‘Correct Decision-Making for Compromised Teeth and Failed Restorations’
BDA Armed Forces Study Day - 4th July 2019
Peter Briggs
- Compromised Tooth
- Restorability
Traditional Restored / Compromised Tooth at time of intervention – some more than others -

**Outcome:**
All may be good
All may be compromised
All may be hopeless (extraction)

**Predictors of remaining tooth tissue:**
Does the RD clamp retain well?
Has the crown / post crown previously de-cemented?
How many crowns have been made previously?

**Restorative worth:**
How useful is the tooth to the patient?
Aesthetic impact?
Functional impact?
Prosthodontic impact?
May need to change Prosthodontic role
Axial Height & Parallelism both very important – for conventional resistance and retention form. Essential to optimise for consistent re-treatment outcome – to allow us to restore compromised teeth in a predicable fashion in 2019 and beyond.
OK - what is a compromised tooth in 2019?

• Caries – extent and site of tooth - remaining dentine
• Fracture – of crown or root
• Existing restoration(s) and type of restorative material(s)
• How an existing restoration is secured
• Endodontic status and complications
• Periodontal status – survival and tooth mortality
Can we objectivise compromise and restorability in 2019?

• Size and shape of tooth
• Damage from Erosive / Abrasive tooth wear
• Damage from Occlusal parafunction / bruxism
• Dentists and the things that we do, or do not do!
PESH & SHEEP

- Perio
- Endo
- Structure
- History

SHEEP has an added ‘E’ for experience – of the operator

- Structure
- History
- Endo
- Experience (and Skill) of the operator
- Perio

I would add: Required Function of Tooth / Teeth / Strategic Importance? / Cosmetic and Biological Implant Risk of patient?
Objectivising the significance of overall compromise
Posterior Teeth - tooth restorability index (TRI) – 2005 relevant for conventionally crowned posterior teeth

Assessment of the amount of remaining coronal dentine in root-treated teeth

R.B. Bandlish, A.V. McDonald *, D.J. Setchell
Department of Conservative Dentistry, Eastman Dental Hospital and Institute for Health Care Sciences, 256 Grays Inn Rd., London WC1X 8LD, United Kingdom

ARTICLE INFO

Article history:
Received 29 July 2005
Received in revised form 21 December 2005
Accepted 5 January 2006

ABSTRACT

Objectives: There is currently no standardised technique to measure the amount of coronal dentine remaining in a root-treated tooth after crown preparation. The aim of this study was to develop a method of measuring remaining coronal dentine in root-treated teeth and to propose an index for grading tooth restorability.

Methods: The study recruited 20 patients who had completed molar endodontic treatment at the Eastman Dental Hospital and had been prescribed an amalgam coronal-radicular core
Prepared Molar – Conventional – doesn’t work well for many of the compromised posterior teeth (shell) that I see.

**TOOTH RESTORABILITY INDEX**

Bandtjahr, MacDonald, Setchell 2006

The tooth divided into six equal sections encompassing two proximal, two buccal and two lingual areas.

For each sextant, the coronal dentine’s contribution to retention and resistance (i.e. above the finishing line of the preparation) assigned a score.

If in doubt, the lower score was assigned.

A scoring system of 0–3 allocated to each section (total tooth score range 0–18):

0 – None: No dentine height in sextant (above finish line)

1 – Inadequate: Insufficient height of dentine to contribute to retention and resistance form of restoration (dentine wall less than 1.5mm high)

2 – Questionable: Dentine availability between category 1 and 3

3 – Adequate: Sufficient coronal dentine (height, thickness and distribution within sextant) to contribute to retention and resistance of core of restoration
# The Dental Practicality Index – assessing the restorability of teeth

A. Dawood and S. Patel

### Table 1 The categories that the tooth should be assessed in: structural integrity, periodontal and endodontic treatment need as well as context are summarised in the grey shaded columns. Each row shows examples of different levels (0, 1, 2, 6) of complexity for each category. An overall DPI score of >6 indicates that treatment may be impractical, this is reduced to 4 if the tooth to be treated is to be used as a bridge abutment.

