Gingival Retraction

Key to Successful Impressions
Affects long term gingival aesthetics

Gingival tissues should be in a state of health prior to starting otherwise struggling right from the start

Effective Gingival Retraction

- Healthy Gums: All bleeding must stop
- Hard Tissues need to be clean and dry
- Vertical Retraction: Must expose margin and see the root surface
- Horizontal Retraction: Need for bulk of impression material to pour impression without tearing

Emergence Profile

0.5mm-1.0 Horizontal and Vertical Retraction
Gingival Retraction

Mechanical

Chemical

Surgical

**Mechanical Retraction**

- Retraction Cord
  - TWISTED
  - BRAIDED
  - KNITTED
  - This is my preference
  - PLAIN OR IMPREGNATED

**How Many Cords Are Needed**

- Supra gingival - 0
- Veneers - 1
  - Margins are usually shallower
- Crown and Bridge - 2 (or 1)
  - Usually 2 is my gold standard

**Two Cord Technique—Gold Standard**

- TWO CORDS USED - THIN FIRST CORD IS PLACED FIRST AND LEFT IN PLACE FOR THE IMPRESSION
- SECOND CORD IS REMOVED BEFORE IMPRESSION IS TAKEN
- FIRST CORD IS NON MEDICATED
  - 3/0 Black Silk or Ultrapak 00
- SECOND CORD USUALLY MEDICATED
  - Mine: Ultrapak 0-1
After Placement of Black Silk/000

Evaluate Margin Show
Assess amount of retraction still required
Drop Margin if Needed
Refine/Smooth Margin

Gingival Packing Technique

FORM LOOP WITH CORD
I START IN THE INTER PROXIMAL AREAS FIRST
PACK INTO PREVIOUSLY PACKED AREA
DO NOT USE EXCESSIVE FORCE
PACK SLIGHTLY TOWARDS PREPARATION
WET CORD PRIOR TO REMOVING

Gingival Packing Instruments

1/2 Hollenback
Use this with my second cord. Rounded tip otherwise pulls out cord

Periodontal Probe
Use this with my first cord. Need to be GENTLE

Specialised packing instrument
Premier angled Serrated

SOAKED CORD
LEAVE NO MORE THAN 5-10 MINUTES
4 MINUTES GIVE MINIMUM 0.2MM SPACE
Double Cord Sequence

- Black Cord start inter proximal
- Keep Packing
- Cut Off
- Tuck 1st Cord in
- Second Cord
- Start inter proximal
- Keep Packing
- Ends left dangling

Chemical Retraction Haemostatic Agents

GELS OR SOLUTIONS
ALUMINIUM OR FERRIC SALTS
PRESOAK CORD
TASTE/PH

Chemical- Haemostatic Agents

- Vaso Constrictors
  - Adrenaline: Systemic Effects- Use Local Anaesthetic

- Astringents
  - Aluminium Chloride
  - Aluminum Sulfate
  - Ferric Sulfate

My Haemostatic Agents

- Astringedent
  - 15.5% Ferric Sulfate

- VISCOSTAT
  - 10% Ferric Sulfate

- Haemodent
  - 5-10% Aluminium Chloride

- STYPTIN
  - 20% Aluminium Chloride

- Gelscord
  - 25% Aluminium Sulfate

- Viscostat Clear
  - 25% Aluminium Chloride
Viscostat vs Astringedent

Astringedent is more acidic (removes dentine plugs)
Watch with self-etching bonding systems - use pumice
Polyethers may be affected - Wash
Tissues turn blue with adrenaline and Astringent

My Use of ViscoStat

I use Microbrush on pad
Rubbing
Scrub
No Bleeding!

Effect of Haemostatic agents on resin bonding?

