

Redefining Single Visit Endodontic Protocol

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INTRODUCTION

Root canal treatment (RCT) or endodontics is a widely sought out therapeutic option in dentistry for rescuing tooth from pulpal and periapical pathologies, which otherwise would end up in extractions. However, number of visits indicated for successful RCT continues to be a matter of debate among clinicians. Though multi visit RCT has been a time tested protocol in endodontics, the single visit version has recently generated considerable interest,

notwithstanding its reporting even as early as in 1880s.¹

Multi visit endodontics has provision for addressing episodes of 'infective flare ups' through intra canal dressings (calcium hydroxide) and antibacterial agents, followed by obturation in subsequent visits.² The hydroxyl ions from highly alkaline calcium hydroxide reduce bacterial growth in root canals through lysis of its proteins/toxins and minimize the inflammatory reactions by inhibiting

ABSTRACT:

With the advent of new rotary instruments and equipments, single visit endodontics has spawned considerable interest in dental practice. However, little consensus exist regarding the right procedures: canal preparation, irrigation, debridement and obturation, to be followed for this modality. Here in, we report a simple protocol for single visit endodontics, adhering to basic principles of root canal treatment with routinely used instruments and materials. The case series involved all types of teeth: upper/lower and single/multi rooted. The high rate of success with respect to treatment outcome and post operative pain observed in this series validate our protocol on single visit endodontics as a reliable, economical and predictable option.

Key words: Single visit endodontics, Crown down method, Lateral condensation

interleukins (IL1 α), tumor necrosis factor (TNF α) and calcitonin gene related peptides (CGRP).³ In contrast, single visit endodontics involves conservative non surgical treatment of an endodontically involved tooth with complete biomechanical cleansing, shaping, and obturation of the root canal in one visit. This method does not rely on calcium hydroxide dressings and see no major difference in the clinical outcome between the two. Moreover, risk for root canal contamination is also reported to be high with multi visit.⁴ Finally; from a statistical perspective; systematic reviews/meta-analysis, too have strong evidences in favour of single visit endodontics, in terms of post operative pain and healing of the periapical lesion.⁵ Nevertheless; the resurge in single visit RCT and its success rate, to some extent has been attributed to the advancements in endodontic armamentarium: surgical microscopes/magnifying loupes, nickel titanium (NiTi) rotary instruments, apex locators, better disinfecting and sealing agents/materials, injectable obturation systems and digital radiography.

In this context, it is imperative to evaluate whether single visit endodontics can be used as a predictable treatment for upper/lower/single/multi rooted teeth without the use of expensive and sophisticated instruments/equipments. This would make available the benefits of single visit endodontics to a larger section of patients at affordable cost. Here, with a case series involving all types of teeth, we present a protocol for single visit root canal treatment with routinely used instruments and methods.

Case report

Thirty patients aged 18-60 yrs and scheduled for root canal treatment were selected from the daily OPD for single visit RCT. Those with cellulitis and profuse discharge from root canals were excluded.

After written informed consent, patients were given appropriate local anaesthesia with 2% lignocaine and 1:80,000 adrenaline, (Lignospan Special, Septodont Inc, Delaware, USA) followed by rubber dam (Dentsply, Addlestone, UK) application. Coronal access to pulp chamber was made by ISO Ø 016 round diamond bur and cavity enlargement by Endo-Z bur (Dentsply Maillefer, Switzerland). 'Crown down' technique was used for canal preparation using ProTaper NiTi (Dentsply, Maillefer, Switzerland) and ISO K# stainless steel files (Mani, Tochigi, Japan). After irrigation and scouting with ISO K#10 files (Mani, Tochigi, Japan) canal enlargement was sequentially done by

ProTaper SX, S1 and S2 files till ISO K#15 file. At this point, working length was determined by periapical radiograph. Finally ProTaper finishing file F1 was used after which apical canal width was refined with an ISO #20 file. If it was snugly fitting to the apex, preparation was assumed to be complete; otherwise instrumentation was continued till finishing file F2. Removal of smear layer was done with 'Glyde' (Dentsply, Addlestone, UK), a root canal conditioner consisting of ethylene-diamine-tetra-acetic acid (EDTA) and carbamide peroxide in a water soluble base. After each file, canal was irrigated with 5.2% sodium hypochlorite and recapitulated with ISO size #10 file. For oval and 'C' shaped canals, pre-curved stainless steel ISO files were used. Lastly, irrigation was completed with 2% chlorhexidine. Canal was then dried by ProTaper paper points and obturated with ProTaper gutta percha and AH Plus sealer (Dentsply, Addlestone, UK) by 'lateral condensation' method. Access cavity was filled with light cure composite, Ceram X duo (Dentsply, Konstanz, Germany). Occlusal reduction was done in cases of tender teeth. Patients were given antibiotics/non steroidal anti inflammatory drugs and were followed up to 2-5 months. Conventional instruments and materials used for the cases are shown in Figure 1. Representative cases of single visit RCT are shown in Figures 2-6.

