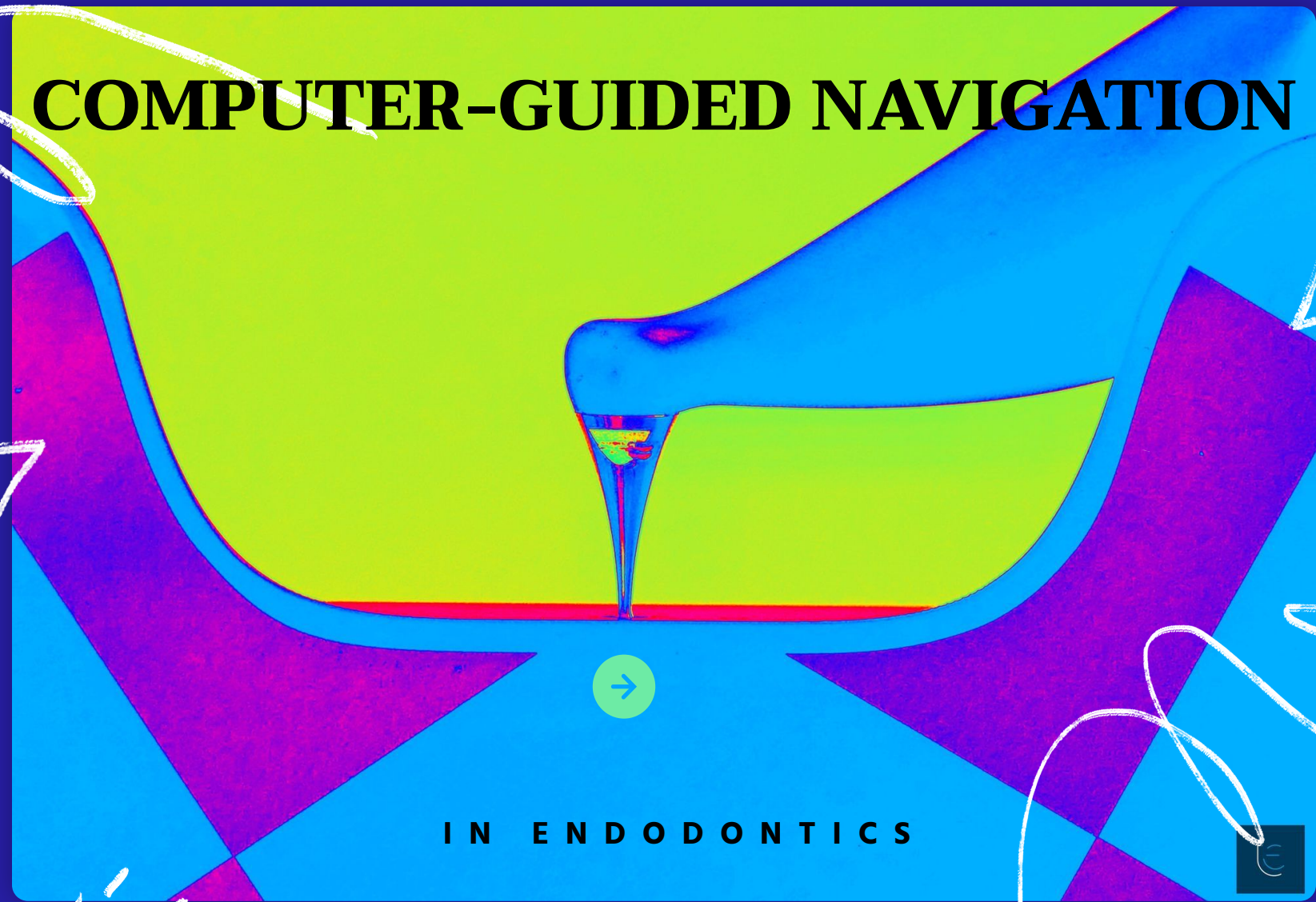


COMPUTER-GUIDED NAVIGATION



IN ENDODONTICS



COMPUTER GUIDED ENDODONTICS

ADVANTAGES COMPARED TO FREE HAND

1 PRECISION

- Dynamically navigated accesses are associated with higher optimal precision (drill path centered) to locate calcified canals in comparison with the freehand technique (75% vs 45%)¹
- The DNS group was significantly more precise, showing smaller mean values in the angulation (4.8°) and in the maximum distance from the ideal position (0.34 mm)²