CAN HAVE DETRIMENTAL EFFECT WITH SELF ETCHING ADHESIVE SYSTEMS

USE OF CHLORHEX SOL OR AGGRESSIVE CLEANING WITH PUMICE WILL IMPROVE

NO EFFECT WITH ETCH AND RINSE ADHESIVES (GENERATION 4,5)

Surgical Retraction

Electrosurge  Laser  Rotary  Crown lengthening

VARGAS J ESTHET REST DENT 2009 21(2)75-76
**Electrosurge**

**Troughing**

- Remove 0.2-0.5mm junctional epithelium
- Don’t touch connective tissue fibres

**Use of Electrosurgery**

- Must be Grounded
- Type of current usually set to Cut
  - Use Coagulation setting if bleeding as well
- Use of High speed aspiration or orange spray to avoid the smell
- Use Plastic Aspirator and Mirror
- Power setting should not allow charring/sparking or dragging
- May need post operative analgesia

**Tips**

- USE FINGER RESTS
- PRACTICE STROKE FIRST BEFORE CUTTING
- NO SPARKING OR DRAGGING
- SERIES OF SMALLER STROKES
- LET TISSUE COOL 10-15 SEC BEFORE RECUTTING
- CLEAN ELECTRODE ON ALCOHOL SOAKED GAUZE
- USE 6% HYDROGEN PEROXIDE AFTER USE

**Electrosurge safety**

- USE GROUND ELECTRODE
- WATCH WITH OLD PACEMAKERS
- WATCH USE WITH O2 AND NITROUS
- USE PLASTIC INSTRUMENTS
- DON’T TOUCH METALLIC RESTORATIONS/IMPLANTS
Electrosurge use

- Posterior situations (occasional)
- Thick biotype tissue
- Overlapping bits of tissue over cord

Laser Soft Tissue Retraction

- Epic 10 - Biolase
  - Concentrated beam of energy delivered to tissue via small diameter fibre (200-400 ums)
  - Less destruction
  - Less pain
  - Improved healing
  - Single use electrodes

Epic 10 - my favourite

- SOFT TISSUE
  - TROUGHING, IMPLANT RECOVERY, FRENECTOMY
- WHITENING
  - NO SENSITIVITY
- PAIN THERAPY
  - TMJs plus other soft tissue

Lasers - My tips for soft tissue use

- TROUGHING
  - ONLY 1MM INTO SULCUS, DON’T TOUCH ATTACHED CONNECTIVE TISSUE FIBRES
- SHORT OVERLAPPING STROKES
  - NOT ALL THE WAY AROUND IN SINGLE STROKE, TAKE YOUR TIME, NOT AS FAST AS AN ELECTROSURGE
- DON’T OVERHEAT TISSUE
  - IF TURNS WHITE IT WILL RECEDE
Surgical Retraction
Rotary

Kerr
Ceramic Bur
Used without water
Used if problems with other techniques

Use in High speed

Crown Lengthening

Consider Crown Lengthening if biologic width violation

Pastes
Expasyl- Kerr

Angle cannula into sulcus
Leave for 1-2 min
3-4 min for thick tissue

Kaolin and Aluminum Chloride
Get right angle
Watch for Whitening of gingiva
Rinse

Expazen - New
Cord paste from Acteon/Kerr
3M ESPE Astringent Paste

85% Fillers, water, modifiers
15% Aluminium chloride hexahydrate

3M ESPE Astringent Retraction Paste

The 3M Astringent Retraction Paste fits into common composite dispensers. Extrude a small amount and discard.

Optional procedure:
For more gingival deflection, the astringent retraction paste can be used in combination with retraction cords.

Leave astringent retraction paste on for a minimum of 2 minutes.

Completely remove astringent retraction paste with air-water spray and suction.

Move around the tooth with inserted tip while slowly and steadily inject astringent retraction paste into the sulcus. Completely fill the sulcus.

Clinical Case Study:
Gingival retraction using the

3M™ ESPE™ Retraction Capsule
Polymers and Pastes - My Take

- Technique sensitive
- Variable unpredictable results
- Still may need to use cord
- Has its place in certain situations - especially anterior
- Veneers & thin biotype

What are clinician's doing now?

