Endodontic Report - Jamie Nelson

This is the winning entry to the 2015 Young Dentist Endodontic Award

This Case: CY – “It ain’t over till the fat lady sings”

‘I always like to gauge what the patient wishes to gain from the experience and make a habit of sitting with them for five to 10 minutes trying to gain the information required to help with any difficult decisions’

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- Abstract
- Case Details
- Presenting Complaint: CY attended the practice initially for a second opinion, as had been informed that the tooth was unable to be saved and would require extraction. The patient was also getting pain from her LR6, the pain itself was characterised by jump up to a 9/10 at times
- HPC: The patient initially had pain from the tooth one month ago, but the pain then subsided
- Examination findings:
  - EO: Right Submandibular Lymphadenopathy, with mild tenderness
  - IO:
    - Soft tissues – Tenderness to buccal palpation LR6
    - Hard Tissues – LR6 TTP and grade 1 mobile, Occlusal caries seen LL6, LL7 and LR6
    - Perio – BPE – 222, 422 (9mm pocket mesial LR6), OH – poor, 50% plaque score
  - Vitality (sensibility): LR6 non-responsive to Endofrost (-50°C)
- Radiographic Report
  - SITE: Right and Left, Upper and Lower, distal of 7s to mesial of 4s
  - JUSTIFICATION: Caries detection and periapical pathology analysis of LR6
  - EXPOSURE: 0.25ms, 6mA, 60kV
  - REPORT:
    - Caries - Occlusal radiolucency’s LR6, LL6 and LL7
    - Path - Furcation obliteration LR6
    - Perio – good bone levels, no subgingival calculus
  - Grade: 1
  - Reporting: Long Cone Periapical Radiograph (LCPA) LR6

Radiographic Report

- SITE: LR6
- EXPOSURE: 0.2ms, 6mA, 60kV
- GRADE: 1
- REPORT:
  - Caries: Occlusal radiolucency LR6
Perio: good bone levels, no subgingival calculus, PD space widening around mesial portion of the tooth

To summarise the findings, the patient attended with a grade 1 mobile LR6, which was TTP, had a 9mm pocket mesially and was negative to sensitivity testing. The LCPA radiograph of the LR6 showed a very large periapical radiolucency around the mesial portion of the LR6, external root resorption around the mesial root, widening of the periodontal ligament (PDL) space mesially and furcation obliteration. With all of this in mind it leads us to a differential diagnosis of:

(As originally outlined by Simon et al)  
- Purely endodontic lesion  
- Perio-endo lesion  
- Primary peri  
- Primary endo  
- Radicular cyst

With all the symptoms taken into account I came to a provisional diagnosis of an acute flare up of chronic periapical periodontitis, in which sinus drainage had been established through the mesial pocket.

Prognostic:
Due to size of periapical (PA) area, mobility, 9mm pocket, communication with oral cavity and mesial external root resorption, the prognosis for this tooth is relatively poor, especially as MTA was not available to me at the practice. All options were discussed with the patient and she wished for the RCT to be done here at the practice and completed by me, whom has a very keen interest in endodontics but no specialist training.

So a treatment plan was drawn up and the patient happy for treatment to begin.

Treatment plan:
Acute Phase: extirpate the LR6, course of antibiotics: 500mg peroxide

Amoxicillin TDS five days (due to systemic involvement of the lymph nodes)
Stabilisation phase: Treat the periapical issues, avoiding root canal dehiscence (RISD) on the LR6, incase of a peri-endo origin, in which cell damage caused by the RISD can limit the regeneration potential for the endodontic treatment 41, OHI, diet advice, fluoride application, Smoking cessation and a fluoride toothpaste prescription (5000ppm).  
Restorative phase: Restore various lesions in LR6 and LL7. Complete root treatment on LR6, due to degree of tooth tissue remaining if a conservative access can be cut, restore with GIC and composite.

