and oral health is integral to the minimal invasive approach. Several advancements have been made in the restoration of the affected teeth [6].

Hall technique is the method of carious primary molars which does not favour the cariogenic biofilm development. With this method the carious lesions are sealed under a preformed metallic crown thus modifying the environment of the carious lesions. For this there is no need of any local anesthetic use and no need for the preparation of the tooth and carious removal. This technique also preserved the teeth under a cover and does not allow the carious lesion to expand. However the Hall technique is not suitable for teeth with clinical signs of infection dental abscess or any other radiographic signs of pathology. Hall technique requires the presence of a sound dentine to provide the support for the crown. Hall technique is easy to operate the patients also find this method easy to comply with as there is no involvement of the local anesthetics and there method is very economical. The only drawback is the alignment of the occlusion but was however found to reset without any adverse symptoms [7-9].

Another important technique is the water laser wherein the water is energized using the laser at a specific wavelength and sprayed at high speed to drill the teeth. However the technique is very expensive and can potentially increase the surface temperature of the teeth, pulp chamber and the other soft tissues. Significant research and development activities have taken place for the advancement of the drilling technology. Water jets were used for cutting of the mineral stones and the glass. Water jets were designed to drill the decayed tooth

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through the nozzles with specific shape and size. Water jets are also used for drilling of the soft and hard tissues in surgical procedures and integrated with the robotic surgery systems. The advantage of using the water jet is that the heat generated due to the kinetic energy can be removed by water immediately. Water jets have high efficiency safety as they do not involve any moving parts as well as cost effectiveness.

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