

Advanced concepts. Guided reduction for crowns and bridges.

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Abstract

The aim of the present article is to propose a new clinical procedure for guided dental reduction during preparation using depth markers named "AS Classic depth markers" and "AS-micro depth markers". The proposed clinical procedure applies for the first time an objective numerical value to tooth preparation, thus making it standardized and reproducible. This way, all the basic principles of tooth preparation and minimal invasiveness would be respected.

Keywords

Minimal invasiveness, calibrated tooth reduction, AS depth marker, AS-micro depth marker, fixed prosthodontics, orientation grooves, guided dental preparation, guided tooth reduction.

Introduction

Tooth preparation is an irreversible procedure during which the clinical crown is reduced in volume in its three dimensions (height, width, depth) and turned into a prosthetic abutment. Due to its irreversible nature, this procedure requires great attention and manual dexterity.

Biologic tissue preservation (enamel, dentin and root cement) should be the first goal of prosthodontic specialists. As many studies highlighted, this aspect should be balanced out with retention and stability principles as well as the materials used.

We are hereby proposing a novel procedure for tooth preparation in crowns and bridges.

Clinical steps:

1. Occlusal reduction with AS-micro depth markers;
2. Buccal and palatal/lingual orientation grooves with AS Classic depth markers;
3. Axial supra-equatorial reduction;
4. Interproximal separation;
5. Axial sub-equatorial reduction;
6. Polishing and finishing of tooth preparation.

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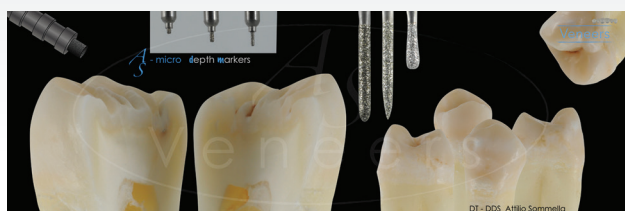


Figure 1: AS-micro markers.

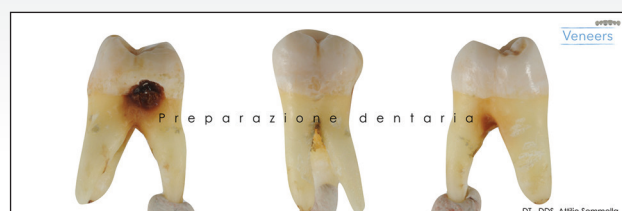


Figure 2: Extracted natural tooth.

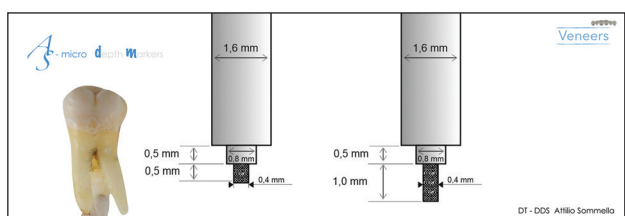


Figure 3: AS-micro markers design and dimensions.

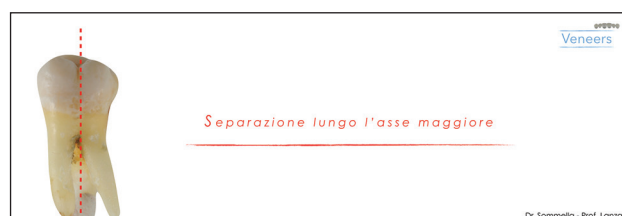


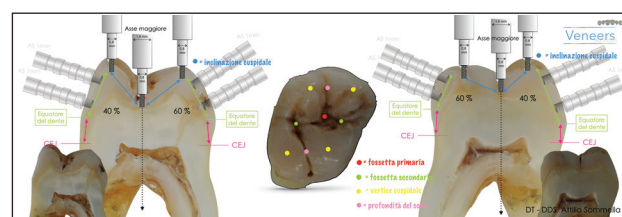
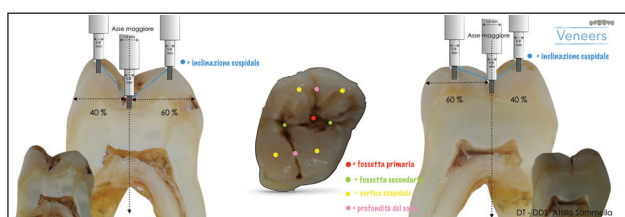
Figure 4: Separation along the long axis of the tooth.



Figure 5: Separated tooth in the laboratory.



