



Minimally Invasive Dentistry, Caries Prevention and Remineralization

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Introduction

Minimally invasive dentistry is a modern approach that focuses on preserving healthy tooth structure while preventing and managing dental caries. Traditional restorative dentistry often involved extensive removal of tooth tissue to eliminate decay, which could weaken the tooth over time. In contrast, minimally invasive dentistry emphasizes early detection of caries, risk assessment, and preventive strategies rather than aggressive intervention. Central to this approach are caries prevention and remineralization, which aim to halt or reverse early stages of tooth decay and maintain long-term oral health [1].

Discussion

Dental caries is a dynamic process caused by the imbalance between demineralization and remineralization of tooth enamel and dentin. Acid-producing bacteria in dental plaque metabolize dietary sugars, leading to mineral loss from the tooth surface. If this process continues unchecked, it results in cavitation. Minimally invasive dentistry seeks to intervene early, before irreversible damage occurs [2,3].

Caries prevention is a cornerstone of minimally invasive care and involves both professional and patient-centered strategies. Fluoride therapy remains one of the most effective preventive measures, as fluoride enhances enamel resistance to acid attack and promotes remineralization. The use of fluoridated toothpaste, varnishes, and sealants significantly reduces caries risk, particularly in children and high-risk individuals. Additionally, dietary counseling to reduce sugar intake, along with improved oral hygiene practices, plays a vital role in controlling caries development [4].

Remineralization is the natural repair process in which minerals such as calcium and phosphate are redeposited into demineralized enamel. Modern dentistry supports this process through the use of remineralizing agents, including fluoride, casein phosphopeptide-amorphous calcium phosphate, and bioactive glass. These agents help restore enamel structure, increase hardness, and prevent lesion progression. Early non-cavitated carious lesions, often appearing

as white spot lesions, can be successfully managed through remineralization without the need for drilling or filling [5].

When restorative treatment is necessary, minimally invasive techniques such as selective caries removal and atraumatic restorative treatment are employed. These methods remove only infected tissue while preserving affected but remineralizable dentin, maintaining tooth strength and vitality.

Conclusion

Minimally invasive dentistry represents a shift from traditional surgical approaches toward prevention, preservation, and biological management of dental caries. By emphasizing caries prevention and promoting remineralization, this approach reduces the need for extensive restorations and supports long-term oral health. Early diagnosis, patient education, and the use of modern preventive materials enable clinicians to manage caries effectively while conserving natural tooth structure. As dental science continues to evolve, minimally invasive strategies will remain central to sustainable and patient-centered dental care.

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