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Interproximal Enamel Reduction in Orthodontic Treatment and Its Risks Related To Dental Caries

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Abstract

Interproximal enamel reduction is used in orthodontic treatments to create space and allow alignment at sites where minimal space is needed. However, it is believed that interproximal reduction may promote biofilm and interproximal caries. For this reason, the purpose of this study is to review the literature to determine whether interproximal tooth caries increases as a result of interproximal enamel reduction. Based on these objectives, this study reviewed the literature published between 1988 and August 2023. Fifteen articles were selected from the MEDLINE (Medical Literature Analysis and Retrieval System), CINAHL (Cumulative Index to Nursing and Allied Health Literature), and Dentistry & Oral Sciences Source online databases using the keywords: interdental stripping, interproximal enamel reduction, and caries. It was concluded that there is no consistent scientific evidence that correlates the increased risk of interproximal dental caries after performed interproximal enamel reduction.

Keywords: *Interdental stripping; interproximal enamel reduction; dental caries*

Introduction

Dental caries is one of the most common diseases (about 50%) in children. If not treated in time, it can affect not only chewing function, but also speech, smile, psychosocial environment and quality of life of the child and family. Treatment of dental diseases is usually very expensive in all countries, while prevention is usually very simple and effective. Treatment of dental caries requires several appointments and has a poor prognosis if the dentition is mutilated. The dentist can easily detect early-stage caries and poor oral habits and advise patients on prevention, referring them to a specialist if necessary. Good oral hygiene, dietary changes regarding the consumption of sugar and sticky foods, and a healthy diet can help prevent this disease. Time is necessary to evaluate all methods of caries prevention (Mathur & Dhillon 2018).

Interproximal enamel reduction (IER), interproximal stripping (IS) or interproximal reduction (IPR) is a part of orthodontic treatment to gain a modest space in the treatment of crowding. Nowadays, interproximal enamel reduction has become a viable alternative to avoid extraction of permanent teeth (Lapenaite & Lopatiene 2014). Diagnosis and treatment of crowding requires planning

and knowledge of various treatment options, such as distalization of molars, extractions, expansion of dental arches, and interproximal stripping. Tooth reduction is the reduction of mesiodistal tooth dimensions to correct mild or moderate crowding and to eliminate the natural disproportion of tooth size between the dental arches (Osmar., *et al*. 2007).

The method is commonly used in the anterior region, especially in the lower teeth, and can be performed with various materials, such as amalgam grinding paper, high-speed burs, discs, manual polishing tapes, tungsten burs. Each technique must be performed carefully to avoid damage to the dental or periodontal tissues. The goal is to treat mild or moderate discrepancies and improve tooth shapes to provide patients with more stable functional and aesthetic results (Salchi., *et al*. 2023).

This procedure can only be used in patients with good oral hygiene and low caries risk. Interdental stripping may create grooves in the enamel that promote plaque accumulation. Therefore, the dentist must perform fluoride treatment after interdental stripping (Paganelli., *et al*. 2015).

Based on these conditions the objective of this study was to review the current literature looking for an association between interdental enamel reduction technique and dental decay. We justify this research due to the few studies that correlate these conditions.

Literature Review

Radlanski., *et al*. (1988) reported that human enamel surfaces were stripped with orthodontic grinding and finishing materials and examined with a scanning electron microscope (SEM). Even under in vitro conditions with the finest finishing strips, it was not possible to produce an enamel surface that was free of the furrows created by the initial abrasion by the coarse strip. Enamel surfaces that were progressively stripped from coarse to superfine were left in the patients' mouths for 12 weeks and evaluated using the SEM. It was found that the edges of the furrows were smoother, but the furrows remained wide and deep enough to promote more plaque accumulation than on untreated surfaces. The authors concluded that flossing did not prevent plaque accumulation at the bottom of the furrows.

Radlanski., *et al*. (1989) conducted an in vitro study to investigate the abrasive properties of various orthodontic finishing strips on the enamel surfaces of human teeth using a scanning electron microscope. As a result, the authors concluded that even the use of the finest finishing strip cannot eliminate the deep furrows created by the previous abrasion with a coarser strip. The authors concluded that the remaining furrows caused by the abrasion procedure are so deep and wide that plaque accumulation can be expected in them, predisposing them to caries and periodontal pathology.

