protectors, and psychotherapy. Side effects were only noted with rTMS and consisted of headache at the beginning of the study. A statistically significant improvement in symptoms was achieved with laser techniques and the tongue protector. Improvements that did not reach statistical significance were noted with acupuncture, use of a tongue protector with or without *Aloe Vera* 70%, and the infrared laser. Psychotherapy achieved no symptom improvement.

DISCUSSION

In addition to the difficulties associated with determining the cause of BMS, there is difficulty determining what the best course of treatment is. None of the treatments investigated to date has achieved total relief or even a satisfactory result based on evidence-based research. More studies with larger samples are needed before the best treatment for BMS will be identified.

de Souza IF, Mármora BC, Rados PV, et al: Treatment modalities for burning mouth syndrome: A systematic review. *Clin Oral Invest* 22:1893-1905, 2018

Reprints available from F Visioli, Oral Pathology Dept, School of Dentistry, Universidade Federal do Rio Grande do Sul, Porto Alegre, Brazil; e-mail: fernanda.visioli@ufrgs.br

DENTAL CARIES

Micro-invasive methods of treatment

BACKGROUND

Carious lesions are traditionally treated by removing all the carious hard tissue and replacing it with a restoration. However, this leads to the cycle of replacing restorations and involves further destruction of tooth structure. The focus of modern dentistry is to control caries and carious lesions with minimally invasive methods. Noninvasive (NI) strategies remove no carious tissue and include control of dietary intake, biofilm, and demineralization or remineralization. These efforts are often combined. Micro-invasive treatment methods remove a few micrometers of tissue during the application, which involves acid etching of the tooth surface, then installing a diffusion barrier on (sealing) or within (infiltration) the carious tissue. The barrier halts acid diffusion into hard tooth tissues and stops mineral loss, which arrests the carious lesion. Restoring early proximal caries sacrifices an especially large amount of sound tooth tissue. In addition, proximal restorations have lower survival rates than non-proximal lesions, so NI or micro-invasive treatments are especially applicable. Dentists have been slow to move to NI or micro-invasive approaches, likely because of a lack of clear evidence of their effectiveness. A systematic review was done to compare the micro-invasive treatments (sealing and infiltration) with NI treatment to determine which is the better choice.

METHODS

The review of Medline via PubMed, Embase via Ovid, and Cochrane Central databases identified 15 reports of 13 split-mouth randomized controlled trials comparing micro-invasive strategies against each other, NI, or placebo for the management of proximal carious lesions. The synthesis used pairwise and network meta-analysis (NMA), with trial sequential analysis (TSA) used to assess the qualitative and quantitative sufficiency of the evidence to make robust conclusions.

RESULTS

The studies covered 486 participants and 1748 treated lesions from 7 countries. Most were done in university dental clinics, but 1 study was a practice-based trial. Four trials assessed primary tooth lesions and 9 investigated permanent teeth. High-risk patients were the subjects of 4 studies, with the remainder including moderate to high or mixed caries risk patients or were lacking that information. No relevant adverse effects were seen with either sealing or infiltration. Seven studies compared sealing and infiltration against NI and 1 compared both micro-invasive strategies against each other.

Pairwise meta-analysis and TSA found firm evidence indicating that sealing/infiltration together were more efficacious than NI and that sealing and infiltration were separately superior to NI treatment. Infiltration and sealing efficacy did not differ significantly.

Findings revealed that sealing or infiltration rather than NI would avoid 278 per 1000 treated lesions from progressing. Sealing would avoid the progression of 282 lesions per 1000 compared to NI, and infiltration would avoid the progression of 266 lesions

Clinical Significance

Sealing and infiltration retain more tooth tissue intact and cost less over the lifetime of patients, since they don't have to continually replace restorations. Dentists should be thinking of these approaches and considering micro-invasive treatments for early proximal lesions, taking into account the specifics of each dentition and patient. It's time to move beyond simply restoring lesions that could be managed with minimally invasive methods that act preventively.

per 1000 compared to NI. The certainty of the evidence underlying these comparisons was graded as moderate to high.

DISCUSSION

Most dentists continue to manage early proximal lesions invasively even though less invasive treatments retain teeth for longer periods and reduce treatment costs for patients. The evidence of this review indicates that micro-invasive treatments should be selected rather than NI treatments. Clinical judgment for each individual situation should be used to determine whether to select sealing or infiltration as the treatment of choice.

Krois J, Göstemeyer G, Reda S, et al: Sealing or infiltrating proximal carious lesions. *J Dent* 74:15-22, 2018

Reprints available from F Schwendicke, Charité Ctr for Dental Medicine, Dept for Operative and Preventive Dentistry, Aûmannshauser Str 4-6, 14197 Berlin, Germany; e-mail: falk.schwendicke@charite.de

DENTAL TRAUMA

Tooth fragment reattachment

BACKGROUND

The reattachment of tooth fragments offers an excellent means to preserve the original shape, color, brightness, and surface texture of the enamel, making the esthetics especially acceptable in anterior teeth. In addition, the incisal edges of the reattached fragment usually wear at a rate similar to that of adjacent natural teeth. This technique tends to be less time-consuming and provides a more predictable long-term result than other approaches. However, there are many variations in the fragment bonding technique. No consensus has yet been reached regarding what approach delivers the best result in terms of the bond strength between the fragment and the dentin over time. A systematic review was done to determine the best tooth fragment reattachment techniques for the crown of a fractured anterior tooth.

METHODS

The search included the PubMed, LILACS, Web of Science, Cochrane, and Scopus databases, as well as the gray literature through Google Scholar and OpenGrey. Five articles were selected after screening.

RESULTS

Four of the 5 articles reported longer follow-up periods than had been reported previously. Tooth fragment reattachment was done with conventional composite resin, flowable composite resin, or resin cement. In 2 studies, no additional preparation was done in the tooth fragment or remaining tooth structure. In 1 study, composite resin was used to reinforce the fracture line. In 3 studies, a double chamfer was performed after the tooth fragment was reattached. In all studies, the tooth fragment was maintained in physiological solution until it was reattached. The studies exhibited little consistency with regard to the method used to reattach the tooth fragment or to the length of the follow-up period.

DISCUSSION

The preferred technique was simple tooth fragment reattachment. Bone strength was increased when an intermediate material was used between the fragment and the dentin. However, the inconsistency of results does not indicate that any of the approaches is superior to all the others.

Clinical Significance

Simple reattachment of a tooth fragment works and achieves good esthetics. It appears wise not to do much in the way of tooth surface adaptation other than using an intermediate material between the tooth fragment and the dentin surface. Further study is needed to determine if there is 1 best way to approach tooth fragment reattachment.

Garcia FCP, Poubel DLN, Almeida JCF, et al: Tooth fragment reattachment techniques—A systematic review. *Dent Trauma* 34:135-143, 2018

Reprints available from DLN Poubel, Dept de Odontologia, Faculdade de Ciências da Saúde, Universidade de Brasilia, Brasilia, Brazil; e-mail: deborah.lousan@gmail.com