

Biological Width-A Dilemma

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The marginal compartments of the periodontium have been widely discussed, analyzed and debated from times immemorial [1]. Literature is replete with studies suggesting the importance of respecting the biological width for ensuring the maintenance of periodontal health in restorative and reconstructive dentistry [2].

The unique anatomic feature concerned with attachment of gingiva to the tooth comprises of two compartments -the epithelial and connective tissue compartment respectively. The epithelial compartment consists of gingival, sulcular and junctional epithelium whereas the connective tissue compartment represents the fibrous attachment of the gingiva to the hard tissue wall and support to the epithelium of the dento-gingival unit.

In 1961, Gargiulo., *et al.* defined biologic width as the dimension of soft tissue which is attached to the portion of the tooth coronal to the crest of alveolar bone [3]. Ingber., *et al.* 1977, Amiri-Jezeh., *et al.* 2006 explained it as - junctional epithelium and supracrestal connective tissue attachment - without the depth of gingival sulcus - surrounding every tooth [4]. The junctional epithelium is an important part of the protective physiological barrier termed the biologic width by Cohen [5].

Bosshardt and Lang in 2005 explained the functions of the biological width as a protective barrier for the sub-adjacent periodontal ligament (PDL) and underlying supporting alveolar bone from the pathogenic bio-film present in the oral cavity and the physiological function which is crucial to maintain periodontal homeostasis [6].

Evidence from different types of studies and reviews suggests that a breach of the biologic width will have an impact on initiation and progression of inflammation resulting in annihilation of the periodontal support structure (Newcomb 1974, Tal., *et al.* 1989, Gunay., *et al.* 2000, Padbury., *et al.* 2003). The sequence of events ensued will be increased plaque accumulation, severe gingival inflammation, periodontal destruction, increased pocket depths, loss of attachment and gingival recession.

A multitude of methods have been used for measuring the biological width such as- histological techniques where autopsy of human jaws of cadaver specimens was done using light microscopy, radiographic technique where parallel profile radiograph i.e. frontal and lateral projections were evaluated, clinical technique utilized probing or trans-gingival probing methodology (Easley 1967) and combination techniques of the above were utilized.

Over several decades, various authors have proposed the dimension of biological width; Gargiulo., *et al.* 1961 proposed the dimension of dento-gingival junction as 2.04 mm with connective tissue attachment as 1.07 mm and epithelial attachment as 0.97 mm [3]. Vacek., *et al.* 1994 explained the dimensions in human cadaveric specimens as 1.91, with connective tissue and epithelial attachments to be 0.77 mm and 1.14 mm respectively [7]. Ingber and colleagues explained the width to be average 2 mm, additional 1 mm to be maintained for proper healing and restoration of the tooth [4]. Nevins and Skurow mentioned 3 mm to be the safe distance from plaque associated crown margins.

Recently, the interactions between dental crowns and the marginal periodontal tissues were analyzed in a systematic review [8]. It was concluded that the recognition of the biologic width, in terms of crown margin placement, is beneficial for periodontal health. Therefore, knowledge of the dimensions of the junctional epithelium and connective tissue attachment is of crucial clinical relevance.

Orban and Kohler 1924 in a study mentioned the vast differences of biological width noted, ranging from the smallest being 0.50 mm to maximum reported 6.73 mm. Average biological width with no periodontal disease was 1.5 - 2.7 mm. Biologic width was smaller in anterior teeth as compared to posterior molars, the proximal surfaces-mesial and distal (> 1 mm) was greater than buccal and lingual (< 0.9 mm) in dimension [9].

Various factors have been reported and explained in literature for the variations in biologic width such as - tooth type, tooth shape, presence of restorations, gingival inflammation, periodontal disease, altered passive eruption and healing period post periodontal surgery. A time period of at least 6 months is needed for the re-establishment of the biologic width after surgical crown lengthening [10].

Schmidt, *et al.* 2013 in a systematic review concluded that mean values of the biologic width obtained from two meta-analyses ranged from 2.15 to 2.30 mm. There is a significant intra and inter individual variation which did not permit to arrive at a magic number [11]. The dimensions of the biologic width seem to be affected by periodontal diseases hence, periodontal health is supposed to be established prior to assessment of the biologic width [12].

Conclusion

To conclude no universal dimension of the biologic width appears to exist and establishment of periodontal health is suggested to be of prime importance in restorative and reconstructive dentistry.

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