

Double Safety Protocol: A Case Report

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Abstract

Introduction: Root canal treatment (RCT) is the hindmost defensive mechanism option before decision of extraction. The purpose of the report is to document the use of Double Safety Protocol (DSP) in management of the most complicated RCT cases. The complicated cases are characterized by 3 or more difficulties, like calcified, thin long rooted double curvature (S-Shaped). In this case, the root canal treatment will be discussed in details from practical point of view through the author's vision (safe, successful endodontics), with simple, feasible and updated sequences, approaches, techniques, concentrating mostly in Apical Approach (AA) and Reproducible Glide Path (RGP).

Methods: A novel premolar tooth 5 was treated with DSP in one visit session sequentially from A to Z, using K file (Mani Japan), hyflex CD sequence, Coltene. Hand pieces were M4 safety handpiece W and H, C5 handpiece COXO, ELEMENT MOTOR, ELEMENT FREE OBT all from Sybron endo.

Results: An optimized obturation was done for this novel premolar successfully and precisely.

Conclusion: The result of this protocol is a promising, effective, safe in preparing viable glide path with preserving original canal shape.

Recommendations: It needs further testing and evaluations.

Keywords: *Difficult Root Canal Anatomy; Reciprocation Motion NiTi Rotary File*

Literature Review

Mechanical instrumentation of root canal space has been an early objective of endodontic science, beginning in 19th century when pioneers were trying to develop endodontic mechanical instruments [1]. Shaping the root canal facilitates cleaning the canal system and is probably the most important phase in endodontic treatment. It includes the removal of pulp tissue, microorganisms, infected dentine and root canal filling materials. Shaping the canal enhances the efficiency of irrigant and medicaments and optimizes subsequent filling procedures [2].

Reciprocating motion is defined as a repeated backward and forward movements [3].

The overall results regarding the shaping ability and its safety were generally inferior to stain less steel (SS) manual root canal preparation, with higher frequency of iatrogenic errors, including tendency for canal straightening [4,5]. In general, reducing the amplitude of the movement toward a smaller oscillation with a higher frequency decreased the incidence of the iatrogenic errors and mechanical damages but often remained higher than SS manual preparation [6,7].

The other common observation after root canal preparation (RCP) with mechanical SS files was that increasing the size of the preparation risked a higher incidence of procedural errors [7-10].

Although there are many systems on the market, the tendency is to limit use to the scouting phase prior to shaping procedures, to obtain a glide path. this would minimize the adverse effects of SS files especially in larger more rigid sizes. despite the widespread use of mechanical SS files, there is still lack of scientific evidence on their efficacy [5].

SS files used for glide path management should be used with equal 30° forwards and backwards movement in a reciprocating handpiece (M4 Safety Handpiece, Sybron Endo, KERR). The primary observations regarding small SS files for glide path management seems to be promising, but studies are lacking on how they would fare in calcified, curved and complex canals [11]. So, I introduced my own experience as double safety protocol (DSP) as case report.

Case Report

A healthy 58 year old female was referred to me for evaluation and treatment of tooth number 5. The patient reported pain and sensitivity to cold and hot. after clinical and radiographic examination (Figure 1A), the diagnosis was acute irreversible pulpitis of tooth number 5. root canal treatment was recommended.

After informed consent was obtained. the tooth was anesthetized with articaine 4%, epinephrine 100,000. isolation with RD was done access opening with removal of caries was done from this point, the protocol was started as 4 steps:

- Step 1: Apical Approach. AA step
- Step 2: Reproducible Glide Path RGP step
- Step 3: Cleaning and Shaping. C and S step
- Step 4: Obturation. OBT step.

Step 1: Apical Approach step

After accessing and irrigation, we started to use scouting, tracing k file number 8 (Mani, Japan) k file handle is most convenient handle with M 4 handpiece. the manual use of k file was done by watch winding motion, in addition of EDTA gel, solution up to feel light side wall resistance, then change to stroke of quarter turn and pull motion, finally removal of file, irrigation. after that insert anew 8 k file with same sequence to gain more 1 - 2 mm in length. repeat it Up to reach the predicable apex. initial working length confirmation was done apex locator (NSK, JAPAN).

Once, we got the proposed apex, never remove the initial apical file, then we started:

- Initial working length determination by apex locator
- Then start from this point step 2, RGP Step.



Figure 1A: Pre-operative X-Ray.



Figure 1B: X-Ray with initial apical file.



Figure 1C: Apical approach was done by 58 K-files below #15.

