South London DCT
Pan South London - Practical Study Session
Endodontics Rx – Course Aims
Thursday July 28th 2016
Course Aims

• Briefly revise the fundamental causes of loss of vitality of teeth
• Explore the indications for root canal treatment
• Explore the prognostic factors and success rates regarding endodontic treatment.
• Explore ideal access cavity preparation for various teeth
Course Aims

• Explore the principles underpinning endodontic treatment
• Explore the efficacy of various root canal irrigants
• Explore the success rates of endodontic retreatment
• Revise hand filing and introduce reciprocating rotary endodontic techniques
Objectives

• Supplement delegate’s existing knowledge regarding the pathophysiology, assessment and management techniques underpinning conventional endodontic treatment.

• Correctly use stainless steel endodontic files and a rotary reciprocating preparation system to instrument resin blocks

• Prepare a suitable endodontic access cavity in a molar tooth and instrument the canals with a combination of hand files and a rotary reciprocating endodontic preparation system.
Thanks

- LonDEC Team
- QED
- DCT Faculty Teaching team
- You
Didactic Programme

Lecture 1  Introduction and Principles of Endodontic Pathophysiology and Treatment

Lecture 2  Comprehensive Endodontic Assessment, and Prognostic Indicators of Success

Lecture 3  Tips for Successful Practical Endodontics
So why did we develop an interest in Endodontics?

- **Challenge** – difficult things are difficult to do well – I like ‘repetitive skills’ training – I am competitive so I always want to do better
- **Outcome & blame** – it is all down to us no one else
- **Enjoy microscopic dentistry** – I got my first Zeiss in 1995 – it has meant that I can still see what I am doing
- **I wanted to get very good and predictable with the most difficult craft skill of all in dentistry** – it would not defeat me!
Endodontics (from the Greek roots endo- "inside" and odont- "tooth") is the dental specialty concerned with the study and treatment of the dental pulp. In my opinion the discipline also involves dealing with pathology and damage ‘outside the root’
Pulpal Conditions

• Reversible Pulpitis – caries, TSL, acid, chemicals – bleach, recession, leakage, cracked tooth, chemical & iatrogenic

• Pain is not spontaneous and related to stimulus(i) only

• Very common
Pulpal conditions

- AIP

Bender (AIP)

The division of pulpite symptoms into reversible or irreversible pulpitis has been described by several authors. Bender (2000) suggested that AIP is commonly associated with the following pain characteristics:

- Spontaneous and severe typically described as an ‘agonising throb’
- Thermal sensitivity – particularly to hot fluids
- Prolonged pain following the removal of an exacerbating factor
- Sleep interference

Dental pain history & history of presenting complaint
Acute Pulpal Pain

- Pulpal pain can be modulated by a number of factors which include inflammatory mediators and vascular changes (blood flow, volume and pressure).
- The acute pain felt by patients with acute irreversible pulpitis is rarely the first episode of discomfort.
- Typically 60% of teeth become hypersensitive to thermal stimuli during pulpal damage.
- Fortunately for the dental profession 40% of pulps which become necrotic may do so without symptoms.
AIP - Why can cold water & ice help acute pain?

• Inflammatory conditions may be helped by holding cold liquids or objects adjacent to the affected site.

• This is likely to relate to vasoconstriction and a transient reduction of vascular flow within the pulp.
What are our problems?

Treating a patient in acute pain can be a stressful experience for the practitioner as well as the patient and prescribing oral antibiotics may often be seen as a convenient option.
Honest benchmarking - where am I?

- Am I prepared to get stuck in well out of my comfort zone?
- Anatomy of teeth and root canals, LA top up techniques
- Consider using Piezon Ultrasound to go into the pulp
AIP - Where am I?

- Am I predictably able to manage this problem?

How do you make the patient numb?
Pulpal Necrosis - Periapical Periodontitis

- Chronic - +/- exudation
- Acute - +/- spread of infection
Apical pathology associated with pulpal necrosis

- Apical Granuloma - commonest
- Apical Cyst (True or False - Nair 1997)
Facial Swelling - what’s going on here?

