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Interdental Brushes in Maintaining Periodontal Health

Esra Guzeldemir-Akcakanat

Abstract

According to the World Health Organization (WHO), oral diseases are accepted as the most prevalent noncommunicable diseases. Oral hygiene and cleanliness is vital and essential to preserve and maintain oral health. Although periodontal diseases are controllable and preventable diseases, periodontal diseases are the most common type of oral disease. Mechanical plaque control is the key factor for not only in prevention but also in the treatment of periodontal diseases and maintenance of health. The primary factor for the development of gingivitis is poor oral hygiene which is microbial plaque formation. Achieving ideal plaque control may be obtained by toothbrushing together with interdental cleaning such as dental floss, interdental brushes (IDB), wood sticks, and waterjet devices. Evidence suggests that the most effective method for interdental plaque removal is the use of interdental brushes. In this chapter, while the importance of interdental brushes in oral hygiene is explained in detail, the types and use of interdental brushes will also be mentioned.

Keywords: dental hygiene, dental plaque, gingivitis, interdental brushes, interdental cleaning, oral hygiene

1. Introduction

While oral diseases are the most prevalent noncommunicable diseases, severe periodontal disease was estimated to be the 11th most prevalent human disease globally (WHO) [1]. Generally, seven oral diseases are described as follows: dental caries, periodontal diseases, oral cancers, oral manifestations of HIV, oro-dental trauma, cleft lip and palate, and noma. The Global Burden of Disease Study reported that oral diseases affected at least 3.58 billion people worldwide, and the most prevalent oral condition was caries of the permanent teeth [1].

Microbial biofilm which is a surface-associated and structurally and functionally organized multi-species biofilm [2] is the main reason of both dental caries and periodontal diseases. Microorganisms destroy not only tooth structures but also supporting structures of the tooth even though they have different microbial backgrounds. In both, the final result is losing the tooth, affecting dentition, function, esthetic, self-esteem, quality of life, and, moreover, pain, systemic infection and/or inflammation, and psychologic and physiologic discomfort. However, both diseases are preventable, and the main causes for both are poor oral hygiene and smoking which are modifiable risk factors.

Oral cleanliness, hence periodontal health, is crucial not only for maintaining the dentition but also general health, quality of life, and well-being for whole individuals [3–5]. Periodontal diseases are multifactorial in nature. While the etiology of periodontal diseases is basically associated with microbial biofilm; genetic, environmental such as smoking, alcohol consumption, unhealthy diet, stress, and immunological factors and systemic health have effects on the disease progression [6]. Current understanding is that the periodontal tissue destruction is mediated by host inflammatory mediators. Transition from gingivitis to periodontitis is still not known.

2. Prevention

Self-performed and professionally administered mechanical plaque control and removal is the pillar in prevention of dental and periodontal diseases and maintaining overall oral health. Keeping plaque accumulation around 20% would result in good periodontal health [7]. There are three stages of preventing and controlling the periodontal disease [6]. Primary prevention implies preclinical and pre-pathological stages. The aim is to prevent the onset of the disease to maintain health. Secondary prevention indicates prevention at the early stages of the disease and restoring health. The aim is to stop and reverse the progression of the disease. And tertiary prevention refers to disease conditions. The aims are to limit the sequels and regain function. In addition, supportive periodontal therapy and periodontal maintenance are crucial to maintain the oral health and prevent the recurrence, since the major risk factor for periodontal diseases is to have had the disease before.

Prevention and control of the dental and periodontal diseases rely on high standards of oral hygiene [8, 9]. Higher standards in oral hygiene can be achieved by education, teaching, motivation, risk assessment, needs-related oral hygiene instructions, and improving the individuals' skills and attitudes towards their oral health [10]. The patient has to understand the disease and its etiology. On the other side, the clinician has to be aware that every patient is unique, needing different approaches for education and clinical implementation. Moreover, there is no consensus or standard on what the proper oral cleaning or hygiene is and what the frequency and the extent of the oral hygiene are. In every situation, today, patients have an active role on their own health and responsibility, and compliance is crucial.

3. Self-administered oral care

The first step of self-administered oral care is to provide professional oral hygiene instruction. There are mechanical and chemical methods to reduce gingival inflammation by controlling the plaque biofilm. The European Federation of Periodontology recommends that “all people should brush their teeth twice a day for at least 2 min. with fluoridated dentifrice, and, periodontitis patients have to use inter-dental cleaning devices” [11].

Mechanical plaque removal may include manual or powered toothbrushes as well as interdental devices. The most common mechanical method for plaque removal is still manual toothbrushes [12]. A single, self-administered brushing with a toothbrush leads to reduction in plaque scores around 42% compared to pre-brushing scores [11]. Powered toothbrushes may increase plaque removal efficacy by 7–17% compared to manual brushes [2]. Toothbrushes do not reach the interdental areas [13].

