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For all complex and/or comprehensive cases, including those involving change in occlusion and/or anterior esthetics, the following would form the basis for all restorative treatment, should be assembled prior to any restorative therapy, and form the basis for diagnosis and treatment planning. They also form the basis and safety net to which we may refer and rescue cases if and when treatment difficulties arise.

1. Pre-op models mounted with a centric bite, duplicate models, and photographs.
2. Centric relation identified and adjusted into as required for a stable treatment position.
3. Treatment VDO established; possibly eliminating the need for any pre-restorative occlusal adjustment if no occlusal interferences exist at that VDO.
4. Ideal wax-up of the case establishing function and esthetics at the proper tx VDO
5. Matrices for "trial smile" and reduction guides. The trial smile to verify patient expectations, and consideration of either the "trial smile" (as per Dr. Pascal Magne) or the reduction guides to prevent over-reduction of the teeth.
6. Custom Incisal guide table to maintain the previous anterior guidance or to allow a shallower guidance so lateral forces are not increased on the anterior teeth.
7. Respect for the biologic width, biologic attachment and occlusal forces.

Each case is restored four times: in our mind, in wax, in acrylic, and in porcelain.

O Preamble: Likeability and Communications

A. Likeability: 12 Keys:

1. Give compliments regularly, face-to-face.
2. Do little, unexpected, things for people.
3. Thank people; show appreciation; mix up the medium.
4. Make eye contact with others.
5. Smile; show friendliness.
6. Use impactful words; show interest and caring.
7. Use a positive tone of voice.
8. Use "I" messages (feelings) to deliver critiques to avoid alienation.
9. Listen: listen, mirror, understand, internalize, acknowledge, and thank.
10. Share feelings.
11. Learn to say "I don't know"; - admit humanity.
12. Show interest in people's personal lives.

B. Be positive, be an optimist: People don't buy from a pessimist!

Be enthusiastic, calm, and confident.

Smile and laugh!

Originations: always clarify, understand, acknowledge.

C. "The universe tends to respond to a spirit of play." - LRH (Philadelphia Doctorate Course Lectures)

D. Max's maxim: My goal in every encounter is to leave the other enhanced.

(Not for me to be right.)

E. " We will provide dentistry for patients within their budget."

" We will provide dentistry for patients when they are ready."

F. "I will ask your permission to look in your mouth, tell you what I see, and recommend to you what I would recommend to a member of my own family. Out of what I recommend I assume you will feel free to accept all of it, none of it, or some of it, without hurting my feelings, as long as I have your permission to tell you what I see."

G. Grant beingness, admiration, importance to the other person.

Instruct and coach; do not lecture. Attempted persuasion = confrontation.

1. Relationship and understanding are primary.
2. The patient must own and understand their problem prior to the solution..
3. The patient must demand a solution to the problem, prior to the solution.
4. Start with small steps and a shared vision.

H. Awareness Characteristics

by LRH:

- 1. Help
- 2. Hope
- 3. Demand for improvement
- 4. Need for change
- 5. Fear of worsening
- 6. Effect
- 7. Ruin

Bob's notes:

Must bring the other up the levels from the bottom:

(Let's do it...)

(We can do it...)

(How badly do you want to improve... ?)

(Is it real?)

(If not handled, what will happen & how will it be?)

(What is the effect on your life?)

(Unwanted condition: Aware of it? Able to be?)

I. Words to create power, energy and excitement:

Great, Wonderful, Terrific, Fantastic, Excellent, Outstanding, Awesome!

J. For the patient to respect your knowledge and judgement, he or she must be made aware of all the factors you consider in your diagnosis and treatment-planning decisions.



V Facial Analysis; Dentofacial

Summary: Tooth alignment, Inclinations, Rotations  
Occlusal Plane, Incisal Plane, Lip Line Curvature, Canting  
Facial Position, Lip Position, Rest Reveal, Smile Reveal  
Gingival Architecture  
Facial Thirds: Upper Third: Forehead Height to outer canthus = 1  
Middle Third: Outer canthus to commissure = 1 (~60mm)  
Lower Third: Subnasale to Chin (menton) = 1 (~60+mm)  
Lower 2/3 of face ~120+mm  
Ratio: Forehead Height to Subnasale : Subnasale to Chin = 1.618 : 1

Lower third (sub-nasale to menton with relaxed lip posture): 60 - 68mm  
Includes Upper lip- interlabial gap- lower lip  
Upper lip: (sub-nasale to upper lip inferior): 19 - 22 mm  
Symmetry - Thickness - Mobility  
Lower lip: (lower lip superior to soft tissue menton): 38 - 44 mm  
Symmetry - Thickness - Curvature

Normal Lip at Repose (rest): Reveal ~ 1-2mm: Females: more; males: less  
Short lip--> more reveal; Long lip--> less reveal; Average Central length ~10+mm  
High smile: lip elevates~ 8mm so a 10mm tooth shows ~2mm at rest and then full 10mm + 0mm gingiva at smile.  
"E": if display of max incisors (Max lip to inc. edge) is;  
50% of interlabial gap, then incisors are easy to lengthen.  
70% of interlabial gap, then incisors are difficult to lengthen.

Interlabial gap (relaxed): 1 - 5 mm: females usu. 3 - 5 mm (F>M)  
Max inc edge to lip (reveal)- Relaxed: 1 - 5 mm: females usu. 3-4 mm (F>M)  
Max inc edge to lip (reveal)- Smile: 3/4 Crown length to 2mm of gingiva (F>M)

Midlines ( always: with condyles seated (CR) at first tooth contact)  
Midline Facial:Nasal bridge-nasal tip-philtrum-chin point  
Midlines Dental: Max. incisors and mandib. incisors  
Facial long axis: mid. nasal bridge to mid philtrum  
Ideally perp. to upper/lower canines & chin

VI Profile

Profile Angle: Soft tissue: glabella-subnasale-pogonion  
CI I: 165-175; CI II: <165; CIII: .175 degrees  
Nasiolabial Angle: upper lip anterior-subnasale-columella  
Ideal: 85 - 105 degrees: Female: 100-105; Male: 90-95  
E-Plane (Facial Balance): Upper lip 4mm: Lower lip 2mm  
Convex: Teeth too prominent  
Concave; Teeth retruded

VII Orthognathics and Orthodontics

Excess Gingival Show? If both ant.and post. --> orthognathic surgery is ideal  
Gingivectomy vs Flap/Osseous vs Orthodontics vs Orthognathics  
  
Long Ramus (&/or flat gonial angle) --> decr. ant. erupt, deep overbite, decr. ant VDO  
Appears overclosed  
Short Ramus (&/or steep gonial angle) -->incr. ant. erupt, ant open bite, incr. ant VDO  
Anterior maxillary excess

Orthodontics:

Comprehensive vs. Limited?  
Correct gingival show (reveal)? Compensate for uneven bone, tissue, perio?  
Create bone/tissue height for implant or pontic site prior to extraction?  
Decision between ortho, restorative or combination is a function of:  
a. Whether maxillary incisal edges require restoration and/or  
b. Patient's anterior occlusion, facial proportions, room for restorative

Immediately Post-ortho: do not want anteriors in contact at closure:

- a. Will lose approx. 0.5mm from settling
- b. Will lose approx. 0.5mm (?) after post-ortho occlusal adjustment
- c. Post-ortho: wait approx. 6mo. to equil.; wait approx. to restore (Dr. Kois)

Incisal wear cases with Ortho & small/peg teeth with ortho:

If room is available, restore required incisors (length, width, size) prior to ortho so tooth structure is placed in correct position for final restoration.