CR Survey: most common method of tissue management and retraction

- 39% Two Cords
- 25% One Cord
- 16% Other
- 12% Retraction Paste
- 8% One Cord and Retraction Paste

Perfect impressions
Consistently, predictably every time

Impression Taking
Tray use survey trends
CRA March 2015

- 60% use triple tray for multiple units
- 21% use special tray for multiple units
- More dentists should use to save money and improve accuracy
- 68% use triple trays for single units

SPECIAL TRAYS

- Even thickness of material (2-4 mm) therefore more accurate impression
- Allows saving in amount of material used (2/3rd less material)
- Needs two visits - time for set of tray
- Must be designed to retain material - perforations, adhesive

SPECIAL TRAYS

- Chemical cured trays: Need to let it set for a day, contact dermatitis possibility, smells
- Light cured trays: This is what we use now, no problems with movement, 5-10 minutes to make
- Light oven: As cheap as $200, your nurses can do this!

Tray Adhesives

- Use adhesive specific for class of impression material
- Single layer
- Paint at least 5-10 minutes before impression (silicone)
- For polyether 90 sec
Triple Tray/Double Arch Tray

- CAN BE USED WITH INTACT DENTITION
- SHOULD HAVE NATURAL CANINE AND ANTERIOR GUIDANCE
- FOR 1-2 CROWNS
- PATIENT SHOULD BE ABLE TO CLOSE INTO CENTRIC OCCLUSION
- NEED GOOD LAB SUPPORT

These days Quadrant impressions in Digital

Quadrant Printed Model

Quadrant scan

IMPRESSION MATERIAL USE

CRA MARCH 2015

Addition Silicone

Polyether

Impression Material Use

Polyether

Advantages

- Hydrophilic
- Moisture control not as critical
- Short Setting time
- Generally 3 minute set
- Excellent accuracy and near perfect surface detail reproduction
- Low surface tension
- Can pour up easily

Disadvantages

- Rigid
- If not using Duosoft, can extract teeth!
- Imbibition
- Lose and gain moisture, pour within 2 weeks
- Short working time
- Snap set
- Model preparation Problems
- Long teeth, isolated teeth, reinforce with wire
This is my favoured material for any removable prosthodontics. Full, Partial or Implant over dentures. Generally do a mono phase impression here.

**PolyEther**
Impregum Duo Soft

**Addition Silicones**

**Advantages**
- Dimensionally Stable and excellent accuracy
- Multiple Pours, long term stability
- Good tear resistance
- Water Friendly
- Neutral Taste and Odour

**Disadvantages**
- High surface tension
- Hydrophobic?

**Addition Silicone Techniques**

- **Heavy Light**
- **Monophase/ Single body**
- **Putty Wash**

**Putty Wash Technique**

- **ONE STAGE**
  - PUTTY WASH RECORDED TOGETHER
- **TWO STEP SPACED**
  - 2 MM SPACING RECOMMENDED
  - USE TEMPORARY CROWN
- **TWO STEP UNSPACED**
  - POTENTIAL FOR INACCURACIES
Problems with One Step Putty Wash Technique

- Movement of light body away from margin and critical areas
- Putty ability to capture detail not as good
- Particular problems with prep margin near occlusal surfaces like for inlays, veneers, resin bonded bridges

Heavy/Light Impresion technique

- Heavy Body in tray
- Light body in syringe
- Use for majority of time
- Medium Body in syringe
- Usually where more viscosity is required or around implants

What about fast set Materials

- Range of setting times 1:30-2:30
- Good for 1-2 teeth
- Know your set and working times
- Imprint 3, Imprint 4
- Load impression tray before syringe
- Light body must not start to set before heavy body is inserted

Imprint 3 vs 4

Regular Set materials for larger cases

<table>
<thead>
<tr>
<th>Imprint 3</th>
<th>3.00</th>
<th>1.00</th>
<th>3.00</th>
</tr>
</thead>
<tbody>
<tr>
<td>Imprint 4</td>
<td>2.00</td>
<td>1.00</td>
<td>2.00</td>
</tr>
</tbody>
</table>

Same working time as Imprint 3 but reduced intra-oral finishing time (2 min instead of 3.30 min)

Quick Set materials for 1 or 2 unit cases

<table>
<thead>
<tr>
<th>Imprint 3 Quick Step</th>
<th>1.00</th>
<th>0.40</th>
<th>2.00</th>
</tr>
</thead>
<tbody>
<tr>
<td>Imprint 4 Super Quick</td>
<td>1.15</td>
<td>0.35</td>
<td>1.15</td>
</tr>
</tbody>
</table>

