Understanding the Biologic Width: A Questionnaire Study

Dr. Ashpreet Kaur1, Dr. Piyush Pandey2, Dr. Shruti Dabi3, Dr. Ravikiran N4, Dr. Sameer Ahmed5
Dr. Vatsala Singh6, Dr. Kratika Baldua Porwal7, Dr. Madalsa Singh8

1Senior Lecturer, 2,3,8Private Practitioner, 4Professor & Head, 5,6,7Reader
1Department of Periodontics, Geetanjali Dental and Research Institute, Udaipur
2Private Practitioner, Bharuch, 3Private Practitioner, Ajmer
4,7Department of Periodontology, Darshan Dental College and Hospital, Udaipur
5Department of Periodontology, Subharti Dental College, Meerut
6Department of Periodontology, Pacific Dental College and Research Centre, Udaipur
8Private Practitioner, Jaipur

*Corresponding Author:
Dr. Ashpreet Kaur
Senior Lecturer, Department of Periodontics, Geetanjali Dental & Research Institute, Udaipur

Type of Publication: Original Research Paper
Conflicts of Interest: Nil

Abstract

Background- High quality restorations essentially depend upon the crown root ratio and the attachment apparatus present around tooth. To avoid the uninvited complications, post restoration, such as impinging and unaesthetic restorations biological width should be maintained. The biologic width is strongly related to the success of restorations as it sustain the healthy gingiva by acting as a barrier against the entrance of microorganisms into the periodontal ligament, gingival and osseous connective tissue. The biologic width should be primarily considered during the crown lengthening procedures, post and core preparations, in subgingival restoration and orthodontic banding for better results. Its violation results in failure of restoration. Thus, to evaluate the understanding of concept of biological width amongst the dentists, the following questionnaire study was done.

Aim- This questionnaire study was conducted to evaluate the awareness regarding the preservation of biologic width amongst periodontists, endodontists and prosthodontists.

Materials And Methods – a questionnaire study was conducted amongst three different specialists: Periodontists, Endodontists, Prosthodontists, and 13 questions were divided into three different sections. The data obtained was tabulated and was statistically analysed.

Result- The importance of biologic width in respect to the dental specialty was known to 56.25% of periodontists, 41.67% of endodontics and 56.25% of prosthodontics.

Conclusion- Results concluded that still there is a keen need for the clinicians to be aware the concept of biologic width in treatment planning and its clinical implementation.

Keywords- Biological width, Restorative margin, Periodontal health.

INTRODUCTION

Maintenance of gingival health is the key for the longevity of teeth, as well as for the restorations.1 The term “Biologic Width” was first described by Sicher in 1959 as “dentogingival junction”. However, the term biological width is based on the work of Gargiulo et al (1961), who described the dimensions and relationship of the dentogingival junction in human. The violations of biologic width led to...
complications like gingival inflammation, alveolar bone loss and improper fit of the restorative component.2

**Biological width anatomy**-

Biological width is described as a natural seal which develops around tooth thus preserving the periodontal health by avoiding the irritation or impingement that might damage the periodontium and also prevents the alveolar bone from infection and disease.3 The mean measurements of the gingival sulcus depth, of the epithelial attachment, and connective tissue attachment were 0.69mm, 0.97mm, and 1.07mm, respectively (Figure 1). World Workshop on the classification of Periodontal and Peri implant diseases and conditions (2018) has replaced the term biologic width with supracrestal tissue attachment which histologically composed of the junctional epithelium and supracrestal connective tissue attachment.2

![Figure 1: The concept of Biologic width](image)

Most of the dental surgeons are not aware of the important relationship, specific concepts such as biologic width, its maintenance and applications of crown lengthening in cases of biologic width violation.4 Therefore, this study was initiated with the aim to check the awareness regarding the preservation of biologic width amongst: Periodontists, Endodontists And Prosthodontists.