If room is not available, have ortho. intrude anteriors and/or extrude posteriors to give room for anterior restorations, remove anterior brackets, then do temp. composite veneers to proper length, width, size. Then rebracket, finish ortho to final positions, then restore.

If peg lateral, have ortho. over-open space, then restore to full contour temp'ly with composite so ortho. can maintain proper spacing, length and incisal position.

If temp./composite restorations not done prior to or mid-ortho, orthodontist may leave worn or peg) teeth with incisal edges at final inc. edge position with need to then cut down teeth for final restoration. Also, short teeth may be left so that perio surgery (and loss of bone support) is needed to create length/room for full-length teeth.

VIII Models mounted; with facebow; in centric

From jig: Inc. edges perpendicular to and midline parallel to facial long axis; not pupils.

Model Analysis Sheet

Model Analysis

- Verify mounting with initial contacts + wear facets; & condylar relation CO-->ICP
- If CR init contact only on M2--> seat condyle & lose vert.height/clearance at prep
- Eval. amount reduction nec. to seat condyles: ? Ease to establish CR=ICP?
- Molars: unworn vs. worn/flat?
- Posteriors: Hit on horiz. fossae/ridges ( hard to adj.) vs on Inclines (easy to adj.)
- Amount change in Overbite (OB) & Overjet (OJ) in occl. adjust to CO=ICP?
  - If open VDO by 3mm (restore)--> increase Overjet by 2mm
  - If close VDO by 3mm (occl. adjust)--> decrease Overjet by 2mm
- ? Inter-incisal angle: constricted envelope of function/chewing pattern?

IX Clinical Chart

Clin. Chart

Clinical Exam

Clin. Exam

- Caries
- Defective Restorations/Margins
- Weak, Fractured Teeth
- Open Contacts
- Erosions: Sodas/Citrus/Alcohol?
- Abfractions vs. Abrasions
- Anterior wear/gingival facets
- Wear: Ant. only v. Post only v. Both?
- Attrition
- Anterior cracks
- Fremitus and/or Mobility
- Crowding and Rotations
- Tooth Alignment and Contours
- Failing RCT's/Posts?
- Caries Susceptibility, Caries Rate, Caries under control prior to treatment!
- Xerostomia, xerostomia tx protocol, dietary changes
- General shade: Indiv. color vs. discolorations

X Perio Evaluation

Perio Chart/Eval

- Susceptibility (--> more perio tx) vs. resistance (--> less tx)
  - Pockets > 4 -5mm are non-maintainable
- Pockets, Furcations, Bone Loss
- Radiographic Bone Loss
- Bleeding, Infection, Inflammation
- Attached Gingiva: Recession or Muco-gingival Defects: Facial and lingual
- Facial Tissue Thickness esp. at anteriors

Perio Biotype: Thick/flat: Resists recession, easy pocket formation  
Easily scars/notches -> decr. esthetics  
Thin/scalloped: Easy recession with ging. trauma  
Thin buccal plate -> incr. defect formation

Biologic Width and Sulcus Depth

Biol. Width: 0.75mm to 3.0=mm; Avrg. = 2mm

Biol. attachment: CT Attachment ~ 1mm, Epith. Attachment ~ 1mm, Sulcus ~ .5 - 1mm  
(Sulcus:Shallow = Low rec risk vs Deep = High rec risk; do g'vectomy prn)

Biological width violations for restorative: Fractures, decay, or restorations violating (encroaching on) biologic width:

Melker: Recontour/bevel tooth smooth and then re-marginate on solid tooth, past core, far enough from bone for biol. width. Avoid removing supporting bone.

In wear cases requiring crown-lengthening to avoid biol. width violations or perio tx:

Do provisional bonding or temps prior to perio surg. to establish incisal length/position so that crown-lengthening gives proper tooth length and proper proportions/ratios.

- a. Establish inc. edge position by reveal, function, phonetics, occl. plane, etc.
- b. Use smile, "E", resting lip reveal, etc.
- c. Establish ideal length of teeth from ratios. (See Smile Analysis XIV, Sect.s B & C)
- d. Mark on gingiva/matrix desired apical length of teeth.
- e. Probe to depth of sulcus plus probe to bone: difference = this patient's genetic biol. width.
- f. If additional apical/gingival length required: slight modif. with gingivectomy
- g. If required apical length violates this patient's biol. width: take impr./model:  
Build ideal inc. length/edge on model, carve gingiva to ideal tooth/gingival length, wax ideal teeth, duplicate model, make clear surg. matrix with ideal bone position marked equal to:  
If margin Equi-gingival: mark osseous crest level [this pt.'s biol. width + sulcus depth] apical to proposed restorative margins.  
If margin Intra-Sulcular: mark osseous crest level [this pt.'s biol. width + 1/2 sulcus {approx.0.5mm}] apical to proposed restorative margins.  
If margin Supra-Gingival: mark osseous crest level so room exists for biol. width and sulcus depth apical to proposed restorative margins.
- h. Trim surgical matrix and use as guide to osseous level during flap/osseous surgery.

Home Care

Excess Gingival Show? If both ant.and post. --> orthognathic surgery is ideal

Gingivectomy vs Flap/Osseous vs Orthodontics vs Orthognathics

Gen'd inflam (ging, perio, apical; clin. or x-ray) ==> Incr. systemic inflam. mediators ==>

Increased atherosclerosis, stroke, MI (eg. diabetes: control inflam.)

