Clinical Significance

MTA offers good clinical properties when used as pulp capping material and has been the material of choice for some time. The ability of BD to overcome the drawbacks associated with MTA and still achieve high success rates makes it an extremely attractive option. Larger randomized clinical trials with a longer period of follow-up are needed to refine and clarify the most appropriate clinical guidelines for using BD.

mature teeth with caries. Their success rates were not significantly different, and both would be valuable for use in VPT.

Awawdeh L, Al-Qudah A, Hamouri H, et al: Outcomes of vital pulp therapy using mineral trioxide aggregate or biodentine: A prospective randomized clinical trial. *J Endod* 44:1603-1609, 2018

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RESTORATIVE DENTISTRY

Longevity of minimally invasive alternatives

BACKGROUND

When addressing a defective restoration in a permanent tooth, replacement is the method most widely used. This approach includes complete removal of the direct restoration and replacement with a restorative material. To counter some of the adverse aspects of this approach, minimally invasive strategies, including repair, sealing, and refurbishment, have been proposed as alternatives. A comparison of the longevity of restorations managed using the removal method or using a minimally invasive alternative was done.

METHODS

The MEDLINE via PubMed, Cochrane Library, Web of Science, Scopus, BVS – Latin American and Caribbean Literature in Health Sciences (LILACS), and the Brazilian Library of Dentistry (BBO) and Open Gray databases were searched. The review included both controlled clinical trials (CCTs) and randomized clinical trials (RCTs) that assessed the clinical characteristics of restorations after replacement with either direct restorations in amalgam or composite resin without cusp involvement and those managed with minimally invasive techniques. Ten articles met the criteria, with 8 found through the initial search and 2 from a manual search of the references of the articles. None of the studies included patients at high risk for caries. Follow-up ranged from 2 to 12 years, and the number of direct restorations for subgroups was between 7 and 73.

RESULTS

The clinical characteristics evaluated in most studies were marginal adaptation, surface roughness, anatomical form, marginal pigmentation, and secondary caries. Whether replacement or minimally invasive techniques were used, the longevity of the restorations was comparable. This included the use of composite resin or amalgam. Additionally, refurbishment was shown to be a useful method for managing localized anatomical form defects.

When the clinicians in the studies were compared, it was found that dentists prefer to replace direct restorations, especially if they did not originally place it. If the dentist who performed the primary technique is called to manage a failed restoration, he or she tends to choose to repair it. Dentists are more likely to choose to repair rather than replace direct restorations in molars compared to premolars and anterior teeth.

Clinicians who work in solo practices or with a multidisciplinary team are more likely to prefer direct restorations over repair. Those in public health practices tend to select repair. Private practice dentists also choose replacement when the direct restoration is in dentin and prefer composite resin over amalgam for the repair or replacement of direct restorations.

Patients will pay less for repairs than for complete replacements of composite resin restorations. Amalgam restoration repair tends to be more expensive.

DISCUSSION

Most restorations fail several years after primary treatment. Failure is usually caused by secondary caries, marginal fracture of the restoration, tooth or restoration discoloration, or degradation of the tooth or restoration. The use of minimally invasive

Clinical Significance

The clinical longevity seen with repaired, sealed, or refurbished techniques for defective restorations was similar to that seen with replacement techniques. The quality of evidence supporting these alternative methods was moderate, which should help to motivate clinicians to consider minimally invasive techniques for defective restorations rather than selecting replacement as their go-to method. Further studies need to be done to address the patient's perception of the repair and replacement of defective direct restorations and to evaluate factors such as dental pain, stress, anxiety, time, and cost.

treatments to address defective restorations has been considered less than attractive by many clinicians, who have been slow to adopt these approaches. The comparable outcomes between replacement and repair or other minimally invasive approaches should encourage clinicians to trust the new and evidence-based procedures.

De Carvalho Martins BM, da Silva EJNL, Ferreira DMTP, et al: Longevity of defective direct restorations treated by minimally invasive techniques or complete replacement in permanent teeth: A systematic review. *J Dent* 78:22-30, 2018

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Conventional and ART techniques for posterior restorations

BACKGROUND

With the phasing down of amalgam as the primary choice for restoring posterior teeth, other restorative materials have been developed to take its place. Resin composites are an all-purpose direct restorative choice that is generally useful when esthetic concerns are paramount. However, it is less useful in treatment environments where reticulated water and electricity are limited. Glass-ionomer cements (GICs) offer the advantages of fluoride release, biocompatibility, and reliable chemical bonds to enamel and dentin. In addition, resin-modified glass ionomer cement (RMGIC) can also overcome the drawbacks of previous materials. 'High-viscosity' GICs (HVGICs) were created with the Atraumatic Restorative Treatment (ART) technique in mind. These materials offer better mechanical properties, improved wear resistance, compressive and flexural strengths, surface hardness, and solubility compared to conventional GICs. The clinical performance of GIC restorations was evaluated in conventional and ART techniques used to restore occlusal and approximal cavities in permanent or deciduous posterior teeth.

METHODS

A search was done of the PubMed database between January 1983 and March 2018 to identify articles covering GIC clinical performance in the situations of interest. Sixty-seven articles were identified through the search. The parameters measured were annual failure rates (AFRs) and qualitative descriptions of the performance of the GIC materials.

RESULTS

The results were reported for permanent posterior teeth and primary posterior teeth. In addition, the reasons for failure were listed.

GICs in Permanent Posterior Tooth Restorations

The mean calculated AFR for conventional GIC restorations was 1.17% (range 0 to 4.68%) over a mean follow-up period of 3.78 years. This was lower than the 8.0% AFR of ART-GIC restorations (range 0 to 40.56%), which was obtained over a mean follow-up period of 3.19 years. When approximal or multi-surface permanent posterior restorations were considered, the mean AFR for conventional GICs was 6.90% (range 1.33% to 22.94%) over a mean follow-up period of 3.86 years. For the ART technique, the mean AFR was 10.7% (range 0 to 35.81%) over a mean follow-up period of 4.83 years. Higher mean AFRs were seen for approximal posterior restorations than for single-surface occlusal restorations irrespective of which restorative technique was used.

GICs in Primary Posterior Tooth Restorations

The mean calculated AFR for conventional GIC restorations in primary posterior teeth was 4.78%, which was higher than for