<table>
<thead>
<tr>
<th>Weighting</th>
<th>Structure integrity</th>
<th>Periodontal treatment need</th>
<th>Endodontic treatment need</th>
<th>Context</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>0</strong>&lt;br&gt;No treatment required&lt;br&gt;(unrestored or existing well-adapted restoration)&lt;br&gt;(probing &lt;3.5 mm (BPE 0-2) previously successfully treated periodontal disease)</td>
<td>Unrestored or existing well-adapted restoration</td>
<td>Probing &lt;3.5 mm (BPE 0-2) previously successfully treated periodontal disease</td>
<td>Vital pulp previously successfully treated endodontic disease</td>
<td>Local: Isolated dental problems where adjacent teeth are healthy&lt;br&gt;General: Replacing of a strategic tooth may be excessively complex&lt;br&gt;History of IV bisphosphonates, head &amp; neck radiotherapy</td>
</tr>
<tr>
<td><strong>1</strong>&lt;br&gt;Simple treatment required&lt;br&gt;(simple (indirect restoration)&lt;br&gt;(probing 3.5-5.5 mm (BPE 3) root surface debridement indicated)</td>
<td>Simple (indirect restoration)</td>
<td>Probing 3.5-5.5 mm (BPE 3) root surface debridement indicated</td>
<td>Simple root canal system with endodontic disease (eg, radiographically easily identifiable root canal[s], easily retrievable root canal filling material)</td>
<td>Local: Prosthodontic treatment planned of neighbouring teeth which may influence treatment plan for tooth being assessed&lt;br&gt;Tooth to be used as a bridge abutment&lt;br&gt;General: Radiotherapy of head and neck region planned&lt;br&gt;Immunocompromised patient</td>
</tr>
<tr>
<td><strong>2</strong>&lt;br&gt;Complex treatment required&lt;br&gt;(minimal residual sound tooth structure (eg subgingival margins, post-core restoration required etc)&lt;br&gt;(probing &gt;5.5 mm (BPE 4) compromised support (eg short root, crown lengthening required, grade 2 mobility). Grade 2-3 furcation involvement)</td>
<td>Minimal residual sound tooth structure (eg subgingival margins, post-core restoration required etc)</td>
<td>Probing &gt;5.5 mm (BPE 4) compromised support (eg short root, crown lengthening required, grade 2 mobility). Grade 2-3 furcation involvement</td>
<td>Complex root canal system with endodontic disease (eg, sclerosed root canal, acute curvatures. Complex re-root canal treatment (eg, fracture instrument removal, perforations). Difficulty in obtaining anaesthesia</td>
<td>Local: Prosthodontic treatment planned of multiple, including adjacent teeth&lt;br&gt;General: High caries rate&lt;br&gt;Poor oral hygiene&lt;br&gt;Parafuncional habits, extensive tooth surface loss&lt;br&gt;Active periodontal disease</td>
</tr>
<tr>
<td><strong>6</strong>&lt;br&gt;Impractical to treat&lt;br&gt;(inadequate structure for ferrule&lt;br&gt;(untreatable periodontal disease&lt;br&gt;(untreatable root canal system)</td>
<td>Inadequate structure for ferrule</td>
<td>Untreatable periodontal disease</td>
<td>Untreatable root canal system</td>
<td>Local: Retention of the tooth being assessed would constrain and/or compromise an otherwise simple and predictable treatment plan (for example extensive bridge work)&lt;br&gt;General: Potentially life threatening medical conditions which should be managed in tertiary care</td>
</tr>
</tbody>
</table>
## Compromise - Case 2 – RCT & Restore or Extract / OI?