XI	Vitality Tests Darkened? Percussion Bite Ice Radiographically	Vitality Tests
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XII	Cancer screening, Lymph nodes, Sleep Oral Cancer screening Lymph Nodes Sleep Problems Insomnia, Obstructive Sleep Apnea (OSA), Restless Leg Syndrome (RLS)? Clenching, Bruxing, factors that increase either?	Cancer/Nodes Eval.
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XIII Joints-Muscles-Occlusion-Teeth-VDO

A Joint Evaluation and Staging

Stage 1: Normal Disk Relation/Alignment: Medial and Lateral Poles of disk WNL

No Hx joint pain, sounds, dysfunction; any pain ~ muscle or retrodiscal edema

Usu. ROM: ~48mm; Right/Left ~8+mm

Tx: Centric Relation with Anterior Guidance

Stage 2: Intermittent Click: Laxity of lateral colat. lig. and lat. retrodiscal tissue

Lateral pole of disk intermittent displacement; medial pole WNL

Joint usu. quiet w. rotation, noisy/crepitus w. translation

Often a.m. click (~Noct. Bruxism) then resolves

Click poss aggravated with centric manip. and palpation (displacement) via EAM

Tx: Occl. equil. to centric plus Occlusal Nightguard

Stage 3a: Lateral Pole Greater Displacement with reduction: Chronic Clicking:

Medial pole still WNL; oft. pain/symptoms if late-opening/early-closing click

Tx: Poss full-time splint wear with occl.adj. as poss to CO/CR w Ant Guidance

Tx: If pain upon movement, use shallow guidance with group function

Stage 3b: Lateral Pole Chronic Displacement without reduction; Medial Pole WNL

Joint quiet ~ rotation; noise/crepitation ~ translation; no clicking

Pain w. chewing and movement; Initially decr'd ROM then increasing

Manip. usu. --> pain;

Centric loading comfortable; pain decreased w. centric loading & stabil. test

Tx: Centric splint (+ as nightguard) then no tx until 3 months pain-free

Tx: Occl. at CO/CR (occl adj. prn) w. ant. guidance; nightguard prn

Tx w. pain on movement: shallow ant. guidance with group function

Stage 4a: Medial Pole Displacement with reduction: Medial pole off disk in centric

Can recapture in open: Centric support off disk w. disk/tissue damage

Hx of pop/click + current pop/click

Noise with rotation and translation; also has click

Pain w. loading and any movement; pain not decr. with ant. jig

Tx if pain: tx-position appliance until pain-free

Tx if no pain: adapted centric + anterior guidance

Tx: joint microsurgery to repair disk and retrodiscal tissue

Stage 4b: Medial Pole Displacement without reduction: Both poles locked off

Increased damage to retrodiscal tissues, attachment, condyles

No current pop/click; Decr'd ROM

Noise on rotation and translation; no click

Pain with chewing, movement and loading

Tx if pain: tx-position appliance + centric; no tx until pain-free 3+ months

Tx if no pain: adapted centric w. anterior guidance

Tx: Joint surgery

Stage 5a: Perforation with acute degenerative joint disease: Ongoing damage to

disk & condyle, osteoarthritis

Joint noisy/coarse noise all times& movement; decr. ROM; poss pain

X-ray shows decr. of condyle cortical plate; Occlusion is changing

Tx; appliance only because occlusion is changing.

Stage 5b: Perforation with chronic degenerative joint disease: poss see chronic

joint degeneration with condylar edema, necrosis and remodelling

Historical /current crepitus; Occlusion was changing, now stable

Tx: adapted centricwith ant. guidance

## B Joint Evaluation

## Joint Evaluation

Any current pain?

ROM + Function + Load test --> Staging the joints [Above]

Clicks?/Pops?/Crepitus? : Intermittent/constant?--> Staging the joints [Above]

Palp/Feel: Lateral to joint

Via EAM at closure ~ retrodiscal tissues

Can manipulate to CR?: Lat pt. relaxed/released?

Pain on loading: Medial Pole Chron. Displaced v. Retrodiskitis vs. Lat. Pt. Spasm

Anterior Jig: If pain increased: Medial Pole Displaced or Retrodiskitis

If pain decreased: pain is from Lat. Pt. Spasm

If Medial Pole Out: Pain not decreased with anterior jig

If Medial Pole out (Chronic); Hx of pop/click now gone

Poss. surgical Tx: no Tx until stable/comfortable

If Lat. Pt. Spasm: Tx until released/comfortable and condyle can seat in CR

Condyle/disk: Medial Pole must be stable in Centric

Lateral Pole guides in eccentric

Muscle problems (with joints ok): Relieved with anterior jig

Joint problems: Require full-coverage splint w. post.occl.; aggravated w. anterior-only jig

Ant. disk displacement: damaged retrodiscal tissue: Sudden vs. Chronic Trauma

Sudden Trauma: disk biconcavity still present --> immediate tx

Chronic Trauma: disk biconcavity lost, w. damage to retrodiscal tissue

Joint Problems: Decr. ROM, Pain, Pain with load-testing or ant. jig, X-ray Degen:

Must Dx and Tx joints prior to restorative!

Dx: a. Musc. (esp. lat. pt.'s, masseters) vs TM joints (pain incr. w. loading)

b. Joints: intra-capsular

c. Centric ok/comfortable? If load-test --> pain:

If ant. jig --> incr. pain, then pain is from joint

If ant. jig --> decr. pain, then pain is from muscle

d. Verify Centric is achievable, comfortable, workable (w. occl. adj. or restorative)

e. Pain: Eliminate other causes: Endo, perio, soft tissue, osseous

f. Re-verify Centric (CO=CR) ok

Manip'd Centric: gently with patient, not forced: if resistance, lat. pt. not released

Biol. Centric: Gently Manip. to CR --> Form ant. jig/discluser (horiz.,elim.incline (Ling))

--> Allow condyles to seat

Then determine VDO remain same [below] w. occl. adj. vs VDO increase [below: occl]

## C Muscle Palpation:

## Muscle Palpation

Any current pain?

Temporalis

Masseter (Size?: Bite force determined by masseter size/bulk)

Lat. Pterygoid

Must relax/release for condyle to seat in CR

Coronoid/Temporalis

Muscle incoordination: look for M1/M2 occl. interferences

Interferences which distalize condyles --> incr'd lateral pterygoid activation/spasm

## D Occlusion

## Occlusal Eval

Centric relation/occlusion?

Model analysis [Above]: CO/CR vs. ICP: Slide? (A-P?, Vertical?, Midline shift?)

Init. contact on M2's only (--> problems) vs mult.posteriors

Manip'd centric (CR): CO/CR vs. ICP: Slide? (A-P?, Vertical?, Midline shift?)

Init. contact on M2's only (--> problems) vs mult. posteriors

CO=CR? vs Straight/even slide? vs Interferences?

Slide from centric to ICP: if ant. shift > vertical shift, --> problems:

3mm open --> 2mm back; 3mm close --> 2mm ant.; A-P shift should be > vert. shift

Envelope of motion (~musc.: out --> in) vs envelope of function (~ teeth: in --> out)  
Failures of mult. teeth/restorations ~ problem of envelope of motion/function  
Tx: Open pathway: increase overjet and/or (in broad grinder) decrease overbite  
Failure of single teeth ~ failure of occlusal adjustment  
Tx: Refine occlusal adjustment esp. in crossover

Muscle Problems (if joints ok): relieved by anterior jig  
Joint Problems: req. full coverage with post. occlusion (pain aggravated by anterior jig)

Bite: Vertical ("Rat") vs Horizontal ("Cow")  
Parafunction: Anterior vs Posterior , Vertical vs Horizontal  
High wear on M1/M2 (esp. M2 D. Marg. ridge)--> Occl adj to centric before tx  
If Lat. Pt .spasm/tight: Eval CO/CR--> Occl adj before tx

Wear facets: Clench/Brux/Grind  
Wear Case: Review: presence - ownership - responsibility:  
Consequences of no tx  
Benefits of tx (not tx plan until patient enrolled in benefits!)

