Single-visit Endodontics in SND

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A biological & technical question...

How effectively can we eliminate bacteria regardless of number of appointments?
How effective is our mechanical debridement?

Regardless of instrumentation technique, some 35-40% of root canal walls are left uninstrumented. *(Peters et al. 2001)*

Therefore, complete mechanical instrumentation of the root canal system cannot realistically be achieved. *(Ida & Gutmann 1995; Siqueira et al. 1997; Peters et al. 2001; Peters 2004)*
How effective is our irrigation?

Dynamic irrigation with NaOCl

- Agitation of irrigant ("jiggle" the needle, or file or GP) (Huang et al. 2008, Caron et al. 2010, Saher et al. 2011)


- Sonic/Subsonic (Pasqualini et al. 2010, Blank-Gonçalves et al. 2011)

- Lasers? (Walsh 2012)
How effective are our dressings?

The bacterial load is not significantly reduced by intracanal medication when compared with chemomechanical instrumentation. (Peters et al. 2002; Kvist et al. 2004; Waltimo et al. 2005; Paquette et al. 2006; Manzur et al. 2007; Chand et al. 2008; Rôças & Siqueira 2011)
But …

The complete removal of microorganisms within the root canal system is difficult and probably impossible (Dalton et al. 1998, Siqueira et al. 1999, Shuping et al. 2000 Siqueira & Rôças 2011).

Therefore …

The practical aim of endodontic therapy is to reduce the microbial load to very low levels, such that the body’s immune system is able to respond to the microbial insult (Byström & Sundqvist 1981, 1983; Byström et al. 1985; Vera et al. 2012).
Evidence for entombment exists in those situations where root canals obturated despite positive cultures are found to heal, particularly when filled very close (0-0.5mm) to the apex. (Sjögren et al. 1997; Peters & Wesselink 2002 Chugal et al. 2003, Schaeffer et al. 2005, Stoll et al. 2005, Ng et al. 2010)
So, obturation will achieve the same result whether at the first appointment or the fifth (Peters et al. 1995)
An evidence-based question...

Is there a difference in outcome between single- and multi-visit endodontics?
Single-visit slightly more effective but no significant difference
Evidence since Sathorn et al. (2005)

- Three systematic reviews (Figini et al. 2007; Ng et al. 2008; Su et al. 2011)
- Four randomised controlled trials (Molander et al. 2007; Penesis et al. 2008; Xiao et al. 2010; Paredes-Vieyra & Enriquez 2012)
- One Bayesian decision support model (Suebnukarn et al. 2008)
- Two prospective cohort studies (de Chevigny et al. 2008; Cotton et al. 2008)
- Two retrospective cohort studies (Gesi et al. 2006; Fleming et al. 2010)
Of the 13 studies, there is evidence of no difference in healing rates between single- and multiple-visit endodontic treatment.

To summarise…

And…

There is no difference in prevalence of postoperative pain/flare-up between single- and multiple-visit treatment

In the USA, the annual number of RCTs is 9.7 million (Manski & Brown 2007)

70% of USA endodontists would treat a necrotic pulp and chronic apical abscess in one visit (Whitten et al. 1996)

Most undergrad (70%) teaching institutions in the USA encourage single-visit root canal treatment (Qualtrough et al. 1999)

MDS: ~30% of cases are single-visit
Single-visit Endodontics

**Advantages**
- Less anxiety and discomfort for patient
- No interappointment leakage or fracture
- Tooth ready for definitive restoration earlier
- Cost effective
  - Less time off work
  - Less traveling
- Benefits to health system

**Disadvantages**
- Long appointments tiring for patient and operator
- Not practical for difficult cases
- Not indicated if canal can’t be dried
- Technical standards may be compromised

(Chng 2003; Wahl 2008; Patel & Barnes 2011)
Other factors

- Overall, patients strongly preferred single-over multiple-visit treatment (Sathorn et al. 2008)
- In a public institution setting single-visit treatment costs society some 23% less than multiple visit (Sathorn et al. 2008)

**But…**

- Operator preference rather than biological or patient considerations appear to be the primary determinant of treatment choice (Sathorn et al. 2009)
Endodontics and Special Needs Patients

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RESULTS

- Most common reason for GDPs not undertaking RCT was limited cooperation (64%).
- Where RCT was not undertaken, GDPs tend to extract (76%) rather than refer.

CONCLUSIONS

More SND patients would be able to maintain their dentition by modifying management options (eg: control of behavioural issues by pharmacological means – sedation/GA) and reducing barriers to dental care (eg: use of single-visit RCT where possible to minimize visits).
Subjective factors
- patients’ signs and symptoms.

Objective factors
- preoperative diagnosis, the ability to obtain infection control, root canal anatomy, procedural complications.
New technology may facilitate single-visit
Technical inadequacies with stainless steel ...

- Perforation
- Zipping
- Straightening
- Ledging
- Excessive dentine removal

Iatrogenic complications such as transportation, perforation and stripping significantly lower healing rates.  (Gorni et al 2004, de Chevigny et al 2008, Ng et al 2008)
Why NiTi?

Conservative coronal flaring

Smoothly tapered canal shape

No apical transportation

Advantages of rotary NiTi canal preparations
<table>
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<tr>
<th>Practical Advantages of Rotary NiTi</th>
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<td><strong>Better</strong></td>
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<td>When NiTi technology replaced SS techniques the rate of good quality root fillings by dentists increased <em>(Molander et al. 2007)</em></td>
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<td><strong>Faster</strong></td>
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<td>Fewer instrumentation sessions were required with the adoption of rotary NiTi. <em>(Koch et al. 2012)</em></td>
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<td><strong>Easier to learn</strong></td>
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<td>No shaping differences between novices and experienced operators <em>(Calberson et al. 2009)</em></td>
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The Melbourne Protocol
(Modified $M_{two}$ System)

Produces an .04 taper canal
Single-instrument systems based on reciprocation


Reciproc (VDW)

WaveOne (Dentsply)
Linking entombment technique to rotary NiTi canal machining

It is possible to match gutta percha taper to instrument taper, with ...

- larger apical sizes,
- conservative taper
- improved canal shape & cleanliness
Canal obturation (Weis, Parashos, Messer 2004)

Traditional lateral compaction

Modified technique (single cone)
Single-visit Apexification

Courtesy Dr Mark Weis

“Revitalisation” (Lenzi & Trope 2012)

Single-visit “revitalisation” (Shin et al. 2009)
General Conclusions

Long-term survival will depend on:

- Effective antimicrobial measures
- An apical open size somewhat larger than traditionally possible with old technology (#35)
- Where the root filling ends (0-5mm)
- Well compacted root filling
- Good coronal restoration

But not on the number of appointments
Thank you