

Aesthetic Restorations using the Latest Techniques

Coursebook to accompany the hands-on course

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Course aim:

To cover the technical aspects of: smile design with composite, creating aesthetic and functional anterior veneers, shade taking, finishing and polishing. For posterior teeth we will cover deep and difficult restorations, bulk-fill techniques, occlusal finishing techniques, dealing with deep margins, coping will difficult contact areas.

Aesthetics- the options using composite resin restorations

1. Direct Composite Resin

Don't cut if possible. Reduce surface enamel only and bond composite to reshape teeth. Do a mock-up first "dry-it-and see" to check contour, patient agreement and shade. A putty index of this can be made to make final restoration easier.

Composite can be placed directly freehand or using a matrix. Currently popular is injection moulding (which requires Smile Design and a wax-up). We will use these techniques on the hands-on course.

2. Semi-Direct Composite Resin

Use preformed enamel shells such as *Componeer* (Coltene) which have the advantage of low cost, easy to adjust and high polishability. Technique is simple but consider doing first case on a model:

1. Select enamel shade (universal, white or bleached white)
2. Select size (5 options)
3. Try-in and select underlying shade which can be any material, any colour, enamel or dentine
4. Etch, bond, apply the underlying composite then place *Componeer* shell on top
5. Check alignment carefully
6. Remove excess composite around margins
7. Recheck position and margins
8. Light cure
9. Polish if necessary. Can characterise.

3. Chairside techniques

Use the tooth as the die or, better still, make a die at the chairside. This means any shrinkage occurs outside the tooth, finishing and contouring is easier outside the mouth. The restoration can be supercured to make it harder and tougher.

1. Check cavity is free of undercuts, or block out with composite
2. Record impression with alginate, just one tooth either side will do
3. Pour alginate with addition silicone bite registration material
4. Place matrix if necessary
5. Fill cavity with composite, shape and cure
6. Transfer to cavity, adjust
7. Finish and polish on the die
8. Cement with dual cure composite eg *ParaCore, SoloCem*

4. Indirect composite veneers

Decide on level of preparation (depth, incisal reduction, proximal extension) depending on tooth position and alignment, existing restorations within the tooth and amount of colour change desired

Minimal – surface reduction only to obtain fresh enamel. Little scope for realigning teeth or colour change. However, treatment is reversible and gives best bond (to enamel) and no tooth sensitivity.

Conventional – within enamel, 0.3 cervically, 0.5 centrally, incisal edge retained or reduced by 1mm. Proximal contacts are retained. Temporary restorations usually needed.

Deep – into dentine, usually 0.6 reduction labially, and can remove interproximal areas completely to produce a preparation similar to a $\frac{3}{4}$ crown. Much more destructive but allows greater scope for tooth realignment, colour change and removes most existing restorations. Temporary restorations in bis-acryl material required with non-eugenol cement.

Consider the use of indices to check preparations, obtain the ideal restorative volume for good aesthetics while minimising tooth reduction.

Colour

Interpreting the shade selected is a great problem in fabricating the restoration. Colour as we see it is determined by radiation from the light source, modified by the object, and interpreted by human vision. Even given identical structure of the human retina in various individuals, interpretation of colour remains subjective because of differences in colour perception faculties. The ability of the eye to perceive colour begins to decline in the third decade of life, as slow yellowing of the lens begins. An operator's eyesight tires at the end of a difficult tooth preparation under strong light or toward the end of a long day and he or she may not distinguish shade nuances as well.

Consider:

- Environment
- Light Source
- The dimensions of colour: Hue, value, and chroma
- Instrumentation for shade matching/taking
- Using different shade guides, eg. 3D master linea guide
- Shade guide Modification

Shade taking

Check lighting, do at the beginning of the appointment (when teeth are not dehydrated and your eyes are less tired) and take shade outdoors if possible. Or use natural light such as from a *Dialite*

Choose shade guide carefully, eg. Vita Classic in value order

Check the value first based on middle 1/3 of the tooth:

B1 - A1 - B2 - D2 - A2 - C1 - C2 - D4 - A3 - D3 - B3 - A3.5 - B4 - C3 - A4 - C4

Look for no longer than 8 sec then look a blue surface. Squinting may help.

Check hue (A-B-C-D): A = red-brown, B = red-yellow, C = grey, D red-grey using the upper canine

Or Vita 3D-master or the new Linear system for value-chroma-hue. Consider using a colorimeter, eg *Easysshade*

Take the dentine shade in the cervical third of the tooth and the enamel shade near the incisal edge. Do a trial mock-up to check the colour.

The natural layering technique

Natural - this means using natural colours, not VITA shades which were designed for single colour denture teeth 60 years ago.

Layering – means use a dentine shade for the dentine and an enamel shade for the enamel.

The advantages of natural layering are:

You buy less composite shades (typically 5 dentine and 2-4 enamel shades)

You get better aesthetics than a monolayer

It is logical (copies the natural tooth)

It is easier than multiple layering

Because you put enamel-shaded composite onto the enamel when doing a veneer you get an invisible infinity margin. You cannot do this with a Vita based shade as it is more opaque than enamel (as it has to pretend to match both enamel and dentine – clearly impossible).