Det. Centric Position: want CO=CR with even bilat. post. contacts on horiz. stops  
Eccentric Positions: Anterior guidance w. cuspid/group function: post.s discluded

Det. VDO: 3 Reasons to change VDO:  
1. Esthetics: a) Incr. tooth length or b) facial appearance or c) elim. gummy smile  
2. Occlusion: a) Decrease overbite or b) Increase overjet or c) Gain ant. coupling  
3 Restorative: a) Room for ant./post. restor. or b) Room for ant. length & guidance

Opening VDO: Concerns: 1) joint pain/disease  
2) Masseter of great size/bulk (det.'s bite force/intrusion)

Freeway space: 1-5mm, usually 2-3mm

Envelope of motion (out --> in, by muscles): --> max. linguals concave  
Envelope of function (in --> out, by occl/teeth):--> centric stops + posterior disclusion

"S": 1mm space between Inc.'s for air flow: 30% retruded & 70% end-to-end/protruded  
Retruded "S": (at CR)  
Protruded "S" (approx. end-to-end): Devel. of "S" + env. of motion poss.--> elim. of  
ant. centric stops & poss shorten mand. incisors-->build out max ling centric stops  
ie: Max. inc. length and concavities estab'd for esthetics, phonetics, env. of motion  
Poss. shorten mandib. incisors then build out max. inguals for centric stops  
If mandib. incisors retruded, then proper "S" may require reclosure of VDO

Bruxer: give: Shallow/flat ant. guidance (--> decr. muscle force/activity)  
Group function in anterior guidance (posterior disclusion)  
Group function in lateral fn.: shallow, not-cuspid-only guidance  
Continue lateral guidance as far ant. as poss.--> decr. forces on restor.s

Avoiding pure cuspid guidance (-->lateral group function, spreading forces) required w.:  
1. Cuspid pontic or multiple pontics: --> guide on anterior and posterior abutments  
2. Cuspid Implant: --> guide on anterior and posterior teeth  
3. Cuspid structurally-weak or perio-involved  
4. Bruxers: --> ant. group function, lateral group function, shallow guidance  
5. TMJ pain on working side: --> lateral group function

Posterior occlusion is required: if post.s not occlude:  
1. Increased joint force --> increased joint pain  
2. Anterior-only contact can distalize condyle --> retrodiscal pain + lat. pt. spasm  
3. Masseters and temporalis may clench to occlude --> spasm and pain

Occlusal planes: Max., Mandib., Stepped?: Incisal edges on occlusal plane

VDO usually has not been lost if posteriors are present/normal/unworn

If posteriors present/normal/unworn: can usually treat at current VDO

May still require modification of max. & mandib. incisor position and relation

VDO poss. req. incr. for: a) Esthetics, phonetics, restorative

b) Design of max/mandib. anteriors

c) Incisal edge position, overbite, overjet

Lower Molars (esp. M2's) if in mortar & pestle form: condyle is anterior/inferior:

Requires occlusal adjustment prior to treatment/restorative

Occl adj. to CO=CR --> occl. stability --> restorative stability/predictability

If CO to CR slide has large lateral shift: poss require unilateral or bilateral restorative

If occl adj. req'd is too great: may req. restoration of posterior teeth in centric

and may req. restor. of ant. teeth onto/incl. linguals for anterior & cuspid guidance

If Class II: poss estab. good post. occl. with bilat.-balanced interf.-free slide to ICP

E Occlusal scheme (current) and goals: ("Biol. Centric" = Seated gently &/or w. ant jig)

1. Min. occl. tx w. no symptoms --> maintain ICP

2. Min. occl. tx w. signs/symptoms --> occl. adj. --> even occl. or biol centric CO=CR

3. Partial rehab. --> even occl. or biologic centric

4. Full Rehab --> Manip'd/seated/biol. centric

5. VDO: Maint. vs increase ~ occlusal, esthetic, restorative needs [above]

6. If VDO incr'd: poss staged tx with bonded occlusal support on teeth to later tx

7. Bilat. post. centric stops w. eccentric disclusion

ie: anterior + cuspid/ group guidance--> posteriors protected/non-interfering

8. Ant. guidance: shallower than prior + shallower ~ force and bruxers

9. Cuspid guidance (if all WNL) vs group function (bruxers or weak cuspids)

F Anterior Teeth:

1. Determine inc. edge posit, ling. contour, labial contour, correct inclination (ortho)

2. Ling contour from env of motion (out-->in, ~ musc), env of function (in--> out, ~ occl)

3. Env. of function due to condylar inclin., ant. guidance, border movements (in-->out)

Determined by required anterior guidance and need to disclude posterior teeth

4. Env. of motion due to phonetics, muscles, habitual closing pattern (out-->in)

Determined by neuromuscular arc of closure; will destroy tooth struct. in the way

