

Gingival Zenith- A critical factor in Esthetics

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Citation of this Article: Dr. Neeta V. Bhavsar, Dr. Swapna Patki, Dr. Rachana Gaonkar, Dr. Shreeja Nair, “Gingival Zenith- A critical factor in Esthetics”, IJDSIR- August - 2020, Vol. – 3, Issue -4, P. No. 266 – 269.

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Type of Publication: Original Research Article

Conflicts of Interest: Nil

Abstract

The aim of this study is to evaluate : the gingival zenith position (GZP) from the vertical bisected midline (VBM) along the long axis of each individual maxillary anterior tooth; and the gingival zenith level (GZL) of lateral incisors in an apical-coronal direction relative to the gingival line joining the GZP of the adjacent central incisor and canine tooth. 60 patients were included in the study. The inclusion patient criteria were absence of periodontal disease, gingival recession, or gingival hypertrophy as well as teeth without loss of interdental papillae, spacing, crowding and existing restorations. GZP dimensions were measured with calibrated digital callipers for each individual tooth in a medial-lateral direction from the VBM. GZLs were measured in an apical-coronal

direction from a line drawn on the diagnostic casts from the GZPs of the adjacent teeth. Central incisors and lateral incisors displayed a distal GZP from VBM. In canines, the GZP was centralized along the long axis of canine. The GZL of lateral incisor was coronal to that of adjacent central incisor and canine.

Keywords: Gingival zenith, Esthetics, Gingival zenith level

Introduction

An ideal smile requires analysis and evaluations of the face, lips, gingival tissues, and teeth and an appreciation of how they appear collectively. The appearance of the gingival tissues surrounding the teeth plays an important role in the esthetics of the anterior maxillary region of the mouth.^[1] Abnormalities in symmetry and contour can

significantly affect the harmonious appearance of the natural or prosthetically restored dentition. Consequently, any dental procedure performed in this zone can be an esthetic challenge because of the visibility of the dentogingival interface.^[2] Knowledge of external anatomy is a critical element. Therefore, an understanding of the ideal gingival topography has critical importance for the treatment in the anterior dentition.

The physiologic gingival architecture has been described as one in which the interdental area is conical and coronally positioned to the buccal and lingual (or palatal) plates of bone, which have a parabolic shape and flow smoothly from the interdental area; that follows the shape of the cemento-enamel junction, allowing a thin, scalloped, knife-edged gingival contour with pyramid-shaped papillae that fill the interproximal space.^[3] This parabolic architecture is critically outlined by the zenith, which is defined as the most apical point of the gingival marginal scallop.^[4]

Correct positioning of the zenith following therapeutic manipulation is necessary, because it can greatly influence the emergence profile and axial inclination of teeth. Despite its critical importance, quantitative morphometric evaluations of the zenith region are not available.^[5] Hence this study was performed to evaluate 1) the GZP from the VBM of each individual maxillary anterior tooth; and (2) the GZL (in an apical coronal direction) of the lateral incisors relative to the gingival line joining the tangents of the gingival zenith of the adjacent central and canine under healthy conditions.

Material and Method

A total of 60 patients with an age range of 18-40 years were included in the study. Patients with periodontal disease, gingival recession, loss of interdental papillae, spacing, crowding, restorations, and incisal attrition were excluded from the study. Maxillary impressions of the

study group were made using irreversible hydrocolloid impression material and were immediately poured in die stone.

The tooth width was measured at two reference points: Proximal apical contact area position and incisal contact area position (Fig 1 and 2). Each width was divided in half, and the centre points were marked. Centre points were extended to a line towards the gingival aspect of the clinical crown to define the vertical bisecting midline (VBM). The highest point of the free gingival margin was marked (Fig 3). Gingival zenith positions were evaluated for each individual tooth in a medial-lateral direction from the vertical bisecting midline. The gingival zenith level of lateral incisor was evaluated and measured with a calibrated digital Vernier calliper (Fig 4). GZLs were measured in an apical-coronal direction from a line drawn on the diagnostic casts from the GZPs of the adjacent teeth.