2 TISSUE PRESERVATION

- Dynamically navigated accesses resulted in significantly less mean substance loss in comparison with the freehand technique (27.2 vs 40.7 mm³)²
- Substance loss was significantly lower with dynamically navigated accesses than freehand technique (10.5 mm³ vs 29.7 mm³)⁴

3 TIME REDUCTION

- Dynamically navigated accesses were prepared significantly faster than freehand preparations (2.2 vs 7.06 minutes)²
- Slow-speed burs through a static- guided approach in simulated calcified canals required on an average 11 minutes compared with an average drilling time of 58 seconds³

4 REPRODUCIBILITY

- All operators located a total of 156 canals, obtaining an overall success of 93% without a difference between operator experience.⁵
- Differences in substance loss between an more experienced operator (10.3 mm³) and a novice (10.6 mm³) were not significant.⁴

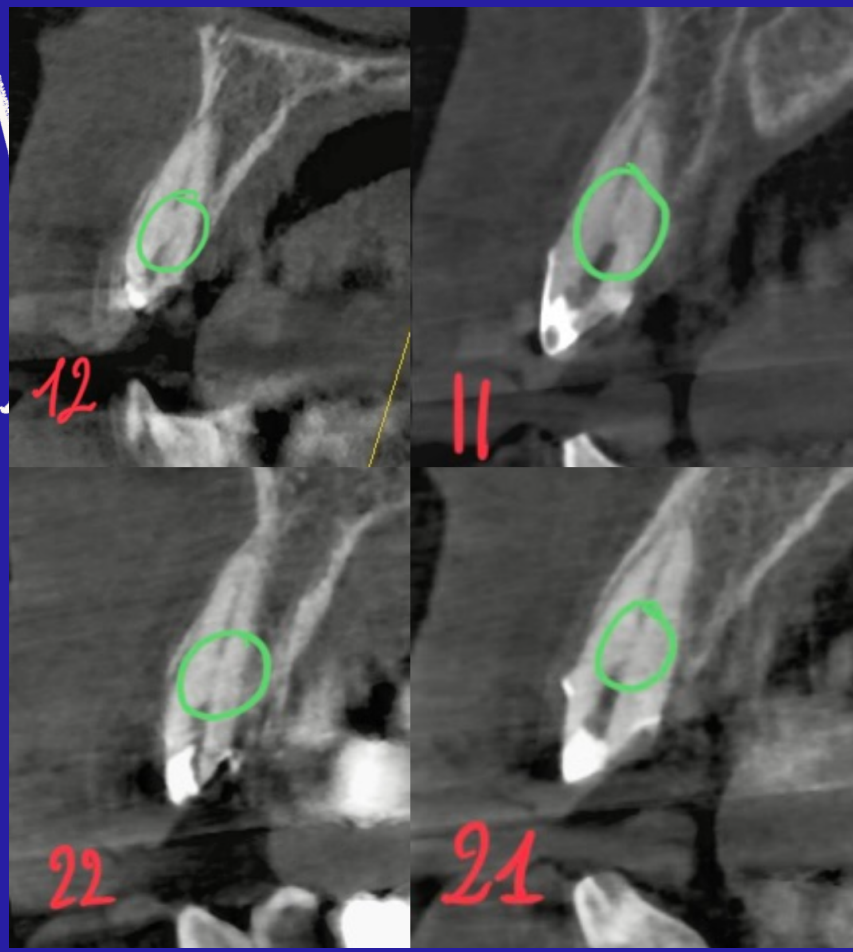
CLINICAL CASE

56 yo female patient, with no systemic condition is referred for performing the root canal treatment of the 4 superior incisives.