5. Maxillary anteriors: facials support lips, edges point to lower lip vermilion border

7. "T", "D" sounds determined by bulk of maxillary anterior cingulae

8. Use custom inc. guide table from pre-op models: maintain or shallow out guidance

9. Verify that ant. guidance -->non-interfering post. teeth/immed. posterior disclusion

allowing for condylar path, anterior guidance, lateral function

10. Occlusal plane with Fox plane and on mounted models/artic./facebow is proper

11. Custom inc. guide table + R/L cuspid guidance --> posterior fossae contours

G Mandibular Incisal Edge position, angle, contour

1. Gives esthetics, phonetics, occl. plane, ant. guidance, stability

2. Inc. edge occlusal (centric) stop; near-horizontal (? max. ~ 15° down?)

3. Incisal edge: facial is convex to flat; lingual is concave to flat

4. Facial embrasures wider/deeper than lingual embrasures

5. Lower cuspid mesio-facial line angles point straight anterior

6. Mandib. incisal edges match position of maxillary linguals for "S":

If anterior incisal plane is convex, "S" position is overlapped

If anterior incisal plane is flat, "S" position is edge-to-edge

H Occlusal Plane, Occlusal Design, Anterior Lingual Form

1. Incisal length: Det'd via esthetics, reveal @ rest, phonetics, occlusal plane  
Occl. Plane: parallel to horizontal (pupillary(?)) plane + approx. ala-tragus line  
along cusps of maxillary posterior teeth continued anteriorly  
Facial 2/3 of #8,9 perpendicular to occl. plane  
Incisal length: min. required to satisfy esthetic/phonetic requirements yet also  
minimize overbite relationship (to minimize horiz. Forces)
2. Posterior occlusal plane: Max. inc. edges to post. Buccal cusp tips
  - a. #8,9 possibly slightly longer than occl. plane
  - b. Max pal. cusps: into central stops of lowers with no contacts on inclined planes  
and no working or balancing contacts/interferences  
Should not be longer than buccal cusps
  - c. Max. and mand. Post.s: shallow central fossae w. good centric platform stops
  - d. Mand buccal cusps: horiz stops on max. teeth; direct occl. forces along long axes
  - e. Mand post ling cusps: deflect tongue out of occl; shorter than buccal cusps
3. Max Incisors: Have horiz occl stops on cingulae then function of mand inc edges  
within lingual concavities of uppers; giving just enough anterior guidance to disclude  
posteriors with no interf.s. Ideal angle of anterior guidance is the shallowest one  
to clearly disclude the posteriors.  
Shallower = less muscle activity to disclude + less horiz forces on anteriors
4. If ant guidance is so steep that ant.s would take great horiz. forces in protrusion, poss:
  - a. Lower max occl plane, giving increased VDO, and restore lingual/cingulum  
occlusal surfaces of max incisors or:
  - b. Lower (reduce) mandib inc edges and build up linguals of max anteriors, including  
re-establishment of cingulum occl stops.
5. Incisal Guidance Angle: Approx. 5 degrees > condylar guidance (ie: 45 + degrees)  
then modify posterior cusp heights as needed.
6. Patients w. horiz. chewing strokes, perio-weakened support, bruxism, implants  
all require shallower inc. guidance; shallow out post cusp heights as needed.
7. Anterior centric holding stops on cingulae of max anteriors are needed  
In Class II occlusions: place centric stops at least on cuspid cingulae for stability  
then init ant guidance on cuspids, moving smoothly onto incisors.
8. VDO:
  - a. Estab centric (condyles seated) --> mounted models in centric/condyles-seated
  - b. Estab. Ideal max ant inc edge position from reveal, occl plane, function,  
phonetics, anterior guidance.
  - c. Transfer inc edge posit to model in wax or composite
  - d. Establish max ant lingual contours for centric stops and function in model in wax  
or composite so max incisor changes for length, esthetics, function are now  
established on model.
  - e. Close articulator: if there is a post open bite with anteriors in contact, determine  
if closing posterior bite will be by building up posteriors or by reducing mand  
incisal edges.
  - f. Factors: Occlusal plane as moving posterior from max incisal edges  
Which teeth already require restoration  
Orthodontics as possible tx  
Using the current VDO is easiest for patient and DDS
  - g. Reduce mandibular incisors as needed if this is tx elected
  - h. Once max incisor ideal functional form is established and required mand incisal  
form is established; if articulator is closed so that anterior ideal contact results  
in post open bite, then we need to increase VDO with post rehab (or ortho):  
upper and/or lower as determined by occl plane back from max inc edges  
and teeth requiring restoration.

I Worn Dentition

1. Rev. w. pt.: damage, responsibility, prob.s if no tx, tx benefits (not tx plan!)
2. Det. need for crown lengthening due to: lost post. VDO, incr. VDO, inc. edge length
3. Wear: Ant vs Post vs Both?  
Inter-incisal angle: ? Constricted envelope of function/chewing pattern?
4. "E": If display of max incisors is 50% of interlabial gap, easy to lengthen  
If display of max incisors is 70% of interlabial gap, difficult to lengthen.  
Review historical photo for incisal length/reveal

Attrition: grinding: wear facets only on occl. and they match, both arches affected  
Enamel and dentin smooth, hard, sharp, shiny

Erosion: wear facets match occl. + other (non-occl.) areas, facets dull, dentin cupped  
Post. wear > ant. wear: GERD vs Bulimia vs Soda vs Citrus (suck) vs Citrus (Mull)  
U-shaped lesions, smooth margins, enamel smooth and often polished

Abrasion: tooth struct. loss from toothbrush/paste; cervicals: wider > deep  
Premolars and cuspids most commonly affected

Wedge/groove-shaped lesions, sharp margins, enamel smooth or scratched  
Abfraction: cervical areas, deep/narrow/v-shaped > wide; due to occl. stress/bending  
On Cuspids/BI's/Single teeth w. wear facets ~ excursive interf's/eccentric occl. loads  
V-shaped lesions, sharp margins, enamel rough; lack of (lost) anterior guidance

Wear/attrition/bruxing/grinding

Functional wear: in lateral excursions, not on anteriors

In paths of normal lateral wear, though excessive

Parafunctional wear: not due to normal, interference-free, functional paths,  
Excess mandib. movements due to occlusal factors/interferences

Bruxism: non-functional mandib. movement due to CNS stim.

Most dangerous patient to treat

Bruxism poss. diagnosed w. Bitestrip then Nightguard and re-test w. Bitestrip

Pathways of movement

Shortening of teeth: from horiz. grinding:

Needs shallow overbite with group function using distal of cuspids for ant. guidance

Thinning of teeth: from vertical grinding

Needs good overjet & max ling. concavities for clearance (env. of motion) in closure

Parafunction: occlusion-mediated, increased w.:

1. Anterior open bite
2. Right and left posteriors not fit, ie: double bite
3. Posterior interferences
4. Lack of posterior teeth
5. Restricted envelope of motion (desired wide by muscles, restricted by teeth)  
Musc. pattern of mandib. motion restricted by teeth of restorative structure

Trial Treatment:

Use: Equilibration, appliances, bonding, provisionals

Eval with: Tooth wear, splint wear, tooth mobility, breakage, loosening, musc. tension

Occlusal Design for Extreme Wear Case: According to pathways of movement

Vertical Pattern: give more overjet (clearance) than previously

Poss. open VDO, build out Maxillary linguals and Mandib. facials

Freeway space: 1-5mm (Denture cases); usually 2-3mm

Horizontal Pattern: give shallow overbite w. group function

Protrusive guidance includes distal of cuspids

Bruxing in Crossover greatly increases failure at the incisal edges.

Tx: either increase overjet, decrease overbite, or both

Pre-op models --> custom inc. guide table --> duplicate env. of function

Can lengthen Max. incisors or reduce Mandib. incisors (to height of occl. plane)?

