

Why Fret when you have the Dental Jet: A Review on the Oral Irrigators

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Abstract

The interdental space is the most overlooked area of the mouth, yet the most susceptible. Its anatomy forms a complex environment for dental plaque to accumulate and foster, thereby causing great harm to both teeth and periodontium since our regular tooth brushing measures are inaccessible for the removal of the adherent plaque. In fact, the most complicated therapy that is performed by a dentist daily is because of the inability of a patient to maintain the interdental space free of plaque and debris. Due to the complexity in the anatomy of the interdental space, neither the bristles of a toothbrush nor a mouthwash can access and maintain this area free of plaque; hence, a possible substitute must be used to clean and maintain the complex interdental space in its pristine health. This led to the discovery of the various interdental aids available today. The aim of this review article is, thus, to present a crescendo on the interdental aids.

Keywords: Interdental Space; Interdental Aids

Introduction

With the increasing awareness among individuals for using the interdental aids and the need for removal of inter-proximal plaque which is considered to be vital for the maintenance of gingival health, prevention of periodontal diseases and reduction of caries, along with tooth brushing, the use of interdental aids became an inevitable part of mechanical plaque control measures. A toothbrush is relatively ineffective in removing plaque from the interproximal areas, thus, patients need to resort to additional home care techniques for plaque removal like the interdental aids.

In an ideal smile, teeth are properly aligned with each tooth touching the tooth next to it and healthy gum tissue interposed between them. The place where the tooth touches the neighboring tooth is called the *contact* and the area below the contact is called the embrasure. The gingival tissue that fills in is called the *papilla*. When papilla completely fills the embrasure, no light passes between the teeth. Sometimes the contacts are touching but the gingival tissue does not completely fill the embrasure space.

Gingival embrasure classification was proposed by Norland and Tarnow in 1998 which is as follows:

- **Normal:** Interdental papilla fills embrasure space to the apical extent of the interdental contact point/area.
- **Class I:** Tip of the interdental papilla lies between the interdental contact point and the most coronal extent of the interdental CEJ.
- **Class II:** Tip of the interdental papilla lies at or apical to interproximal CEJ but coronal to apical extent of facial CEJ.
- **Class III:** Tip of the interdental papilla lies level with or apical to the facial CEJ.

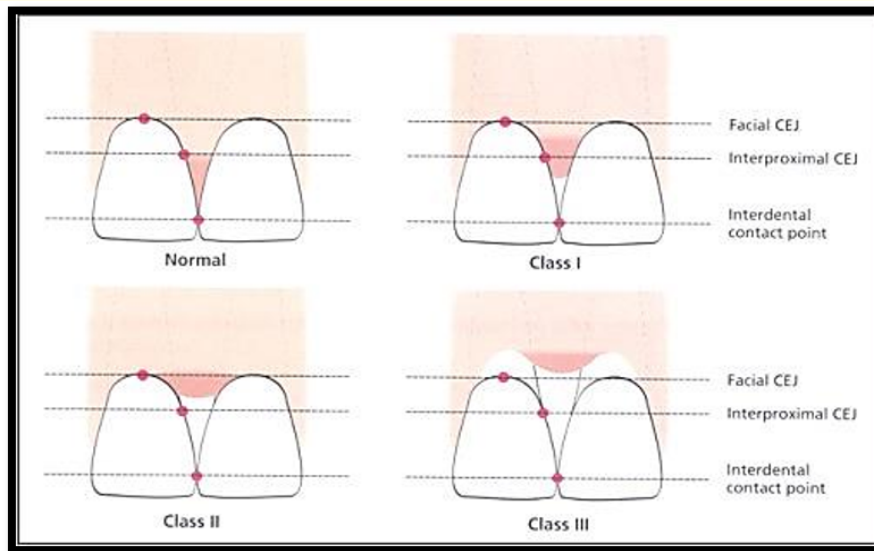


Figure 1: Norland and Tarnow classification of gingival embrasures.