Figure 6: AS-micro markers kit includes 3 cut dimensions: 0,5mm, 1mm and 1,5mm.



Figures 7 & 8: Summary of the minimally-invasive cutting technique using AS-micro and AS-Classic depth markers.

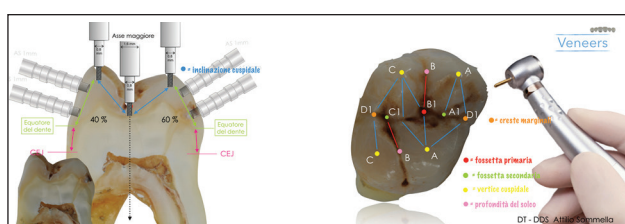


Figure 9: Using a cutting instrument, the corono-apical tooth reduction will be carried out by following the orientation of the internal triangular ridges.

Technique Description

The present technique will allow clinicians to carry out a reproducible and standardized procedure, based on geometrical principles.

In fact, the innovation has been allowed thanks to the novel "AS-micro depth markers" (Figures 1-9) to be used in conjunction with "AS depth markers Classic" for the guided tooth reduction of molars.

AS-micro depth markers should be used first in order to define the depth cut chosen in specific areas (e.g. primary

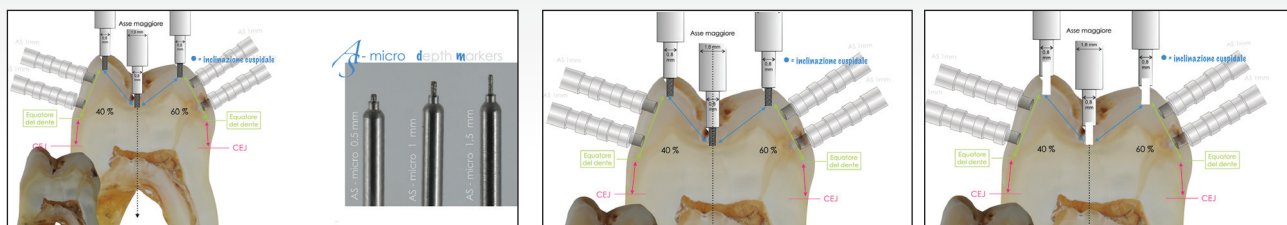
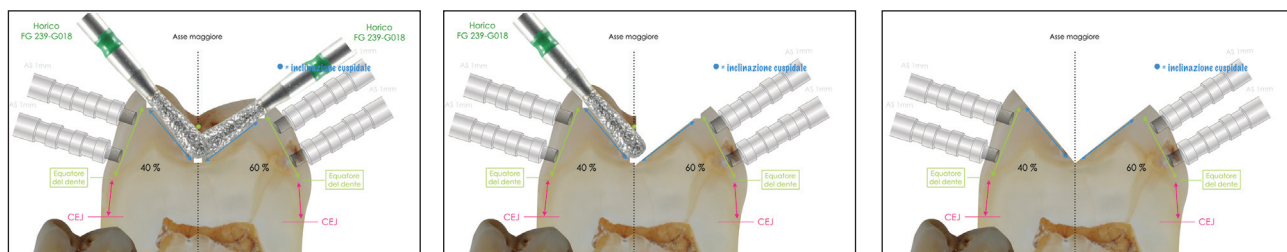


Figure 10: Step-by-step illustration of the technique. Figures 11 & 12: AS-micro markers will cut in the landmark points identified.



Figures 13 = 15: Micrometric control of both cut depth and angulation. Tooth reduction is carried out with a rounded bur (green ring) by following the depth cut previously identified with AS-micro markers.