Radlanski., *et al*. (1990) studied the morphology of proximal enamel surface that has been stripped for therapeutic reasons under the scanning electron microscope (SEM) twelve weeks and one year after treatment. In the first part of the study, teeth were extracted prior to evaluation, and in the second part, impressions were taken. For comparative purposes, the morphology of the natural proximal enamel surface was also evaluated at SEM. After twelve weeks, the edges of the furrows were smoother and plaque accumulation was found in the depths of the furrows. After one year, essentially no difference was observed. Some leveling of the margins was noted in the proximal contact area of some of the specimens, but not in the cervical area of the artificially abraded tooth surface. The natural enamel surface of the contact area exhibited excavations of similar size to the furrows left after stripping and finishing. However, the authors reported that the study showed that therapeutic proximal abrasion left furrows in the cervical region that were not repaired even after one year.

Lundgren., *et al*. (1993) applied interdental stripping to the enamel surface and evaluated methods to restore the treated surface. Extracted teeth embedded in a semielastic material were abraded with different types of steel strips. The treated enamel surfaces were then polished in various ways. The effects were studied using SEM and profilometry. It was concluded that the coarsest strips produced irregularities to such an extent that polishing had a very limited effect. Polishing with coarse polishing strips, followed by gradually finer ones, gave the best result. Increasing the number of strokes and using all grades of polishing strips improved the result slightly.

Zachrisson., *et al*. (2007) investigated whether interdental enamel reduction using fine diamond disks with air cooling followed by polishing resulted in iatrogenic damage or reduced interradicular distances. The studied subjects were 61 consecutive patients who

had undergone mesiodistal enamel reduction on all 6 mandibular anterior teeth more than 10 years prior. Caries, bleeding on probing, probing depths, and gingival recession were examined using standard techniques. Incisor irregularities and tooth width/thickness ratios were measured on models, and patients were asked about increased tooth sensitivity. The reference group included 16 students. No new caries lesions were detected. Three mature adults had some minor labial gingival recessions. There was no evidence of root pathology. The distance between the roots of the lower incisors was statistically significantly greater in patients who had received stripping than in those who had not. Fifty-nine of 61 patients reported no increased sensitivity to temperature changes. The overall index of irregularity at follow-up was only 0.67 (SD, 0.64). Interdental enamel reduction according to this protocol did not result in iatrogenic damage. Caries, gingival problems, or alveolar bone loss did not increase, and the distances between the roots of the teeth in the anterior mandibular region did not decrease. Overall incisor irregularity was low at follow-up.

Jarjoura., *et al*. (2006) studied air-rotor stripping (ARS). It is a commonly used method to alleviate crowding in the permanent dentition. However, its wide acceptance has been limited by the potentially increased caries risk of the abraded enamel surface. The aim of this study was to compare the caries susceptibility of ARS -treated enamel surfaces with intact surfaces in patients undergoing fixed orthodontic therapy. Forty patients treated with ARS were evaluated clinically and radiographically for caries 1 to 6 years after interproximal enamel reduction. All patients were examined by their dentists for prophylaxis at 6-month intervals during active orthodontic treatment and were exposed to fluoridated water and fluoridated toothpaste. Topical fluoride agents or sealants were not applied to the abraded surface after any ARS session. The incidence of caries was compared between ARS treated and untreated surfaces within subjects. Carious, missing, filled tooth (DMFT) and surface (DMFS) scores were used to assess the subjects' overall caries risk. A total of 376 test and 376 control surfaces were examined. The number of interproximal lesions detected was low, with no statistically significant difference found between groups (test = 3; control = 6; P = .33). DMFT and DMFS scores increased significantly during the study period, indicating that these patients were clearly at risk for caries (P <.001). The results indicate that caries risk is not influenced by ARS. In addition, the data indicated that application of topical fluoride to enamel surfaces immediately after ARS may not add benefit in patients exposed to fluoridated water and fluoride-containing toothpaste.

