Occlusion in a Modern World
Occlusion, Occlusal Restoration, TMD & Vertical Dimension,
Occlusion in a modern world

Occlusion, occlusal restoration, TMD and vertical dimension

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MANCHESTER  I  Friday 4 March 2016

6 hours verifiable CPD
Learning aims – in a modern world

- Parafunional patient in 2015
- Cracked Teeth
- Cuspal Protection / Coverage of RCT’d Teeth
- Fixed Occlusal Restoration Choice in 2015
- Clinical cases / Examples to argue about
Parafunctional Patients in 2015

Parafunctional patient

Demolition Experts: Management of the Parafunctional Patient: 1. Diagnosis and Prevention

Abstract: The first part of this paper discusses the clinical problems associated with providing predictable restorative dental care for parafunctional patients. The identification of patients with parafunctional problems is an initial step in providing comprehensive care. The identification and documentation of parafunctional problems can help guide the clinician to better understand the etiology of the problem and design a treatment protocol.

Keywords: Parafunctional Patients, 2015

Demolition Experts: Management of the Parafunctional Patient: 2. Restorative Management Strategies

Abstract: The second part of this paper describes strategies for providing predictable restorative care for parafunctional patients. There is evidence that parafunctional patients can be managed with restorative procedures, but the success of these procedures depends on the proper diagnosis and management of the patient. This paper describes the restorative procedures that can be used to manage parafunctional patients.

Keywords: Parafunctional Patients, 2015

Images and charts are included in the paper to illustrate the concepts and procedures discussed.
For some para-functional cases even bringing metal right up to incisal edge is not enough I’m afraid.
This patient ‘precipitated’ these papers
How well do removal appliances perform in such patients?

Retrospective Audit of Patients with Advanced Toothwear Restored with Removable Partial Dentures

Nicola J. Woodley*, Brigitte M. Griffiths† and Kenneth W. Hemmings‡

Abstract — The dental records of 50 patients with advanced toothwear restored with removable prostheses were examined. Retrospective data were collected with regard to source of referral, presenting complaint, aetiological factors, clinical features, dentures provided, details of failures and maintenance. The maximum follow up period was three years. The ratio of male to female patients was 4:1 and the age range 31–75 years. Failures were recorded in 38% of patients with provisional and 64% with definitive dentures. The most common failure was fracture or wear of the incisal or occlusal surfaces. The majority of failures were addressed by adjustment of the dentures and the audit confirmed the need for regular maintenance.
Strategy

- Do as little dentistry as you can and prevent and protect

<table>
<thead>
<tr>
<th>Monitor and Review /Prevention alone</th>
<th>Study casts, Photographs, Toothwear indices, Patient education, Dietary and fluoride advice, Occlusal protection with occlusal splints, eg Michigan Splint (Figure 3) Fluoride gel in customized trays</th>
</tr>
</thead>
<tbody>
<tr>
<td>Adhesive</td>
<td>Direct composite resin restorations Adhesively bonded indirect composite, porcelain or metal restorations</td>
</tr>
<tr>
<td>Conventional</td>
<td>Metal onlay, ¾ or full veneer crown (eg yellow gold) Porcelain fused to metal crowns</td>
</tr>
<tr>
<td>Onlay denture or Overdenture with abutment preparation</td>
<td></td>
</tr>
<tr>
<td>Extraction(s)</td>
<td></td>
</tr>
</tbody>
</table>

Table 2. The options available to manage a patient.
Parafuntional Patients in 2015

Parafuntion

- Simple use of restorations to diagnose
- Sensible interventions and sensible material
- Sensible messages to patients and sensibel expectations please
- Balance of robustness - V - aesthetics

Figure 4. The management of a parafuntional patient with PFMCs with metal collar, metal incisal coverage and a metal palatal surface: (a) labial view; (b) occlusal view showing the extension of palatal metal; (c) labial view with patient smiling. Note how discrete the palatal and incisal metal is despite its extent.
Removable Partial Dentures in 2013

We must not worry about increasing VD – it’s well-tolerated as long as shared by the natural teeth and not all on the partial denture.
Is this type of dentistry on the wane in the 21st century? If so why and what are we going to do about it? When did you last use a surveyor?