There is a conversion from Vita to natural shades if you are locked into the A2/A3 way of thinking! You can try to apply the natural layering concept using Vita shaded systems but it gets even more tricky and is unreliable.

Top-end materials use natural layering eg *Inspiro* (10 years old). A few materials offer both methods although it is more tricky to carry out, eg *Gradia* (26 years old), *Everglow* (10 years old).

Pre-restorative Tooth Bleaching

Initial assessment

- determine what the patient actually wants – use mirror, is a trial possible?
- colour – use a shade guide, record on a photograph?
- tooth shape – try diagnostic reshaping with composite?
- tooth position – alignment, occlusion, midlines, black triangles, buccal sulcus
- soft tissues - gingival, lips, cheeks, which teeth are visible

Techniques

- Assess patient's request, consider options and existing tooth colour
- Check patient is not pregnant or breast feeding
- Compare tooth destruction with veneers and crowns
- Warn patient about existing restorations (will no longer match), tooth sensitivity, unpredictable outcome, need to repeat procedure
- Check oral health, no allergies to products
- Assess existing shade, estimate improvement (99% whiten, 96% satisfied, yellow/brown responds better than grey/blue)
- 66% patients get sensitivity, manage with agents eg GC Tooth Moose in same tray
- Can bond composite after 2 weeks post-whitening, colour stable at 6 weeks, top-up required in 1 year approx. using same system.

Techniques for external bleaching of vital teeth

(a) Nightguard bleaching

Which agent? – Carbamide peroxide has long proven record of safety and efficacy

Which % - 10% universally accepted and has research and proven record. No good evidence to support the use of >10% CP, several leading authorities recommend not using strengths above 10% CP as it increases sensitivity. Consider >10%CP only for older patients with no previous dentine sensitivity.

Tray fabricated, no need for reservoirs, typically extending over 12 teeth when whitening 10 teeth.

Can be worn overnight or during the day, (but 2 hrs considered best) for about 3-6 weeks depending on initial colour and desired final colour.

One CP syringe will be enough for 2 or 3 tray applications with reservoirs and much more if no reservoirs in the tray.

Can also be used non-stop (replenish every 2-3 hours) over a weekend.

Outcome – use Vita shade guide value range (see below) and 4 places to the left is easily achieved, can be much more (eg. C3 to B1). Almost all patients satisfied, best outcome with yellow-brown discolouration as grey-blue takes longer. ?ethically stop at B1

Patient is in control of the colour change and so can stop if unwanted effects, eg. mottling appear.

Management of sensitivity- take a break from whitening, use the same tray but with a desensitising toothpaste in it for 20 min/day, use chewing gum after tray removal, avoid the use of high-power whitening agents.

10%CP for 2hrs/day is first choice.

16% CP for 2hrs/day good for resistant teeth, older patients (>50 years perhaps) or if patient wants a 60-90min application per day

6% HP for 10-15 min/day is a good alternative if patient only wants to wear the tray for short period each day.

3.5% HP for 10min/day for younger patients (not <18 years) or those with sensitive teeth

Avoid lights and lasers as they increase dehydration and sensitivity, increase costs and give false colour change with more relapse and more dissatisfied patients due to rebound.

Techniques for anterior teeth

Direct composite freehand

Dry-it-and-see (old composite or *Revotek*, *GC*)

Smile Design principles: length, width, position, contour, symmetry

Determine the new incisal edge position

Check occlusion, function, phonetics

Can you copy the old restoration with an index? Putty or clear silicone (eg Elite HD glass)

Shade – 2 layers usually, trial cure to check colours

Trial restoration for contour and indices?

Determine line angle position

Isolation, matrix system (PTFE, Sectional?)

Clean surface with bur or sandblaster the etch eg 3 stage phosphoric acid etch/prime/bond

Place composite without increments (dentine, special effects, enamel)

Create surface anatomy

Margins – knife edge works well

Finishing: primary anatomy at first visit: labial profile (3D), incisal length, occlusion.

At same or later visit secondary anatomy: surface detail and texture/lustre (see later section).

Clear post-op matrix for easy repairs, eg Elite Glass HD

Direct composite freehand

Carry our Smile Design then copy with a putty index for the lab. This leads to a wax-up or printed model. From this a clear silicone index can be made. The silicone can be injected through with a flowable composite. The key to success is limiting the spread of the resin to unwanted places so isolation with PTFE is essential Using two matrices is very effective as will be discussed on the hands-on course.

Chairside Inlay technique

Cut a non-undercut cavity and take impression in alginate (or condensation cure or *Impregum*)

Pour at chairside, eg bite registration silicone

Make composite inlay/onlay on the silicone die. Use matrix if it helps.