Zheng (2010) discussed the advantage of interproximal enamel reduction when used to create space in the orthodontic treatment of malocclusion patients with periodontitis. Thirty-four patients were selected from those seeking orthodontic treatment at Stomatology Department of the Third Hospital of Peking University between 2004 and 2009, including 9 men and 25 women, with an average age was 25.4 years. All of them were diagnosed with periodontitis to some extent. The space requirement for orthodontic treatment was determined for each patient by plaster model analysis and cephalometric measurement. The treatment plan was then developed on the premise that interproximal enamel reduction was the first choice for creating space, specifying the sites and extent of enamel reduction, any further extraction required, and the appropriate anchorage. Fixed orthodontic treatment began after systematic periodontal treatment. A needle-shaped fine diamond bur was used to abrade 0.25-0.5 mm of interproximal enamel after arch alignment, and NaF glycerol was used after polishing to reduce the risk of caries. The result was maintained after orthodontic treatment. After 6-24 months of orthodontic treatment, teeth were aligned, interdental spaces had shrunk or disappeared, normal overbite, overjet and posterior occlusion were achieved, and periodontal conditions were stable. No new caries were found in the enamel reduction areas at the 0.5-2 year follow-up examination. Interproximal enamel reduction is clearly superior for making room for orthodontic treatment in patients with periodontitis. This method reduces the difficulty and periodontal risk of orthodontic treatment, shortens treatment time, improves gingival aesthetics, and prolongs the life of the dentition.

Grippaudo., *et al*. (2010) evaluated the morphological effects and surface irregularities produced by different methods of mechanical stripping (abrasive strips and burs) and chemical stripping (37% orthophosphoric acid), as well as the surface changes after finishing procedures (polishing strips) or the subsequent application of sealants, in order to determine the correct stripping method that would guarantee the smoothest possible surface. The authors also analyzed the degree of wear of the different abrasive strips used according to their structure. 160 proximal surfaces of 80 healthy molars extracted for orthodontic and periodontal reasons were divided into the following groups: 1 control group with untreated proximal enamel surfaces and 5 different groups depending on the abrasion method used, which were examined with a scanning electron microscope (SEM). Each of the 5 treated groups was also divided into 3 different

subgroups, depending on the finishing procedures or the subsequent application of sealants. The finishing stage following the manual reduction proves to be fundamental in reducing the number and depth of the grooves created by stripping. After stripping with an air rotor method, the use of sealants is recommended to obtain a smoother surface. The analysis of the combinations of mechanical and chemical stripping showed unsatisfactory results. Regarding the wear of the strips, the authors found a different degree of abrasion for the different types of strips analysed with SEM. The damage to the enamel is limited only when the finishing procedure is applied, regardless of the type of abrasion strips used. It would be advisable, even though it is rarely clinically possible, to use sealants after the air-rotor stripping technique.

Zachrisson., *et al*. (2011) investigated whether careful interdental enamel reduction (using extra-fine diamond disks with air cooling, followed by contouring with triangular diamond burs and polishing) leads to an increased risk of caries in premolars and first molars. The subjects were 43 consecutive patients, aged 19 to 71 years, who had undergone mesiodistal enamel reduction in the anterior and posterior regions of the dentition 4 to 6 years previously. Caries was assessed on standardized bitewing radiographs using a 5-level grade scale and a fine probing tip. The incidence of interproximal caries was compared between reproximated and unreduced contralateral surfaces of the same patient. Patients were questioned about their tooth brushing habits, flossing and tooth picking, and regular fluoride supplementation after removal of orthodontic appliances. The overall clinical impression generally showed a healthy dentition with excellent occlusion. Only 7 (2.5%) new caries lesions (all grade 1) were found among 278 reproximated mesial or distal surfaces in 3 patients. In 84 contralateral uncut reference tooth surfaces, 2 lesions (2.4%) were detected. In unmilled, unpaired premolars and molars, 23 surfaces had to be referred for caries treatment (grade 3 or occlusal caries). Eleven of these occurred in 1 patient. None of the 43 patients reported increased sensitivity to temperature changes. Interdental enamel reduction with this protocol did not result in an increased risk of posterior caries. The authors found no evidence that proper mesiodistal enamel reduction, within accepted limits and in appropriate situations, is detrimental to teeth and supporting structures.

Lapenaite & Lopatiene (2014) evaluated different interproximal enamel reduction techniques, their indications, contraindications and complications presented in recent scientific studies. Papers published in English between 2003 and 2012 were searched in the PubMed, ScienceDirect, and The Cochrane Library databases and in the Google Scholar web search. Initial searches were made looking for peer-reviewed systematic reviews, meta-analyses, literature reviews, and clinical trials that analyzed at least one method of interproximal enamel reduction. Thirty-one published data met the inclusion criteria. According to the study, abrasive metal strips, diamond-coated stripping disks, and air rotor stripping are the main interproximal enamel reduction procedures. Indications for use include mild or moderate crowding in dental arches, Bolton index discrepancy, changes in tooth shape and esthetics within the enamel, improvement of retention and stability after orthodontic treatment, normalization of gingival contour, elimination of black gingival triangles, and correction of the Curve of Spee. Complications of interproximal enamel reduction include hypersensitivity, irreversible damage to the dental pulp, increased plaque formation, caries risk in the stripped enamel areas, and periodontal decay. The authors concluded that interproximal enamel reduction is an important component of orthodontic treatment to gain space in the dental arch and correct the Bolton index discrepancy.