Legend:
- Imprint 3 Quick Step
- Imprint 4 Super Quick

Range of setting times: 1:30-2:30

Imprint 3
- Improved finishing time (2 min instead of 3.30 min)

Imprint 4
- Reduced finishing time (1.15 minutes)

Improvements for more complex cases

Improvement in finishing techniques

Simplified techniques for adding implants
Material Types

- Normal Crown and bridge: Light and Heavy
- Implant head impressions: Medium and Heavy
- Mixture: implant and crowns: Light/Medium/Heavy, Light and Heavy

Impression Syringes/Tips

- Coe Syringe: I like using these
- Syringe tips on Cartridge: I don’t think this allows you to see what tip is doing as well

Use of syringe

- More tactile feel
- Get closer to the preparation
- Nurse cover tip when passing
- Cut tip if needed to increase opening

Syringe use tips

- Syringe tip on margin at all times
  - Cushion material before syringe tip into marginal area
  - If can’t get through, access material from other side before injecting
  - Dry run with syringe or tip to ensure access to all parts of tooth
Ready/Set/Go

Nurse has paper towel and mirror ready

INJECT-BLOW-INJECT TECHNIQUE

- **BLOW OR NOT**
  - I like to blow after placement of light body

- **THIS IS NOT TO 'PUSH' IMPRESSION MATERIAL INTO SULCUS BUT TO REDUCE SURFACE TENSION**

- **IF MATERIAL BLOWS OFF, PREP IS TOO WET**
  - Blow dry and inject again

- **ONCE MATERIAL STAYS ON, INJECT FINAL WASH MATERIAL LAYER AND PLACE TRAY WITH HEAVY BODY**

New Impression Syringe

- Syringes for both PVS and Polyether
- Clip onto cartridge
- Fill
- Place plunger
- Can stay for a few days
- Compares sizes of different options

Fabricating an Ideal Impression
Retractors
My Second Pair of Hands

Indispensable
Use these for most of my impressions
Generally around $15 each, Autoclavable
Livingstone

Very good for also for Photography

Kerr Retractors
These have handles at sides

Block out undercuts
Under bridges, implants, perio involved teeth

Blue periphery wax
Oraseal

Clinical Tip

Don't you hate half wasted tubes

Extenders
From Adam Dental

Extender
Place on Cartridge
Join to other cartridge
Inject into one cartridge
Clean up with q tip
Ready to go again
Evaluation of an adequate impression

Preparation

01 Emergence profile-length/width
02 Margin quality
03 Bubbles, drags, tears

Other teeth

Coverage, tears, drags

General

Adhesion of material to each other/tray
Material consistency

Material consistency

Coverage, tears, drags

Bleeding - what now?

USE STRONGER HAEMOSTATIC AGENT
USE TWO CORD TECHNIQUE
USE ELECTROSURGE ON COAGULATION CYCLE
USE MORE HYDROPHILIC IMPRESSION MATERIAL
BLOW BLOOD AWAY AND GO FOR IT!
TAKE SECOND IMPRESSION
STOP, RETEMPORISE, REIMPRESS AFTER HEALING PERIOD (PAT ON M WASH)

Bubbles - where are they important?

Generally a result of inadequate syringing technique
Contamination with blood/saliva/gingival fluids
What about the elephant in the room- Digital Impressions?

My History With Digital Cad Cam
Did my Masters thesis on CEREC 2 in 1992

I was one of the first in Australia to research CAD/CAM
Looked at marginal accuracy of CAD/CAM onlays, laboratory and pressed onlays

Werner Mormann
Co Inventor of CEREC
University of Zurich

Francois Duret- early pioneer

How many of you have done anything to do with Digital dentistry?
More pervasive than you think

What is possible with Digital Impressions?
- Crowns/Bridges
- Veneers/Onlays
- Dentures
- Temporaries
- Post and cores
- Implant surgical guides
- Splints
- Implants abutments
- Orthodontics/Invisalign

Shade taking

Why go digital?
- SAVE TIME
- SAVE COSTS - IMPRESSIONS
- DECREASED TURNAROUND TIME
- DIGITAL ACCURACY
- IMPROVED PATIENT COMFORT/EXPERIENCE
- ENJOY IMPRESSION TAKING
- DIGITAL RECORDS
One big reason for us

Getting Into Digital impressions?

