The localization subgingival margins of cavity: a new classification

Oleksandr Bulbuk*, Olena Bulbuk[2,] , Mykola Rozhko[2]

[1]Department of Prosthetic Dentistry, Ivano-Frankivsk National Medical University, Ivano-Frankivsk, Ukraine

[2]Dentistry PE department, Ivano-Frankivsk National Medical University, Ivano-Frankivsk, Ukraine

*Corresponding Author: bulbuk77@gmail.com

Abstract

Background. Restoring large defects with proximal caries extending below the cemento-enamel junction and cavity margins located beneath the gingival tissues represents a very common clinical situation.

The aim of this article is to propose a clinical classification of the localization subgingival margins of cavity.

Material and methods. Diagnosis is carried out by periodontal probe perpendicular to the long axis of the tooth in the deepest point of the cavity's margin. To describe the localization subgingival margins of cavity we use exponent which value is equal to the distance (integer number expressed in millimeters) of the level of epithelial attachment to the margin of the cavity. Three periodontal examiners, with >10 years of periodontal practice, were required to attend a calibration session aimed at the validation of the proposed classification.

Results. The intrarater and interrater agreement among the localization subgingival margins of cavity: for intrarater agreement ranged from 0.74 to 0.95 (almost perfect agreement), whereas interrater agreement ranged from 0.26 to 0.59 (moderate agreement).

Conclusions. The classification the localization subgingival margins of cavity is useful for reaching a more precise diagnosis.

Key words: subgingival margin, cavity, gum, choice of treatment plan.

Introduction

Restoring large defects with proximal caries extending below the cemento-enamel junction (CEJ) and cavity margins located beneath the gingival tissues represents a very common clinical situation. The past three decades have brought a

great number of new materials, techniques and devices to dentistry, some of them revolutionary, like adhesive dentistry. Materials that are stronger, more esthetic, with unique features like the ability to set on command, with great mechanical characteristics. Devices offering amazing diagnostic, clinical and manufacturing possibilities. Unfortunately, when restoring cavities with deep cervical margins two major clinical problems may occur: problems of biological nature (violation of the "biological width") and technical-operative problems (impossible or inadequate isolation of the operating field). Localized subgingival margins can complicate the use of direct/indirect adhesive restorations (isolation, impression taking, and delivery) and subsequently hinder their durability and relationship with the periodontal tissues. The restoration of that tooth is always a challenge for the clinician, not only due to excessive loss of tooth structure but also invasion of the biological width due to large decayed lesions. The correct choice of treatment plan is crucial to success, but it is difficult because of the scarcity of clinical protocols and lack of consensus on the optimal method of restoration in such cases [1-6].

To make the clinical procedures simpler and less fault-prone, Dietschi and Spreafico in 1998 introduced a technique named "cervical margin relocation" (CMR) [7]. Magne and Spreafico in 2012 referred to the same technique as "deep margin elevation" (DME) [8]. Similar names, such as "coronal margin relocation" and "proximal box elevation", could also be heard among the practitioners and found in the literature. This technique proposes application of composite resin in the deepest parts of the proximal areas in order to reposition the cervical margin supragingivally, which is supposed to facilitate the isolation and improve impression taking and adhesive cementation of indirect restorations [5, 7, 8].

M. Veneziani [9] has proposed a classification and algorithm to choice of treatment for patients with that clinical cases. But this approach focuses on the impossibility of imposing cofferdam during recovery gingival defects and are not highlights the features of prosthetic treatment.

M. Żarow [10] based on two parameters - the position of the cavity relative to the edge of alveolar bone (ie biological width (Fig. 1) - normally 2 mm) and technical

specifications that enable the imposition cofferdam - has proposed to allocate 5 classes that clinical cases.

We aim to classify schematically from a multidisciplinary perspective, the best treatment option in each case, including both the choice of restoration (direct or indirect) and the management of the cavity margin (DME or surgical crown lengthening [SCL]) if necessary [6, 11-15].

Diagnosis, treatment and prevention of any clinical condition are impossible without systematization. So improvement of diagnosis and classification of the localization subgingival margins of cavity is an urgent problem that needs a solution.

The aim of this article is to propose a clinical classification of the localization subgingival margins of cavity.

Materials and methods

The localization subgingival margins of cavity was the object of this study. From the historical studies of Gargiulo et al [16] the average values of dentogingival junctions are known: sulcus 0.69 mm, junctional epithelium 0.97 mm, connective attachment 1.07 mm with a total biological dimension (epithelial + connective attachment) of 2.04 mm.