To correct ant. overbite: can build up ling. of max. ant.s or facials of mand. inc.'s

Work out env. of function and env. of motion in splinted temps

Look for loosening, wear facets, fractures and adjust prn:

Failure of single unit = failure of occl. adjustment:

Failure of mult. units = failure of env. of function/env. of motion

Notched max. linguals (broad env. of function/motion = long centric = incr. freedom)

--> custom inc. guide table --> duplicate glide path of incisors

Duplicate finalized provisionals --> matrix for finals

Posterior wear/erosion (excessive): tx choices:

1. Open VDO if masseters not excessive and anteriors allow; freeway space usu. 2-3mm
2. Orthognathic surgery to intrude posteriors
3. Mini-implants to intrude posteriors
4. Crown lengthening + endo prior to restorative (not recommended)

Restoring worn dentition w. change in VDO/Occlusion:

Transitional bonding &/or provisionals for 3+ months: Verify stability & comfort w. no:

Breakage, wear, loosening of mult. teeth (problem w. env. of function/env. of motion) or

Breakage, wear, loosening of indiv. teeth (problem w. occl. adjust. on indiv. teeth)

Incisal wear cases with Ortho & small/peg teeth with ortho:

If room is available, restore required incisors (length, width, size) prior to ortho so tooth structure is placed in correct position for final restoration.

If room is not available, have ortho. intrude anteriors and/or extrude posteriors to give room for anterior restorations, remove anterior brackets, then do temp. composite veneers to proper length, width, size. Then rebracket, finish ortho to final positions, then restore.

If peg lateral, have ortho. over-open space, then restore to full contour temp'ly with composite so ortho. can maintain proper spacing, length and incisal position.

If temp./composite restorations not done to or mid-ortho, orthodontist may leave (worn or peg) teeth with incisal edges at final inc. edge position with need to then cut down teeth for final restoration. Also, short teeth may be left so that perio surgery (and loss of bone support) is needed to create length/room for full-length teeth.

## J Occlusal Adjustment Protocol

1. Centric: Ant. jig or leaf guage + gentle manip. to seat condyles  
Shortening cusp--> easier lat. disclusion: deepening fossa--> difficult lat. disclusion  
Want even post/ant. horiz. centric stops; no inclines, no slide to centric  
Good centric but certain teeth not contact--> buildup/restore centric stops
2. Lateral excursions: post. teeth centric stops only, no lat. excursive contacts  
Post.s: red excursive marks, black centric marks: elim. red
3. Protrusive excursions: post. teethcentric stops only, no protrusive contacts  
Post.s: red excursive marks, black centric marks: elim. red
4. Harmonize a) Protrusive group function (up linguals of both centrals, poss. laterals)  
b) Cuspid rise (smooth line) or lateral ant. group fn.(cuspid, lat., central)
5. Protrusive edge-to-edge and crossover excursions  
Centrals: broad end-on contacts in protrusive and lateral crossover  
Laterals: centered contacts in crossovers, never on corners  
Cuspids: smooth crossovers in lateral, no catches, maintain centric stops
6. Postural freedom (long centric): no ant. contacts on inclines ant. to centric stops  
Mark centric stops reclined/black + centric stops upright/red, elim red ant marks  
Envelope of motion: upright: elim red marks on inclines ant. to centric stops  
Envelope of function: have pt. protrude/right/left: ?smooth, even, no catches?
7. Verify even centric stops + no post protrus/lateral contacts + smooth ant/lat guidance
8. Smooth and polish

XIV Smile Analysis and Design

- A Smile: Current style/shade  
Smile: Desired: Chosen from Smile Guide  
Shade: Desired: Chosen, Color Map, Transluc., Halo

Smile Style Chosen  
Shade Chosen

- B Smile Line  
Horizontal Axis: Pupils> Cheekbones> Lips  
Vertical Axis: Frontella-Nose-Philtrum-Chin  
Occlusal Plane Horizontal: Fox Plane to Face

Incisal Plane/Edges: Horizontal;Possibly // to Pupillary Plane; \* Perp. to Facial Midline  
Centrals on Max. (Posterior) Occlusal Plane; Horiz. R to L and Front to Back  
Centrals: Incisal Thirds perpendicular to Occlusal Plane

Incisal edges approx. ideal curve of lower lip; convex, not reverse smile line  
Incisal edges in harmony in lateral and occlusal views  
Incisal edges approx. vermillion border of lower lip at rest  
Incisal edges: Definitive line angles with lobes and embrasures in occl. view

Incisal edges must not bang into lower incisal edges in speech or function  
(See D Phonetics (below).) Use provisionals to verify.

- C Upper Lip Reveal/Display  
Avg smile: lip reveals 75-100% of Max centrals + interprox. gingiva  
High smile shows total length of max centrals + contiguous band of gingiva  
Low smile shows <75% of max centrals  
Length to upper lip ("M" or "B" --> Relaxed): 1-5mm Female> Male  
Young show 1-3+mm; Older wear+sag-->decr. reveal to ~1mm  
Young Female to 30 years: approx. 3.5mm reveal at rest ("mom", relax)  
40 years: 1.6mm; 50 years: 1mm; 60 years: 0.5mm; 70 years: 0.2mm  
Centrals Length:Test w. marker to decr.; If decr. must still disclude posteriors  
Inc. Edges #6,8,9,10 on curve; Laterals ~.5 mm shorter  
Negative space good/symmetric; Cuspid lengths harmonious  
E-reveal of max incisors: if < 50% of interlabial gap, can lengthen; if > 50%, is difficult

Historical Photo: (Rest Reveal ~2mm, Smile Lip Elev. ~8mm; Smile Reveal ~10mm tooth)  
Decide: Recreate smile once had or create the smile the patient never had?

- D Phonetics  
At "S": approx. 1-mm space between incisal edges (30% retruded & 70% end-to-end)  
At Rest, "F", "V": Inc. Edges lightly touch vermillion border (wet/dry line)  
At "Ch", "Sh", "Sixty...": Max/Mandib incisal edges just miss, in line  
At "T", "D": clarity determined by bulk of maxillary anterior cingulae

Overbite/overjet: Harmonious, Ant. Guidance, Envelope of Function, No trauma

Max ging. zeniths approx. upper lip at smile or "E"  
Smile: show some gingiva: Rest: show some teeth  
Smile, "E", "8": Show between 3/4 centrals and 2mm of gingiva  
At "E": If visible part max teeth occupy less than 50% of inter-lip gap, can lengthen teeth  
If visible part max teeth more than 50% of gap, difficult to lengthen teeth

- E Midline  
Not canted: Vertical and Perpendicular to Horiz/Pupillary Plane  
Bisects papilla  
Approximates Midline of Face/Philtrum  
Relative to mandib. midline?: Proportionality is more critical  
Any midline correction (position or cant) in veneers requires tooth preparation