**OBJECTIVES**

1. To evaluate awareness regarding the general concepts of supracrestal attached tissues.
2. To evaluate awareness concerning the diagnosis and evaluation of the supracrestal attached tissues.
3. To evaluate awareness relating to the clinical significance of supracrestal attached tissues during treatment planning.

**MATERIAL AND METHODS**

A closed-ended objective questionnaire study was conducted amongst three different specialists: Periodontists, Endodontists, and Prosthodontists. The study was conducted amongst the above mentioned specialists practising in Udaipur, Rajasthan (India). A total thirteen questions were formulated which were divided into three different sections. First section involved five questions related to biologic width and its general concepts, second section involved three questions related to diagnosis and evaluation of the biologic width and third section involved five questions related to biologic width for treatment needs (Figure 2). The data obtained from completed questionnaires was compiled on a MS office excel sheet and were then analyzed statistically using student t-test to obtain the results in terms of percentages.
PERFORMA FOR QUESTIONNAIRE STUDY
Awareness Regarding The Preservation of The Biologic Width Amongst Periodontists, Endodontists and Prosthodontists- A Questionnaire Study

- Name of the Candidate: 
- Qualification: 
- Speciality: 
- Years of Clinical Experience: 

Section I: BIOLOGIC WIDTH AND ITS GENERAL CONCEPTS
1) Are you aware of the term “BIOLOGIC WIDTH”?
   - Yes 
   - No

2) The ideal biologic width that is to be maintained?
   - 1 mm
   - 1.5 mm
   - 2.04 mm
   - 3 mm

3) Biologic width functions as a barrier against the entry of the pathogens into the internal medium of the periodontium?
   - Yes
   - No

4) According to AAP 2017 world workshop the term biologic width is changed to?
   - i. Suprabony width
   - ii. Upper crestal attachment width
   - iii. Supracrestal attached tissues
   - iv. Supracrestal width

5) Biologic width is important in?
   - i) Prosthodontics only
   - ii) Conservative and endodontics only
   - iii) Oral surgery only
   - iv) Periodontology only
   - v) Prosthodontics, endodontics, periodontics
   - vi) All of the above branches

Section II: DIAGNOSIS AND EVALUATION OF BIOLOGIC WIDTH
1) The most important method for the clinical evaluation of the biologic width is?
   - i) Intra oral periapical radiographs
   - ii) Histologic sections
   - iii) Bone sounding
iv) All of the above

2) Radiographic evaluation is diagnostic for the assessment of the biologic width?

Yes [ ] No [ ]

3) Biologic width is assessed by subtracting?
   i) Vestibular depth from bone measurement
   ii) Bone measurement from sulcular depth
   iii) Bone measurement from the vestibular depth
   iv) Sulcular depth from the bone measurement

Section III: BIOLOGIC WIDTH FOR TREATMENT NEEDS

1) Placing restorative margins within the biologic width frequently leads to?
   i. Gingival inflammation
   ii. Clinical attachment loss
   iii. Bone loss
   iv. All of the above

2) Sulcus depth can be used as guideline while placing the margins of restoration?

Yes [ ] No [ ]

3) Orthodontic extrusion for crown lengthening is indicated when?
   i. Biologic width violation is on the interproximal surface
   ii. Violation is across the facial surface and level of gingiva is correct
   iii. Both

4) Surgical removal of bone away from the proximity of the restorative margin can correct biologic width violation?

Yes [ ] No [ ]

5) For subgingival margins:
   i) Correct crown contour in the gingival third and
   ii) Correct finishing and polishing of the margins are necessary

Yes [ ] No [ ]

DOCTOR’S NAME & SIGNATURE

RESULTS

A closed-ended objective questionnaire study was conducted amongst three different specialists: Periodontists, Endodontists, Prosthodontists. The questionnaire was distributed to 100 dentists who were selected randomly. A total 13 question divided into 3 sections were included in this questionnaire study. The data obtained from completed questionnaires were tabulated and were analyzed statistically using student t-test to obtain the results
in terms of percentage. Among all the three specialists majorly periodontists were aware of biologic width importance.