Depending on the type of the gingival embrasure, the type of interdental aid to be used is determined - For teeth with normal embrasures, it is advisable to use thin floss; for Class I embrasures, a thick floss is recommended; for Class II embrasures, an Interdental brush is advisable to be used; for Class III embrasures, a unitufted interdental brush is recommended.

Black triangles are spaces in between an individual's teeth caused by gum recession, periodontal disease or traumatic tooth brushing. The empty spaces that usually are filled with gum tissue known as papilla - when these tissues are lost, black triangles start to form. There is a space or a dark triangle between the teeth under the contacts which results in higher chances of plaque accumulation, thus, acting as niches for the progression of gingivitis and periodontitis. The appearance of the dark triangles is affected by the following two factors:

- 1) The shape of the teeth: The flat sides will lay side-by-side with little or no space between them if the teeth are rectangular in shape. The embrasure is larger if the sides are round and more likely to appear as a space if the gum tissue is not ideal.
- 2) The shape and size of the papilla: As we age, the height of our gum tissue decreases and triangular space begin to appear. Teeth that are aligned properly accommodate normally shaped gum tissue between them. Crooked teeth overlap and allow very little room for papilla between them.

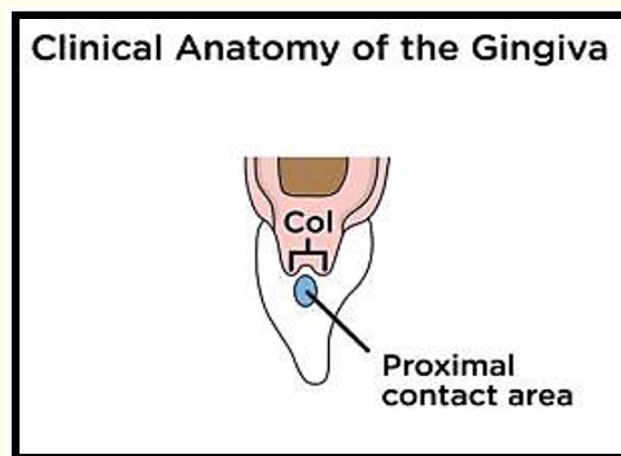


Figure 2: Anatomy of the gingiva.

Different interdental aids

Since the Interdental areas are the predominant sites for the disease progression and since mere tooth brushing and mouth rinsing does not help remove the debris or plaque in the these areas, it, thus, becomes imperative to use interdental aids in order to inhibit the disease initiation.

Woodsticks and Toothpicks: A pointed, triangular woodstick when placed interdentially maintains a plaque-free region for at least 2 - 3 mm subgingivally. For open interdental spaces, woodsticks seem to be the most appropriate. Woodsticks carry the advantage of being easy to use and can be used anywhere.

Toothpicks that have pointed ends and have a round cross section (cocktail sticks) are undervalued in daily plaque control in 45% of the population that are more prone to chronic periodontitis. In the past ten years, it was found that the use of these is effective during the treatment stages and in the maintenance phase in patients diagnosed with moderate/advanced periodontal disease, especially recalcitrant cases. The tip is shaped for easy access to all root morphologies and most of the complex anatomies like the furcation areas. The prominent disadvantages of these interdental aids like laceration of the adjacent gingival tissue precluded its use as an efficient interdental aid.

Dental floss, invented by Dr. Levi Spear Parmly in 1815, is the hallmark in the interdental cleaning devices. A variety of dental flosses are commonly available. Floss is available in many forms including waxed, unwaxed, monofilament and multifilament. Dental floss made of monofilaments coated in wax slides easily between teeth, does not get separated or does not fray at all and is generally expensive as compared to its uncoated counterparts. The key difference between the available dental flosses is in the thickness and the width. Studies have shown that the efficacy of waxed and unwaxed dental floss is similar; however, some waxed types of dental floss are impregnated with antibacterial agents and/or sodium fluoride. Dental floss is the most frequently prescribed interdental aid for cleaning the spaces between the teeth with a normal gingival contour where the space between teeth are tight and small. However, there are quite a few limitations with the use of a dental floss like most people dislike the process, non-compliance on the part of the patient, shedding, tearing of the floss, inefficient cleaning of larger embrasures, inaccessibility in areas with deeper pockets and furcation involvements. Hence, alternatives to dental floss have recently been introduced [1-3].