The practitioner didn't find the accesses and RCTs need to be done regarding the anterior prosthetic rehabilitation in progress

The choice of computer guided navigation over a static guided approach is based on the possibility of modifying the axis in real-time, the facility of the workflow (only a CBCT needed) and the use of all kind of burs, not just endodontic guided drills

PULP CANAL COMPLICATIONS



S1

Initial CBCT

12-11 : 1-2-1 root canal typology

21-22: narrowed root canal



PULP CANAL COMPLICATIONS

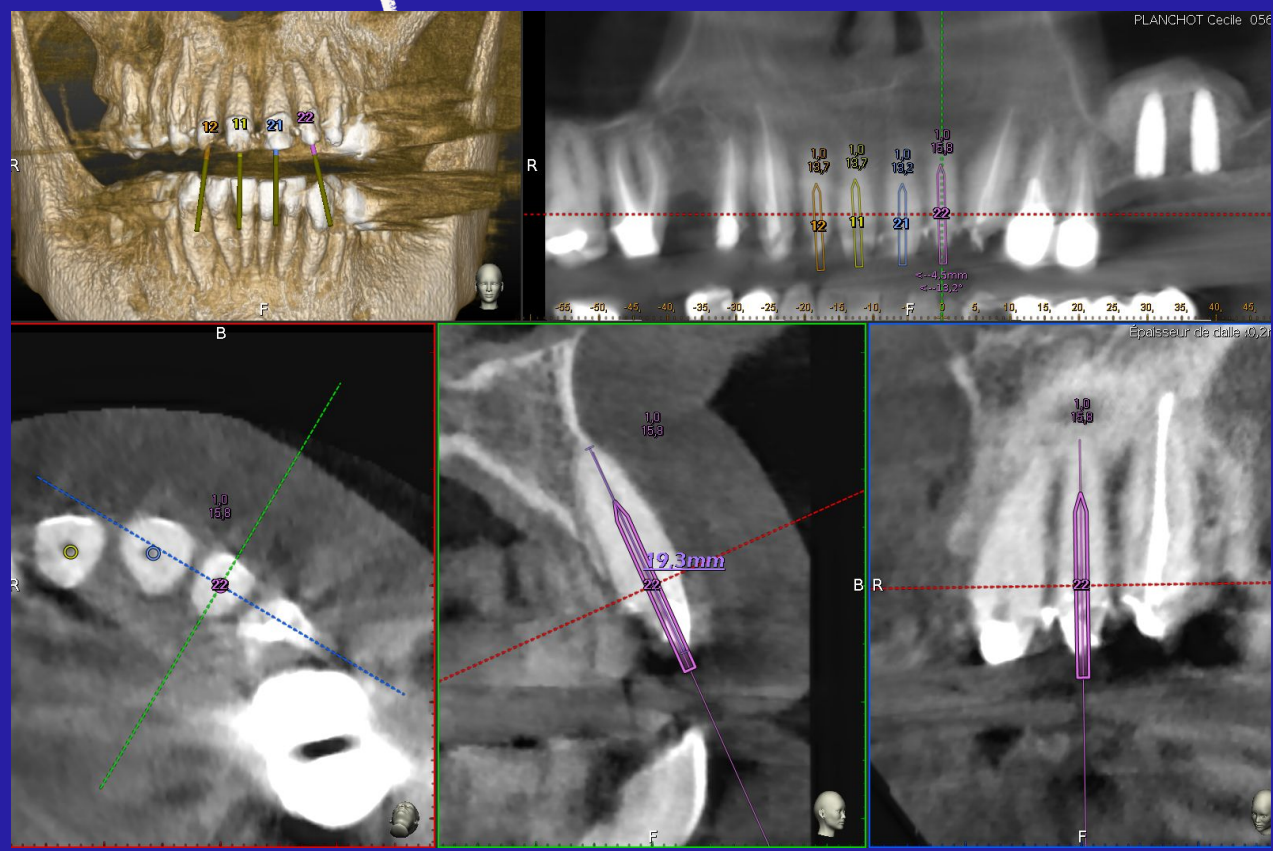


S2

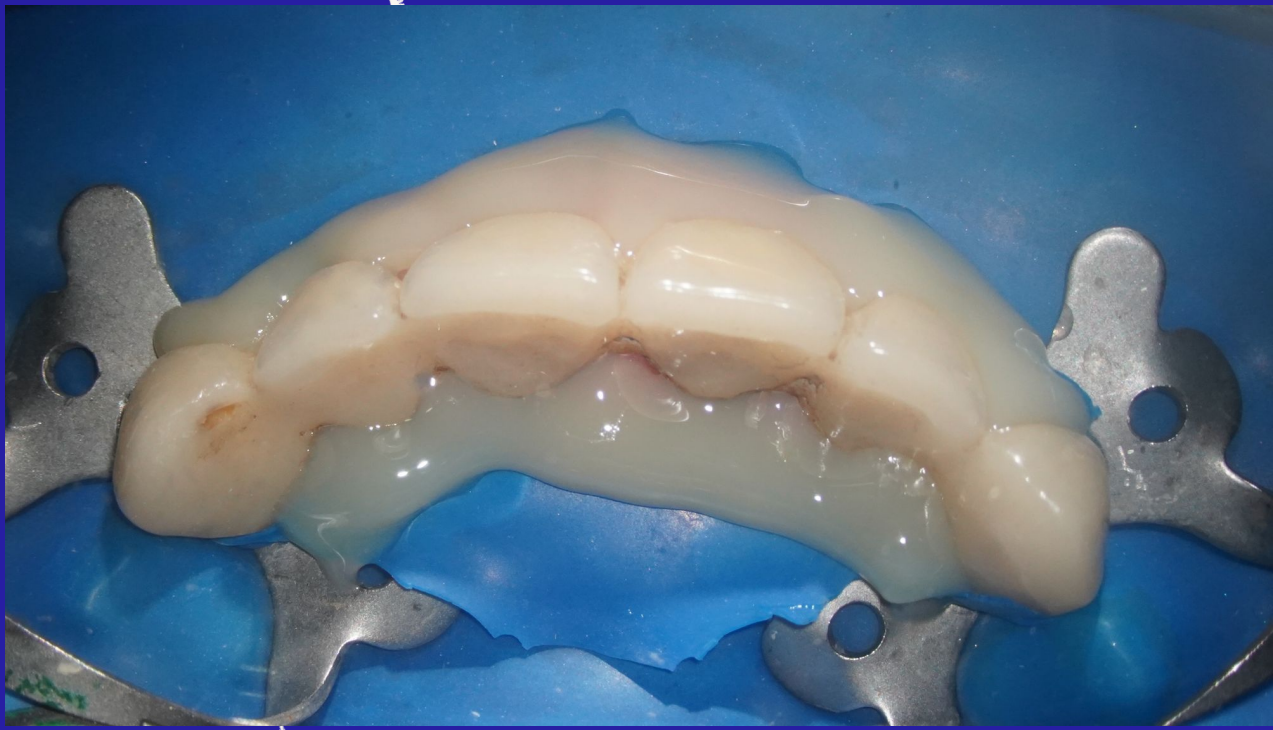
Planification

4 virtual axis are planified with the minimal size (1mm) and the roots length are measured for information

(temporary crowns don't allow us to measure precisely)