Koretsi., *et al*. (2014) reported on the effects of interproximal enamel reduction (IER) on tooth surfaces in terms of the level of enamel roughness after applying different IER methods and the caries risk of treated teeth. Seven electronic databases were systematically searched. Two independent reviewers evaluated the articles at each step according to the predefined eligibility criteria. Enamel roughness data were pooled when the same IER method was used and arithmetic values were available. The caries incidence data were appropriate for analysis when the same caries development units were used. Of the 2396 citations initially identified, 18 articles met the inclusion criteria and were considered further (14 addressing enamel roughness and four examining caries risk after IER). Meta-analysis of quantitative data on enamel roughness was not possible because of statistical heterogeneity; instead, only the results on enamel roughness were described. Meta-analysis of studies focusing on caries incidence revealed no statistical difference between treated and untreated enamel surfaces (p = NS) from 1 to 7 years after IER. Drawing reliable conclusions on enamel roughness after IER is difficult due to the diversity of available studies. Statistically, the incidence of caries on surfaces previously treated with IER was the same as on intact surfaces, suggesting that IER does not increase the risk of caries on treated teeth.

Meredith., *et al*. (2017) performed interproximal reduction (IPR) to remove enamel, leaving grooves and furrows on the tooth surface that may increase caries risk. The study examined the nanotopography of enamel surfaces created by the most commonly used IPR instruments and to evaluate the effect of polishing after IPR. Enamel plates were cut from the interproximal surfaces of healthy premolars and then treated with diamond burs, strips or discs or Sof-Lex polishing discs (3M ESPE, St Paul, Minn). All samples were cleaned by sonication in distilled water. No IPR was performed on the control group, which was cleaned by sonication only. Enamel surfaces were examined by atomic force microscopy. The IPR instruments all produced rougher surfaces than the control sample; however, the samples polished with Sof-Lex discs after enamel reduction were smoother than untreated enamel ($P < 0.05$ for all comparisons). The larger grit medium diamond burs and medium strips generated rougher enamel surfaces than their smaller grit counterparts: fine diamond burs and fine strips ($P <0.001$). The difference in roughness produced by mesh and curved discs was not statistically significant ($P = 0.122$), nor was the difference caused by fine strips and mesh discs ($P = 0.811$) or by fine strips and curved discs ($P = 0.076$) (surface roughness values for medium burs, 702 ± 134 nm; medium strips, 501 ± 115 nm; mesh discs, 307 ± 107 nm; fine burs, 407 ± 95 nm; fine strips, 318 ± 50 nm; curved discs, 224 ± 65 nm). The smoothest surfaces were produced by using the entire series of Sof-Lex polishing discs after enamel reduction (surface roughness, 37 ± 14 nm), and these surfaces were significantly smoother than the control surfaces (surface roughness, 149 ± 39 nm; $P = 0.017$). Different IPR instruments produced enamel surfaces with different nanotopography and varying degrees of roughness. Enamel surfaces treated with diamond burs were the roughest, followed by diamond strips and diamond discs. Polishing with Sof-Lex polishing discs after IPR reduced the roughness of the enamel surface, and this surface was even smoother than untreated enamel.

