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Interdental Cleaning: Information for Dental Practitioners

Colgate Dental Education Programs | Special Topic No.26

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make history.

Removing bacterial plaque has been pivotal in preventing and controlling gum disease, ever since the plaque induced aetiology of gum disease was conceptualised by Loe and co-workers almost six decades ago[1]. Accordingly, toothbrushing is established as the mainstay of mechanical plaque removal in oral self-care.

Toothbrushing can successfully remove plaque at all tooth surfaces excluding interdental surfaces. Nonetheless, plaque tends to accumulate heavily on interdental sites where both gingivitis and periodontitis occur more frequently than other sites.[2-6] Given that interdental sites are also commonly affected by dental caries, the value of interdental cleaning in the prevention of both dental caries and periodontal disease is highlighted by dental professional bodies, worldwide. For instance, Australian Dental Association[7] and their counterparts in New Zealand[8] and America[9] all recommend brushing teeth twice a day in combination with daily interdental cleaning (using dental floss or other interdental cleaners) to keep teeth and gums healthy. Against this background, using interdental cleaning aids such as flossing[2], interdental brushing[3] and wood sticks/toothpicks[4] as an adjunct to toothbrushing gained popularity. Subsequently, power interdental cleaning devices including water flossers or oral irrigators have been introduced to the market.[5,6] Ongoing research is attempting not only to provide the evidence behind using such devices but also to develop novel interdental cleaning devices/techniques.

This information sheet discusses the current evidence-based status of interdental cleaning devices, under the following four broad categories:

- Dental floss
- Woodsticks/toothpicks
- Interdental brushing
- Water flossers/oral irrigators

Dental floss

There are different types of dental floss available -regular string floss, dental tape and floss holders/flossettes (Figure 1). Using dental floss as an interdental cleaning aid was conceptualised almost two centuries ago.[10] With its ability to remove interdental plaque, flossing has been the most recommended interdental cleaning aid, as an adjunct to toothbrushing, throughout the world.[7-9] Despite such recommendations, the latest evidence on using dental floss as an interdental cleaning aid remains rather ambiguous. For example, Berchier et al.[2] had systematically assessed the beneficial effects of flossing in addition to toothbrushing compared with toothbrushing alone. They concluded that there was no sufficient evidence to support that flossing plus toothbrushing has more beneficial effects on plaque removal or gingivitis than toothbrushing alone and therefore suggested that dental professionals should assess on an individual patient basis to determine if high-quality flossing is achievable. In a meta-analysis ranking interproximal oral hygiene (IOH) aids, unsupervised flossing was ranked poorly against other IOH aids, failing to achieve substantial reduction in gingivitis.[11] However, not rebutting the efficacy of flossing in removing interdental plaque, they attributed the poor ranking received by flossing to the inability of individuals to perform the proper flossing technique. In contrast, a recent Cochrane systematic review[12] suggested that flossing combined with toothbrushing might reduce gingivitis compared with toothbrushing alone despite the overall certainty of evidence being low. They also pointed out that flossing did not contribute to a substantial reduction in plaque compared with toothbrushing alone.

Dental floss has advantages such as being relatively cheap, travel friendly and good for small gaps and crowded teeth whereas its drawbacks include gingival trauma, unsuitability for larger gaps, low patient compliance - mainly due to difficulties in using and following the correct flossing technique coupled with lack of motivation.[2,11-14] Dental floss/tape is either waxed or unwaxed. Despite being more expensive and not fitting tight gaps compared with unwaxed floss, waxed options may make the flossing process easier by helping the floss to glide over tooth.[14] Some studies, albeit lacking control groups, indicated that floss holders/flossettes (Figure 1b) were successful to a certain extent in overcoming issues with manual dexterity as well as compliance while helping to set up a long-term habit of flossing.[13,15,16] Although a systematic review[17] reported a reduction in interproximal caries among children induced by professional flossing, evidence is scant on dental caries/interproximal caries reducing effects of self-performed flossing.[11,12]