<table>
<thead>
<tr>
<th>Weighting</th>
<th>Structure integrity</th>
<th>Periodontal treatment need</th>
<th>Endodontic treatment need</th>
<th>Context</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>No treatment required</td>
<td>Unrestored or existing well-adapted restoration</td>
<td>Probing &lt; 3.5 mm (BPE 0-2) previously successfully treated periodontal disease</td>
<td>Vital pulp previously successfully treated endodontic disease</td>
</tr>
<tr>
<td>1</td>
<td>Simple treatment required</td>
<td>Simple (or) direct restoration</td>
<td>Probing 3.5-5.5 mm (BPE 3) root surface debridement indicated</td>
<td>Simple root canal system with endodontic disease (eg, radiographically easily identifiable root canals), easily retrievable root canal filling material</td>
</tr>
<tr>
<td>2</td>
<td>Complex treatment required</td>
<td>Minimal residual sound tooth structure (eg subgingival margins, post-core restoration required etc)</td>
<td>Probing &gt;5.5 mm (BPE 4) compromised support (eg short root, crown lengthening required, grade 2 mobility). Grade 2-3 furcation involvement</td>
<td>Complex root canal system with endodontic disease (eg, sclerosed root canal, acute curvatures. Complex re-root canal treatment (eg, fracture instrument removal, perforations) Difficulty in obtaining anaesthesia</td>
</tr>
<tr>
<td>6</td>
<td>Impractical to treat</td>
<td>Inadequate structure for ferrule</td>
<td>Untreatable periodontal disease</td>
<td>Untreatable root canal system</td>
</tr>
</tbody>
</table>

### Table 1
The categories that the tooth should be assessed in: structural integrity, periodontal and endodontic treatment need as well as context are summarised in the grey shaded columns. Each row shows examples of different levels (0,1,2,6) of complexity for each category. An overall DPI score of >6 indicates that treatment may be impractical, this is reduced to 4 if the tooth to be treated is to be used as a bridge abutment.

**General:**
- High caries rate
- Poor oral hygiene
- Parafunctional habits, extensive tooth surface loss
- Active periodontal disease

**Local:**
- Retention of the tooth being assessed would constrain and/or compromise an otherwise simple and predictable treatment plan (for example extensive bridge work)

**Immunocompromised patient:**
- Radiotherapy of head and neck region planned

**History of IV bisphosphonates, head & neck radiotherapy:**
- Replacing of a strategic tooth may be excessively complex

**Isolated dental problems where adjacent teeth are healthy:**
- Local:
  - Isolated dental problems where adjacent teeth are healthy

**Prosthodontic treatment planned of multiple, including adjacent teeth:**
- Local:
  - Prosthodontic treatment planned of multiple, including adjacent teeth

**Prosthodontic treatment planned of neighbouring teeth which may influence treatment plan for tooth being assessed Tooth to be used as a bridge abutment:**
- Local:
  - Prosthodontic treatment planned of neighbouring teeth which may influence treatment plan for tooth being assessed Tooth to be used as a bridge abutment

**General:**
- High caries rate
- Poor oral hygiene
- Parafunctional habits, extensive tooth surface loss
- Active periodontal disease

**Local:**
- Retention of the tooth being assessed would constrain and/or compromise an otherwise simple and predictable treatment plan (for example extensive bridge work)

**Immunocompromised patient:**
- Radiotherapy of head and neck region planned

**History of IV bisphosphonates, head & neck radiotherapy:**
- Replacing of a strategic tooth may be excessively complex

**Isolated dental problems where adjacent teeth are healthy:**
- Local:
  - Isolated dental problems where adjacent teeth are healthy

**Prosthodontic treatment planned of multiple, including adjacent teeth:**
- Local:
  - Prosthodontic treatment planned of multiple, including adjacent teeth

**Prosthodontic treatment planned of neighbouring teeth which may influence treatment plan for tooth being assessed Tooth to be used as a bridge abutment:**
- Local:
  - Prosthodontic treatment planned of neighbouring teeth which may influence treatment plan for tooth being assessed Tooth to be used as a bridge abutment

**General:**
- High caries rate
- Poor oral hygiene
- Parafunctional habits, extensive tooth surface loss
- Active periodontal disease

**Local:**
- Retention of the tooth being assessed would constrain and/or compromise an otherwise simple and predictable treatment plan (for example extensive bridge work)

**Immunocompromised patient:**
- Radiotherapy of head and neck region planned

**History of IV bisphosphonates, head & neck radiotherapy:**
- Replacing of a strategic tooth may be excessively complex

**Isolated dental problems where adjacent teeth are healthy:**
- Local:
  - Isolated dental problems where adjacent teeth are healthy