Step 2: Reproducible Glide Path (RGP)

Reproducible means is easy to apply. as applicable also easy to make it viable by fixing most of variables during preparation of it as it was done by automated mechanical preparation. it was done by using handpiece s with fixed reciprocation. the first handpiece used was M 4 safety for k file, by especially sequence as pre-curved, preinserted in the canal to the full length with tightness, then attach the handpiece head of M4 to file which was in the canal, finally active the handpiece to work, starting by very short stroke then increase it gradually up to complete looseness feeling of it in the canal.

The sequence of the procedures is very essential, also the sequential manner of files is very critical from 8, 10, 12 and 15 maximally (below 20) is very important more than 15 (Figure 2A).

The second handpiece is C5 for NiTi rotary file of 2,4% taper below 25 size (Figure 2B). fixed reciprocation is 90 degree 10:1. the sequence of C5 is like before, pre-curved, pre-insertion, attachment then activation sequentially. about rotary file was started by 2% with smaller size, increased gradually then 4%. the used rotary in our case was hyflex CM, crown down from Coltene.

RGP sequence of steps:

- Pre-curving
- Pre-insertion

- Attachment
- Activation

Sequence of handpieces

- M4 for k file
- C5 for NiTi rotary
- Sequence of size and taper:
- Smaller to larger
- 2% to 4% taper

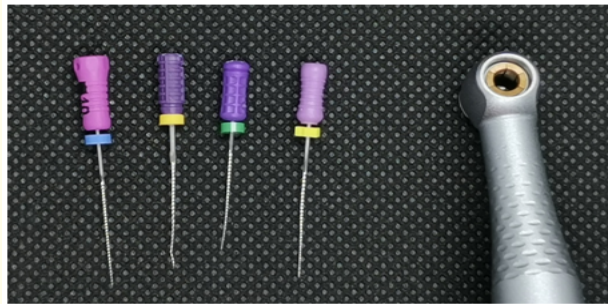


Figure 2A: M for handpiece from W and H limited company Austria + K file #10.

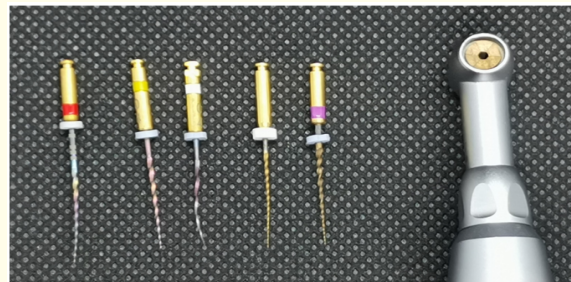


Figure 2B: C5 from coxo limited company-china.



Figure 2C: Final working length X-Ray.

Step 3: Cleaning and shaping (C and S)

In our case, we used hyflex EDM rotary files from coltene. Before C and S, we confirmed final working length by apex locator from NSK (Figure 3A-3C), after that we started C and S sequentially, keeping in mind copious irrigation by EDTA, Naocl, recapitulation before new file insertion to the canal patency.



Figure 3A: Hyflex EDM rotary files from Coltene Switzerland.



Figure 3B: Mastercone X-Ray.

Step 4: Obturation (OBT)

After checking of master cone with x ray, final irrigation was done by Naocl, then saline flushing, dryness. OBT was done by element free OBT system from sypron endo with sealer of AH10 plus jet from dentsply (Figure 4A and 4B).

Discussion

The occurrence of accidents increases during shaping and cleaning of the root canal system, mainly in curved root canals. therefore, one of the in order to improve their performance, endodontic instruments had their physical and mechanical properties enhanced [12].



Figure 4A: Element free obturation system from Sypron Endo.



Figure 4B: Postoperative X-Ray.

One of the most promising evolution in endodontics is an oscillating motion (reciprocation motion). by its pros and cons, I tried to combine in this protocol between different motions, (rotational, reciprocating), to make endodontics not only safe but double safer. in this protocol, I tried to overcome the all inherent, iatrogenic errors of SS files by improving the quality of preparation in AA step with highly tactile sensation work, in RGP step with pre-curving, pre-insertion, SS files below 15, NiTi only 2,4% taper only so mechanical preparation errors, like straightening, zipping apical perforation etc. were limited.

Conclusion

The result of this protocol is technically a treatment modality for difficult cases. It showed effective, safely glide path preparation with preserving original root canal shape. the using of fixed reciprocation motion with k file, rotary NiTi files proved fantastic results.

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