Policy on Minimally Invasive Dentistry

Adopted
2023

How to Cite: American Academy of Pediatric Dentistry. Policy on minimally invasive dentistry. *The Reference Manual of Pediatric Dentistry*. American Academy of Pediatric Dentistry; 2026:112-114.

Purpose

The American Academy of Pediatric Dentistry (**AAPD**) recognizes the role of minimally invasive dentistry (**MID**), also known as minimal intervention dentistry, in contemporary caries management. An understanding of the different MID approaches and their indications can aid in the safe, effective, and efficient management of caries in infants, children, adolescents, and individuals with special health care needs (**SHCN**) in the context of a dental home. The AAPD also recognizes that MID interventions can delay entry into the restorative cycle and helps to preserve tooth structure and functional dentitions long term.

Methods

This document was developed by the Council on Clinical Affairs. This policy is based on a review of current dental literature related to minimally invasive dentistry. A literature search was conducted using PubMed/MEDLINE with the terms: *minimally invasive* AND *dentistry*, *Hall crown*, *Hall technique*, and *resin infiltration*; field: all fields; limits: within the last 10 years. humans, English. Two thousand five hundred twelve articles match these criteria. Expert and/or consensus opinion by experienced researchers and clinicians also was considered.

Background

The AAPD recognizes medical management of caries and minimally invasive treatment as fundamental components of patient care and that such care is best delivered in a comprehensive, coordinated, patient- and family-centered manner within the patient's dental home. The AAPD recommends that a dental home be established no later than twelve months of age.[1] Early establishment of the dental home allows for primary prevention of dental caries, with the goal being to prevent caries from ever occurring.[2] Caries risk factors can be assessed and parents educated about strategies to prevent caries.[2,3] If incipient caries lesions develop, periodic evaluation and care within the dental home allow for early identification and interventions to slow, stop, or reverse the disease process. If these secondary prevention interventions are ineffective and cavitation occurs, surgical and nonsurgical approaches can be provided depending on the patient's individual needs.

Historically, dental caries was thought to be a progressive disease resulting in destruction of tooth structure unless the caries lesion was completely surgically removed and a restoration was placed. Understanding of the caries process has changed, and it is now recognized that surgical intervention and restoration of the tooth do not stop the disease.[4] Instead, the caries process is a result of the interaction of plaque biofilm and carbohydrate. If the biofilm can be managed effectively, a caries lesion will not progress.[5] The medical model of caries management focuses on elimination of the disease by addressing its causes and risk factors; its goal is to prevent new and recurrent caries as well as encourage the remineralization of dental tissues.[4]

The traditional GV Black cavity preparation calls for proximal extension to the facial and lingual line angles and occlusal extension through the fissures so that the cavosurface margins are on nonfissured enamel.[6] With the use of bonded restorations, removal of this large quantity of healthy tissue is no longer necessary.[7] Complete removal of all carious dentin was recommended in the past but no longer is for deep caries lesions in vital teeth. The goal of incomplete caries removal is to maintain tooth vitality by avoiding pulp exposure during caries excavation.[8] Avoiding pulp exposure improves the lifetime prognosis for the tooth.[7,9,10]

MID is a philosophy of dental care concerned with early identification of disease, factors contributing to the disease, intervention to arrest the disease, and, if needed, restorative treatment.[5] The goal of MID is to preserve as much healthy tooth structure as possible focusing on prevention, remineralization, and minimal restorative interventions.[11] Patient-level interventions attempt to establish a healthy mineralization balance and use chronic disease management approaches including patient and family engagement to facilitate sustainable behavior changes at home, dietary counseling aimed at reducing the frequency of carbohydrate consumption, oral hygiene instructions including the use of a fluoridated dentifrice, and professional application of fluoride.[3,12-14] Lesion-level interventions include remineralization, caries arrest, sealing in caries, removing caries, and restorative treatments.[14]

Some MID interventions are especially useful to treat pre-cooperative children, anxious patients, and individuals with SHCN or limited access to care. These interventions include fluoride varnish[14,15], silver diammine fluoride (**SDF**)[14-16], interim therapeutic restorations (**ITR**)[17], and Hall-technique

ABBREVIATIONS
AAPD: American Academy of Pediatric Dentistry. **ITR:** Interim therapeutic restorations. **MID:** Minimally invasive dentistry. **SDF:** Silver diammine fluoride. **SHCN:** Special health care needs.

stainless steel crowns[5,18-21]. These therapies also can be used to help stabilize caries when traditional restorative care is planned but cannot be completed in a timely manner (eg, young child with early childhood caries awaiting full-mouth dental rehabilitation under general anesthesia) and to defer non-emergent treatment if needed due to age, health status, or other factors.[22,23]

Other MID options (eg, sealants, resin infiltration) are used to help arrest incipient caries lesions. They serve as adjuncts to preventive measures and active surveillance to prevent initiation of the restorative cycle. This is possible in the context of comprehensive care in the dental home where patients/families receive individualized oral hygiene instruction and dietary counseling, and the patient's caries risk factors and dental history are known.[5] Close monitoring of caries risk, active surveillance, and more frequent professional recare (including fluoride treatments) are important parts of a minimally invasive approach.

Sealants can prevent pit and fissure decay and arrest noncavitated lesions.[14,24-28] To remain effective over time, they must be monitored and may require reapplication.[29] Resin infiltration is an appropriate intervention for noncavitated proximal caries lesions involving enamel and the outer third of dentin.[9,14,30-32] Restoration of these lesions also is appropriate; however, iatrogenic damage to adjacent teeth can occur and, if the caries disease is not addressed, recurrent decay will mandate replacement of the original restoration. When a restoration is replaced, additional natural tooth structure is removed; in time, this new restoration can fail, and the restorative cycle will need to be repeated. After repeated cycles, the tooth may be so weakened that it will require a full coverage restoration or extraction.[33] Delaying the initiation of the restorative cycle can help to maintain functional dentitions long term.[7]

Most MID interventions do not generate aerosols and can be used in situations when aerosols need to be minimized. This has been advantageous during the severe acute respiratory syndrome coronavirus 2 (SARS-CoV-2)/coronavirus disease 2019 (COVID-19) pandemic.

Policy statement

The American Academy of Pediatric Dentistry supports

- MID as patient- and family-centered, risk-based chronic disease management within the dental home to facilitate and promote preventive and caries-management measures to achieve individualized behavioral and treatment goals.
- interventions that encourage remineralization (eg, fluoride varnish).
- interventions that promote caries arrest (eg, SDF, sealants).
- minimal intervention approaches including ITR until a definitive restoration is possible or the primary tooth exfoliates, as well as the use of Hall-technique stainless steel crowns.
- tooth-sparing approaches (eg, resin infiltration, sealants) that prevent or delay the initiation of the restorative cycle.
- interventions that avoid pulp exposure in vital teeth.
- conventional restorative care, as minimal intervention approaches do not replace conventional restorations and require close monitoring of caries risk, active surveillance of caries lesions, monitoring for pain or signs/symptoms of infection, and more frequent professional recare.
- further research regarding the efficacy and safety of minimally invasive interventions for infants, children, adolescents, and individuals with SHCN.

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