**Prosthodontic treatment planned of multiple, including adjacent teeth:**
- Local:
  - Prosthodontic treatment planned of multiple, including adjacent teeth

**Prosthodontic treatment planned of neighbouring teeth which may influence treatment plan for tooth being assessed Tooth to be used as a bridge abutment:**
- Local:
  - Prosthodontic treatment planned of neighbouring teeth which may influence treatment plan for tooth being assessed Tooth to be used as a bridge abutment

**General:**
- High caries rate
- Poor oral hygiene
- Parafunctional habits, extensive tooth surface loss
- Active periodontal disease

**Local:**
- Retention of the tooth being assessed would constrain and/or compromise an otherwise simple and predictable treatment plan (for example extensive bridge work)

**Immunocompromised patient:**
- Radiotherapy of head and neck region planned

**History of IV bisphosphonates, head & neck radiotherapy:**
- Replacing of a strategic tooth may be excessively complex

**Isolated dental problems where adjacent teeth are healthy:**
- Local:
  - Isolated dental problems where adjacent teeth are healthy

**Prosthodontic treatment planned of multiple, including adjacent teeth:**
- Local:
  - Prosthodontic treatment planned of multiple, including adjacent teeth

**Prosthodontic treatment planned of neighbouring teeth which may influence treatment plan for tooth being assessed Tooth to be used as a bridge abutment:**
- Local:
  - Prosthodontic treatment planned of neighbouring teeth which may influence treatment plan for tooth being assessed Tooth to be used as a bridge abutment

**General:**
- High caries rate
- Poor oral hygiene
- Parafunctional habits, extensive tooth surface loss
- Active periodontal disease

**Local:**
- Retention of the tooth being assessed would constrain and/or compromise an otherwise simple and predictable treatment plan (for example extensive bridge work)

**Immunocompromised patient:**
- Radiotherapy of head and neck region planned

**History of IV bisphosphonates, head & neck radiotherapy:**
- Replacing of a strategic tooth may be excessively complex

**Isolated dental problems where adjacent teeth are healthy:**
- Local:
  - Isolated dental problems where adjacent teeth are healthy

**Prosthodontic treatment planned of multiple, including adjacent teeth:**
- Local:
  - Prosthodontic treatment planned of multiple, including adjacent teeth

**Prosthodontic treatment planned of neighbouring teeth which may influence treatment plan for tooth being assessed Tooth to be used as a bridge abutment:**
- Local:
  - Prosthodontic treatment planned of neighbouring teeth which may influence treatment plan for tooth being assessed Tooth to be used as a bridge abutment

**General:**
- High caries rate
- Poor oral hygiene
- Parafunctional habits, extensive tooth surface loss
- Active periodontal disease

**Local:**
- Retention of the tooth being assessed would constrain and/or compromise an otherwise simple and predictable treatment plan (for example extensive bridge work)

**Immunocompromised patient:**
- Radiotherapy of head and neck region planned

**History of IV bisphosphonates, head & neck radiotherapy:**
- Replacing of a strategic tooth may be excessively complex

**Isolated dental problems where adjacent teeth are healthy:**
- Local:
  - Isolated dental problems where adjacent teeth are healthy

**Prosthodontic treatment planned of multiple, including adjacent teeth:**
- Local:
  - Prosthodontic treatment planned of multiple, including adjacent teeth

**Prosthodontic treatment planned of neighbouring teeth which may influence treatment plan for tooth being assessed Tooth to be used as a bridge abutment:**
- Local:
  - Prosthodontic treatment planned of neighbouring teeth which may influence treatment plan for tooth being assessed Tooth to be used as a bridge abutment

**General:**
- High caries rate
- Poor oral hygiene
- Parafunctional habits, extensive tooth surface loss
- Active periodontal disease

**Local:**
- Retention of the tooth being assessed would constrain and/or compromise an otherwise simple and predictable treatment plan (for example extensive bridge work)

**Immunocompromised patient:**
- Radiotherapy of head and neck region planned

**History of IV bisphosphonates, head & neck radiotherapy:**
- Replacing of a strategic tooth may be excessively complex

**Isolated dental problems where adjacent teeth are healthy:**
- Local:
  - Isolated dental problems where adjacent teeth are healthy