Maintenance Phase: Review RCT and peri at 5, 6 and 12 months.
Recall phase: Cartes risk – High, Perio Risk – High, Oral cancer risk – medium, 5-monthly CE

Treatment Completed
First visit: LR6 extirpation
A minimally invasive access was cut into the LR6 – by preserving as much tooth tissue as possible it greatly improves the chances of a long term successful endodontic treatment. Ideally all four sides of the tooth need to remain intact, this allows for better isolation and a stronger external tooth structure. Four canals were located and cleaned in the EWL at an ISO size 20 hand file with copious amounts of two per cent sodium hypochlorite; then dressed with lêdermix and restored with GIC. A good access is key to locating canals quickly and by spending slightly longer making it as neat as possible it can really help. (Photos of the access can be seen in Figures 4 and 5)

Second visit: The patient reported she was out of pain after the extirpation was completed, which meant we could proceed to stabilise all other active disease. A supra and sub gingival scale was completed on all teeth except LR6 (incase of peri-endo lesion 42), smoking cessation given, amalgam restorations placed on LL6 and LL7 occlusally and fluoride applied to all teeth.

Third visit:  
RCT stage 1 LR6
The temporary restoration was removed and all four canals re-located using hand files, once re-located the access to each canal was improved using Gates Glidden burs, a size 2 to 1/15 estimated working length (EWL), size 4 to 5mm short of that and finally a size 6 counter sunk into each canal by no more than half the depth of the bur around 3mm, (by doing this it also makes creating Nayyar cores much easier as once the bulk of the GP has been removed the size 6 Gates Glidden bur can be counter sunk once again providing a space for the nayyar core to be placed.
Each canal was then prepared to 2/5’s EWL using protaper rotary instruments sizes S1, S2, F1 and F2. 43

Handfiles were then placed into each canal measured to the EWL and a diagnostic radiograph was taken. When taking a diagnostic radiograph on multi-rooted teeth, I use a mesial swing on the tube head in order to ensure each file is in a separate canal. This can be seen in the diagnostic radiograph figure 6. Once the diagnostic radiograph has been taken the tooth is dressed with non-setting calcium hydroxide and again sealed with GIC.

The radiograph then confirmed the working lengths for each canal as:
- MB – 18mm (OA)
- ML – 18mm (OA)
- DB – 21mm
- DL – 21mm

(0A) indicates open apex

Fourth visit: RCT stage 2 LR6
The obturation stage for this tooth brings its own challenges as there is no guarantee that a seal can be achieved with an open apex present, which is why conventionally MTA is used to close the open area and allow for an effective seal and this is what I would have done had MTA been available. Instead, I adopted a technique that had never been formally taught to me and prepared the mesial canals from past the radiographic apex in order to ensure effective cleaning at the open apex. Once all of the canals had been prepared to their EWLs to size F2 protaper 43 with thorough irrigation of two per cent sodium hypochlorite (the irrigant used is warmed to increase effectiveness 46 and after placement a handfile is used to ensure the irrigant reaches the apex) the total time the irrigant spends in the canals cumulatively was 10 + minutes, this combined with the time of the procedure is in excess of 60 minutes. 47

Obturation – a single point obturation technique was used, using an eight per cent ISO 25 F2 Protaper point, using again a technique never taught to me. I placed the GP point beyond the apex until an
apical twist back/tug back could be achieved (resistance to rotational or vertical displacement of the point once in place). Once that was achieved the point was marked at the coronal end, this leaves the point long, essentially overshooting beyond the apex, but giving an apical seal. This “overshoot” is then removed by once again measuring the GP and simply snipping off the excess from the apical end (figure 7). The shortened GP has essentially a custom thickness at the apex now and fits snugly into the canal, hopefully, achieving an apical seal.

The canals were then lined with TubliSeal and the GP cemented into each canal. GIC was used to line the GP as this provides a dynamic bond with the tooth, reducing the risk of GP contamination 6. The restoration can be seen in figure 8.

Once the restoration was complete, the post operative radiograph was taken (figure 9).

The radiograph shows that the GP is to length, has a good taper, good density and doesn’t show any voids.

Review stage:
The patient attended her three-six-and-nine month review appointments and has demonstrated a huge improvement as summarised by Table 1.

Also during the nine month review, the nine month post op endodontic radiograph was taken (figure 10). The radiograph showed an almost complete resolution of the pathology and has demonstrated a successful endodontic treatment.

The Results
Taking into account all of the above, the Table 1 shows a clinical breakdown of the L6i comparing the pre and post treatment results, as well as both pre-operative and 9 month post operative radiographs.