Light cure in the silicone

Remove restoration from the silicone die, remove flash and tidy, add if necessary, eg to contact area

Repeat light cure from all sides, hold light close and generate heat it all helps maximise the polymerisation conversion

Check in the tooth

Modify as necessary

Cement into cavity as an indirect restoration

Indirect technique

Cut a non-undercut cavity

Take impression in heavy/light addition silicone (see below for impression techniques)

Prescribe for a lab-made composite restoration, eg *Gradia Lab*

Cement into cavity as an indirect restoration

For speedy complete cavity filling with 3 sec light cure consider bulk-fill dual-cure composite (eg *FillUp*, *Coltene*). Many bulk-fills on the market actually are only partial cavity fill, ie linings materials, eg *SDR*. *FillUp* is a complete cavity single fill, based on the successful *ParaCore* range, tested over 7 years.

The options for posterior composite resin restorations

After giving the LA check the existing tooth and restorations. Check the occlusion and remove any unwanted contacts (on non-functional cusps, and non-working side interferences).

Copy the occlusal surface with the stamp technique.

Remove damaged tooth tissue and damaged restorative material but you can leave sound old restorative material.

Assess cavity size, shape and depth. Decide if direct is possible or if indirect would be more optimal.

Assess the cavity. If subgingival then consider:

- Deep Margin Elevation
- Gingivoplasty eg electrosurgery
- Erupting the tooth using Dahl

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Cementation of indirect composite

Block out interproximal areas with PTFE to reduce risk of mess and set cement

Etch enamel but consider a self-adhesive dual cure luting material

Hold during clean-up until cured (3sec)

Avoid damaging the occlusion – remember if the impression was recorded two weeks ago then the tooth is now in a different position so the occlusion cannot be expected to be correct when fitting an indirect restoration.

Finishing and Polishing

This is an important step taking more time than we allow for.

The composite restoration should be placed with maximum anatomy:

Primary anatomy – width, length, line angles, general shape.

Secondary anatomy – longitudinal labial grooves, mamelons,

Tertiary anatomy – not important unless you want to take photographs – perikymata lines, horizontal lines and surface microdetail detail

Once light cured the restorations should look incorrect as it will have too much texture (roughness) and not enough lustre (shine). You then polish it to reduce the texture and increase the lustre. Patients will always want high lustre. The final texture depends on the adjacent teeth and if you want the restorations to look real or not.

It can be frustrating to spend much time polishing to discover at the end that the lustre:texture ratio is wrong, as it means altering the texture (usually with a diamond bur) and then having to completely re-polish. So you can test the final result before polishing by wetting the surface with resin and assessing the appearance. Only light cure this if you do not have time to polish at this visit.

Polishing requires:

- Diamond burs - maintain or create the anatomy you want, preserve the line angles, check the labial surface is fairly flat, all other surface curve, reduce margins close to zero thickness to blend in. reate the anatomy for initial recontouring. Put in labial vertical grooves.
- Discs eg Swissflex (double-sided and very thin) for embrasure areas and labial – maintain line angles
- 40micron diamond burs for surface contour and detail
- Impregnated points and wheels eg *Shapeguard*
- Nylon prophyl brushes used dry

Consider using a clear post-op matrix for easy repairs, eg *Elite Glass HD*

Further training:

If you are interested in joining our prosthodontics programme, now in its 27th year. It is blended learning with much online content and a 10 day block of F2F each year of study which can be taken in London or Dubai.

If you choose to study with us at King's College London you can obtain:

- 1 year for a PG Certificate
- 2 years for a PG Diploma
- 3 years for an MSc in Prosthodontics
- 4 years for an MClintDent in Prosthodontics

For more details:

<https://www.kcl.ac.uk/study/postgraduate/taught-courses/fixed-and-removable-prosthodontics->

[mclindent](#) or email me: brian./millar@kcl.ac.uk

Materials list

Composites:

BRILLIANT EverGlow System Kit Syringes (9 syr) 60019722
BRILLIANT EverGlow System Kit Tips (60tips) 60019723
Inspiro – Henry Schein/Optident/Edelweiss – for layering
PTFE tape
Shapeguard polishers– Kit 250095AA
Universal bond – Bottle refill 5ml 60019539, single dose kit 60019540 (50pcs)
Hygienic rubber dam kit – Starter kit with winged clamps H02778, Starter kit with plastic carry case and winged clamps H02782, Complete kit with Wingless clamps no carry case H02790
Garrison matrices: anterior (blue curved) and posterior (Fusion)

Impressions:

Putty, fast set Affinis – AFFINIS fast putty soft 6531
Affinis Heavy Black – 360 refills 60019776
Affinis light Green – AFFINIS LIGHT BODY 50ml 6501/ FAST LIGHT BODY 50ml 6601
President Clear Impression trays
Putty knife – Coltene 4420

Provisionals:

CoolTemp – COOLTEMP Single Pack A2 5805
QuickTemp varnish for provisionals (Schottlander)
TempoSil2 silicone cement

Equipment:

Bur Kits Diatek: general kit for all preps #60011104; Crown Prep Kit by Prof Brian Millar #60020102
Articulators: Bioart 4000S & Professional facebow – Panadent or Denar 330 - Prestige
Shade: Vita 3D linear shade guide - Panadent
Handpieces: speed increasing W&H 99, ceramic bearings, LED light

Other restoratives:

Fill-Up, Coltene
Posts - Parapost or Tenax from Coltene