- F Axial Inclinations (View from direct frontal)  
Progressively increases (medially/inward) as move distally  
Lines from zygoma to chin parallel to facials of cuspids/posteriors  
Symmetrical on contra-lateral teeth
- G Buccal Corridor  
Correct fullness; Teeth to commisures; Symmetrical  
Bicuspid bulk correct: Bring/restore to full facial contour prn to support cheeks/esthetics  
and continue anterior curve and fullness of the arch. (No drop-off)  
Bicuspid value correct (including amalgam show-through)
- H Incisal Embrasures  
Progressively increase in size (width & depth) as move distally from midline  
Contact areas (zones) (tip of papilla to embrasure) move apically as go distally  
Contact zones % of tooth: 50% @ Centrals: 40% @Cen/Lat: 30% @ Lat/Cuspid
- I Proportions/Shapes/Ratios  
Central Length: \_\_\_\_\_ & Width: \_\_\_\_\_; Visual Width Lateral: \_\_\_\_\_ & Cuspid: \_\_\_\_\_  
Central Dominance: Length Av. = 10.4 - 11.5mm (never < than 10mm H X 7.5mm W)  
Width Av. = 8.3 - 9.3mm  
Centrals: Width = 75-80% of Length (W:L = 4:5 = 0.8:1)  
Golden Proportion: Apparent (visual) width Cen-Lat-Cuspid ~ 1.6 - 1 - 0.6  
Symmetrical R. to L.: Length - Width - Shape - Position - Surface - Reflection  
  
Centrals Shape harmonious with face and arch; Dominant  
Laterals: Never dominant: Female--> Delicate ; Male--> Square  
Involve laterals to correct Length/Width Ratio of Centrals  
If add to #8,9 mesials: take from distals prn & add to mesials of laterals  
Incisal edges of #6,8,9,11: Approx. lower lip curve ; #7,10 approx. 0.5mm shorter
- J Profile/Anatomy/Contour  
Natural Emergence Profiles Facial + Mesial + Distal  
Three planes of Facial Contour: Gingival - Middle - Incisal  
Incisal third of centrals perpendicular to Occl. Plane & Point to Vermillion Border  
Lobe formation: both Contour + Opacity/Translucency  
Incisal Edges: Occl. View: Definite + Good B-L thickness + Harmonious Contour  
Lip Support det.'d by bodily position of teeth  
Max Inc. profile should be within inner border of lower lip  
-> adequate lip closure with no interference  
Full lips: tooth changes give min. effect on lip support  
Med. lips: tooth changes give mod. poss. effect on lips  
Thin lips: tooth changes give changes in lip support and position  
When evening rotated teeth, bring all teeth out to most facial point of facial contour
- K Cervical Embrasures/Papillae  
Papillae height level/even: # 7/8, # 8/9, # 9/10  
Size (length and width) increasing distally  
No dark triangles: ie. all papillae reach contact areas  
  
Papillae: present and full  
If papilla deficient: Make tooth square but round in line angles for narrower look  
  
ie: Natural-shaped teeth but w. open embrasures vs. square teeth w. wide contacts  
  
Tooth-Tooth: 1mm min. between roots  
Tooth-Implant: 1.5 - 2mm min. between implant and roots to avoid bone die-back  
Implant-Implant: 3 - 4mm min. between them to avoid bone die-back

Papilla max. height from bone: therefore contact begins to avoid black triangle

1. Tooth/tooth: approx. 4-4.5mm: Tissue ~ 2mm, sulcus ~ 2 -2.5mm,
2. Implant: approx 3.4mm: after implants placed, will lose ~ 1-1.5 mm interprox crestal bone  
After extraction, will lose ~ 1.5mm crestal bone height + additional 1.5mm papilla height  
(diff.between heights tooth/tooth vs. implant) for total loss of 3mm in papilla height  
Tooth contact zone must be ~ 3mm wider (more apical) than original tooth/tooth.
3. Pontic: approx. 6mm; Adjacent lost teeth (now pontic spaces) usu. flat ridge  
With lost bone, can usually augment to 6mm soft tissue height
4. In Esthetic Zone: Alv. crest to CEJ of adjacent tooth ideally = 3 - 5mm for proper biologic width of place implant

L Periodontal Health

No inflammation or tissue weeping: tissue pink, visually firm and proper form

M Gingival Height and Shape

Zeniths # 6,8,9,11 approx. even and symmetrical  
Zeniths # 6,8,9,11 elliptical: to distal of midline  
Zeniths # 7,10 approx .5mm coronal to other ant.s (never apical to) & symmetrical  
Zeniths # 7,10 half-oval: at midline

N Gingival Margins

No recessions, abfractions abrasions, deformities  
Margins of restorations not visible  
Pontics: ovate site with natural-looking emergence

O Shade

Significance: Value > Translucency > Form > Texture > Chroma > Hue  
Polychromaticity? Translucency : Symmetrical  
Hue : Color: Symmetrical  
Chroma: Decreasing as move distally: richer at gingival  
Gingival: higher chroma, lower value  
Middle: highest value, lower chroma  
Incisal: high value, highest translucency  
Value (V. important)  
Opacity and Translucencies with visual (dentin) lobes  
Incisal Translucency with poss. incisal halo to contrast translucency

P Surface

Contours --> mammelons/lobes  
Texture/ form--> break up light and reflect light symmetrically  
Polish: high shine without erasing morphology

Q Lingual of Anteriors: For Envelope of Function and Envelope of Motion

R Determine Incisal Length ~Lips, Occl Plane, Reveal, Esthetics (age/gender), Phonetics

S Level of CEJ's / Attached Gingiva / Attachment

Poss ortho extrude/intrude--> equilibrate to even incisal edges--> proper L/W ratio  
Adequate attached gingiva  
Sulcus: Shallow (min. recession risk) vs. Deep (max. recession risk)  
Excess Gingival Show? If both ant.and post. --> orthognathic surgery is ideal  
Gingivectomy vs Flap/Osseous vs Orthodontics vs Orthognathics

T Anterior Implant Case: Inc edge position--> Tooth Length--> Ging. level--> Implant Position

Always want 3mm osseous between adjacent implant platforms

If removing 3+ ant. teeth w. good perio/osseous, sep. teeth/implants by one pontic, ie: poss. avoid adjacent implants, to maintain good osseous/soft-tissue/papillae

Therefore, consider bridge with pontic(s)

If removing # 7-10, w. good bone/perio poss. do:

a. # 8,9 implants/abuts/crowns w. cantilevered pontics # 7, 10 or

b. # 7, 10 implants/abuts w. bridge # 7- 10 (# 8,9 pontics)

If lost perio support, poss. a. Augment soft tissue or

b. Erupt teeth prior to extractions

If teeth already missing with flat ridge, good bone & tissue height, poss:

all teeth replaced by implants (poor esth.'s due to poor papillae) vs. pontics

If teeth already missing with poor bone height (much bone loss), poss:

a. Implants (poor esth.'s) vs. pink porcelain on pontics and abutments or

b. Removable prosthetics (eg. bar-retained)

c. Gingival mask (moll)

Implant Placement: 3 x 3 x PIE:

a. 3mm: platform is 3mm apical to facial CEJ's/apical zeniths of adjacent teeth

b. 3mm: center of implant is 3mm in from facials of adjac. teeth --> 1+ -2mm facial bone

c. PIE: Long axis of implant through palatal-incisal edges of adjacent teeth (in arc/arch)

Implant length: want 10+mm in bone w. crown/root ratio < 1:1

Implant position (M.to D.): Tooth to tooth: 1mm bt. roots

Tooth to implant: 1.5 - 2.0mm bt. to avoid bone die-back

Implant to implant: 3 - 4mm bt. to avoid bone die-back

Implant position (Fac/Ling): Min facial bone thickness 1mm; want 1.8 -2mm fac. & pal.