Filling spaces the old way.
Ten-year evaluation of removable partial dentures: Survival rates based on retreatment, not wearing and replacement

A. H. B. M. Vermeulen, DDS, PhD, a H. M. A. M. Keltjens, DDS, PhD, a M. A. van't Hof, PhD, a and A. F. Kayser, DDS, PhD a
Trikon, Institute for Dental Clinical Research, School of Dentistry, University of Nijmegen, Nijmegen, The Netherlands

From a group of 1480 patients, 1036 were treated with metal frame removable partial dentures (RPDs) at least 5 years before this analysis. Of those, 748 patients who wore 886 RPDs were followed up between 5 and 10 years; 288 patients dropped out. The 748 patients in the study groups were wearing 703 conventionally designed metal frame RPDs and 183 RPDs with attachments. When dropout patients and patients who remained in the study were compared, no differences were shown in the variables analyzed, which indicated that the dropouts did not bias the results. Survival rates of the RPDs were calculated by different failure criteria. Taking abutment retreatment as failure criterion, 40% of the conventional RPDs survived 5 years and more than 20% survived 10 years. In RPDs with attachments crowning abutments seemed to retard abutment retreatment. Fracture of the metal frame was found in 10% to 20% of the RPDs after 5 years and in 27% to 44% after 10 years. Extension base RPDs needed more adjustments of the denture base than did tooth-supported base RPDs. Taking replacement or not wearing the RPD as failure criteria, the survival rate was 75% after 5 years and 50% after 10 years (half-life time). The treatment approach in this study was characterized by a simple design of the RPD and regular surveillance of the patient in a recall system. (J Prostheth Dent 1996;76:267-72.)
Misch (2008)

- 10 year evaluation RPD – survival rate for metal frame RPDs approximately 75% at 5 years dropping to 50% at 10 years
Partial Dentures

In 2009, nearly one in five adults (20%) wore removable dentures of some description (partial or complete). In addition to the edentulous patients, 13% of the sample group relied on a combination of dentures and natural teeth.

- Connector
- Saddle
- Support
- Retention
- Stability
- Survey
- Occlusion (overlay / over-denture)
- Modification of teeth with composite

Path of Insertion and Surveyor
Mucosa Supported RPDs

- **Misch (2008)** have the lowest patient acceptance rates in dentistry
- **Carlsson, Hedegord & Koivumaa (1965)** 80% wear prostheses at 12 months dropping to only 60% with free end saddles at 4 years
OI – Immediate placement but **delay loading**
Parafuction – a different level of risk to your restorations – cast-metal has many advantages – as do screw retention for implant restoration – ceramic / composite stand no chance
I worry how these will go in parafunction cases – do you?
Very large forces are going through your restorations
Occlusion onimplants: current clinical guidelines.
Kovano K*, Esaki D.

Abstract
Proper implant occlusion is essential for adequate oral function and the prevention of adverse consequences, such as implant overloading. Dental implants are thought to be more prone to occlusal overloading than natural teeth because of the loss of the periodontal ligament, which provides shock absorption and periodontal mechanoreceptors, which provide tactile sensitivity and proprioceptive motion feedback. Although many guidelines and theories on implant occlusion have been proposed, few have provided strong supportive evidence. Thus, we performed a narrative literature review to ascertain the influence of implant occlusion on the occurrence of complications of implant treatment and discuss the clinical considerations focused on the overloading factors at present. The search terms were 'dental implant', 'dental implantation', 'dental occlusion' and 'dental prosthesis'. The inclusion criteria were literature published in English up to September 2013. Randomised controlled trials (RCTs), prospective cohort studies and case-control studies with at least 20 cases and 12 months follow-up interval were included. Based on the selected literature, this review explores factors related to the implant prosthesis (cantilever, crown/implant ratio, premature contact, occlusal scheme, implant-abutment connection, splinting implants and tooth-implant connection) and other considerations, such as the number, diameter, length and angulation of implants. Over 700 abstracts were reviewed, from which more than 30 manuscripts were included. We found insufficient evidence to establish firm clinical guidelines for implant occlusion. To discuss the ideal occlusion for implants, further well-designed RCTs are required in the future.
Think about the system and re-cycling
Cracked Tooth Syndrome (CTS)
Has the way we treat CTS changed?