**Section I: Biologic width and its general concepts (Table 1)**

The first section constituted the questions related to Biologic width and its general concepts, in which 100% of periodontists and prosthodontists were aware of the term biologic width. 93.75% periodontists knew the ideal measurement and the function of the biologic width. The new term for biologic width i.e. supracrestal attached tissues proposed by AAP in 2017, was known by 75% of periodontists while only 38.89% of endodontists and 56.25% of prosthodontists were aware of the new term. Moreover, the importance of biologic width in respect to the dental speciality was known to 56.25% of periodontists, 41.67% of endodontists and 56.25% of prosthodontists.

<table>
<thead>
<tr>
<th></th>
<th>PERIODONTOLOGY</th>
<th>ENDODONTICS</th>
<th>PROSTHODONTICS</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q:01</td>
<td>100%</td>
<td>97.22%</td>
<td>100.00%</td>
<td>0.06 (NS)</td>
</tr>
<tr>
<td>Q:02</td>
<td>93.75%</td>
<td>61.11%</td>
<td>68.75%</td>
<td>0.858 (NS)</td>
</tr>
<tr>
<td>Q:03</td>
<td>93.75%</td>
<td>86.11%</td>
<td>96.88%</td>
<td>0.958 (NS)</td>
</tr>
<tr>
<td>Q:04</td>
<td>75.00%</td>
<td>38.89%</td>
<td>56.25%</td>
<td>0.876 (NS)</td>
</tr>
<tr>
<td>Q:05</td>
<td>56.25%</td>
<td>41.67%</td>
<td>56.25%</td>
<td>0.972 (NS)</td>
</tr>
</tbody>
</table>

**Table 1: Biologic width and its general concepts**

**Section II: Diagnosis and evaluation of the biologic width (Table 2)**

The second section constituted the questions related to diagnosis and evaluation of the biologic width, half of the periodontists and endodontists were aware about the clinical evaluation of biologic width. 50% of prosthodontists considered radiographs to be a diagnostic tool for assessment of the biologic width and moreover, 62.50% of prosthodontists considered sulcular depth from the bone measurements as a reference to assess the biologic width.

<table>
<thead>
<tr>
<th></th>
<th>PERIODONTOLOGY</th>
<th>ENDODONTICS</th>
<th>PROSTHODONTICS</th>
<th>P value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q:06</td>
<td>50.00%</td>
<td>50.00%</td>
<td>21.88%</td>
<td>0.896 (NS)</td>
</tr>
<tr>
<td>Q:07</td>
<td>43.75%</td>
<td>38.89%</td>
<td>50.00%</td>
<td>0.988</td>
</tr>
</tbody>
</table>
Section III: Biologic width for treatment needs (Table 3)

The third section constituted the questions related to Biologic width for treatment needs in which maximum of prosthodontists (90.63%) were aware of the consequences of encroaching the biologic width and only 28.13% of periodontists use sulcus depth as a guideline while placing the margins of the restorations and moreover 75% of periodontists correctly answered indication for orthodontic extrusion for crown lengthening and 84.38% of periodontists considered surgical removal of bone away from the restorative margin to correct biologic width. While considering the correct crown contour at gingival third and adequate finishing and polishing for the subgingival margins, 100% of prosthodontists were aware of the correct placement of the crown.

<table>
<thead>
<tr>
<th>Q:08</th>
<th>40.63%</th>
<th>58.33%</th>
<th>62.50%</th>
<th>0.947 (NS)</th>
</tr>
</thead>
</table>

**Table 2: Diagnosis and evaluation of the biologic width**

DISCUSSION

Improvements in electron microscopy were milestones in periodontal research for improving the understanding of the structure of the junctional epithelium. Using this technique, Schroeder and Listgarten (1971) published data on the components and structure of the junctional epithelium. However, these marginal compartments of the periodontium have been analyzed and debated for several decades (Schroeder & Listgarten 2003). The junctional epithelium is an important part of the protective physiological barrier termed the biologic width by Cohen (1962), and is defined as the junctional epithelium and supracrestal connective tissue attachment – without the depth of the gingival sulcus – surrounding every tooth. This complex protects the subjacent periodontal ligament and the alveolar bone from the attack of a pathogenic biofilm present in the oral cavity (Bosshardt & Lang 2005).

