2015 ‘Hands-on’ Tooth Preparation Course
Teachers / Demonstrators: Ahmed, Tracy & Peter March 2015

Tooth Preparation Course – Norfolk and Norwich University Hospital - Dental Simulation Laboratory
Course Programme

Date: Friday 6th March 2015
Venue: Norfolk and Norwich University Hospital
Demonstrators/Educators: Teachers Peter & Ahmed

Title: 2015 ‘Hands-on’ Tooth Preparation for the 21st Century

Course Timetable:

9.15 – 10 am  Welcome and Introduction  (Peter)
10 am – 11.50 am  Simulation Room Practical – Anterior Tooth Preparation  (Peter & Ahmed)
11.30 am – 11.45 am  Coffee
11.45 am – 1.00 pm  Simulation Room Practical – Anterior Tooth Preparation  (Peter & Ahmed)
1.00 pm – 1.45 pm  Lunch
1.45 pm – 3.15 pm  Simulation Room Practical – Posterior Tooth Preparation  (Ahmed & Peter)
3.15 pm – 3.30 pm  Tea
3.30 pm – 4.30 pm  Simulation Room Practical – Posterior Tooth Preparation  (Ahmed & Peter)
4.30 – 5.00 pm  Summary and Close  (Ahmed & Peter)
‘Hands-On’ Didactic Teaching
Hands-on Tooth Preparation Course -
Clinical Simulation Laboratory, Norwich 2015
Why are we all here?

• Confirm / Update our Knowledge
• Clinically Apply our Knowledge
• Accept Incompetency
• Work towards Proficiency
• Learn to be Competent
• Learn to be Proficient
• Exposure to new clinical skills
‘Phantom Head’ dentistry

• It has taught me what I am going to do before I do it
• It allows you to execute practical skills until you can predictably achieve a satisfactory result
• It taught me the importance of reflective learning and to be self-aware of my limitations – so I can improve them
• It also taught me to look at criticism positively – and realise that a ‘nicey / nicey’ approach to teaching (and life) doesn’t work in the long run
Rules of the Day

• Get feedback from us and your colleagues
• Enjoy the day and have fun but and reflect on at you have done
• Lets try and do step by step approach – keeping together
• It’s not an exam – it’s a day to make mistakes
• We will take photos of the preps so we can discuss them as a group
• We will come round & offer honest constructive comments
• You will objectively score your preparations
Practical Day
Objectivise where we all are with the skill of tooth preparation
Understand what is it that makes a good or poor tooth preparation?
Simulation Environment

- In practice you will rarely be preparing virgin teeth
- The teeth will be heavily restored, broken down or worn
- You may be replacing failed ‘fixed’ restorations
- In practice you are dealing with the quirks of a patient
- You are also dealing with the strengths and weaknesses of your trainer in your foundation year
Does anyone know what these three anterior tooth preparations are for and why they are different?
What do we want you all to do well today?

- Margins
- Taper
- Matching reduction to tooth anatomy
- Matching reduction to proposed material of restoration
- Producing an overall circular preparation shape
- Hold and control your hand-piece properly
- Know the dimensions of your burs – and why you are using them
Learning outcomes

• Produce **taper** appropriate to design and material of indirect restoration

• Produce **margins** of appropriate **depth, consistency and height (relevant to gingival margin)** for material choice

• **3D tooth reduction** appropriate to material choice and design of crown / indirect restoration

• **Can prescribe to technician** material choice and design and work backwards from your choice of restoration to preparation design
Tools for the day:

Silicone putty & sharp scalpel blade
Burs
Plastic Teeth
Sharp pencil
I look at a Putty Index like an implant stent
(you need help and guidance with precision)
I look at a Putty Index like an implant stent
(you need help and guidance with precision)
It will demonstrate to you the truth. You are new to this so I would suggest that you use a putty index routinely.
Technical things that we can all objectively check with the Putty Index

