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OPTIMAL PREPARATION JUNCTIONS FOR ALL-CERAMIC FIXED RESTORATIONS MADE BY CAM 5 – S 2 IMPRESSION, VHF

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ABSTRACT

Introduction: The type of the preparation junction is determined by a number of factors that need to be taken in consideration with CAD/CAM Fixed Prosthodontics: the material of which the construction will be made; the type and condition of the retainer teeth, of their periodontium and the occlusion; the design software, the CAM setting and the type of drills; the working protocol; the type of the cement and the method of cementation.

Purpose: The aim of this publication is to describe the optimal preparation junctions for all-ceramic crown and bridge restorations made by CAM 5 - S 2 Impression, VHF.

Materials and methods: Suitable are chamfer and shoulder preparation junction with rounded inner angle (width 1 - 1, 5 mm). Trimming of 1.5 – 2 mm dental tissues is necessary on the occlusal surface. The homothetic reduction of teeth is optimal.

Results and discussion: The width depends on the size and vitality of the tooth. In stained teeth and those built with metal pins the removal of more tissues provides a greater volume needed to disguise the dark color. Vestibular preparation under the level of the gingiva is preferable to ensure optimal aesthetics. Preparation junction is determined also by the CAD/CAM technology - the type of drills and protocol of impression taking (classical or digital). The creation of a working model with TRIOS, 3Shape intraoral scanner is greatly facilitated by preparation junctions made above the gingival margin.

Conclusion: Knowledge about the criteria for selection the preparation junctions is essential for fabrication accurate and aesthetic CAD/CAM restorations.

UDC CODE & KEYWORDS

■ UDC: 61 ■ Preparation junctions ■ CAD/CAM ■ All-ceramic fixed restorations

INTRODUCTION

The type of preparation junction is determined by a number of factors that need to be aligned with CAD/CAM fixed restorations: the material of which the construction will be made (Kissov, 2008); the type and condition of the retainer teeth, of their periodontium (Newman, Takei, Klokkevold, & Carranza, 2014) and the occlusion (Dawson, 2006); the design software, the CAM setting and the type of drills (Hayashi et al., 2013); the working protocol (Song, Zhao, Sun, Lü, & Wang, 2013) – starting with a working cast poured of a classical impression (by laboratory scanning) or a digital model (made by intraoral scanning); the type of the cement and the method of cementation.

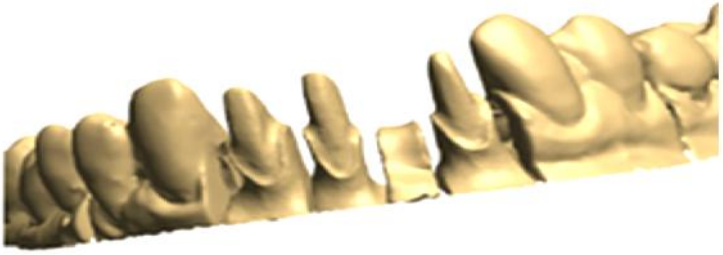
Purpose

The aim of this publication is to describe the optimal preparation junctions for all-ceramic crown and bridge restorations made by CAM 5 - S 2 Impression, VHF.

Materials and Methods

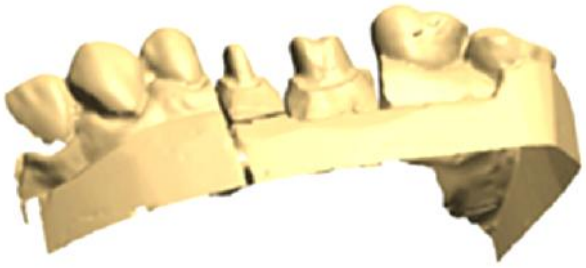
Suitable are chamfer (Figure 1) and shoulder preparation junctions with rounded inner angle (Figure 2) (width 1 – 1.5 mm). Trimming of 1.5 – 2 mm dental tissues is necessary on the occlusal surface. The homothetic reduction of teeth is optimal. It can be simplified by initial depth guides preparation and by the use of silicone key for control. Depending on the CAD/CAM technique variations in their position are possible. In intraoral scanning protocol, especially in the area of distal teeth, preparations over the gingival margin are preferred (Figure 3). In laboratory scanning of a dental stone working cast the level of the junctions is on or under the gingiva (no more than 1 mm in the depth of the gingival sulcus for prevention of the biological width).

Figure 1: Chamfer preparation junctions. (A photo from 3Shape Dental System Software)



Source: Authors (2015)

Figure 2: Shoulder preparation junctions with rounded inner angle. (A photo from 3Shape Dental System Software)



Source: Authors (2015)

Figure 3: Homothetic preparation junctions over the level of the gingiva are preferable in intraoral scanning protocol. (A photo from 3Shape Dental System Software)



Source: Authors (2015)

Results and Discussion

The width of the preparation junction depends of the volume and vitality of the tooth (Kissov, 2005).

In stained teeth and those built with metal pins removal of more tissue provides a greater volume needed to disguise the dark color. In such cases the vestibular preparation under the level of the gingiva is preferable to ensure optimal aesthetics.

Preparation junction is determined also by CAD/CAM technology - the type of drills, the way of impression taking (classical, with a real working cast and laboratory scanner or with a digital model made by the intraoral scanner). The rounded heads of the drills for the CAM 5 - S 2 Impression, VHF define the necessity of preparations with rounded angles (unlike CEREC, Sirona).

Furthermore, CAM 5 - S 2 Impression, VHF is 5-axis CAM device. Its drills mill apart not only along the axes X, Y, and Z, and also along two more additional - A (the axis to which the disc is rotated through 360°) and B (an axis of rotation of the disc in the chamber +30°).

Creation of a working model with TRIOS, 3Shape intraoral scanner is greatly facilitated by the development of preparation junctions over the gingival level.

Obtaining the so-called “J – preparations” (named for its similar shape to the English letter "J") must be promptly corrected, because the preserved enamel edge hinders further manipulations - adjustments and cementation.

CONCLUSION

Knowledge about the criteria for selection the preparation junctions is essential for fabrication accurate and aesthetic CAD/CAM restorations. Number of factors have to be taken into consideration: the material of which the construction will be made; the type and condition of the retainer teeth, of the periodontium and the occlusion; the design software, the CAM setting and the type of drills; the working protocol – digital or classical type of impression; the cement and the method for fixation of the restorations.

The homothetic reduction of dental tissues releases enough volume (1.5 – 2 mm) for the ceramics that ensures strength and aesthetics. Two types of fixed all-ceramic restorations CAD/CAM manufacturing are possible – full contour or ceramic cap fabrication that has to be additionally finished with dentin end enamel ceramic masses, glaze and shades. For full contour only shades and glaze are necessary. The full contour fabrication for distal teeth can be done only on digital impression, without pouring a real gypsum working cast. This makes the process simple, reduces the technological time and the risk for mistakes in the additional laboratory steps.

The preparation junctions over the level of the gingiva make the process of impression taking (real or digital) easier, improve the local oral hygiene and therefore the periodontal health. The preparation junctions on or under the gingival margin do not disturb the biological width if they are positioned till 1-mm depth in the gingival sulcus.

The rounded heads of the drills for the CAM 5 - S 2 Impression, VHF define the necessity of preparations with rounded angles. The 5-axes CAM device simplifies the milling process and makes it more precise.

With proper correction of the so-called “J-preparations,” the problems with the following adjustments and cementation decrease significantly.

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