**Prosthodontic treatment planned of multiple, including adjacent teeth:**
- Local:
  - Prosthodontic treatment planned of multiple, including adjacent teeth

**Prosthodontic treatment planned of neighbouring teeth which may influence treatment plan for tooth being assessed Tooth to be used as a bridge abutment:**
- Local:
  - Prosthodontic treatment planned of neighbouring teeth which may influence treatment plan for tooth being assessed Tooth to be used as a bridge abutment

**General:**
- High caries rate
- Poor oral hygiene
- Parafunctional habits, extensive tooth surface loss
- Active periodontal disease

**Local:**
- Retention of the tooth being assessed would constrain and/or compromise an otherwise simple and predictable treatment plan (for example extensive bridge work)

**Immunocompromised patient:**
- Radiotherapy of head and neck region planned

**History of IV bisphosphonates, head & neck radiotherapy:**
- Replacing of a strategic tooth may be excessively complex

**Isolated dental problems where adjacent teeth are healthy:**
- Local:
  - Isolated dental problems where adjacent teeth are healthy

**Prosthodontic treatment planned of multiple, including adjacent teeth:**
- Local:
  - Prosthodontic treatment planned of multiple, including adjacent teeth

**Prosthodontic treatment planned of neighbouring teeth which may influence treatment plan for tooth being assessed Tooth to be used as a bridge abutment:**
- Local:
  - Prosthodontic treatment planned of neighbouring teeth which may influence treatment plan for tooth being assessed Tooth to be used as a bridge abutment

**General:**
- High caries rate
- Poor oral hygiene
- Parafunctional habits, extensive tooth surface loss
- Active periodontal disease

**Local:**
- Retention of the tooth being assessed would constrain and/or compromise an otherwise simple and predictable treatment plan (for example extensive bridge work)
Compromise – weighting 2

• Good Buccal & Palatal walls
• Poor distal – can we get a good impression of the deep distal margin?
• With care is restorable as a single unit
We must all know how to get a good impression / scan if we are to successfully restore compromised teeth – many C&B complaints relate to inadequate marginal fit
Very Compromised – weighting 6

- No Lingual wall
- Sub-gingival lingual margin
- Soft lingual caries
- Previous RCT
- Buccal wall of enamel and dentine
‘Adhesive’ Restorability
Stripped down anterior tooth to natural tooth tissue

- Amount of and quality of dental tissue type - % of enamel : dentine
- The amount of useable peripheral enamel
- Position of Enamel – Amount of supra-gingival coronal enamel?
- Challenges with marginal moisture control at cementation?
- If yes, are they fixable? – advanced Rubber Dam skills needed
- Can I use BisGMA – luting technology in this scenario?
Minimal adhesive posterior tooth preparations:

(Chana et al 2000)

• No retention / resistance grooves as pre-cementation retention has no relevance to cemented performance (Osman et al 2010)

• Minimal interocclusal preparation

• No ‘offsets’ / bevels

• Preservation of enamel with supra-gingival margins whenever possible

(Briggs et al 2002)
This allows us to all think very differently from the past and is a game changer at the time of intervention.

Minimal adhesive posterior tooth preparations:

(Chene et al 2000)

- No retention / resistance grooves as pre-cementation retention has no relevance to cemented performance (Osman et al 2010)
- Minimal interocclusal preparation
- No ‘offsets’ / bevels
- Preservation of enamel with supragingival margins whenever possible (Briggs et al 2002)
Hybrid ‘Adhesive / Conventional’ Restorability Guide
Strip down posterior tooth to natural tooth-tissue

- Amount of and quality of dental tissue type - % of enamel : dentine
- Position of Enamel – Amount of supra-gingival coronal enamel?
- Challenges with marginal moisture control at cementation – at margins?
- If yes, are they fixable? – advanced Rubber Dam skills
- Think differently about function of cores – block out undercuts rather than provide structural support and provide retention for future crown
**Endo Crowns:** we can use cast metal and resin-active cements to help avoid undertaking procedures with which we can struggle (e.g. posts)