- Idiopathic/iatrogenic
- Vascular:
  - Inflammatory
  - Traumatic
  - Autoimmune
  - Metabolic
  - Infective
  - Neoplastic
- Degenerative:
‘Never let the sun go down on pus’
Pulpal Necrosis - Periapical Periodontitis

• Infection – Caries / Developmental / Trauma /
• Micro-leakage – in association with restorations and restoration re-cycling
• Iatrogenic – traumatic exposure followed by infection
Goal is to change & promote the balance to healing – radiographic sign of healing or radiographic improvement should of occurred by 24 months if not then NSRCT not likely to have worked (Wu et al 2009)
Root Pathology

- Fracture / Crack
- Resorption:  
  - Internal  
  - External – inflammatory / replacement  
- Root Perforation:  
  - Pathological  
  - Iatrogenic
Non-Vital Cracked tooth
How would you restore this molar?
Prognosis affected by:

• Presence of multiple cracks
• Presence of pre-RCT periodontal pocketing
• The tooth is terminal tooth of the arch
• Limited evidence – but overall survival for #’d non-vital teeth at 24 months was 85.5% (Tan et al 2006)
A loose, very old, MO Amalgam in a RCT’d maxillary molar – what is going through your mind?
Perio-Endo Lesions

- Primary Perio / Secondary Endo
- Primary Endo / Secondary Perio
- True Combined (Simon et al 1972 / P.V. Abbott classifications)
- Furcation involvement
**Decision-Making**
What endodontic skills do we need and be able to teach to others & why?

- We need to all understand what factors influence Endodontic outcome
Influence of root canal fillings on longevity of direct and indirect restorations placed within the General Dental Services in England and Wales

P. S. K. Lucarotti,^1 M. Lessani,^1 P. J. Lumley^1 and F. J. T. Burke^*^1

Abstract


Aim To consider the survival of root canal treatment provided within the General Dental Services in England and Wales, with failure being defined as re-treatment of a root canal, apical surgery or extraction.

Methods A data set was established consisting of patients, 18 years or older, whose birthdays were included within a set of randomly selected dates and whose restoration records contained the placement of one or more direct restorations or crowns in courses of treatment between September 1990 and January 2002. The history of each root canal-treated tooth was consulted, and the next data used for an intervention on the root canal of the tooth, defined as a re-treatment, apical surgery or extraction, was obtained. Thus, a data set was created of root canal-treated teeth, with the dates of root canal filling placement and the date any re-intervention.

Results Data for over 80,000 different adult patient were analysed, and a total of 10,843 root canal-treated teeth identified from the data over a period of 11 years. The proportion surviving without further treatment in the root canal was estimated at 74% within an observation time of up to 10 years, with survival being strongly correlated with the characteristics of the patient, including age and treatment history, with older patients having root canal treatment with earlier re-intervention than those of younger patients.

Conclusion Within the dataset analysed, an estimated 74% of root canal-treated teeth pass through 10 years without re-treatment, apical surgery or extraction.

Keywords: general dental services, root filling, survival.
Survival rates of NHS RCT’s mandibular 6s

- RCT of 174 lower 6s - 12 NHS practices
- Salford (NW England)
- 90% retained at 5 years - Most failures in first year
- 10% failure: 15 extracted, 1 retreated
- Most important positive statistical significant on tooth survival was presence of crown
- No correlation of tooth survival and quality of post-op radiograph

Factors Affecting the Long-term Results of Endodontic Treatment

Ulf Sjögren, DDS, Björn Häggström, DDS, Göran Sundqvist, DDS, PhD, and Kenneth Wing, DMD, PhD

The influence of various factors that may affect the outcome of root canal therapy was evaluated in 356 patients 8 to 10 yr after the treatment. The results of treatment were directly dependent on the preoperative status of the pulp and periradicular tissues. The rate of success for cases with vital or nonvital pulps but having no periapical radiolucency exceeded 96%, whereas only 85% of the cases with pulp necrosis and periapical radiolucency showed apical healing. The possibility of instrumenting the root canal to its full length and the level of root filling significantly affected the outcome of treatment. Of all the periapical lesions present on previously root-filled teeth, only 62% healed after retreatment. The predictability from clinical and radiographic signs of the treatment outcome in individual cases with preoperative periapical lesions cases was found to be low. Thus, factors which were not measured or identified may be critical to the outcome of endodontic treatment.

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MATERIALS AND METHODS

The aim of the present study was to assess the long-term results of endodontic treatment and to determine the influence of various factors on the outcome of treatment when the treatment had been controlled with anaerobic bacteriological techniques.
Sobering thought – this study was carried out by year 4/5 dental students
Hopefully most are aware of this critical review on Endodontics  Ng et al. (2008 a & b) Int Endod J 41: 6-31

- Pre-operative apical area
- Root filling ending within 2 mm of radiographic apex (instrumentation and obturation)
- Voids within the root-filling (obturation quality)
- Satisfactory restoration coronal seal (post-Rx Rest Dent) – restoration
We need to know, understand and teach others dental anatomy – it is not rocket science
Pulpal vitality an important factor
Electronic Pulp Tester- a great tool

Get the patient to hold the pulp tester and let go when they feel something

Are we dealing with infection or not?
Things that will affect your clinical outcome – pulpal diagnosis

There are other tools that can help with pain chasing fridge cold or hot water ‘dripped’ onto teeth
Chronic Apical Periodontitis means that we need to spend much of our time killing infecting bacteria.
Things that will affect your clinical outcome

Gold Standards – we do all know the difference between standard and guide?