- **Margin** (dimension / height / consistency / smoothness)
- **Taper** (appropriate for restoration DBC 15-20 degrees)
- **Adequacy of Reduction** (compared to pre-operative putty)
- **Overall shape** of preparation
- **Appropriateness of preparation for the material choice** of the restoration
Putty Index – please use them for your patients to improve your anatomical awareness
If you have time make two pre-preparation putty indices:

Cut one from **buccal to palatal** in middle of crown - to use as a preparation guide

Cut the other **across incisal edge**

They will give you different information
Tools for the day:

Silicone putty
Burs
Plastic Teeth
Sharp pencil

Burs – you need to select the right type and size of burs for the job you need done

Know and understand the relevance of the burs you use – need ones with a 1.2 - 1.5mm tip thickness.
Tools for the day:

Tapered Broad Chamfer

&

Tapered Broad Shoulder
Tools for the day:

Silicone putty
Burs
Plastic Teeth
Sharp pencil
Plastic Teeth – we have lots to practice on – this is a good place to make mistakes
Basic things

• Handpiece control – smooth cutting
• Holding the handpiece right – ‘parallelism’ control
• Using two hands for extra control when needed
• Bur selection
• Knowing bur size
We will not ask you to do anything that we cannot
Tools for the day:

Silicone putty
Burs
Plastic Teeth
Sharp Pencil

Axial reduction and undercuts

Use sharp pencil at each of the four line angle to check for undercuts
If you can see all four then no undercuts – if not you have an undercut

PB 2013
Objectivise undercut assessment – should be able to see the 4 points at each of the line angles with mirror – this means no undercut(s) present

Use sharp pencil at each of the four line angle to check for undercuts

If you can see all four then no undercuts – if not you have an undercut

Axial reduction and undercuts
Draw on the labial aspect of your teeth prior to preparation to:

• Identify the maximal labial contour
• Understand the directions of the two labial planes
• Identify mesial and distal marginal ridges
• Anatomy of different teeth is different
Multi-Plane Labial Reduction
Two / three plane tooth reduction which relates to crown anatomy. Worn teeth end up thick at incisal tips.

- Incisal plane
- Cervical plane
Feedback
Winged Porcelain-Fused-to-Metal Crown (WPFM) Preparation Performance Assessment - 2015 - Norwich

Possible Score = 20

Margins:
Overall margin height in relationship to gingival margin level
Satisfactory □ 2 Unsatisfactory □ 0

Labial depth:
Satisfactory □ 1 Unsatisfactory □ 0

Palatal depth:
Satisfactory □ 1 Unsatisfactory □ 0

Wing area:
Satisfactory □ 2 Unsatisfactory □ 0

Smoothness and overall finish:
Satisfactory □ 1 Unsatisfactory □ 0

Taper and parallelism:
Palatal cusp ridge:
Satisfactory □ 1 Unsatisfactory □ 0

Axial wall:
Satisfactory □ 1 Unsatisfactory □ 0

Labial wall:
Satisfactory □ 1 Unsatisfactory □ 0

Undeciduous:
Not present □ 1 Present □

Tooth reduction:
Labial wall:
Satisfactory □ 1 Unsatisfactory □ 0

Axial wall:
Satisfactory □ 1 Unsatisfactory □ 0

Palatal wall:
Satisfactory □ 1 Unsatisfactory □ 0

Palatal occlusal:
Satisfactory □ 1 Unsatisfactory □ 0

Incisal edge removal:
Satisfactory □ 1 Unsatisfactory □ 0

Interdental (distance between the prepared tooth and its neighbor):
Satisfactory □ 1 Unsatisfactory □ 0

Overall preparation shape (should be round and follow the shape of the tooth):
Satisfactory □ 2 Unsatisfactory □ 0

Total score for WPFM preparation = 20

Reflective learning comments:

Things I need to improve on:

Things I did well:

□
1\textsuperscript{st} Clinical Task

A ‘Winged’ VMK anterior tooth preparation
Porcelain Fused to Metal Crowns account for more than 85% of all prescribed crowns in the UK
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
‘Good’ Ceramic support

‘Poor’ Ceramic support
WPFM Preparation

Preparation Specifications:

- Incisal Reduction: 1.5 - 2.0mm
- Labial Shoulder: 1.2 - 1.5mm
- Palatal Chamfer: 0.5mm – for Metal only
- Palatal Reduction: 0.7 - 1.0mm for Metal only (palato-occlusal (gingival) 2/3s)
  1.2 -1.5mm for both Metal & Ceramic (palato-incisal third)
The ‘Wings’

• If you need a 1.2 – 1.5mm shoulder labially (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
The wing is where the palatal metal preparation meets the labial and interdental porcelain and metal preparation.
We need to get the palatal chamfer margin right and note how it slides round the outer aspect of the ‘wing’!
Common errors with WPFM Tooth Preparation:

Single labial plane reduction – look carefully at the tooth before you start to work out what you should aim for

Inappropriate change of Labial Plane
Uneven labial shoulder – want consistent depth

‘Universal’ preparation – no information on what surface should be covered by porcelain and metal and which surfaces should be covered by metal alone – think where you want metal only, where metal and ceramic and what this means to your preparation

Gouging and lipping of labial shoulder – think about bur choice.

Start off by placing your margin supra-gingival and then refine near the very end to avoid you placing your Margins too deep

Aim for labial margin, at or just below gingival level, and palatal margin supra-gingival
Here are some other aspects that you need to consider:

Winged preparation – this provides the technician with information about where you wish the ceramic/metal junction to be positioned. **Obvious demarcation interproximally and palatally** where the preparation changes from having sufficient space for metal and ceramic to having metal alone. **Think very carefully how much and where you need to remove tooth tissue - and why?**

Measure the tips of your burs and understand how much tooth needs to be removed.
WPFM Objective Feedback Scoring

• Please fill in the quality assessment sheet when you have finished
• A total score of 20 is possible
• There is space for reflective learning comments
• I want you all to discuss this with your DF trainers / tutors
Go do it - a ‘Winged’ PFM preparation on one of your maxillary central incisor (UL1)
Common errors displayed with WPFM Today:

Over-preparation in some areas and under-preparation in others

Over taper

Undercuts - check with sharp pencil and mirror at the line angles

Too aggressive incisal length reduction - think how much you need

Not enough interproximal space between preparation margins and adjacent teeth - technician must be able to section the die - so there must be enough space between the prepared tooth / teeth
Try not to take too much off the very valuable parts of the tooth – work on improving drill precision and control – use your other hand to control and guide the drill.
Axial Height
Minimum 2mm Ferrule
Parallelism is essential for retention on short teeth
Remember

- Retention - the direction of the path of insertion (occlusal direction)
- Resistance form any other lateral direction
- A function of:
  - Taper
  - Surface area/bulk of preparation
  - Surface roughness

Jorgensen 1955
‘Good, better, best. Never let it rest. Until your good is better and your better is best.’ Tim Duncan
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Task 2 - DRBCC

- Convergence
  - Taper 15-20°

- Occlusal Reduction
  - 1.0-1.5mm

- Axial Reduction
  - 0.5-1.0mm

- Heavy Chamfer

Dentine Resin Bonded Ceramic Crown
Resin (Dentine) Bonded Crown Preparation – can easily convert a labial ceramic veneer preparation into a DRBCC preparation
Tooth Destruction

INDIRECT COMPOSITE

DBC

PJC
Aesthetic restorations looking good comes at a biological price

- DBC prep = 63% off tooth
- PFM prep = 72% off tooth
- PFM prep 20% > FGC prep
- PFM prep x5 > Porcelain veneer (feathered) x3 > Porcelain veneer (butt joint)