**Intra-radicular resin-bonded gold hats**
Endo Crowns / Adhesion – where does this fit in 2019?
Adhesively Compromised Tooth / Teeth
– some more than others -
So this is easy at re-intervention
In reality such compromised teeth can be managed straightforwardly in 2019 - now less reliance and need for conventional retention and resistance form -

Feb 2019 – E-max Monolithic Adhesive Onlay (‘occlusal Hat’ – non-translucent)
• Survival and practical tips and material(s) awareness that will reduce your risk with your posts
The presence of cast post and core has been identified as a negative prognostic factor regarding the survival of root filled teeth (Ng et al. 2011).

However, a retrospective study found an 83% survival rate at 10 years and the highest rate for maxillary incisors (Gómez-Polo et al. 2010).
A systematic review (Heydecke & Peters 2002) identified two studies reporting survival rate of 87 and 88% after 6 years (Bergman et al. 1989, Mentink et al. 1993)

A median survival rate of 17.4 years was found in a retrospective study (Nanayakkara et al. 1999) conducted at the Eastman Dental Hospital.

EDH high success rate could be attributed to:
- Operators’ expertise
- Retention of dentine and optimization of ferrule
- Cast post and core restorations were provided before discharging the patient back to the referring dentist for the definitive crown

Post Crowns
The endodontically compromised tooth

REVIEW

A new classification system for the restoration of root filled teeth

M. Zarow¹, A. Ramírez-Sebastià², G. Paolone³, J. de Ribot Porta², J. Mora², J. Espona², F. Durán-Sindreu² & M. Roig²

¹Private Practice, Krakow, Poland; ²Department of Restorative Dentistry and Endodontics, School of Dentistry, Universitat Internacional de Catalunya, Barcelona, Spain; and ³Dental School, Università Vita e Salute San Raffaele, Milan, Italy

Abstract


The aim of this report is to (i) review the current literature on the status of root filled teeth, (ii) analyse the most important factors in decision-making, (iii) discuss the current restorative concepts, and (iv) classify both the evidence and clinical practice in a way that seeks to be clear, understandable and helpful for clinicians. Restoration of root filled teeth represents a challenge for the clinician and remains a controversial subject. The guidelines describe a new classification that is drawn from evidence presented in the literature and also from clinical expertise-based reviews. It describes five categories of teeth.

Keywords: dental restoration, endodontics, post-and-core technique, root canal treatment.

Received 3 December 2015; accepted 23 August 2017
Zarow et al 2017

- Residual Crown Structure
- Residual Root Structure
- Compromised tooth reconstruction versus value of tooth within treatment plan
- Function and Position within the Arch

Endodontically Compromised Tooth
Compromised Teeth: Post and Crowns – risky procedure for some - but not you -

**Good or Bad?**
Grieve & M'Andrew (1993)

- Radiographic examination of 327 post-retained crowns
- **20%** had deviated posts
- **10%** had no root filling
- **50%** inadequate RCT
- **47%** had radiolucent areas
- **74%** of posts tapered
End cutting post burs can create significant greater deviations from the centre of canals compare to non-end-cutting burs like - Gates Glidden (Gegauff et al 1988) Therefore safest to use measured GGs first to remove (mostly by heat) the GP and then prepare / cut a post channel within the root.
Ferrule

- Decreases impact of the post and core system – it allows external loading of the root
- Affects performance of the final restoration
- Teeth with ferrule have a tendency to fail more favourably
- The amount of suggested ferrule varies from 1 to 2 mm
- Resistance form increases significantly with increased ferrule height
- A better prognosis expected if the ferrule is circumferential
Up to 17-year controlled clinical study on post-and-cores and covering crowns


*Department of Oral Function and Prosthetic Dentistry, College of Dental Science, Radboud University Nijmegen Medical Centre, P.O. Box 5010, 6500 HG Nijmegen, The Netherlands.
**Department of Preventive and Restorative Dentistry, College of Dental Science, Radboud University Nijmegen Medical Centre, P.O. Box 5010, 6500 HG Nijmegen, The Netherlands.