Recently, the interactions between dental crowns and the marginal periodontal tissues were analyzed in a systematic review (Kosyfaki et al. 2010). Evidence from different types of studies and a recent review suggests that a breach of the biologic width have an impact on periodontal health (Newcomb 1974, Tal et al. 1989, Gunay et al. 2000, Padbury et al.)

<table>
<thead>
<tr>
<th>Q:09</th>
<th>84.38%</th>
<th>86.11%</th>
<th>90.63%</th>
<th>0.991 (NS)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Q:10</td>
<td>28.13%</td>
<td>16.67%</td>
<td>12.50%</td>
<td>0.959 (NS)</td>
</tr>
<tr>
<td>Q:11</td>
<td>75.00%</td>
<td>72.22%</td>
<td>71.88%</td>
<td>0.999 (NS)</td>
</tr>
<tr>
<td>Q:12</td>
<td>84.38%</td>
<td>52.78%</td>
<td>62.50%</td>
<td>0.889 (NS)</td>
</tr>
<tr>
<td>Q:13</td>
<td>96.88%</td>
<td>88.89%</td>
<td>100.00%</td>
<td>0.930 (NS)</td>
</tr>
</tbody>
</table>

**Table 3: Biologic width for treatment needs**
No matter how inert and biocompatible the material is, if it violates the sacred supracrestal attached tissues it will adversely interact with the biology of the periodontium. The recognition of the supracrestal attached tissues, in terms of crown margin placement, is beneficial for the periodontal health. Therefore; the present questionnaire study was conducted so as to evaluate the awareness regarding the latest concepts and terminologies of the supracrestal tissues amongst three different specialities.

First section of the questionnaire evaluated awareness regarding the basics of the biologic width amongst three specialities, in which Periodontists were seen to be more aware about the subject (93.75%) when compared with Endodontists and Prosthodontists. Only 75% of Periodontists were aware regarding the new terminology of the biologic width, i.e. Supracrestal attached tissues, when compared with Endodontists (38.89%) and Prosthodontists (56.25%), emphasizing that the update regarding the subject was less amongst the specialists and there was a need to be updated with the current trends. Individual specialist under-estimated the importance of supracrestal attached tissues with regard to the other specialities. Uniform, elaborate and precise interpretation/ clinical significance needs to be emphasized for all the three specialities which will help us in better communication and precise treatment planning when it comes to supracrestal attached tissues. Second section of the questionnaire evaluated knowledge regarding the diagnosis and assessment of supracrestal attached tissues, clinically, which inferred lack of understanding in the evaluation techniques. One of the crucial parameter in assessing the supracrestal attached tissues clinically is the alveolar bone which is evaluated by bone sounding. Clinicians were confused with the role of sulcus in the evaluation of the supracrestal attached tissues, thus we need thorough awareness regarding the procedures to evaluate the same. The third section of the questionnaire evaluated knowledge of the clinicians regarding the implication of supracrestal attached tissues in treatment planning.

Clinicians were aware in-depth regarding the aesthetics, form and function of the restorations/prosthesis [Periodontists (96.88%), Endodontists (88.89%), Prosthodontists (100%)]. However, they lack the expertise regarding in detail knowledge about the extension of the restorative margins/ prosthesis nearing the supracrestal attached tissues and its clinical implications.

CONCLUSION

Biological width is the reflection of the periodontium, thus the violation of biologic width should be avoided. Rather the restorations should be placed properly by taking in consideration of the placement of restorative margin and adaptation of restoration. All the three specialists should have an updated and uniform knowledge about the biologic width. Thus, the study concluded that clinicians should be made more aware clinically as well as in implementing the concept of biologic width in treatment planning.

REFERENCES