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GUIDED ENDODONTIC ACCESS

Endodontic

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ABSTRACT

We have come a long way in dentistry from "extension for prevention" to "prevention of extension". A similar approach in endodontics is going to change the future of dental practice with **Minimal Invasive Endodontics (MIE)**. MIE mainly includes preservation of structural integrity of tooth, alternate access cavity designs, guided endodontic access, modern burs, cleaning and shaping, 3D irrigation and disinfection, magnification aids like loupes and dental operating microscope. Survival of an endodontically treated tooth depends mainly on its remaining structural integrity after access preparation. The concept of Conservative endodontic cavities (CEC) was introduced to preserve the pericervical dentin (PCD), which is crucial to transfer the occlusal load to the root. In traditional endodontic cavities (TEC) much of PCD is lost which reduces the fracture resistance of tooth. Guided endodontic access was introduced as an attempt to preserve the PCD. It ensures predictable outcome without any procedural errors. The present paper attempts to narratively summarize the scope of Guided endodontic access in dental practice and explain its benefits to the practitioners compared with conventional technique.

KEYWORDS

3D endoguide, CBCT, endoguide, guided access, guided endodontics.

INTRODUCTION:

Guided endodontic access is a technologically driven approach to prepare smallest possible customized access cavity with minimal tooth structure removal for ensuring long term survival and function of endodontically treated teeth[1]. Krastl et al first termed the endodontic guided procedure and recommended its use for teeth with calcified canals[2]. Guided endodontics includes CBCT, digital impression systems, 3D printing technology, template designing software and dynamic navigation. It provides safe and predictable treatment outcome with least invasive procedures even in most challenging cases compared to conventional treatment strategies[1]. With only 2 dimensional radiography coming to correct diagnosis and planning appropriate treatment plan solely depended on the skill and experience of the clinician. 3D guided endodontics not only helps with diagnosis and treatment plan but also in execution of the planned treatment. With advanced CBCT imaging and software, clinicians can not only assess the root canal anatomy, length and location but also virtually plan the access cavity design for individual tooth with 3D scanner and 3D templates. This virtual planning will help to preserve the tooth structure and avoid any procedural errors.

Types of Guided Endodontic Access:

Guided endodontics can be Static or Dynamic.

I) Static Guided Endodontics: involves use of CBCT with optical impression, where both the images are merged creating platform for design of a virtual drill path with help of sleeve guide.

ii) Dynamic Guided Endodontics: uses information from patients CBCT to plan access cavity, overhead tracking cameras relate the position of bur in 3D by looking at the software interface, clinician gets immediate feedback about position of bur as it relates to the position of planned access and the tooth.

Technological advancements have enabled inter-operability between 3D imaging devices, 3D virtual planning systems and 3D printers to process, manipulate and create data for producing 3D printed guides.

What is 3D Endodontic Guide?

3D Endodontic Guide is a template fabricated to guide drills into pre-planned positions for localization and exploration of root canal orifices[1]. Endodontic guides are also called Endoguide, Endodontic Template, 3D Endodontic Guide/Template, and Guide Sleeve.

Steps in 3D Guide Planning and Designing:

Step 1: CBCT: of involved tooth

Step 2: Surface Scan: using intra-oral scanner or scanning a model made after an impression. The scan has to cover atleast one quadrant of the tooth arch to secure a stable support for the guide.

Step 3: Merging CBCT scan with Surface scan using software: superimposition of CBCT data and surface scan is very crucial to get accurate fit of the guide. Three to six reference landmarks or points are marked on both scan files and then software automatically merges them.

Step 4: Designing Endoguide: mainly done by tracing the canal, creating virtual drill path by deciding the target point, angle of the drill and diameter of the drill and finally Sleeve selection. These Endoguides are printed with the help of 3D printers.

Krastl et al noted that skill or experience of clinician does not affect the accuracy of guided endodontic procedure[2]. In addition to conserving remaining tooth structure it also reduces the chair side time compared to conventional techniques especially in difficult cases like calcified canals or developmental anomalies[2]. High success rate has been seen with guided endodontic technique with a low deviation angle three dimensionally and at the tip of bur[3]. 4.Zubizarreta- Macho et al in 2020 compared two types of guided endodontics and found that Dynamic guided endodontics are more accurate than Static guided endodontics[4].

Limitations:

Some of the limitations of Static guidance are that it will work only for straight parts of root canals, might require drill guide for each canal increasing the cost in multiple canal cases, tooth has to be stable during scan and guided drilling, presence of metallic restorations may lead to artefacts while imaging thus resulting in inaccuracies in treatment planning, limited availability of armamentarium, requires time to prepare endoguides before procedure, and does not allow even minor changes in treatment plan[1,4].

Dynamic guidance however can overcome this limitations as clinician can visualize the bur on screen in 3D and control the removal of tooth structure to keep it as minimal as planned. High speed drills and burs can be used, no guide rings are required, and any changes in treatment plan can also be accommodated. However limited mouth opening could pose problems especially in posterior teeth[1,4].

CONCLUSION:

Guided access techniques are more accurate and safe than traditional freehand technique. Guided endodontics with its predictable outcome, lower risk of procedural errors and preservation of structural integrity of tooth even in most challenging cases is soon going to be the future of Endodontics.

REFERENCES:

1. Kinariwala N, Samaranayake L. Guided Endodontics, Springer 2020.
2. Krastl G, Zehnder M S, Connert T, Weiger K, Kuw S. Guided Endodontics: A novel treatment approach for teeth with pulp canal calcification and apical pathology. Dent Traumatol. 2016; 32: 240-246.
3. Zehnder MS, Connert T, Weiger R, Krastl G, Kuw S. Guided Endodontics: Accuracy of a novel method for guided access cavity preparation and root canal location. Int Endod J 2016; 49:966-72.
4. Zubizarreta- Macho, Munoz, Deglow, Agustin-Panndero, Alvarez. Accurracy of computer aided dynamic navigation compared to computer aided static procedure for endodontic access cavities: an in-vitro study. J Clin Med 2020; 9:129.