This case demonstrates that no matter how bleak the outlook there’s always a possibility for success. I myself treat difficult cases with an attitude summed up very nicely by Henry Ford “Obstacles are those frightful things you see when you take your eyes off your goal” 7.

References:
3) Clifford J. Ruddle - The ProTaper Technique Shaping the Future of Endodontics

About the author
The son of a dentist and a former Kings College student, Jamie works part time in two practices. He trained at The Bromley Road Dental Surgery in Colchester and at the end of his training year, all the dentists in the practice decided to give up a proportion of their units of dental activity to keep him in the practice. It was here that he carried out the case which made him one of the winners of the award. He also works at a private practice in Basildon where his colleagues assign most endodontic cases to him.
Young Dentist Endodontic Award
Non surgical endodontic treatment of the maxillary right central incisor with incomplete root formation by Rupal Shah. This is the second place entry for the 2013 Young Dentist Endodontic Award

This report discusses the successful management of an 10-year-old patient, who required root canal treatment of her immature upper right central incisor, following a previous history of trauma. She was initially referred to the paediatric department at Birmingham Dental Hospital by her general dental practitioner. Following assessment and diagnosis, she underwent root canal therapy of her upper right central incisor, which was deemed to be non-vital and had an open apex.

Patient details
10 year old female, school pupil

History

Presenting Complaint: The patient’s chief complaint was her ‘fractured front teeth’ which she did not like the appearance of.

History of Presenting Complaint: History of presenting complaint revealed that she had suffered trauma in November 2011, when she had fallen in the school playground and knocked her front teeth on metal railings. Both upper central incisors had fractured, but there was no obvious displacement at the time of injury.

No loss of consciousness or head injuries had been noted, but there was a laceration to the upper lip. She initially attended Heartlands Hospital, from which she was referred to Birmingham Children’s Hospital for a chest x-ray, as the tooth fragments had not been accounted for. The chest x-ray reported no abnormalities.

The patient then saw her GDP one day after the injury, and had adhesive composite restorations placed on the UR1 and UL1. However, these were subsequently lost after six weeks, and were not replaced.

Medical History
The patient suffers from asthma, for which she uses Ventolin and Beclomethasone inhalers, as and when required. She has not had any previous hospitalisations due to her asthma.

Dental History
There is no history of any other previous trauma. Co-operation appeared to be reduced as the patient had not had any previous extensive dental treatment, and was therefore quite nervous.

Examination

Extra - oral
Scarring was noted in the midline of the patient’s upper lip; she had sustained a laceration to this area at the time of injury.

Intra - oral
Soft tissues
Oral hygiene was fair, but some gingival inflammation was present.

Hard tissues
Teeth present were: 6|6|2|2 12|12|6|6

Unrestored enamel-dentine fractures were evident on the UR1 and UL1, with the UR1 fracture being fairly extensive. Caries was noted on the LL1.

Occlusion
Occlusal analysis revealed a class 1 incisor relationship with class 2 right molars, and class 1 left molars.

Special Investigations
All maxillary incisors responded positively to ethyl chloride. The UR2, UL1 and LL2 responded positively to Electric Pulp Tester whilst the UR1 tested negative. None of the maxillary incisors were tender to percussion and no lachrymal sinus or tenderness, discolouration or mobility was noted.

Radiographic examination

Periapical Radiographs
Long cone periapical radiographs UR21, UL22 (Fig 1.1) revealed open apices on all maxillary incisors, and PDL widening around the apex of the UR1. It also showed the unrestored enamel-dentine fractures on both maxillary central incisors.

Upper Standard Occlusal Radiograph
This radiograph confirmed PDL widening around the UR1, with associated periapical pathology. It also shows the open apices of all four upper incisors, as well as the presence of maxillary canines.

Soft Tissue X-ray
The soft tissue radiograph of the upper lip revealed no abnormalities, and no evidence of any tooth fragments in the lip (Fig 1.5).

Diagnoses
1. Enamel-dentine crown fractures UR1 and UL1
2. Likely non-vital UR1; chronic apical periodontitis secondary to trauma
3. Caries LL2
4. Anxious patient

Treatment options
1. Test cavity UR1, and proceed to non-surgical root canal therapy with MTA apical plug if non-vital +/- RA sedation (Birmingham Dental Hospital)
2. The patient was quite nervous, so the use of RA sedation was discussed; a RA sedation information sheet was given to the patient
3. Extraction of the UR1 with or without prosthetic replacement (GDP).