PULP CANAL COMPLICATIONS



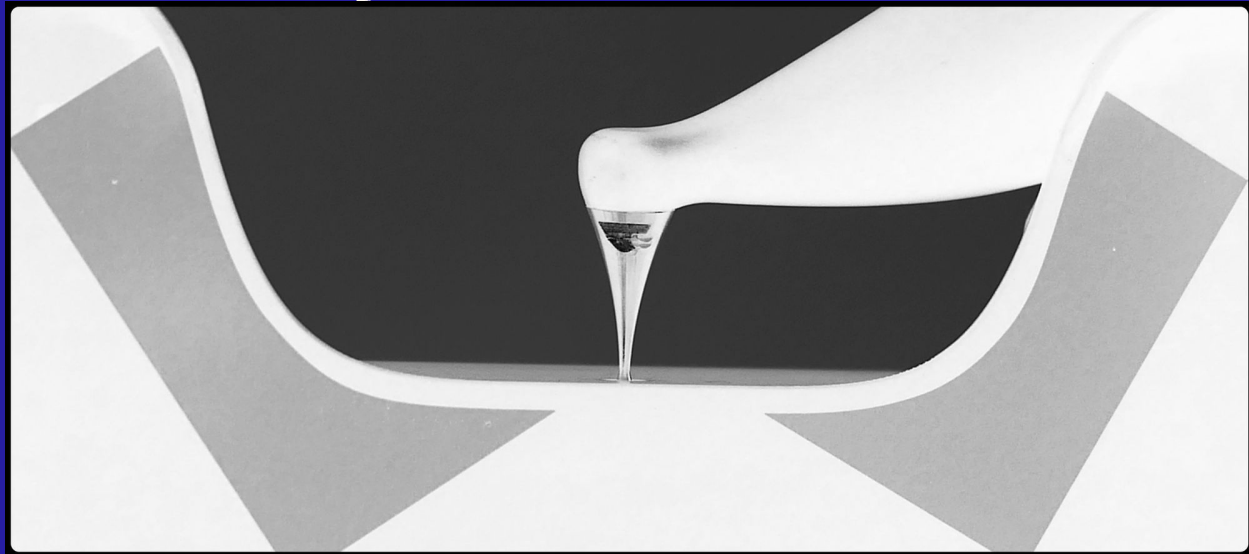
S3

Step 3 - Rubber Dam Isolation

Temporary crowns are sealed with a self-curing composite material (Structur 3, Voco)



PULP CANAL COMPLICATIONS



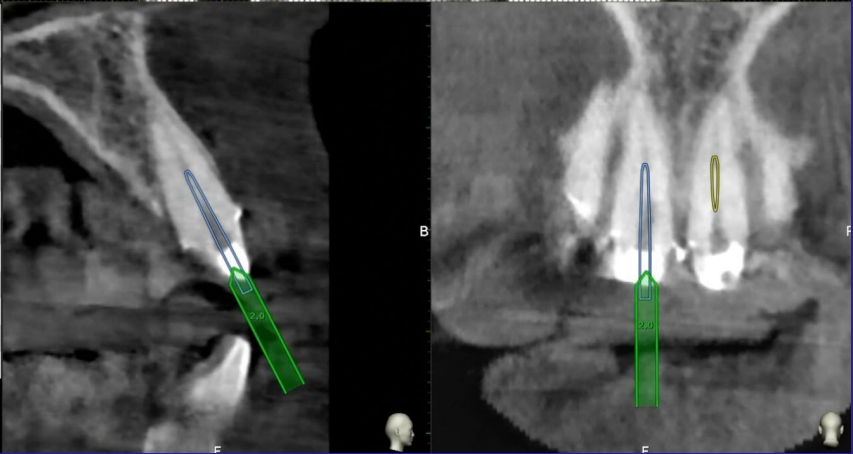
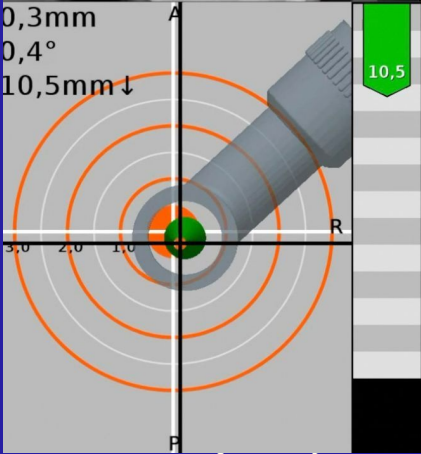
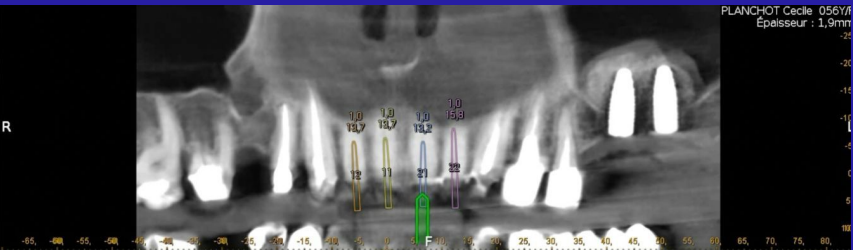
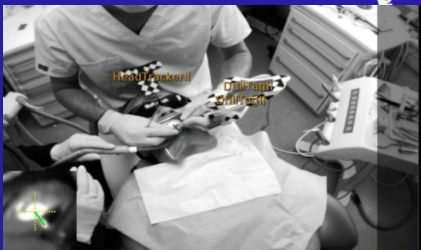
S4

Calibrations

As required by the software, calibration of the tracer, the high speed contra-angle and the endodontic bur.