Discussion

Single visit endodontics has several advantages: few appointments, no repeat anaesthesia/rubber dam application, less microbial contamination and immediate restoration. Further, here the clinician need not remember the canal for next sitting. It is generally indicated for (1) vital pulp exposures in caries/trauma, (2) mutilated crowns, (3) abutments and (4) medically compromised/non ambulatory patients who cannot afford multi visits. Conversely, it is not indicated for unduly curved/calcified canals, perforations/ledges/broken instruments, previously attempted/failed cases and in cellulitis/abscesses. It may also be not feasible for child patients and those with temporomandibular/neuromuscular disorders. Preferably, it is better to keep duration of single visit endodontics to 40-45 minutes. These tenets have been well laid down in Olie's criteria for single visit RCT.⁶

Clinical expertise and selection of appropriate tools/technique is important in single visit RCT. Central to it is achieving a straight line access to root apex and meticulous debridement/disinfection/shaping of the canal prior to root filling. Complexity of tooth anatomy is to be rightly judged while



Fig. 1: Instruments and materials for single visit endodontics

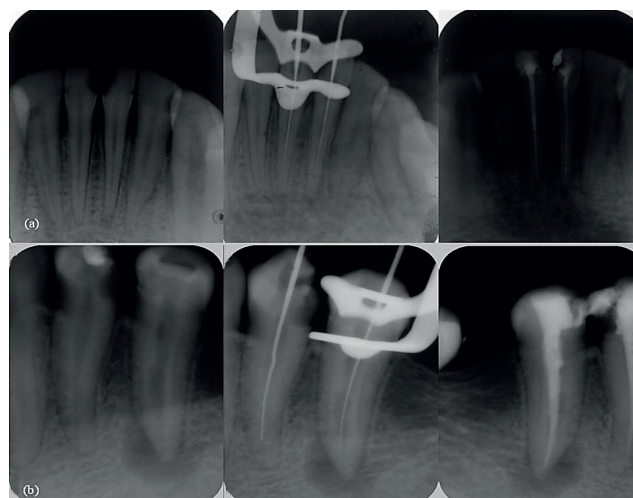


Fig. 2: Pre-intra and post-operative periapical radiographs of lower (a) incisors and (b) premolars

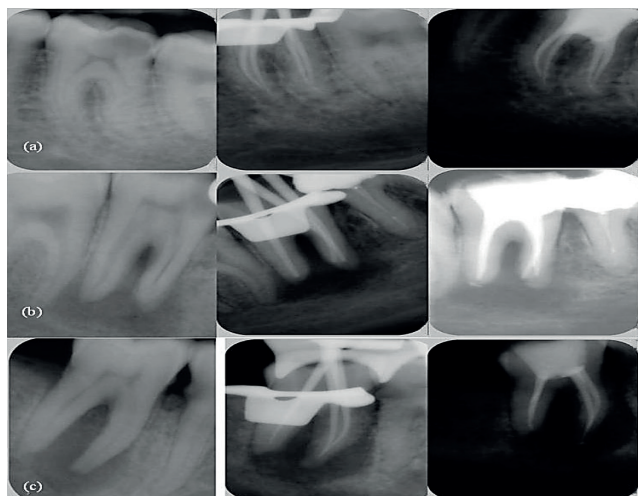


Fig. 3: Pre-intra and post-operative periapical radiographs of lower molars (a) first, (b) second and (c) third

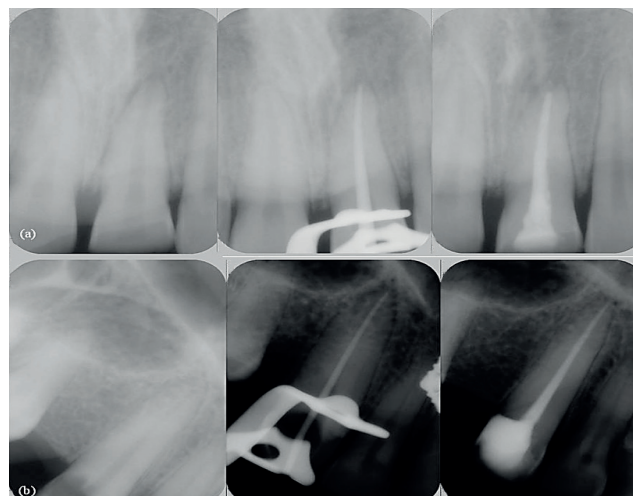


Fig. 4: Pre-intra and post-operative periapical radiographs of upper (a) incisor and (b) canine