A multi-centred clinical audit to describe the efficacy of direct supra-coronal splinting – A minimally invasive approach to the management of cracked tooth syndrome

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²Department of Primary Dental Care, King’s College London, London, United Kingdom
³General Dental Practitioner, United Kingdom
⁴Primary Care Dentistry, King’s College London, Dental Institute at Guy’s, King’s College & St. Thomas’ Hospitals, London, United Kingdom
Cracked Teeth – should we change what we do?

Banerji et al (2014)

Diagnostic Blobs at increase VD
### Table 2 – Summary of the distribution of posterior teeth in the sample, affected by incomplete fractures.

<table>
<thead>
<tr>
<th>Teeth affected</th>
<th>Number of cases</th>
<th>% of sample</th>
<th>Frequency of presentation</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maxillary third molars</td>
<td>1</td>
<td>0.66%</td>
<td>9</td>
</tr>
<tr>
<td>Mandibular third molars</td>
<td>0</td>
<td>0.00%</td>
<td>10</td>
</tr>
<tr>
<td>Maxillary second molars</td>
<td>13</td>
<td>8.61%</td>
<td>4</td>
</tr>
<tr>
<td>Mandibular second molars</td>
<td>29</td>
<td>19.21%</td>
<td>3</td>
</tr>
<tr>
<td>Maxillary first molars</td>
<td>33</td>
<td>21.85%</td>
<td>2</td>
</tr>
<tr>
<td>Mandibular first molars</td>
<td>44</td>
<td>29.14%</td>
<td>1</td>
</tr>
<tr>
<td>Maxillary second premolars</td>
<td>9</td>
<td>5.96%</td>
<td>6</td>
</tr>
<tr>
<td>Mandibular second premolars</td>
<td>8</td>
<td>5.29%</td>
<td>7</td>
</tr>
<tr>
<td>Maxillary first premolars</td>
<td>12</td>
<td>7.94%</td>
<td>5</td>
</tr>
<tr>
<td>Mandibular first premolars</td>
<td>2</td>
<td>1.34%</td>
<td>8</td>
</tr>
</tbody>
</table>

### Table 3 – Overall success of DCS restorations to treat CTS at 2-week, 4-weeks and 3-month recall intervals.

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Recall interval</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2 week</td>
</tr>
<tr>
<td>Overall successful cases</td>
<td>133 (88.07%)</td>
</tr>
<tr>
<td>Overall failed cases (treatment terminated)</td>
<td>18 (11.93%)</td>
</tr>
<tr>
<td>Total cases</td>
<td>151 (100%)</td>
</tr>
</tbody>
</table>
Does this mean the end of this?
Conformative Stabilisation / Protection
Would I place a high blob of composite here?

I find Piezon Ultrasound good for opening up hyperaemic teeth.
Excellent technology for Restoration of the Cracked Tooth & post-RCT restoration

Minimally invasive - I find it the usual choice for dentists!
Just an Occlusal amalgam in symptomatic RCT’d posterior tooth – think crack!
Non-Vital Cracked Teeth

- The tooth has been associated with multiple infections
- What would you do here and why?
Clinical Stages & Steps

- Band & protect against further damage
- Investigate – remove pulpal roof and carefully assess the propagation of the cracks
- Is there coronal movement of across the cracks?
- Do the cracks extend to (and across) the pulpal floor?
- Can you control endodontic infection, leakage and restore the tooth?
How would you restore this molar?
How would you restore this molar?
A loose, very old, MO Amalgam in a RCT’d maxillary molar – what is going through your mind?
Cracked Teeth – should we change what we do?
Survival of root filled cracked teeth in a tertiary institution

L. Tan¹, N. N. Chen¹, C. Y. Poon¹ & H. B. Wong²
¹Department of Restorative Dentistry, National Dental Centre, Singapore; and ²Biostatistic Department, Clinical Trial and Epidemiology Research Unit, Singapore

Abstract

Aim To assess the survival rate of root filled cracked teeth over a 2-year period in a tertiary institute.

Methodology Forty-nine patients who had root canal treatment completed on their cracked teeth at the National Dental Centre (Singapore) were recalled for a 2-year review. Collected review data included presence of periodontal pocketing, sinus tract and swelling associated with the teeth. The date of extraction was noted if a tooth was missing at review. Pre-treatment data collected were number, extent and location of crack, presence of periodontal pocketing, patients’ age and gender, location of cracked teeth, type of teeth and presence of terminal cracked tooth.