Fig. 2 - Restoration survival probability \( S(u) \) as a function of time in Trial 1 (under the condition "substantial dentin height"). Vertical lines in survival curves indicate points of censoring. Kaplan Meier analysis, \( P = 0.05 \).

Fig. 4 - Restoration survival probability \( S(u) \) as a function of time comparing "substantial" and "minimal dentin height" for only M/C + C (prefab metal post and composite core + crown). Vertical lines in survival curves indicate points of censoring. Kaplan Meier analysis, \( P = 0.03 \).
Class 0

No post – composite core build-up

• According to Magne et al. (2017), fibre posts are always detrimental to the failure mode, and should be avoided in incisors when a ferrule is present.
Class 1

Class 1 (fibre post)

- Post placement is recommended in anterior teeth and premolars with compromised tooth structure (<50% structure; Meyenberg 2013, Guldener et al. 2017).
- The placement of a post is indicated when two or fewer walls are present in anterior teeth and premolars (Ferrari et al. 2012).
Class 1

Class 1 (fibre post)

• RCT’s premolars are vulnerable - for these reasons, they may require posts more often than molars. Ferrari et al. (2000)

• Over a 2-year observation period, concluded that fibre post placement significantly reduced failure risk for root filled premolars.

• Molars, post only where missing coronal tooth tissue and insufficient pulp chamber surface (Sorrentino et al. 2007).
The Kaplan-Meier survival graphs for all groups are displayed in Figure 9. The log-rank test showed significantly higher survival of groups with a ferrule.
Class 2 (pre-restorative procedures are needed: orthodontic extrusion or crown lengthening / electrosurgery)

• Post placement cannot compensate for total or partial ferrule loss.

• This decision should be based on the position of the tooth in the arch: for molars, surgical crown lengthening, and for premolars and anteriors, orthodontic extrusion is reported to be preferable (Abdulrazzak et al. 2014, Juloski et al. 2014, Magne et al. 2017)
Assessment of restorability

< 2 mm of coronal tooth tissue – unrestorable?
Ferrule

• Decreases impact of the post and core system – it allows external loading of the root
• Affects performance of the final restoration
• Teeth with ferrule have a tendency to fail more favourably
• The amount of suggested ferrule varies from 1 to 2 mm
• Resistance form increases significantly with increased ferrule height
• A better prognosis expected if the ferrule is circumferential
Assessment of restorability

< 2 mm of coronal tooth tissue – unrestorable?
Electro-Surgery / Radio Waves Surgery  
(Moderate)

• Sub-gingival margin(s)
• Thick (and often inflamed) gingival tissue which has rolled over the preparation margin
• Need for good quality impression in one visit – instant trough around tooth in which impression material will flow – time is money to patients and dental practices in the real world
Class 3 (gold cast post)

• Teeth with no ferrule effect may fail and root fracture may result (Abdulrazzak et al. 2014, Magne et al. 2017).

• If a ferrule is not possible (either periodontally or orthodontically), but the patient still prefers to save the tooth, a gold cast could provide a possible alternative (Maroulakos et al. 2015, Sarkis-Onofre et al. 2017).
Endodontic Tooth Survival

After four years the cumulative tooth survival rate was 95.4% for primary treatment and 95.3% for secondary treatment.

Post-operative factors relevant to survival of root filled teeth were:

- The presence of a cast restoration coronally (positive)
- Two proximal contacts (positive)
- Cast post and core (negative)
- Terminal tooth (negative)

Class 3 - plan B – more aggressive use of electro-surgery with good biological width and attached gingivae – to create ferrule – rapid Ortho extrusion can achieve the same result

Optimise coronal height
Impression at same appointment

Optimise coronal height
• Where you cannot create 3mm of crown height with shortened teeth – e.g. broken down tooth / #’d tooth / tooth wear – with soft tissue loss alone

• Where thick gingival and connective tissue are not primarily responsible for the issue