Treatment plan
1. Immediate: cover exposed dentine UR1 and UL1 with GIC (Birmingham Dental Hospital)
2. OHIL dietary analysis and advice, hiertwing radiographs (GDP)
3. Scale and polish, restore caries LL2, fissure seal 1st permanent molars (GDP)
4. Test cavity UR1 and proceed to root canal treatment if non-vital +/- RA sedation. Dress with non-setting calcium hydroxide until stable. (Birmingham Dental Hospital)
5. Adhesive composite restorations UR1 and UL1 +/- RA sedation (Birmingham Dental Hospital)
6. Review (Birmingham Dental Hospital)

Treatment protocol
Appropriate verbal and written consent was obtained prior to commencing treatment. As a test cavity was carried out on the UR1, no local anaesthetic was required. Isolation was achieved with dry dam, wedges and Orosol caulking material. The tooth, as expected, was found to be non-vital, and ex- torted and dressed with non-setting calcium hydroxide as an intracanal medicament. A temporary dressing of a cotton wool pledget and GIC was placed in the access cavity. This initial management was carried out under RA sedation.

At two subsequent visits, the patient mentioned the tooth had been symptomatic. Therefore, it was decided to re-access and re-irrigate with 2.5 per cent sodium hypochlorite irrigation. The working length was measured as 21mm.

Chemo-mechanical cleaning of the canal was carried out using K-flex handfiles, interdental brushes, and 2.5 per cent sodium hypochlorite irrigation. The actual apical size of the canal was 80, due to the immature apex and lack of apical barrier. An apical stepback technique was used to prepare the wide canal.

The canal was then cleaned with non-setting calcium hydroxide, a cotton wool pledget and GIC. After this visit, the patient felt less anxious, and opted to have future treatment without RA sedation.

At the next visit, the patient mentioned the tooth had been symptomatic. Therefore, it was decided to re-access and re-irrigate with 2.5 per cent sodium hypochlorite solution. The tooth was again temporarily dressed with calcium hydroxide, a cotton wool pledget and GIC.

At the following appointment, the patient was asymptomatic. The canal was re-irrigated with sodium hypochlorite and dried with paper points. A master cone periapical radiograph was taken (Fig 1.5) to confirm the length, and a 4mm apical plug of mineral trioxide aggregate was placed using the Micro Apical Placement System (Fig 1.6). The remaining canal space was obturated with thermoplastised GP (Obtura) and sealer using warm vertical gutta-percha. A master cone periapical radiograph was taken (Fig 1.5) to confirm the length, and a 4mm apical plug of mineral trioxide aggregate was placed using the Micro Apical Placement System (Fig 1.6). The remaining canal space was obturated with thermoplastised GP (Obtura) and sealer using warm vertical gutta-percha.

Vitreous lining was placed over the GP, and the access cavity was restored with composite resin to create an effective coronal seal (Fig 1.7).

Review
The patient recently attended for a six month review, which reported no symptoms associated with the UR1. With regards to the UL1, there was a query whether there was some periodontal ligament widening, however the sensibility tests were inconclusive and the tooth was asymptomatic. It was therefore decided to continue to monitor the UL1 for now, and review the patient again in a further six months.

Discussion
The patient’s traumatic incident had resulted in pulp necrosis of the UR1 and consequently an incomplete formation of the root. Effective cleaning of the canal walls was achieved with large K-flex handfiles, interdental brushes and sodium hypochlorite irrigation. The MTA technique allowed for successful obturation of the maxillary central incisor with an open apex.

I successfully completed this treatment in an anxious 10-year old girl, who had not had any previous extensive dental treatment. I overcame this by using different behaviour management techniques including tell-show-do, and ensuring that all appointments were not of too long a duration. This meant compliance was not lost. In fact, the patient initially began treatment under RA sedation due to her anxiety, but at subsequent visits, decided she no longer wanted it, and appeared to cope well without it.