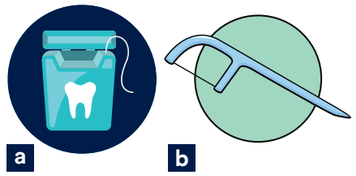

Figure 1: (a) Dental floss/tape (b) Floss holder

Woodsticks/toothpicks

Woodsticks/toothpicks are one of the earliest devices used by humans with toothpicks being historically connected to removing food debris.[12] Usually, woodsticks are triangular, and toothpicks are round in shape - both claimed to be effective in removing supragingival plaque[4] (Figure 2) although research on woodsticks/toothpicks is rather sparse compared with other interdental cleaning tools.[13]

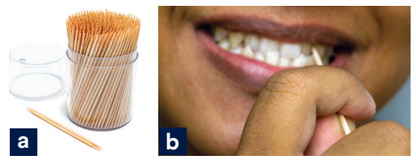

Figure 2: (a) Toothpicks/woodsticks (b) Using a toothpick for interdental cleaning

A systematic review evaluating the adjunctive effect of hand-held triangular wood sticks revealed that woodsticks had no additional benefit on visible plaque control compared with toothbrushing alone.[18] They noted, however, that woodsticks might improve interdental gingivitis by reducing gingival bleeding. Reports indicate that interdental plaque removal efficacy of toothpicks is almost similar to that of flossing[13] although both flossing and toothpicks were ranked last in single and multiple outcome analyses of ten interdental cleaning devices.[11,19] Nonetheless, woodsticks/toothpicks are considered relatively cheap, easy to use and may be more accepted by elderly who in particular use toothpicks as a habit to remove food debris after meals.[13] Interestingly, the Australian Dental Association recommends using interdental cleaning aids other than toothpicks, citing gingival trauma, splinter injury and tooth wear associated with using toothpicks.[7]

Interdental brushing

Research on the effectiveness of interdental brushing in removing interdental plaque goes back nearly five decades.[20] Initially, patients who usually had lost their interdental papilla due to periodontal disease and developed wide embrasure spaces between the teeth were recommended interdental brushes while dental floss was the preferred interdental cleaning aid for those who had intact interdental papilla filling up the embrasure space.[12,13,20] Nonetheless, with the introduction of a wide variety of interdental brushes to the market over the years, interdental brushing is increasingly becoming a viable alternative to flossing (Figure 3).[12,13]

Figure 3: Using an interdental brush for interdental cleaning

Numerous studies have attempted to assess adjunctive effects of interdental brushing compared with toothbrushing alone or in combination with other interdental cleaning tools. For instance, Slot and colleagues (2008, 2020)[3,21] found that interdental brushing combined with toothbrushing was effective in removing more plaque than toothbrushing alone while evidence was inconclusive for its effect on gingivitis. In an analysis of ten interdental cleaning devices, interdental brushing was consistently ranked high against other devices for its effect on reducing both plaque and gingivitis.[11] Superiority of interdental brushing over flossing might be evident in both healthy individuals and periodontal patients irrespective of their periodontal status[13], and in preventing peri-implantitis/peri-mucositis.[22] A Cochrane systematic review[12] suggested, with low-certainty evidence, that interdental brushing reduces more plaque than toothbrushing alone and may reduce gingivitis when it was used as an adjunct to toothbrushing (very-low certainty of evidence). Interdental brushing is easy to use and highly accepted by patients, although it may be associated with a potential risk of gingival trauma, particularly when not used properly.[23]

Evidence suggests that using the correct size of interdental brush significantly improves the efficacy of the brush.[7,13] As such, when recommending an interdental brush to patients, dental practitioners should choose the appropriate size of the interdental brush that fits the interdental spaces of the patient. Moreover, some studies have indicated that the design of the interdental brush, including the shape of the brush head and material of the brush, may affect their efficacy. For example, straight interdental brushes, waist/conical/triangular-shaped brush heads and rubber interdental brushes have been rather efficient in interdental cleaning as opposed to their angled, straight-brush-headed and conventional (made with metal-core material) counterparts, respectively.[13]

Water flossers

Water flossers - also known as oral irrigators/dental water jets – (Figure 4) were invented and introduced to the dental profession nearly six decades ago.[13,24] Since then several studies have attempted to assess the mechanism of action and the efficacy of water flossers. A combination of pulsation and pressure is regarded as the mechanical mode of action through which the water flosser operates to remove supragingival plaque, subgingival bacteria and other debris while stimulating gingival tissue.[13,24] The following two zones of hydrokinetic activity are produced by the pulsating action[24]:

- The impact zone: where the solution initially contacts the gingival margin
- The flushing zone: where the water/ irrigant reaches subgingivally

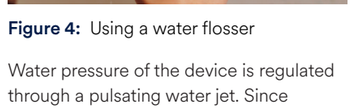

Figure 4: Using a water flosser

Water pressure of the device is regulated through a pulsating water jet. Since attached gingiva can sustain pressure up to 160 psi (pounds per square inch) for 30 seconds resulting in no permanent damage, it has been estimated that 90 psi and 50-70 psi are acceptable for undamaged tissue and inflamed/ ulcerated oral tissue, respectively.[25] Given that water flossing induced bacteraemia levels are not different to chewing, toothbrushing, flossing and scaling, it has not been associated with health risks and thus, water flossing at 80-90 psi is supported.[26] Some studies suggested that oral irrigation/water flossing might decrease inflammatory cytokines, including prostaglandin E_2, and modify host-microbial interactions to mitigate gingival inflammation regardless of plaque removal.[27-29] Water flossers are indicated to maintain periodontal health around implants and patients wearing orthodontic appliances such as braces[13,29], while water flossing as an adjunct to toothbrushing was shown to be superior to interdental brushing in reducing peri-implant mucositis.[29]

Studies on the efficacy of water flossers have yielded somewhat conflicting results. A systematic review to assess the adjunctive effect of water flossers on plaque and clinical parameters of periodontitis, compared to toothbrushing alone or regular oral hygiene was unable to provide evidence for additional benefit of using water flossers on plaque control as opposed to toothbrushing alone/ regular oral hygiene.[30] However, they concluded that water flossing could improve gingival health compared with toothbrushing alone/regular oral hygiene. In a single and multiple outcome analyses of ten interdental cleaning devices, water flossers were ranked consistently high against other devices, particularly for their effect on decreasing gingival bleeding.[11,19] In contrast, a Cochrane review[12] suggested, with very low-certainty evidence, that water flossers as an adjunct to toothbrushing may reduce gingivitis at one month but not at three or six months compared with toothbrushing alone. They also noted that water flossers did not reduce plaque at these three time points more than toothbrushing alone (low-certainty evidence) while their effect on reducing gingivitis at one month was superior to that of flossing (low- to very low-certainty evidence). Accordingly, the currently available evidence indicates that the effect of using water flossers tend more towards reducing gingivitis that may not be linked to plaque removal or may be due to irrigation- related mechanical stimulation of the gingiva/ additional healing effect or any combination of these factors.[13,14,29] Advantages of water flossers include; ease of use for patients with limited manual dexterity (e.g., patients with arthritis), being hygienic as water flow is used instead of reinserting floss or interdental brush, and providing easy access to posterior as well as crowded teeth.[14] Water flosser use has been hampered by its drawbacks such as high cost, bulkiness and not being travel friendly; need for power, water and access to sink, among other things.[14]

Conclusion

The latest research suggests that both interdental brushing and water flossing can be ranked high among interdental cleaning tools currently available in the market.[6,11,12,19] Interdental brushing may be more effective in removing interdental plaque and reducing gingivitis while water flossers tend to reduce gingival bleeding/gingivitis compared with other interdental cleaning devices.[12,19]

The currently available evidence on the adjunctive effects of these devices in controlling plaque and gingivitis ranges from weak to moderate with very low- to low-certainty.[6,12] Accordingly, oral health practitioners should continue to make informed decisions, on an individual patient basis, to recommend personalised interdental cleaning tools for their patients.[6,12,13,21] This should include not only determining the type of interdental cleaning tool most suitable for the patients but also whether they have sufficient skills to achieve a safe and high standard of interdental cleaning. Studies reported hitherto have been of comparatively short duration and thus, it is important to conduct further studies, particularly randomised controlled trials, of longer duration with sufficient power and low-risk of bias to reaffirm and strengthen the available body of evidence on the efficacy of both the current and emerging interdental cleaning devices. Such studies should evaluate the effects of interdental cleaning aids on interproximal caries prevention, safety outcomes including gingival trauma and, other patient-related outcomes such as patient-perceived benefits, all of which have been sparsely investigated.

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