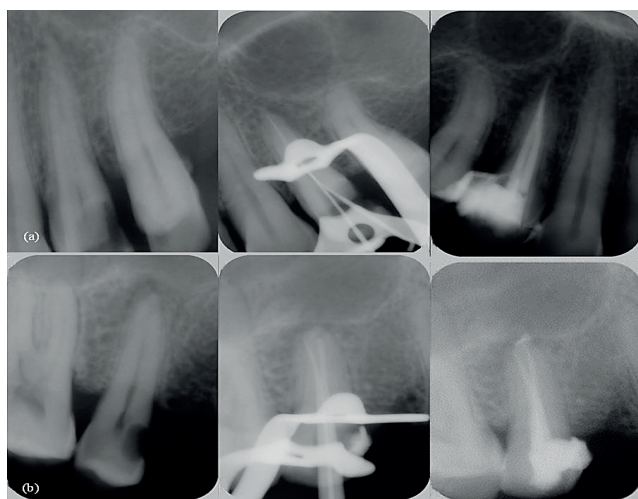


Fig. 5: Pre-intra and post-operative periapical radiographs of upper premolars (a) first and (b) second

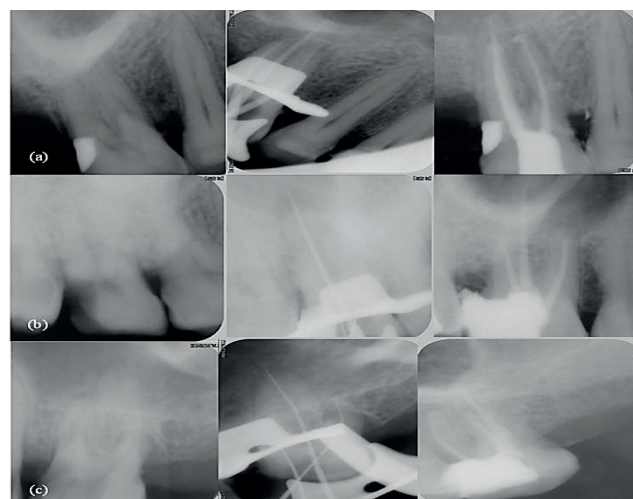


Fig. 6: Pre-intra and post-operative periapical radiographs of upper molars (a) first (b) second and (c) third

making the treatment plan and this would decide for either single or multi visit RCT. 'Crown down' and 'step back' techniques are two methods in root canal preparation based on direction of instrumentation; the former starts from the coronal part of the canal towards the apical area where as the latter is in the reverse direction.¹ NiTi rotary instruments in a crown down approach for canal preparation were used in these patients which ensured a flared preparation with small apical enlargement. NiTi files are cited to produce well shaped canals with few iatrogenic problems than stainless steel versions and to have less postoperative pain, due to its file design and the crown down modality.⁷ The hybrid method; a combination of two, was effective in cases with extremely curved canals. Electronic apex locators, based on the principles of resistance, impedance and frequency are a recent innovation in determining the working length to an accuracy of 0.5mm. Similarly, ultrasonics in combination with irrigants is another fresh addition for canal debridement. However, neither apex locators nor ultrasonics were used; instead, worked with hand instruments and two reagents: sodium hypochlorite and chlorhexidine gluconate. Sodium hypochlorite (2.5%) with its ability to liberate free chlorine has antimicrobial as well as solvent action on root canal debris through protein breakdown. Alternatively, chlorhexidine (2%) has a broader and sustained action on microbes than sodium hypochlorite. Root canal instrumentation results in a smear layer which is an organic/inorganic mix of dentinal shavings and necrotic debris of pulp/microorganisms. Removal of this layer is essential since it acts as a nidus for microbes and tends to alter dentinal tubule surface, which in turn jeopardizes the innate adaptation of obturation materials to dentine.⁸ So, adequate care was taken to eliminate the smear layer with 'Glyde,' an EDTA containing canal lubricant.

Obturation of the canals was done by lateral condensation method, where a wedge shaped spreader was pressed to move the gutta percha laterally.⁹ This type of condensation goes well with a canal aared from apex to coronal direction as prepared by crown down method in this series. Gutta percha condensation done in the same sitting deprives microbes of essential nutrients. Also, the zinc ions liberated from it has antibacterial action. As root canal sealant, 'AH Plus' a thermoplastic 'epoxide-amine' paste was used. Another material which is widely used is mineral trioxide aggregate (MTA),

which contains tricalcium-silicate, aluminate, oxides, and bismuth oxide. It has a high alkaline pH (12.5) like calcium hydroxide which makes it antibacterial.⁸ Yet, the multiple utilities of AH Plus: high biocompatibility, dimensional stability, antibacterial and self adhesive properties were more appealing and was found to be very effective.

Post operative pain is an important issue in single visit endodontics. In our 30 cases, only three were tender on percussion after obturation, which became asymptomatic in the next 24-48hrs. This was higher than the results discussed in a recent review.¹⁰ Success rate of 100% noticed in our series was also higher than those reported in another review.¹¹ This was because cases with cellulitis and draining canals were avoided and meticulous standards were maintained throughout all the cases.

Conclusion

A simple and reliable protocol for single visit RCT is presented. The case series highlighted the importance of clinical judgment and correct diagnosis for pursuing this type of endodontics. It also proved that costly and advanced equipments/instruments need not be a restraining factor for this versatile treatment, which can resolve the morbidity associated with tooth pulp exposures. Successful results from all types of teeth proved that the protocol can be a viable guide line for single visit endodontics.

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