Results Fifty teeth in 49 patients were included. The Kaplan–Meier estimate of 2-year survival rate was 85.5% (95% confidence interval: 75.5–95.5). Cracked teeth which were the terminal teeth in the dental arch (RR = 4.9, 95% CI: 1.2–2.0, P = 0.04), teeth with pre-root filling periodontal pocketing (RR = 4.9, 95% CI: 1.2–2.0, P = 0.04) and teeth with multiple cracks (RR = ∞, 95% CI: 1.9–∞, P = 0.01) were more likely to be extracted.

Conclusions Within the limitations of this study, multiple cracks, terminal teeth and pre-root filling pocketing were significant prognostic factors for the survival of root filled cracked teeth.

Keywords: cracked teeth, endodontic treatment, prognosis, survival.

Received 25 August 2005; accepted 15 May 2006
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)
Additional things that I look for

- Is there any fluid seeping through the cracks into the access chamber?
- What are the implications to the patient of the loss of the tooth?
- How easy will the tooth be to restore if extracted?
Occlusal Protection of RCT’d Teeth
Let’s start off with Occlusal Protection of Endo-treated premolar (class II)
Do we need to cuspal-coverage or not?

Three-year clinical comparison of survival of endodontically treated teeth restored with either full cast coverage or with direct composite restoration

Francisco Mannocci, MD, DDS, PhD, Ediello Bortolotti, MD, DDS, Filomeno Bennati, MD, PhD, *

University of Siena, Siena, Italy. *Corresponding author. Tel.: 39 057 515721; fax: 39 057 515722.

Do we need to cuspal-coverage or not?

Mannocci et al 2002

Table I. Failure rate and failure modes at the 1-, 2- and 3-year recalls

<table>
<thead>
<tr>
<th>Year</th>
<th>Composite only (Group 1)</th>
<th>Composite and crown (Group 2)</th>
<th>Δ</th>
<th>95% CI</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Sample size</td>
<td>60</td>
<td>57</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Recall</td>
<td>55</td>
<td>57</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Failure</td>
<td>0</td>
<td>0</td>
<td></td>
</tr>
<tr>
<td>2</td>
<td>Recall</td>
<td>48</td>
<td>57</td>
<td>-0.09</td>
</tr>
<tr>
<td></td>
<td>Failure</td>
<td>3</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>(Decementation of post)</td>
<td>1</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td></td>
<td>(Marginal gap formations)</td>
<td>2</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td>3</td>
<td>Recall</td>
<td>50</td>
<td>34</td>
<td>-2.0</td>
</tr>
<tr>
<td></td>
<td>Failure</td>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>(Marginal gap formations)</td>
<td>1</td>
<td>1</td>
<td></td>
</tr>
</tbody>
</table>

Δ: Difference in percentage failures between Group 1 and Group 2. 95% CI, 95% confidence interval.

CONCLUSIONS

Within the limitations of the study, ceramo-metal crown coverage did not enhance the clinical performance of endodontically treated and restored teeth when compared with placement of a direct composite restoration over a 3-year time span.

Mannocci et al 2002
Mannocci et al 2002

• Composite with carbon fiber post as successful in class II premolar cavities as covering the teeth with full crown (PFM)
• Mode of failures: post de-cement & marginal gap formation
• There was no effort t standardising the pre-restoration state of the teeth & no split mouth design – lots of type II errors
What about composite with fibre post and amalgam?

Randomized Clinical Comparison of Endodontically Treated Teeth Restored with Amalgam or with Fiber Posts and Resin Composite: Five-Year Results

F Mannocci • AJE Qualtrough
HV Worthington • TF Watson • TR Pitt Ford
Premolars with Class II carious lesions were selected and randomly assigned to one of two experimental groups: (1) restoration with amalgam or (2) restoration with fiber posts and composite. One hundred and nine teeth were included in Group 1 and 110 in Group 2. Patients were recalled after 1, 3 and 5 years.

No statistically significant difference was found between the proportion of failed teeth in the two experimental groups. Significant differences were observed between the proportion of root fractures ($p=0.029$) and caries ($p=0.047$), with more root fractures and less caries observed in the teeth restored with amalgam at the five-year recall. Within the limits of this study, it can be concluded that restorations with fiber posts and composite were found to be more effective than amalgam in preventing root fractures but less effective in preventing secondary caries.