Do you just want to Scan
Do you want to construct restorations as well

CAD/CAM systems - Integrated systems

<table>
<thead>
<tr>
<th>Digital impressioning Systems</th>
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<tbody>
<tr>
<td>3M Tru Def</td>
</tr>
<tr>
<td>Needs light coating of powder</td>
</tr>
<tr>
<td>$38000, View in 3D</td>
</tr>
<tr>
<td>Trios 3 Scanner</td>
</tr>
<tr>
<td>No powder</td>
</tr>
<tr>
<td>Around $45000</td>
</tr>
<tr>
<td>Carestream 3600</td>
</tr>
<tr>
<td>Powderless, No Annual Fees,</td>
</tr>
<tr>
<td>Open system around $39000</td>
</tr>
</tbody>
</table>

CEREC
Long History
Now no powder with omnicam
$185000

E4D - larger mill, no powder
**TRIOS® Pod – The Mobile**

- Extreme mobility
- Small footprint
- Connect to multiple laptops / PCs

**We had to confirm its accuracy**

I am a prosthodontist after all!!!

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Did both conventional and digital and made 2 crowns.
Both crowns were interchangeable on the models.
Digital Crown had better fit and contacts! and was inserted.

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**We have had our scanner for only 6 months**

Digital impression with model

1. Scan
2. Temporary Crown
3. Design Restoration
4. Milling and Sintering
5. Finish
6. Second Appointment
7. Sealed Appointment
8. Receive from Lab
Digital Impression without Models

More familiar process for Laboratory and you. Best start off this way until get familiar

There are many 3D printing services of different abilities

Model

- More familiar process for Laboratory and you. Best start off this way until get familiar
- Trust in Digital process! Chipping of margins possible
- Restorations generally designed oversized

Modelless

- If need to add to porcelain in anyway will need model
- Best for Full contour restorations

This is a Paradigm shift

Emergence profile

Can see emergence profile if scan is ‘flipped over’

Need to look at scans carefully
Retrain yourself to visualise margins

‘Green’ Areas

Where insufficient information is present

Need to decide what is critical
‘We are Green Friendly’

My first scan took over 1 hour!
Digital and gingival retraction

Digital will not hide bad preparations or poor retraction or see through blood!
I am generally using a larger second cord to improve horizontal retraction
Can erase parts of the margin and rescan if needed

Great things about Digital Scans

- Bite registration
- Check for clearance
- Check for undercuts

Bite registration can manual registration as well
Automatic check
Check for undercuts

If you decide to get into restoration as well

Numerous wet/dry/combined mills present - Learn to ‘walk’ first!

- LYRA
  Full integration
In clinical use
- CONTEC 149
  Full integration
In clinical use
- VHF
  Full integration
- Roland
- PlanMeca
  Full integration
In clinical use
- Arctica
  STL Interface
In clinical use
- DWX-4W
  Full integration
In clinical use
- LYRA Mill
  Full integration
In clinical use
- CORiTEC 140i
  Full integration
In clinical use
- VHF
  Full integration
- LYRA Mill
  Full integration
In clinical use
- DWX-4W
  Full integration
In clinical use
- LYRA Mill
  Full integration
In clinical use
- VHF
  Full integration
- LYRA Mill
  Full integration
In clinical use
- DWX-4W
  Full integration
In clinical use
- LYRA Mill
  Full integration
In clinical use
- VHF
  Full integration
- LYRA Mill
  Full integration
In clinical use
- DWX-4W
  Full integration
In clinical use

My initial impressions with digital after 6 months

There is a learning curve for you, your staff and your labs
Give yourself enough time in your first cases
Work to make it fit into your workflow
There is a technique to scanning
You don’t need to get every little ‘green’ areas only the important ones
Digital technology brings its own challenges which companies don’t talk about
Take your time in deciding the right system for you
Pick a sales vendor which will offer you support
These are exciting times

(How did you do in the budget?!)