Interdental brushes

The first interdental brush was invented in 1980s as an alternative to flossing as which are more effective for plaque removal from the interproximal areas than floss as suggested by a number of studies [5,11].

In a study in 2007, comparison of manual devices, that is, floss and interdental brushes was carried out wherein both were useful in removing plaque from the interproximal space, especially in comparison to simply brushing [5].



Figure 3: Interdental brushes.

Use of the interdental brush resulted in higher reductions of pocket probing depths and bleeding on probing scores. These changes in clinical signs show the effectiveness of the use of interdental brushes over the dental floss in the interproximal cleaning and suggest that inflammation also decreased with its use.

In a systematic review [6] in 2012, it was concluded that motivation was a key element and that the ease of use of a product would affect one’s motivation. The majority of the test study individuals preferred the interdental brushes as they found the process to be simpler when compared to flossing. Test subjects preferred using only one hand and felt that interdental brushes were time saving as compared to flossing. From this systematic review, the following conclusions were drawn: Interdental brushes should be the product of choice for interproximal cleaning in patients with type 1 embrasures and also patients with inflamed gingiva and that the interdental brushes were proved to be superior to floss in the reduction of plaque and signs of inflammation within a four- to twelve-week time period.

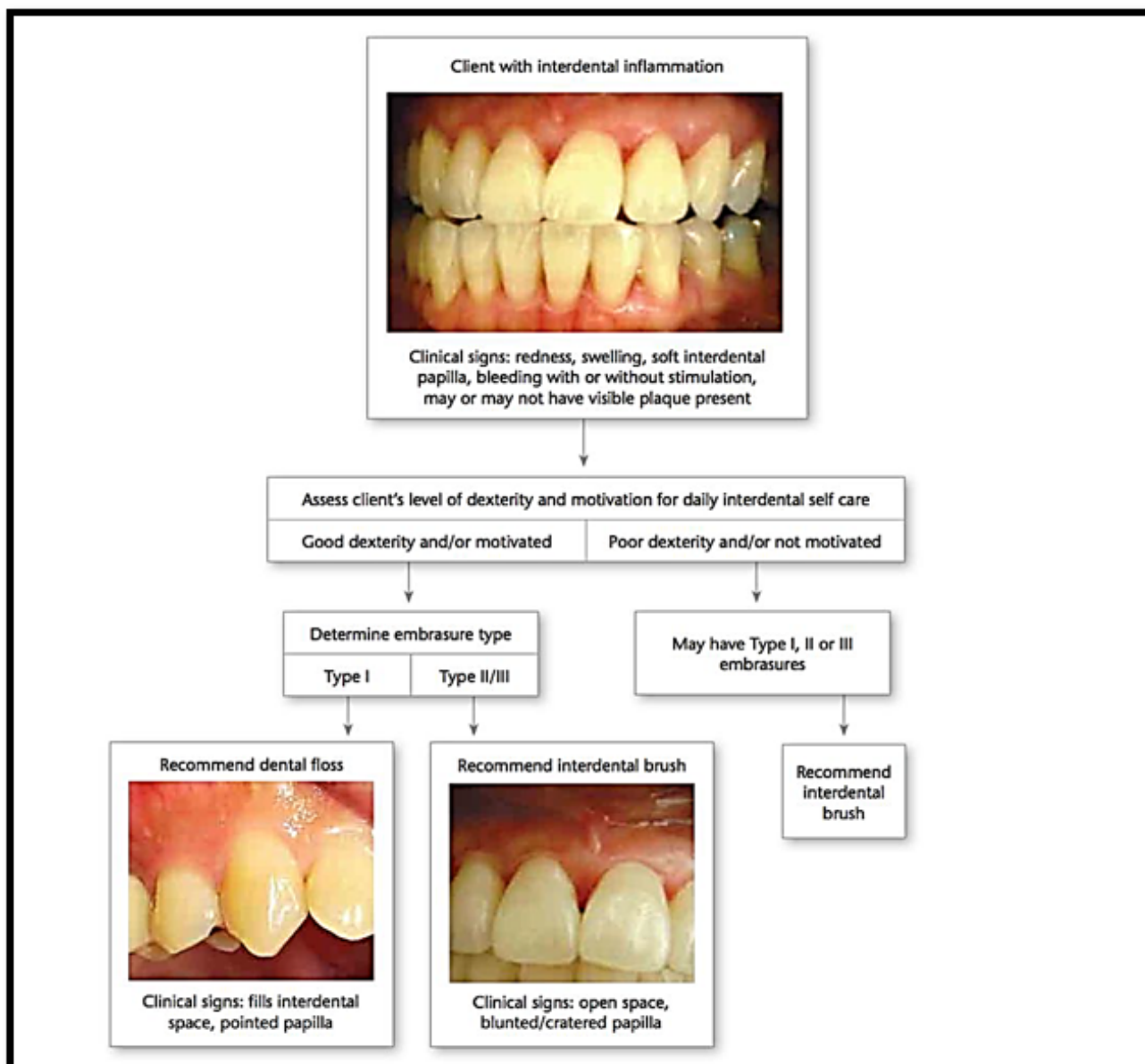


Figure 4: The chart provides the clinician an excellent guide for the recommendation of the particular interdental aid for a specific patient.

PerioTwist

The PerioTwist is an innovative alternative to dental floss that effectively cleans the interdental space of all teeth regardless of the size and anatomy; therefore, it is rightly referred to as the “one-size fits all” device. It is usually used with prophylaxis paste to clean the interdental space and can also be used to deliver a variety of topical medicaments such as chlorhexidine, varnish, bleaching gels, remineralization pastes, etc. PerioTwist will not remove these medicaments when it is removed in a clockwise direction. It is inserted and used with only two fingers (when compared to floss which uses both the hands) and can snap on to a prophyl angle. The cover may snap into the handle extending the length if required.

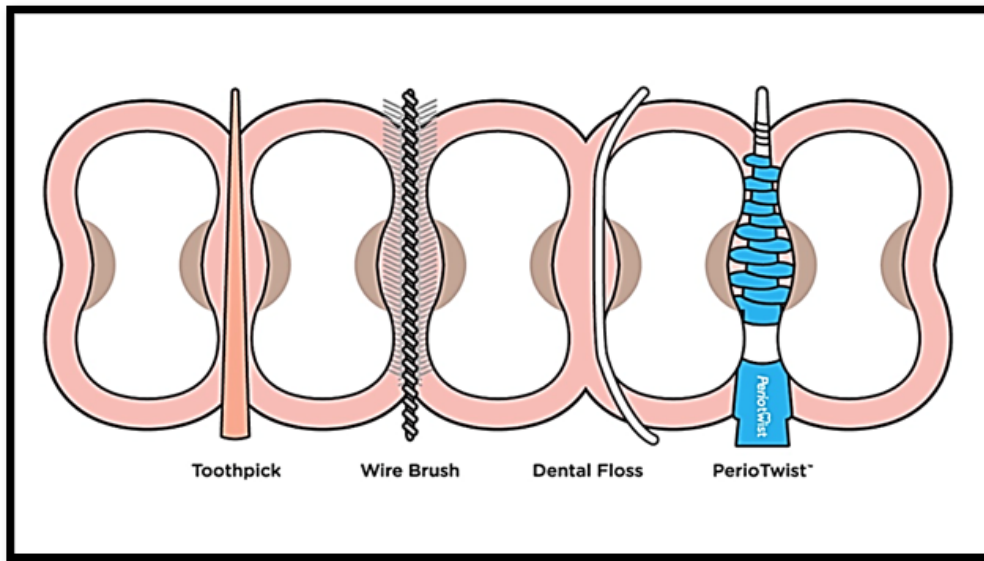


Figure 5: Insertion of Perio-twist as compared to the other interdental aids.