Clinical Relevance
Within the limits of this study, restorations with fiber posts and composite were found to be more effective than amalgam in preventing root fractures but less effective in preventing secondary caries; the overall failure rate was not significantly different for the two kinds of restorations.
Mannocci et al 2005

- Both successful with good success rates

Table 3: Results at Five Years Showing the Differences Between the Groups in the Proportions of Failed Teeth with 95% Confidence Interval

<table>
<thead>
<tr>
<th></th>
<th>Amalgam (Group 1)</th>
<th>Composite + fiber post Group 2</th>
<th>Δ</th>
<th>95% CI</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recall Failure</td>
<td>100</td>
<td>97</td>
<td>-0.013</td>
<td>from -0.100</td>
<td>to</td>
</tr>
<tr>
<td></td>
<td>9</td>
<td>10</td>
<td></td>
<td>0.073</td>
<td></td>
</tr>
<tr>
<td>Fracture</td>
<td>6</td>
<td>0</td>
<td>0.060</td>
<td>from 0.010 to</td>
<td>0.125</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.010 to 0.125</td>
<td></td>
</tr>
<tr>
<td>Caries</td>
<td>3</td>
<td>10</td>
<td>-0.073</td>
<td>from -0.152 to</td>
<td>0.002</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>0.002 to</td>
<td></td>
</tr>
</tbody>
</table>

Occlusal protection of the RCT’d Tooth
What should we be doing?

Occlusal protection of the RCT’d Tooth
Cuspal Protection of RCT’d Posterior Teeth

Where’s the damage done – by the endodontics?4

The largest losses in stiffness were related to the loss of marginal ridge integrity. MOD cavity preparation resulted in an average of a 63% loss in relative cuspal stiffness.
Cuspal Protection of RCT’d Posterior Teeth

Where’s the damage done – by the size of cavity?
Cuspal-Protection of RCT’d Posterior Teeth

- where’s the damage done?

Removal of the marginal ridges is the main problem for root filled posterior teeth
Hansen and team 1990 – *in-vivo*

**In vivo fractures of endodontically treated posterior teeth restored with amalgam**

EK Hansen, E Asmussen – *Dental...*, 1990 - Wiley Online Library

Abstract The cumulative survival rate (retention of both cusps) and the fracture pattern of 1639 endodontically treated posterior teeth were assessed in a retrospective study. All teeth had an MO/DO or an MOD cavity restored with amalgam without cuspal overlays. The 20...
The cumulative survival rate (retention of both cusps) and the fracture pattern of 1639 endodontically treated posterior teeth were assessed in a retrospective study.

All teeth had an MO/DO or an MOD cavity restored with amalgam without cuspal overlays.

The 20-year survival rate of teeth with an MO/DO cavity was markedly higher than that of teeth with an MOD cavity. The lowest survival rate was found for the upper premolars with an MOD cavity: 28% of these teeth fractured within 3 years after endodontic therapy, 57% were lost after 10 years, and 73% after 20 years.

Generally, the cusp most prone to fracture was the lingual one, and lingual fractures caused significantly more damage to the periodontal tissues than did facial or total crown fractures. The severity of periodontal damage increased with posterior location of the tooth.

By far the most serious failures, irrespective of the cavity type, were found for the upper second molar, as 10 of 29 fractures led to extraction. It is concluded that amalgam, especially in MOD cavities, is an unacceptable material for restoration of endodontically treated posterior teeth if used without cuspal overlays.
Clinical performance of RCT posterior teeth just restored with intra-coronal amalgams

Hansen et al. (1990) - In vivo fractures of endodontically treated posterior teeth restored with amalgam

- MO/DO survive better over 20 years than MOD.
- 73% of MOD on premolars failed by 20 years

**Conclusion:** RCT’d posterior teeth with MOD restorations should have cuspal coverage of at least 2-3mm of amalgam or a casting.
Vital teeth fracture # more favourably (supra-gingival) and thus are usually restorable.
The cumulative survival rate of 190 endodontically treated posterior teeth were assessed in a retrospective study; all teeth had an MO/DO or an MOD cavity restored with a composite resin without cuspal overlays after previous acid-etching of the enamel. In contrast to our previous study on endodontically treated posterior teeth restored with amalgam, the survival rate of the MOD resin-restored teeth was equal to that of MO/DO teeth. Teeth restored with a light-activated resin had a much lower survival rate than teeth restored with a chemically-activated material, the cause presumably being that the light-activated resins were insufficiently irradiated.