Finally, I decided to submit this case, because I feel that I obtained an excellent final outcome, both clinically and radiographically. The tooth was symptom free at the six-month review appointment at Birmingham Dental Hospital. The 4mm MTA apical plug was to the correct length, and radiographically, there were no voids in the thermoplastic GP. The access cavity was sealed with a vitreous lining, followed by adhesive composite restoration, ensuring a good coronal seal.

The endodontic prognosis for this tooth is good, however the patient is fully aware of the long term consequences of trauma, and the subsequent need for regular dental monitoring and sensibility testing of the traumatised upper incisor teeth.

References
Case report by Lydia Harris
This is the third place entry for the 2015 Young Dentist Endodontic Award

This patient attended in pain from the UL5 and a diagnosis was made of symptomatic Apical Periodontitis. I was aware that the presence of an apical radiolucency, curved roots and a heavily restored crown meant that the tooth had a guarded prognosis, but as the patient was keen to keep the tooth we began root canal treatment. I placed rubber dam, accessed the tooth, located the canals, patency filed and irrigated.

At university I had trained by using the step-back technique with K files, and ProTaper hand files. I had started using rotary instruments in my DF1 placement and I attempted to use the rotary files to my corrected working length, but struggled to do so due to the canal curvature. I had struggled to get to grips with using rotary instruments in more curved canals and I therefore returned to using the step-back technique and K-files.

Upon obturation, I noted that something was awry as the Thermafil would not seat to length. I was aware that the GP was unable to negotiate the canal curvature and a radiograph showed that the gutta percha (GP) was not at length, and some had entered the 2nd canal.

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In order to achieve a satisfactory result, I needed to remove GP using DMZ-IV and Pro-Taper re-treatment files. This was my first experience of removing GP and I was careful to ensure complete removal of the GP, before re-preparing the canals chemically. As I had evidently failed to sufficiently prepare the canals for GP the first time round, I spent some time enlarging the orifice using hand files and using EDTA to ensure I could use the ProTaper files to length prior to obturation. I then obturated using Thermafil, and have subsequently restored the tooth using a porcelain onlay.

An S-shaped curvature or double curvature can make a canal very challenging to negotiate. I learned that using hand files initially can help prepare the canal sufficiently prior to using rotary files. I now know to approach curved canals like these with more caution, and to take time preparing the canals ensuring adequate mechanical preparation. I had never used re-treatment files before and I learnt to use a pecking motion and ensure visualisation of GP on the files. I now feel more confident in doing this and therefore more able to attempt re-root treatment in the future.

I chose a porcelain onlay to restore the tooth as it provided excellent aesthetics, cuspal coverage and also helped to preserve more of the buccal and lingual tooth present, which would have been destroyed had I chosen to perform a crown preparation. The tooth was in the patient’s smile line and she was very pleased with the aesthetic result. Overall, I was pleased with the end result of this root canal treatment and hope that the patient is able to retain this tooth for many years as a result.

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I feel that this case helped me to develop my endodontic skills overall as it involved improving upon a myriad of skills. Firstly, my assessment of a case; I had not previously spent a long time analysing the curvature of the roots and the effect this would have on my method of root filling the tooth. Since this case I have become acutely aware of the need to tailor your technique to the type of roots present, including ensuring adequate access, the need for anticurvature filling, and the advantages and disadvantages of using rotary instrumentation in these cases. Secondly, it made me realise the importance of establishing the aetiology of any problems encountered. I realised that as my GP had not seated to length that I had evidently not prepared the canals adequately and by establishing this aetiology I could therefore improve the outcome by rectifying this problem. I have also realised that acknowledging your own limitations and competency is key in endodontics; I was aware that the initial treatment I provided was poor, but that rectifying it may be difficult. I therefore ensured I informed the patient that I would try my best to improve on the root treatment, but that should it be beyond my competency we would have to consider alternative pathways.

This case helped me improve upon my endodontic planning and also, the techniques involved in S-shaped root canals. It has encouraged me to realise that if an ideal result is not achieved initially, things can be improved upon and should not just be accepted.  

Textbook of Endodontology, Gunnar Bergenholtz, Preben Horsted-Bindslev, Claus Ruti Second Edition

Harty’s Endodontics in Clinical Practice, Bun San Chong, Ninth Edition

About the author
At the time of this case, Lydia was working in a Bristol dental practice as a foundation dentist, in her second year of vocational training.

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