Brush-pick

This polythene plastic product has two cleaning ends: One has a scored triangular-shaped tip and the other end has a flexible stem with three rows of lateral bristles in one plane. It is shown in figure 6. These new interdental cleaners on one end resemble the interdental brushes, but do not have metal or fiber bristles; instead they have small elastomeric fingers protruding perpendicularly from a plastic core. The other end is designed like a tooth pick which is circular in cross section.



Figure 3: Interdental brushes.

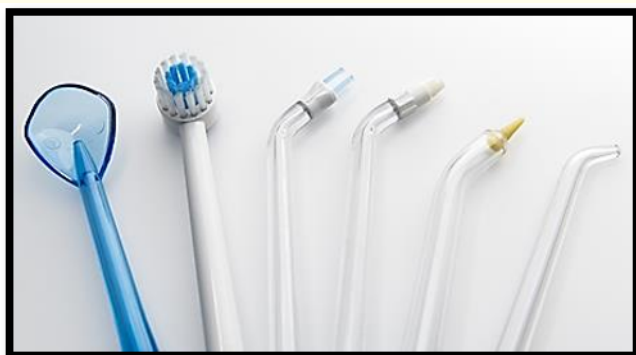
The results of a split mouth, randomized, controlled clinical trial suggested that in open interdental embrasures, the BrushPick significantly reduces plaque accumulation and gingival inflammation, as measured by RMNPI and IBI, respectively (Rustogi, *et al.* modified Navy plaque index (RMNPI) and interdental bleeding index (IBI)) [12-14].

The interdental aids described above have been used effectively since many years. However, owing to certain limitations of each one of them, newer devices were discovered that could aid in inter-dental cleaning. One of the newest additions to this has been that of the «Oral irrigators».

Oral irrigator devices

Evidence shows that adults and adolescents do not floss regularly and most people do so infrequently or not at all [7,8]. Evidence contradicts the regular recommendation of string floss as an effective means of interdental cleaning; lack of efficacy for plaque removal or reducing gingivitis when compared to brushing alone [4,5]. Individuals do understand the importance of interdental cleaning but do not always feel confident using dental floss and prefer other devices that are easy to use. If given a choice, they will readily choose other devices over traditional floss [9-11]. Thus, water flosser and air flosser are two such devices which provide additional benefit over the previously discussed interdental aids [17].

Water Flosser which is differently known as an Oral Irrigator or the Dental Jet is designed for interdental and sub gingival cleaning. It is the next generation of oral health products which uses pulsating water to clean between teeth and below the gingiva where traditional brushing and flossing cannot reach. A powerful miniature pump sends a jet of water that is pulsating through a tip to clean the teeth. It received its first patent in the 1967. The first cordless water flosser was introduced in the year 2004. The mechanism of action of the water flosser is based on a simple principle - it has a reservoir, a pressure control and delivers a pulsating stream of water which is directed towards the gingival margin and interproximal areas. The reservoir is calibrated with both milliliters and ounces and can be filled with water, mouth rinse, or antimicrobials. There are several tip designs for varying patient needs 0 tongue cleaner tip, toothbrush tip, plaque-seeker tip, orthodontic tip, pik-pocket tip, and the classic jet tip.



- Starting from the leftmost,**
- 1. Tongue cleaner tip**
 - 2. Toothbrush tip**
 - 3. Plaque-Seeker tip**
 - 4. Orthodontic tip**
 - 5. Pik-Pocket tip**
 - 6. Classic jet tip.**

Figure 7: Various tips of the water flosser.

There are two modes in a water flosser, namely, 1) The Floss mode which provides maximum plaque removal and 2) The Hydro-Pulse Massage mode which enhances the gingival stimulation and improves the circulation. The convenient one minute timer with a 30 second pacer ensures thorough water flossing of all the areas.