Kaaouara., *et al*. (2019) often used interdental stripping in orthodontics to correct discrepancies in tooth shape or size. However, the authors reported that this procedure poses significant risks to enamel. The roughness of the enamel surface may depend on the instruments used; it may lead to the accumulation of cariogenic plaque and periodontal problems. The main objective of our study was to evaluate the condition of the enamel surface after interproximal stripping in the mouth by comparing different manual and mechanized enamel reduction protocols; on the other hand, the topography of the stripped area was observed to determine its location on the stripped proximal surfaces. An in vivo study was performed: Interdental stripping was done in the mouths of patients undergoing orthodontic treatment and on healthy teeth to be extracted for orthodontic or periodontal reasons. The sample was divided into four groups: in group 1, distal surfaces were stripped with conventional single-sided diamond abrasive strips and non-stripped mesial surfaces (control surfaces); in group 2, distal surfaces were stripped with the manual Contac EZ IRP kit (single-sided abrasive strips of different grit sizes) and non-stripped mesial surfaces (control surfaces); in group 3, surfaces were stripped with ContacEZ IRP diamond discs attached to a handpiece and mesial surfaces were non-stripped (control surfaces); in group 4: the distal surfaces were stripped with the Intensiv Ortho-Strips mechanized system, and the mesial surfaces were not stripped (control surfaces). The study showed that regardless of the type of stripping material used, the enamel surface showed a certain roughness with the presence of striations and grooves of varying width and depth. Our observations objectified a more uniform and less rough enamel surface when using the Intensive oscillating files. Manual instruments (abrasive strips and files) showed a rougher and more irregular surface texture, which may pose a real risk for carious and periodontal disease. Macroscopic evaluation of the topography of the stripped area showed that there is a great variability in the location and extent of the ablated area with respect to several parameters. Current mechanical instruments (oscillating files) allow for more comfortable enamel removal for the patient and the practitioner and appear to produce a more even and less damaging surface finish for the tooth and periodontium.

Gómez-Aguirre., *et al*. (2022) conducted a systematic review to determine the effects of interproximal enamel reduction techniques (IPR) used in orthodontics. Six databases were searched: PubMed, Scopus, Web of Science, Dentistry & Oral Sciences Source, ScienceDirect, and Clinical Trials. Grey literature was searched using Google Scholar. Risk of bias was assessed using the Risk of Bias 2, Newcastle-Ottawa Scale, and Robins I Scale depending on the design of the assessed study. In addition, the quality of the included studies was determined using the Grading of Recommendations Assessment, Development and Evaluation (GRADE) criteria. This systematic review included randomized clinical trials, nonrandomized clinical trials, and observational studies with a control group that reported on the effects of IPR for orthodontic purposes on the teeth and periodontium. Case reports and in vitro and in vivo studies were

excluded. Eight clinical trials met the eligibility criteria. As a result, no demineralization of enamel, increase in caries incidence, periodontal changes, or tooth sensitivity were observed after IPR. Also, considering the duration of orthodontic treatment, IPR was a faster procedure than tooth extractions. In assessing risk of bias, all observational studies had low risk, the nonrandomized clinical trial had critical bias, and all randomized clinical trials had some concerns. The overall quality of the studies was rated as low to very low. After analyzing the data from the included studies, it was concluded that the procedures of IPR could be useful for the treatment of crowding in orthodontic clinical practice without adverse effects. However, further randomized controlled clinical trials with a longer follow-up period and high-quality studies are needed to draw robust conclusions.

Shalchi., *et al*. (2023) investigated the impact of IER on patients' gingival health status, including clinical attachment loss (CAL) and bleeding on probing (BOP). In addition, this study evaluated the incidence of caries after IER with or without fluoride therapy. In this retrospective cohort study, 90 patients who had started and completed their orthodontic treatment within the past two years were divided into three groups as follows: In group 1, patients had received interproximal stripping on the anterior mandibular teeth. Group 2 patients also had interproximal stripping of the mandibular anterior teeth, and topical fluoride was applied after IER. Group 3 patients had received only orthodontic treatment without interproximal stripping. Patients were then examined for CAL, BOP and the presence of caries. Results CAL for patients in the IER and control groups were 2.06±0.18 and 2.08±0.16, respectively. BOP was also 3.01±0.14 and 3.05±0.19 for patients in the IER and control groups, respectively. The incidence of caries, BOP and CAL did not differ significantly between the group of patients who received IER and the control group ($P > 0.05$). The incidence of caries was also not significantly different between the patients who received topical fluoride after IER and those who did not ($P=0.999$). The authors concluded that interproximal stripping of mandibular anterior teeth prior to orthodontic treatment did not significantly increase the incidence of caries, BOP and CAL. In addition, the application of topical fluoride after IER has no significant effect on the incidence of caries.

Materials and Methods

Fifteen scientific articles published between 1988 and August 2023 were selected through MEDLINE (Medical Literature Analysis and Retrieval System online), CINAHL (Cumulative Index to Nursing and Allied Health Literature), and Dentistry & Oral Sciences Source databases using keywords: Sixteen articles were selected using the keywords: Interdental Stripping, Interproximal Enamel Reduction, and Caries were selected. Inclusion criteria were full texts, all languages, ethics committee- approved studies, and clinical cases. The exclusion criteria were editorial letters.