Table 1: Summary of the gold standards for root canal treatment, as described by the European Society of Endodontology (European Society of Endodontology, 2006)

<table>
<thead>
<tr>
<th>Isolation:</th>
<th>By the use of rubber dam</th>
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<tbody>
<tr>
<td>Determining the working length</td>
<td>Use electronic and radiographic methods to determine working length should be as close to the apical constriction as possible – i.e. between 0.5 and 2mm of the radiographic apex. It may be necessary to take more than one working length radiograph</td>
</tr>
<tr>
<td>Preparation of the root canal system</td>
<td>The prepared canal should include the original canal, the apical constriction should be maintained, the canal should end in an apical narrowing, the canal should be tapered from crown to apex</td>
</tr>
<tr>
<td>Irrigation</td>
<td>The irrigant solution should preferably have disinfectant and organic detent dissolving properties, should be delivered in copious amounts as far up the canal as possible without risking extrusion beyond the foramen, and may be delivered by ultrasonic or sonic systems</td>
</tr>
<tr>
<td>Obturation of the root canal system</td>
<td>The quality of the filling must be checked with a radiograph which should show the root apex and preferably 2-3mm of the periradicular region. The filled canal should be completely filled unless a post space is required and contain the original canal. No space should be seen between the canal filling and the canal walls. There should be no canal space visible beyond the end point of the root canal filling</td>
</tr>
<tr>
<td>Assessment of outcome of root canal treatment</td>
<td>Should be assessed at least 1 year and subsequently as required. Favoured outcome: absence of pain, swelling and other symptoms, no sinus tract, no loss of function and radiological evidence of a normal periodontal ligament around the root. Uncertain outcome: periapical lesion remains the same size or has only reduced in size. In this situation it is recommended that the lesion is further monitored for a minimum period of 4 years. If the lesion persists, the tooth may be associated with post-treatment disease. Unfavourable outcome: tooth is associated with signs and symptoms of infection, a radiologically visible lesion has appeared subsequent to treatment or a pre-existing lesion has increased in size, the lesion has remained the same size or only diminished in size during the 4 year assessment period, or continuing root resorption is present. Exception: the presence of scar tissue – an extensive radiological lesion may heal but leave a locally visible, irregularly mineralised area. This tooth should continue to be assessed</td>
</tr>
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Table 2. Summary of factors affecting outcome of root canal treatment (Ng et al 2011a).

<table>
<thead>
<tr>
<th>Study</th>
<th>Success rates</th>
<th>Conditions found to improve periapical healing</th>
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<tr>
<td></td>
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<td>1. The pre-operative absence of periapical lesion</td>
</tr>
<tr>
<td>Success rate of primary root canal treatment (Ng et al 2011a)</td>
<td>83% (95% CI: 81%, 86%)</td>
<td>2. In presence of periapical lesion, the smaller its size</td>
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<td></td>
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<td>3. The absence of a pre-operative sinus tract</td>
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<td>4. Achievement of patency at the canal terminus</td>
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<td>5. Extension of canal cleaning as close as possible to its apical terminus</td>
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<td></td>
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<td>6. The use of EDTA solution as a penultimate wash followed by a final rinse of NaOCl in secondary root treatment cases</td>
</tr>
<tr>
<td>Success rate of secondary root canal treatment (Ng et al 2011a)</td>
<td>80% (95% CI: 78%, 82%)</td>
<td>7. Abstaining from using 2% CHX as an adjunct irrigant to NaOCl solution</td>
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<td>8. Absence of tooth/root perforation</td>
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<td>9. Absence of inter appointment flare up (pain or swelling)</td>
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<td>10. Absence of root canal filling extrusion</td>
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<td>11. Presence of satisfactory coronal restoration</td>
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Clean, Shape & Fill
Clean

- Full length of root canal
- Produce a continuing tapering shape narrowest at apex
- Maintain position of canal within the root
- Allow for adequate cleansing
- Allow for adequate obturation
Fill - 3D filling and sealing of root canal from top to bottom – GP + Sealer
Good Coronal Seal

Sensible Restorative Messages & Management is the key to successful Endodontics
Restoration is a big part of the success.
Peter Briggs  BDS (Hons) MSc MRD RCS FDS RCS (Eng)
www.hodsollhousedental.co.uk