Nearly 25% of the teeth had been restored with a micro-filled resin for anterior use and these teeth had a lower survival rate than had teeth restored with a macrofilled or hybrid resin. It was also found that a beveling technique did not decrease the fracture rate while the use of an intermediate layer of low-viscosity resin resulted in a significant improvement.
• With composite resin MOD similar to MO/DO performance
• Light-activated had lower success than chemical cure
• Micro-filled resin had poorer outcome cf macro-filled
• Intermediate resin layer useful
My views

• I think MOD restorations seem to be the key difference
• With AF high risk of fracture – with significant risk of tooth loss
• Composite resin – MO / DO similar outcome to MOD
• Will get more caries with composite but less than fracture
• Cuspal protection will reduce risk of # - can do this with resin / amalgam or indirect (metal / ceramic / resin) restorations
• Avoid posts if you can
Post-Endodontic Restoration and Cuspal Protection
Non-Vital posterior teeth # unfavourably

Occlusal protection of the RCT’d Tooth
Cuspal Protection

all-ceramic onlay ‘hats’ can do the job
Fixed Occlusal Restoration
Choice in 2015
Roberts (1970)

A long span bridge, in front of and behind the canine, has the poorest prognosis of all

Anterior / Posterior combination bridge - bad news
Implants are the best fixed method in 2015 of replacing a missing canine with care if parafunction on-going
What is the preparation that we need to execute ‘to allow’ or to facilitate’ a PFM?

• Full cast alloy metal core that provides support for all the ceramic (the cut back)
• Metal ‘only’ coverage on palatal / lingual aspect of tooth to involves ICP and initial incisal guidance contacts
• Fully ‘supported’ labial, interdental and incisal Ceramic
Fixed Occlusal Restoration Choice in 2015

‘Good’ Ceramic support

‘Poor’ Ceramic support
Ceramic Support - Cut Back
do it properly after ‘full contour’ wax up
Two / three plane tooth reduction which relates to crown anatomy. Worn teeth end up thick at incisal tips.
Temporisation of worn lower incisors
link & cement with Poly F

Place suck down over prepared teeth with temp material in between - Then cure, finish and polish.
The uppers were done in the same way
Porcelain Fused to Metal Crowns accounts for more than 85% of all prescribed crowns in the UK
Palatal Metal

- Good wear properties
- Reduces extent of palatal tooth preparation - allows the lower teeth to be longer
- Less brittle than porcelain
Where are the weaknesses and what do you think might happen in the future?
Porcelain ‘popped’ at UL3

What would I do differently?
Take the metal support up and over the incisal edges of the teeth for attritional patients.
A ‘Winged’ VMK anterior tooth preparation
WPFM Preparation

Preparation Specifications:

- **Incisal Reduction**: 1.5 mm
- **Labial Shoulder**: 1.2 mm
- **Palatal Chamfer**: 0.5 mm – for metal only
- **Palatal Reduction**: 0.7 - 1.0 mm for Metal only (palato-occlusal (gingival) 2/3s)
  
  1.2 mm for both Metal & Ceramic (palato-incisal third)
The ‘Wings’

- Because of better ceramics we now only need a 1.2 mm labial shoulder (for metal and ceramic)
- If you need a 0.5mm palatal chamfer (for metal only)
- Then you will end up with interdental ‘Wings’ where the different dimensions of the margins meet
Appropriate for Parafunctional Cases
The wing is where the palatal metal preparation meets the labial and interdental porcelain and metal preparation.
Note how the palatal chamfer slides round the outside of the ‘wing’!
Monolithic Zirconium
480 MP / oxides give colour
Strong and no more destructive than gold crown
Polish before glaze – conventional cement
Adhesive metal ideal for parafunctional patients (on all fronts)
2014 – I find that they fail by wear and perforation
Occlusal Cast Alloy – Parafunction

- No chipping
- No fracture
- No need for support
- Good wear characteristics – but will wear away eventually and leak in the end

Fixed Occlusal Restoration Choice in 2015
ATD – marginal enamel, isolation & execution

- Separation of teeth
- Smooth margins
- Conservative
- Predictable
- Parafunction
Case Example

Peter & Phil

Occlusion in a Modern World
Occlusion, Occlusal Restoration, TMD & Vertical Dimension,