The basis of elaboration of classification we put own scientific hypothesis that all dimensions (in assessing Fig. 1) anatomical parameters can be compared to an integer number, that measured in mm (attached epithelium ~ 1 mm, attached connective tissue ~ 1 mm, biological width ~ 2 mm). To describe the localization subgingival margins of cavity we use exponent (or power) which value is equal to the distance (integer number expressed in millimeters) of the level of epithelial attachment to the bottom of the cavity.
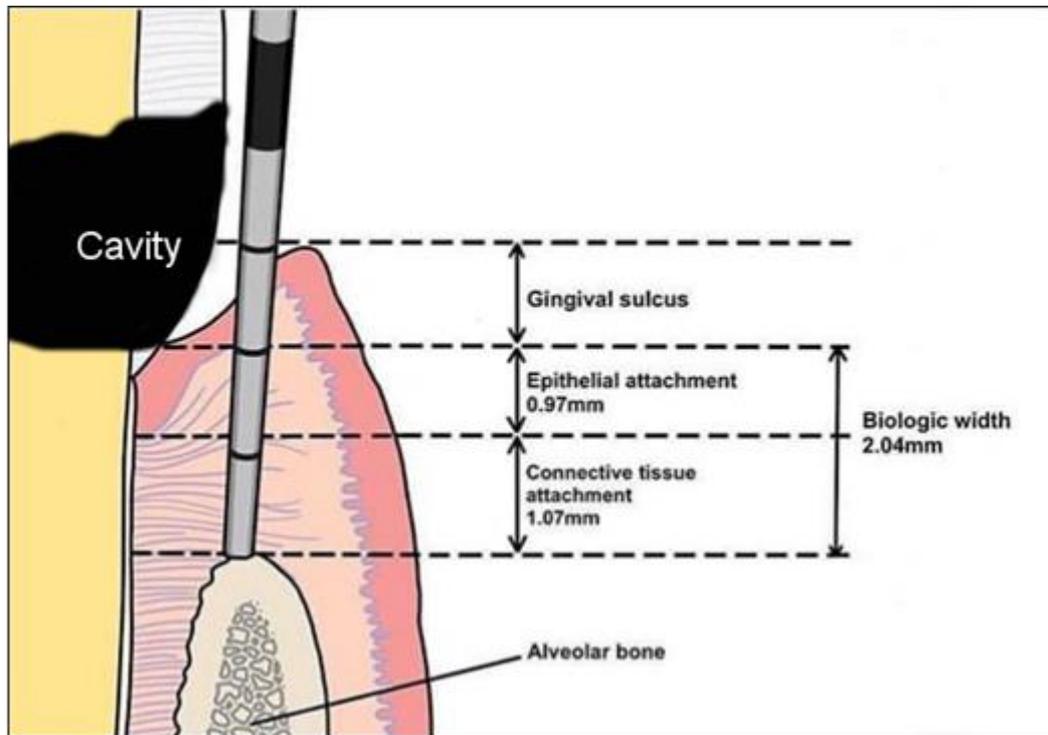
Fig. 1. Cavities localized in the cervical margin

Diagnosis is carried out by periodontal probe perpendicular to the long axis of the tooth in the deepest point of the cavity's margin. If the cavity's margin is located over gum - we put the sign "+" before exponent. If the cavity's margin is under gum we put the sign "-". If the cavity's margin is located at the level of epithelial attachment we inscribe exponent "0". The defect of hard tissue denoted "C". Thus, seven classes were identified [11, 13]:

C^{+3} cavity's margin is 3 mm or more above the epithelial attachment;

C^{+2} cavity's margin is 2 mm above the epithelial attachment;

C^{+1} cavity's margin is 1 mm above the epithelial attachment;

C^0 cavity's margin is on the level of the epithelial attachment;

C^{-1} cavity's margin is 2 mm below the level of the epithelial attachment;

C^{-2} cavity's margin is 2 mm below the level of the epithelial attachment;

C^{-3} cavity's margin is 3 mm or more below the level of the epithelial attachment.

Validation Session

Three periodontal examiners, with >10 years of periodontal practice, were required to attend a calibration session on 46 the localization subgingival margins of

cavity aimed at the validation of the proposed classification. Under the guidance of one statistical operator the examiners twice evaluated, independently and blindly, the localization subgingival margins of cavity and of step after an interval of 1 hour. The considered variables were recorded directly by the statistician. We were examined between January 2018 and May 2020 at the Dentistry PE department, Ivano-Frankivsk National Medical University, Ukraine.

A sample of 536 cavities was included in the study. Informed written consent was obtained from all subjects who participated in the study. The principles set forth in the Helsinki Declaration on experimentation involving human subjects were fully respected in obtaining the informed consent and in the conduct of the study. A descriptive statistic analysis was also performed.

Results and discussion

In order not heap up the diagnostic process with several classifications, into any of the classifications can be inserted the exponent that would indicate the depth of destruction in the gingival part. It is best to combine classification proposed by us with classification elaborated by Black. For example: 2^{-1} class by Black - cavity's margin is 1 mm below the level of the epithelial attachment, although it can be used with the other, such as: $M^{-1}OD^{+1}$ and others.

The intrarater and interrater agreement (k statistics) among the localization subgingival margins of cavity: for intrarater agreement ranged from 0.74 to 0.95 (almost perfect agreement), whereas interrater agreement ranged from 0.26 to 0.59 (moderate agreement) according to the guidelines proposed by Landis and Koch. [17]

In the available medical literature, we have not found works, devoted to the issues of clear classification hard tissue defects located in the gingival part of any tooth. It is clear that these defects can be divided into defects over gingival, defects on the level of the epithelial attachment and under gingival defects. The treatises by Żarow M. and Veneziani M. are devoted to diagnosis and treatment under gingival defects [9, 10]. Schmidsered J., [18] has identified the five types of defects class by Black and proposed tactics of their treatment, they are more are related to defects over gingival. At the present stage of dentistry dynamic occurs growth of new knowledge,

technologies and materials that significantly changed the methods of treatment of hard tissues defects. [6, 13, 19, 20] However, not only are the dimensions of the cavity or lack of tissue important, but the depth of the aggression that could reach the periodontal tissues is also a key point in the restoration.

Therefore, lack of classification the localization subgingival margins of cavity forms a methodological gap in modern chain of treatment such cavity.

Conclusions

The classification the localization subgingival margins of cavity is useful for reaching a more precise diagnosis. In general, we believe that the proposed classification fills an obvious gap in academic representations about hard tissue defects located in the gingival part of any tooth, offers the prospect of consensus on differentiated diagnostic and therapeutic approaches in different clinical variants of location.

Equally important is the suitability of this classification for objectification and unbiased comparison of published results of treatment of that cavities.

ORCID iDs

Oleksandr Bulbuk https://orcid.org/0000-0001-9229-9334

Olena Bulbuk https://orcid.org/0000-0001-8985-8254

Mykola Rozhko https://orcid.org/0000-0002-6876-2533

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