PULP CANAL COMPLICATIONS



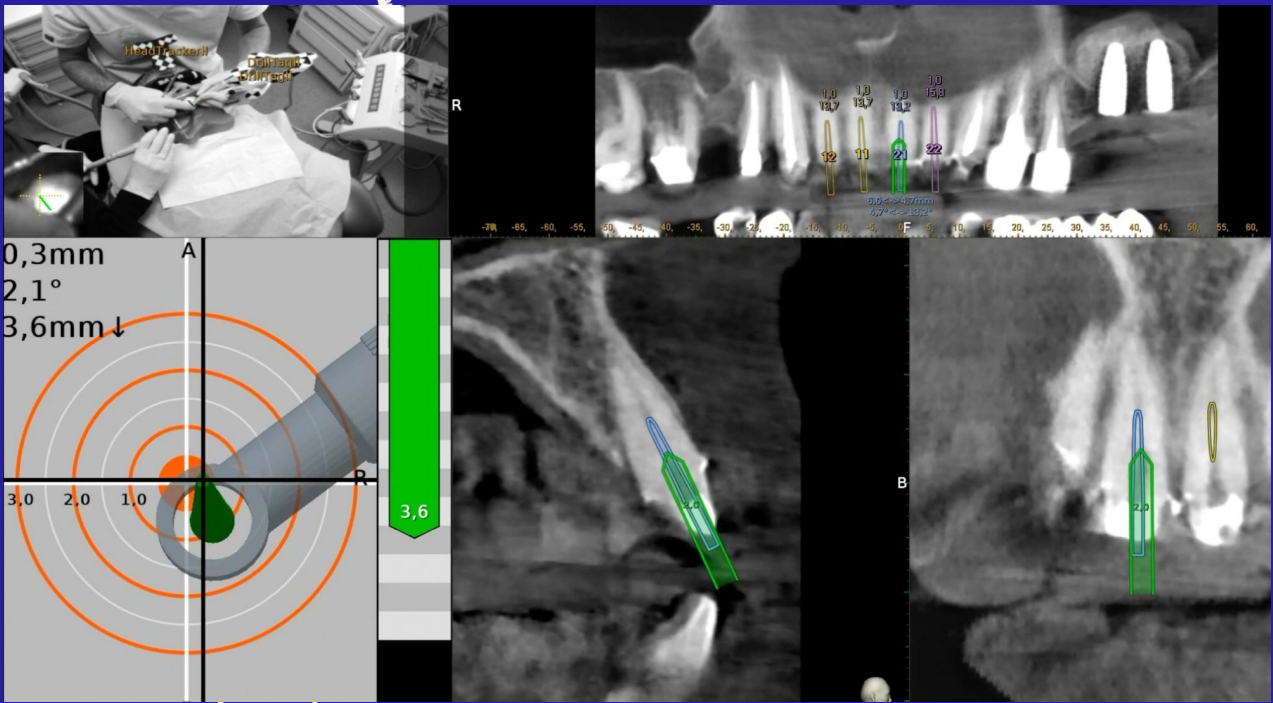
S5

Drilling part

The first step is marking on the surface the access point for each tooth, with a high speed round diamond burr and a contra-angle held by 2 hands, to prevent slipping during the drilling.