Class 3 CLS

Crown Lengthening Surgery – moving the ‘whole attachment apparatus’ level up the root of the tooth
30 year old Female Finance worker
c/o:
Does not like gummy smile
Does not like appearance of crowns
Getting married in 6 weeks
Crowns placed at age 12!
Would like metal free restorations
Tier 2 / 3 Dismantling – Metal and Glass Fiber Posts
People have these skills – never use as a reason alone to extract restorable teeth (Abbott, 2004)
• Strip down and investigate the amount and quality of remaining dentine / ferrule – this drives decision making for compromised teeth
Up to 17-year controlled clinical study on post-and-cores and covering crowns

Wietse A. Folkinga², Cees M. Kreulen², Ewald M. Bronkhorst², Nico H.J. Crumers²

1Department of Oral Function and Prosthodontics, College of Dentistry, Radboud University Nijmegen Medical Centre, P.O. Box 9101, 6500 HB Nijmegen, The Netherlands.
2Department of Prosthodontics and Restorative Dentistry, College of Dentistry, Radboud University Nijmegen Medical Centre, P.O. Box 9101, 6500 HB Nijmegen, The Netherlands.

Fig. 4 – Restoration survival probability (Sₘ) as a function of time comparing “substantial” and “minimal dentin height” for only M/C + C (prefab metal post and composite core + crown). Vertical lines in survival curves indicate points of censoring. Kaplan Meier analysis, P = 0.03.
REMEMBER THAT
THE MODE OF
FAILURE WILL BE
VERY DIFFERENT

Caries and Core # - core in crown in the patient's hand
What is the take relevant home messages on the compromised tooth in need of a post?

• Different types of Post / Cores restorations do not have equal survival
• The amount of dentine and number of remaining walls is the biggest factor
• Presence of ferrule - very important
• Where limited remaining dentine – cast metal arrangement performs better and this relates to the material strength
• Where good dentine – it does not matter what you use – good outcome

Some practical tips on managing Periapical failure

Make the most of the dentine you have and use the right type of post
The ‘Moshonov’ Gap to be avoided


The effect of the distance between post and residual gutta-percha on the clinical outcome of endodontic treatment.

Moshonov J¹, Slutzky-Goldberg I, Gottlieb A, Peretz B.

Abstract

To determine whether the distance between the post and the residual gutta-percha influences the clinical outcome of endodontic treatment, 94 endodontically treated teeth following post and core restoration were evaluated radiographically. The teeth were divided into three groups: (I) no gap between the gutta-percha and the post; (II) a gap of >0 to 2 mm; (III) a gap of >2 mm. Treatment outcome was evaluated in follow-up radiographs, taken 1 yr after treatment and up to 5 yr posttreatment. In group I, 83.3% of the teeth were evaluated normal, 53.6% of group II, and only 29.4% of group III. A gap between the gutta-percha and the post was related to an increased rate of emerged disease in endodontically treated teeth restored with a post and core.
Greater risk of periapical infection when there is a radiographic space between the root filling and the post

(Moshonov et al 2005)

Team work: mind the gap

No Gap - 83.3% PAH normal
GAP 0-2mm - 53.6% PAH Normal
GAP greater than 2mm - 29.4% PAH Normal
Doing this well will dictate biological success of compromised teeth
What is the take relevant home messages on the compromised tooth in need of a post?

• Restoring root filled teeth works well - the tooth should only look after itself
• The amount and quality of remaining dentine (and number of remaining walls) is the biggest predictor on restorability and success
• Effective coronal seal is the most important individual operative factor on success
• Presence of ferrule – is very important
• Different material types of Post / Cores restorations do not have equal survival - where good dentine present – it does not matter what you use – good outcome
• Within reason, most teeth can be root treated – therefore the ‘restoring’ dentist should decide whether restorable
Assuming the root intact, good 5mm RCT, decent ferrule, decent length post, a single crown, no deep localised pockets and treatment done well - then one is looking at a very high survival of single and multi-rooted teeth supporting single fixed restorations (Salvi et al 2007)

Creugers and Mentink


The amount, height, thickness & ferrule of remaining tooth structure is the most important factor on outcome - much more so than the type & length of post and the type of core.
‘Correct Decision-Making for Compromised Teeth and Failed Restorations’
BDA Armed Forces Study Day - 4th July 2019

Peter Briggs