Airflosser is a second generation interdental cleaning device. It is a hand-held rechargeable device that utilizes air under pressure to deliver micro-droplets of water and air to the interdental area. This device has a larger reservoir than its predecessor and can also deliver up to three bursts of air and microdroplets with one activation. The ideal protocol is filling the reservoir to capacity with lukewarm water, placing the guiding tip between the teeth from the facial aspect and activating the device by pushing the activation button at each interproximal space.



Figure 8: Air flosser.

Discussion

Daily tooth brushing is the most common and practical way of maintaining low levels of supragingival plaque and good gingival health. In industrialized countries, 80 - 90% of the population use a toothbrush once or twice a day [19,20]. The removal of supragingival and sub gingival plaque is important in preventing the initiation and proliferation of sub gingival pathogenic bacteria and gingivitis [21,22]. A minimum of twice-daily brushing is recommended to remove plaque, deliver fluoride and provide a clean fresh feeling [23]. Individuals tend to form patterns while brushing, and miss areas such as the proximal and marginal areas. The adjunctive use of an interdental cleaner is necessary to clean the interdental area and proximal surfaces of the teeth where a tooth brush cannot reach, making it the site where infection and gingivitis is likely to first occur. Dental floss is the most recommended interdental cleaning device, but new products and devices have introduced that are more effective when compared to the older interdental aids and thus highly recommended.

Thus, the purpose of this review article was to present data regarding the efficacy of different types of interdental aids and its recent advancements.

Various studies were carried out comparing water flosser with the dental floss, interdental brush and the Airflosser wherein the following conclusions were made [15-18]- 1) In removal of dental plaque and debris from the tooth surfaces, the Water Flosser and manual toothbrush together proved to be significantly more effective than a manual brush and dental floss alone and 2) The use of the Water Flosser removes significantly more amount of plaque from tooth surfaces (whole mouth, marginal, approximal, facial, and lingual) than the Air Floss when used with a manual toothbrush and was significantly more effective than the air flosser used. 3) The Water Flosser and manual toothbrush is more effective in removing plaque from tooth surfaces (whole mouth, marginal, approximal, facial, and lingual) than interdental brushes and a manual toothbrush after a single use.

The following advantages were, thus, highlighted as far as the water flosser was concerned - a) It helps in the reduction of the periodontal infection - the pulsating action creates a compression-decompression phase that forces the sub gingival bacteria out from the pocket. b) Also, reduces the inflammation - systematic review in the year 2008 [24] showed that water flossing has a beneficial effect on the gingival index, bleeding scores and the pocket depth. c) Proved to be quite safe and gentle around the implants - In the study by Felo A., *et al.* in 1997, it was proved that Water flossing with CHX using the Pik-Pocket tip was superior as compared to rinsing with CHX in terms of reduction of plaque, bleeding and gingivitis during the three-month study period. d) Can also be used for cleaning around orthodontic bands and brackets. It has been proved that the Water Pik device gets deeper into the pockets than the string floss and is clinically proven to be more effective than the floss. e) Evidence from over 56 years suggests that Water Pik Water Flosser is the most effective interdental aid in terms of reduction of plaque, bleeding scores and gingivitis.

The possible difficulties that could bloom with the use of an oral irrigator are as follows: The major drawback of using a Water flosser or an air flosser is the cost, including the replacement heads, averages way more than the normal floss and the second being it is technique sensitive as compared to a simple dental floss.

Conclusion

As seen in the review above, interdental aids are an important adjunct to normal tooth-brushing. There are plethora of devices available which can be used as an adjunct to tooth brushing which must be decided upon reviewing the patient's clinical condition; no one interdental aid should be prescribed to all the patients; the Water Flosser is by far the most effective interdental aid for the removal of supragingival and sub gingival plaque when combined with manual tooth brushing; except for being expensive, there are no factors that limit the use of this dynamic device for interdental cleaning.

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