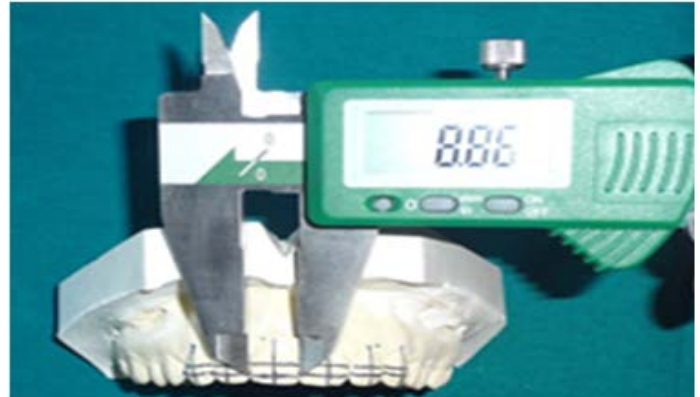


Fig 1: Measuring distance at incisal contact area position



Fig 2: Measuring distance at apical contact area position



Result

60% of maxillary right central incisors showed gingival zenith distal to vertical bisected midline (VBM), 25% on VBM and 15% showed gingival zenith mesial to VBM. 70% of maxillary left central incisor showed gingival zenith distal to vertical bisected midline, 20% on VBM and 10% mesial to VBM.

55% of maxillary right lateral incisor showed gingival zenith distal to VBM, 30% on VBM and 10% mesial to VBM. 55% of maxillary left lateral incisor showed gingival zenith distal to VBM, 30% on VBM and 10% mesial to VBM.

15% of maxillary right canine showed gingival zenith distal to VBM, 80% on VBM and 5% mesial to VBM.

15% of maxillary left canine showed gingival zenith distal to VBM, 80% on VBM and 5% mesial to VBM.

Gingival zenith of lateral incisor was coronal to that of adjacent central incisor and canine and the distance between gingival zenith of lateral incisor and gingival line for maxillary right lateral incisor was 0.94 ± 0.35 and maxillary left lateral incisor was 0.91 ± 0.37 . (Table 1)

Table 1: Distance of lateral incisor in an apical-coronal direction relative to gingival level line

Gingival zenith level	N	Mean± SD	Minimum	Maximum
Right lateral incisor	60	0.94 ± 0.35	0.24	1.8
Left lateral incisor	60	0.91 ± 0.37	0.23	1.86

Discussion

Designing of an esthetic smile has been profoundly discussed in the dental literature. The Gingival zenith position (GZP), the most apical point of the free gingival margin of the periodontium, and the Gingival zenith level (GZL) of the lateral incisor relative to the central incisors and canine teeth can significantly influence the esthetic appearance of a smile. However, many studies, though discussing various aspects related to the gingival contours of the maxillary anterior teeth, have presented conflicting information on where the GZP should be. The placement of the gingival zenith is critical, as it determines the desired axial inclination of the tooth by maneuvering the line angle of the tooth vertical axis. Moreover, knowing the GZP of each maxillary anterior tooth in relation to the VBM as well as the GZL of the lateral incisors can help facilitate a reference point during esthetic periodontal plastic surgery procedures.^[2]

Rufenacht (1990) proposed that the GZP was distally placed on the central incisor and canines only, whereas those of the lateral incisor were coincident with the VBM.^[5]

Magne and Belser (2002) suggested that the GZP was distal to the long axis of all the maxillary anterior teeth.^[6]

Goodlin (2003) described the GZP for central incisors at the distal third, lateral incisor at the VBM, and canines

ranging from the anterior third to the distal third of the VBM.^[7]

Stephen J Chu (2009) suggested that the GZP for central incisors and lateral incisor was distal to vertical bisecting midline and for canines it was centralized along the long axis of the tooth.^[2]

The findings of this study are consistent with the GZP for the maxillary central incisors but are in disagreement with those for lateral incisors and canines. Most of the studies stated that the GZP of the lateral incisors were concurrent with the VBM, and that of canines were coincident with the VBM within each tooth group.

Charruel S (2008) suggested that 81.1% of lateral incisors showed gingival zenith position coronal to gingival line whereas 15% of lateral incisors showed gingival zenith position on the gingival line. In this study, photographs of the study casts were taken and then evaluated. A possible explanation for this variation in gingival zenith position could be related to the variations in protocol.^[8]

The results obtained in the present study are in accordance with the results obtained by Chu S (2009)^[2] where gingival zenith position of lateral incisor was coronal to the gingival line.

Conclusion

The location of GZP of the clinical crown of central incisor and lateral incisor was distal to VBM and centralized on the VBM for canines. The GZL in an apical-coronal direction of lateral incisors relative to gingival zenith line joining adjacent central incisor and canine was approximately 1mm under healthy conditions. Thus, the findings of this study can be clinically applied to re-establish the gingival zenith positions of maxillary anterior teeth during smile designing procedures.

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