Discussion

Interdental Enamel Reduction (IER) is a common clinical procedure in which the mesiodistal size of permanent teeth is reduced by enamel removal and anatomic recontouring. However, there is controversy in the literature as to whether IER performed on the tooth surface can promote interproximal caries.

The abrasive procedures used in IER can be performed with different types of materials, burs and abrasive strips. The results obtained have already been analyzed by SEM, and it was found that the abrasive procedures are so deep and wide that the accumulation of plaque is to be expected and therefore predisposes to caries and periodontal pathology (Radlanski., *et al*. 1988). Radlanski., *et al*. (1989 and 1990) concur that the margins of the grooves produced by IER were smoother, even when a good polish was performed, but the grooves remained wide and deep enough to promote greater plaque accumulation than on untreated surfaces. Radlanski., *et al*. (1990) reported that the study showed that therapeutic proximal abrasion left grooves in the cervical region that were not repaired even after one year. Lundgren., *et al*. (1993) and Meredith., *et al*. (2017) suggested that polishing should start with coarse polishing strips, followed by gradually finer ones that provide the best result.

Regarding the comparison of IER with different methods of mechanical stripping (abrasive strips and burs) and chemical stripping (37% orthophosphoric acid) and surface changes after finishing procedures (polishing strips) or subsequent application of sealants, to determine the best stripping method that can guarantee the smoothest surface. Grippaudo., *et al*. (2010) reported that mechanical and chemical stripping showed unsatisfactory results, as these methods resulted in different degrees of abrasion. Kaaouara., *et al*. (2019)

reported that manual instruments (abrasive strips and files) have a rougher and more irregular surface texture that can pose a real risk for carious and periodontal disease, while mechanized instruments (oscillating files) allow the removal of enamel with more comfort for the patient and the practitioner and seem to produce a more uniform and less damaging surface texture for the tooth and periodontium.

Studies on caries risk after IER were conducted by Koretsi., *et al*. (2014) and Gómez-Aguirre., *et al*. (2022). The authors concluded that analysis of the studies was difficult due to the diversity of methodologies. Koretsi., *et al*. (2014) reported that the incidence of caries on surfaces previously treated with IER was the same as that on intact surfaces, suggesting that IER does not increase the risk of caries on treated teeth, and Gómez-Aguirre., *et al*. (2022) reported that the IPR procedures could be useful in treating crowding in orthodontic clinical practice without adverse effects. However, further randomized controlled clinical trials with a longer follow-up period and high-quality studies are needed to draw robust conclusions.

The use of fluoride after IER is also controversial in the literature. Jarjoura., *et al*. (2006) reported that the application of topical fluoride to enamel surfaces immediately after ARS provided no additional benefit in patients exposed to fluoridated water and fluoride-containing toothpaste. Shalchi., *et al*. (2023) reported that the application of topical fluoride after IER had no significant effect on the incidence of caries. However, Zheng (2010) used NaF glycerol after IER and reported that it reduced the risk of caries.

IER treatment in patients with gingival problems is also controversial, as the grooves may promote biofilm accumulation, but stripping tends to promote esthetics by eliminating the interproximal black triangular spaces. Zheng (2010) performed interproximal enamel reduction in patients with malocclusion and periodontitis. The author demonstrated that interproximal enamel reduction did not result in iatrogenic damage. Caries, gingival problems, or alveolar bone loss did not increase, and the distances between the roots of the teeth in the anterior region of the mandible were not reduced. The authors demonstrated that the use of IER did not cause greater periodontal damage in patients, as noted by Shalchi., *et al*. (2023), who concluded that interproximal stripping of mandibular anterior teeth prior to orthodontic treatment did not significantly increase the incidence of caries, BOP, and CAL. However, Radlanski., *et al*. (1988) reported that interproximal grooves may promote periodontal pathology, Zachrisson., *et al*. (2011) reported that especially molars and premolars are at higher risk of caries and may affect periodontal structures, Lapenaite & Lopatiene (2014) concluded after a literature review that the complications of interproximal enamel reduction are hypersensitivity, irreversible damage to the dental pulp, increased plaque formation, risk of caries in the stripped enamel areas, and periodontal disease, and Kaaouara., *et al*. (2019) agreed that the risk of caries and periodontal problems may be increased after IER.

Conclusion

From this literature review, we concluded that there is no evidence that the technique of interproximal enamel reduction increases the risk of caries. However, there are few studies with methodological flaws investigating the relationship between caries and IPR, so further studies are needed to verify whether these results can be sustained.

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