3.1 Interdental cleaning

Interdental cleaning is essential and achieved by interdental cleaning tools such as dental floss, toothpicks (wood sticks), rubber-tip simulators, interdental brushes (IDB), single-tufted brushes, and electrically powered cleaning devices such as waterjet devices. While the adjunctive use of wood sticks, dental floss, or irrigators showed weak evidence for removal of plaque, IDB were found to be more effective than other interdental cleaning tools especially when the interdental space is not filled with gingiva [14]. Dental flossing may be a better choice for sites with intact interdental gingiva and healthy periodontium; however, self-administered flossing was found not very effective in removing interdental plaque.

3.1.1 Interdental brushes

IDB were launched in the 1960s as an alternative to wood sticks [15]. The term of IDB was used for “brushes with helical alignment of filaments fixed to a twisted stainless steel central wire” [14]. The quality of IDB is backed by the ISO 16409 standard [16]. In ISO 16409, manual IDB is defined as “hand-powered device composed of filaments that is single strand, attached to the stem, emanating radially from a stem which is a central support structure of the manual IDB, usually of twisted wire, which secures the filaments, intended for cleaning of interdental surfaces.” They may be conical or cylindrical in shape, and usually widths of IDB are ranging from 1.9 to 14 mm [4]. The ISO brush size is determined by passage hole diameter which is a minimum diameter in mm of a hole through which a manual IDB can pass without deformation of the stem. Usually, IDB tend to bend, buckle, and distort [17].

The lengths of filaments and texture of IDB vary, and they may be cylindrical, conical, or in other shapes or have hard and soft filaments and are usually available in a sealed package (**Figure 1**). Due to various interdental spaces and shapes, it is clear that various IDB shapes, sizes, and different angulations (angled or straight) are required (**Figures 2–6**).

As examples:

- **Figure 2** shows an IDB with micro ultrasoft brush-top with 1.80 mm diameter of bristle and 0.35 mm diameter of stem for narrow interdental spaces (ISO 0).
- **Figure 3** shows an IDB with extra ultrasoft brush-top with 2.00 mm diameter of bristle and 0.40 mm diameter of stem (ISO 1).
- **Figure 4** shows an IDB with super ultrasoft brush-top with 2.20 mm diameter of bristle and 0.45 mm diameter of stem. (ISO 2).
- **Figure 5** shows an IDB with conical ultrasoft brush-top with 2.50–4.50 mm diameter of bristle and 0.50 mm diameter of stem (ISO 3).
- **Figure 6** shows an IDB with middle optimized brush-top with 3.50 mm diameter of bristle and 0.60 mm diameter of stem (ISO 4).

There is a relationship between position of the tooth and interdental spaces [18]. It would be logical to use dental floss in the anterior region since the interdental spaces are narrow. However, at the premolar and molar sites, interdental spaces are larger, and IDB may even reach to dental grooves and fissures. While the clinician is searching for the most appropriate size and shape of IDB, contour and



Figure 1.
A sealed package of IDB.



Figure 2.
ISO 0 micro IDB.

consistency of interdental tissue, and shape, alignment, and position of tooth, the size and form of embrasure have to be considered. The most appropriate interdental devices or IDB may differ between patients. In young individuals, dental floss is



Figure 3.
ISO1 extra IDB.



Figure 4.
ISO 2 super IDB.



Figure 5.
ISO 3 conical IDB.



Figure 6.
ISO 4 middle IDB.

the only tool since the interdental gingival tissue fills out the interdental sites. So, the clinician should be careful when recommending IDB to periodontally healthy individuals since IDB may cause trauma at healthy sites. The European Federation of Periodontology concluded that “flossing cannot be recommended other than for sites of gingival and periodontal health, where inter-dental brushes will not pass through the interproximal area without trauma” [11].

In 1976, Waerhaug reported that IDB have an excellent effect both in the central part of the interdental space and on the embrasures; moreover, IDB may remove dental plaque as far as 2–2.5 mm below the gingival margin [19].

The use of IDB in addition to toothbrushing provides moderate evidence for higher plaque removal compared to toothbrushing alone or flossing in addition to toothbrushing [4, 20]. Although the studies which compare the efficacy of IDB with dental flossing are scarce, it was shown that IDB have a considerable effect on controlling and removal of dental plaque, and moreover, patients’ perception is higher in IDB [13, 14, 21].

It was reported that interdental cleaning with IDB is the most effective method for interproximal plaque removal [7, 11, 13]. The patients’ acceptance for IDB is very high, and IDB were considered as easier to use and less time-consuming than flossing [17].

4. Conclusion

Today, oral care over-the-counter products have a sizeable retail market; nevertheless, although periodontal and dental diseases are noncommunicable,

controllable, and preventable diseases, the prevalence of these diseases is very high all around the world. The onset and progression of dental and periodontal diseases are mainly related with poor or inadequate oral hygiene. Optimal self-performed oral care at home has a substantial effect on not only oral health but also overall health. To prevent and control dental and periodontal diseases, toothbrushing is essential, but not enough. Based on the available data with respect to interdental plaque removal, the use of the IDB is strongly suggested.

Conflict of interest

The author declares no conflict of interest.

Notes/thanks/other declarations

The pictures are used with permission from the DentRAM Company, Istanbul, Turkey. The author would like to thank them for kindly providing pictures of PearlDent Interdental Brushes.

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