Dentine Resin-Bonded Ceramic Crown Preparation

360° Heavy Veneer Preparation – but no undercuts can be allowed
DRBCC Preparation

- **Margin** (supra-gingival): 0.5 - 0.7mm consistent circumferential depth
- **3D tooth reduction** of 0.5 - 0.7mm in all dimensions
- **1mm** inter-occlusal space palatal clearance with rugby ball burs
- **Taper of all walls**: 8 - 10°
Rounded Contours

No Undercuts

PB
Convergence Taper
15 - 20°

Axial Reduction
0.5 - 0.7mm

Occlusal Reduction
1.0 mm

Heavy Chamfer

Dentine Resin Bonded Ceramic Crown
DRBCC Preparation

- ‘Ceramic-Veneer’ concept around the whole tooth
- Adhere hopefully to a good amount of enamel (as well as dentine)
- Can use with one or two stage Dahl
- Need **significant convergence taper** as neo-parallel will threaten # of crown on seating / cementing
- Most feel less tooth tissue removed – however you will be surprised!
Note the difference - in my view it is much more destructive palatally than a PFM.
Can use RB Ceramic ‘Hats’ or Crowns – manage what is in front of you
Common error in C&B preparation

Still need to use conventional sense – e.g. good separation of ID margins but keep enamel peripherally if possible
Indirect Palatal Veneers

- Can use DRBC Veneers – where aesthetics important
Now go and give it a go please
Task 3 - E-Max Anterior Crown
e.max core can be used in several ways
E-max

CAD CAM or Pressed:

- Layered
- Monolithic
- Hybrid (using the advantages of both layered (labial) and the monolithic full-thickness core (palatal))
Which is best and why?

**e.max Layered or Monolithic?**

TLC offers IPS e.max® in both monolithic and layered states.

When a crown is called monolithic this means it is fabricated in full contour from a single block of material. The weakest link in traditional PFM's and other ceramic restorations is the porcelain layer over the substructure. In many cases the porcelain can chip or fracture from the substructure and ultimately cause the restoration to fail. Monolithic crowns have no such weakness.

We also offer layered crowns. Though the monolithic press is stronger than a layered one you can achieve even better esthetics with a layered crown. IPS e.max® layered offers the high translucence and lifelike aesthetics you look for in an anterior crown.

**Benefits of monolithic**
- Monolithic material offers greater flexural strength and no chipping of the porcelain veneer.
- Provides a balance of versatility and simplicity
- Best for Posterior

**Benefits of layered**
- The ultimate cosmetic restoration
- Gentle to opposing dentition
- Best for Anterior
Monolithic full contour e-max (400MPA) – v – ‘Layered’ e.max – (90 MPA)
Do not do this please:

If you must – then use monolithic e.max as bridge framework:
‘Monolithic’ full contour e.max (400MPA)

- 1.0 to 1.2 mm occlusal depth to achieve appropriate occlusal anatomy.
- 1.2 to 1.5 mm functional cusp tip reduction.
- 0.7 mm gingival chamfer reduction
- 6-8 degree taper to the axial walls
3rd Task – a ‘Layered’ e.max anterior all-ceramic crown
‘Layered’ e.max anterior crown

- **Occlusal Reduction:** 2.0mm reduction
- **Butt Margin:** 1.0 - 1.2 mm circumferential shoulder reduction (with round internal line angle)
- **Taper:** 6-8 degree taper to axial walls
- **Overall wall reduction:** 1.5 mm in all aspects
3rd Task - A Layered e.max anterior all-ceramic crown

- **1.2mm butt joint** margin at gingival margin – all rounded angles
- **1.5mm** of facial, axial and palatal reduction
- **2mm** reduction of incisal tip
- **1.5-2.0mm** of palatal clearance in area of occlusion
Total Score for Layered e.max Anterior Full Ceramic Crown = 15

Reflective learning comments:

Things I need to improve on:

Things I did well:
Feedback