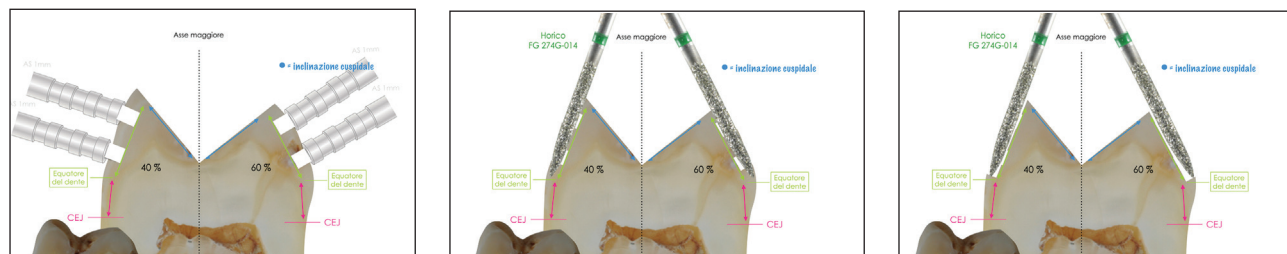
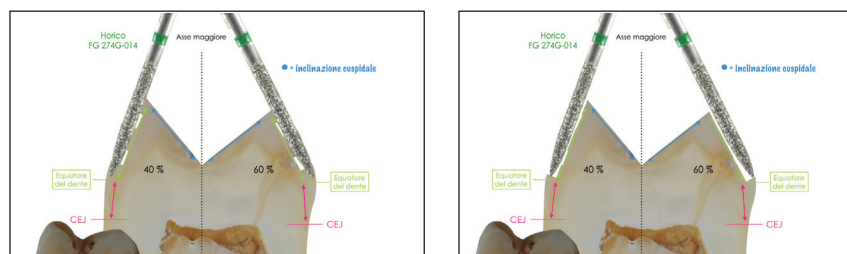


Figure 16: A 1 mm AS-Classic marker will be used to cut the buccal and palatal/lingual surfaces in specific areas.



Figures 17 & 18: By using a pointed green ring bur, we will reduce residual dental anatomy until reaching the depth identified by As markers.

and secondary fossae, cusps, center of every internal triangular ridge, in occluso-buccal and occluso-palatal-lingual grooves), particularly paying attention to mark the same depth at the center of the mesial and distal marginal ridges.

Due to its reduced and streamlined dimensions, the depth marker will easily fit into the narrow spaces of the fossae, thus marking the desired depth right where the most apical point of occlusal reduction will stand (Figures 10-12).

The reduction cut will be then carried out with a rounded cylindrical diamond bur (green ring) by joining the buccal and palatal points A-B-C with the centro-occlusal points A1-B1-C1-D-D1 (Figures 13-15). Afterwards, AS Classic depth

markers will be used for a circumferential reduction by marking the depth cut and then by carrying out a reductional cut until reaching the chosen depth. This reduction will include the tooth area between the most coronal point of the newly-created cusp and tooth equator (Figures 16-18).

While using this technique, clinicians can choose whichever finish line they prefer (Figures 19-22); moreover after the first cut, a diamond bur (red ring) will smooth all surface roughness of the tooth preparation (Figures 23,24).

Conclusion

Depth cut identification and cut direction have always been two crucial issues in dental preparation techniques. The

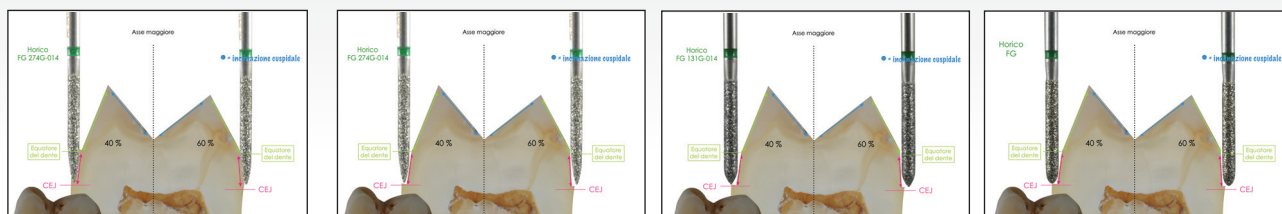


Figure 19: The cervico-axial reduction will be completed along the long prosthetic axis identified.

Figures 20 - 22: Any finish line could be chosen after using these novel depth markers.

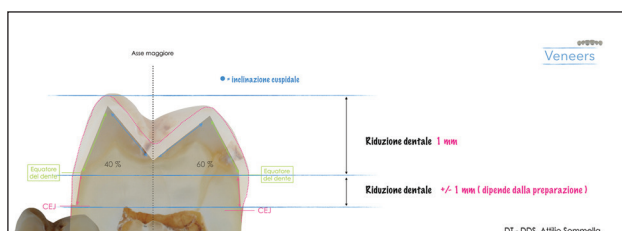


Figure 23: AS Preparation technique and As depth markers will allow clinicians to create a circumferential tooth preparation according to a mathematical/geometrical concept, thus reducing sensitivity operator.



Figure 24: Image summarizing the work-flow for a calibrated tooth reduction.



Figure 25: The AS Depth Marker kit (HORICO, Berlin, Germany)

proposed technique is the first one to date to provide tooth preparation with "solid numeric values" as well as to assist the clinician in carrying out a geometrically-assisted cut, thus minimizing irreversible damage to dental structure.

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