PULP CANAL COMPLICATIONS



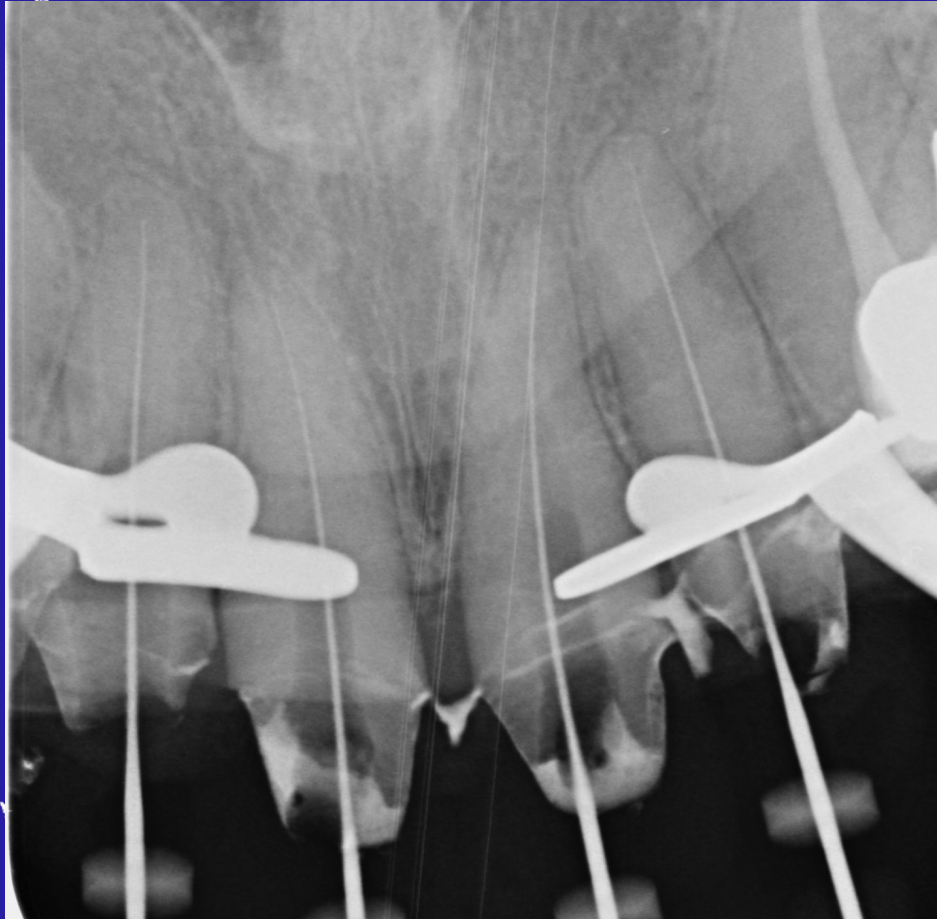
S5

Drilling part

Coronal access is made with a high speed round diamond bur and the radicular part is done with a EndoTracer (Komet) a special endodontic bur made with a long neck (31mm or 34mm)



PULP CANAL COMPLICATIONS



S6

X-ray Control

Verification of the permeability with a K10 file in each canal

Registration of the working length with an apex locator (EndoPilot, Komet)



PULP CANAL COMPLICATIONS



S7

Root Canal Shapping

Use of the Reflex Komet System

(Endopilot + Procodile Q) with a constant irrigation of 2,5 % NaOCl

Verification with Gutta Percha cone of the apical adjustment



PULP CANAL COMPLICATIONS



S7

Root Canal Filling

Use of the Gutta-Smart (Dentsply) to perform the warm gutta percha vertical technique and temporary obturation with a Cavit (3M)



REFERENCES

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2. Gambarini G, Massimo G, Morese A., et al Precision of Dynamic Navigation to Perform Endodontic Ultraconservative Access Cavities: A Preliminary In Vitro Analysis. J Endod. 2020;46:1286-90
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4. Connert T, Leontiev W, et al. Real-Time Guided Endodontics with a Miniaturized Dynamic Navigation System Versus Conventional Freehand Endodontic Access Cavity Preparation: Substance Loss and Procedure Time. J Endod. 2021;47:1951-56
5. Torres A, Boelen GJ, Lambrechts P, Pedano MS, Jacobs R. Dynamic navigation: a laboratory study on the accuracy and potential use of guided root canal treatment. Int Endod J. 2021 Sep;54(9):1659-1667