For each 1mm palatal placement, want 1mm more apical for correct emergence/angle

Implant angulation: aligned with adj. teeth or 5 degrees to palatal

Use fac. & pal. GBR (perf.s + bone + membrane) for proper bone thickness & impl. posit.

Zirconia Implant Abutments: Use with thin anterior tissue, esp. with high lip line, to avoid shine-through of dark abutment (Note: Gingival attachment is stronger to titanium than to porcelain or zirconia.)

Zirconia abutment adds approx. \$300 to cost (2007)

Provisionals for Anterior Implants during healing:

a) Acrylic (Flipper) Partial with Distal molar .045 WW clasps and Cuspid/Bicuspid occlusal ball clasps to avoid trauma to implant site!! or

b) Essex retainer with original tooth or denture tooth or acrylic or

c) Bonded original tooth or denture tooth (If occlusion allows, two horizontal wires at/into lingual, bonded to linguals of adjacent teeth with bright white core-paste or composite, allow for easy removal/replacement for surgical and restorative treatment.) or

d) "Immediate Load" Provisional/Temp on Temp. Cylinder: out of occlusion and function!!

Cementing Provisional or Final Crown on Implant Abutment if Margin is far Sub-gingival:

Mix cement (not fast-set), place in crown, seat lightly and remove excess from abutment, sulcus, and crown. Then perform final seat.

XV Restorative Materials, Margins, Color Matching

A Materials:

Material Choice based on color & structure:

- Choice of materials dictated by darkest/most broken-down tooth
- Avoid multiple materials in same case due to shade match and lab difficulty
- Then this determines preps and amount of tooth reduction
- Also: lip dynamics and reveal: Do margins and gingiva show?

Replacing: Enamel only (-->Porc. only) vs Enamel/Dentin (-->Porc. on Core)

Color: OK (-->Porc. only + Supra-G) vs. Dark (--> Porc. on Core + Sub-G)

ie.:Missing Enamel only --> Min. prep + Supra-G

Missing Dentin --> Core Built to Ideal Dentin Form (If dark --> opaque)

Dark Color: Deeper prep+ sub-G + core (Metal v. Alum. v. Zirc.)

Keeping Enamel + Cingulum --> Incr.tooth stiffness + bond strength.

Translucency: Stacked > Pressed ( Eris ) > Alum. (Inceram) > Zirc. > PFM

- Stacked: Thinnest, Artistic, Strong once bonded; use heavy chamfer
- Pressed: Lithium-Disilicate: Bondable, Stronger, Stained or Porc. Layered (Eris)
- Alum: Mid-strength/Mid-transluc, Denser/Stronger, Cement or Bond (Inceram, Procera)
- Bonding: Etch Intaglio + Silanate + Heat in Triad for 3 min.s
- Zirc.: Incr. strength + Decr. transluc. + Core is Bright! (Green-milled: Circon, Lava)
- Lava is more transluc. than Circon)
- PFM: On Implants (no PDL) and Bridgework/mult. pontics (min. connector bulk)

Ant.s: Eris (Bond) (Transluc.) vs Alum. (Inceram,Procera) w. Transluc. Cement

Post.s: Zirc. (Circon, Lava) vs PFM (Strong + Opaque)

Partial coverage, bonded porc.: total etch technique for best strength & durability

Porc. vs PFM vs FGC: Margin/Shoulder Design

Porc.: Bondable (Pressed vs Stacked) vs Cementable (Alum. vs zirconia)

Bondable: Maximize enamel bonding; avoid heavy occl. and much cervical dentin

Veneers: Max porc. extension = 3mm; 50%+ in enamel; Deep Color/Banding??

Luted Crowns: Porc. (Alum) vs Porc. (Zirc) vs PFM; 3.5mm prep length; 2.0mm Ferrule

RMGI vs Panavia/ED Primer vs Clearfil-F 2.0 vs Rocatec Soft (< 40 psi) w. silane and resin cement

Unicem: good results; still awaiting long-term results

Homogeneous: Uniform thru-out struct. vs. Non-homogeneous: Porc. layered over core

- |  |   |
|--|---|
| Powder/liquid stacked porc.  | Veneering porc. over pressed core         |
| Pressed porc. then stained   | Porc. over alum./ zirc./ metal core       |
| Bonding req'd for strength/retent.                                     | Cementable; bonding not increase strength |
| More translucent   | More opaque/reflective/bright             |
| Less color masking   | More color masking                        |
| Less prep; more supra-gingival   | More prep; more sub-gingival              |
| For: good color & structure  | For: bad color and bad/lost structure     |
| more shade change --> more reduction                                   | room for porc/core --> more reduction     |
| le: Tooth structure and color determine material and so determine prep |   |

Room for material (reduction from ideal) required: (At facial in mm.)

Level:	Stacked	Pressed Veneer	Pressed Crn Translucent If color ok	Non-homog. Transluc core If Color ok	Non-homog. Opaque Core Subgingival eg. Zirconia
Gingival	0.4	0.7	0.8 - 1.0	1.2 - 1.4	1.0 - 1.2
Middle	0.6	0.7	0.8 - 1.0	1.2 - 1.4	1.2 - 1.4
Incisal	1.0 - 1.5	1.0 - 1.5	2.0 - 2.5	2.0 - 2.5	2.0 - 2.5
Occlusal	1.0 - 1.5	1.5 - 2.0	2.0 - 2.5	2.0 - 2.5	2.0 - 2.5

Walls of the preps for scanned (eg. Zirconia) crowns must not be parallel; the scanner cannot read them. They must have occlusal convergence of 4 to 6 degrees with rounded internal line angles.

Margins should be butt joints or heavy chamfers with exit angles of 90 to 110 degrees. 90 degrees is ideal; the scanner cannot read acute-angle or bevel margins.

Good color: Supra-Ging; Mild Discolor: Equi-Ging w. Translucency/blending;  
Discolored: Sub-Ging.

Lip Dynamics: Do margins and gingiva show?

All-ceramic: 1mm shoulder, 2mm inc., 2mm occ., 1mm lingual, 1mm on up facial  
Stacked (feldspathic): Deep chamfer--> to medium chamfer with rounded internals  
Pressed (Empress): Deep chamfer--> shoulder with rounded internals  
Zirconia (Lava): 90° - 110° with no drop-off ( if too thin, cannot mill)

Tooth rigidity: Decreased with removal of facial enamel and lingual enamel -->  
Incr. tooth flexure --> Debond/Breakage of (rigid) enamel replacement (ie: porcelain)  
So: Tooth flexure req's enamel at facial cervical to minimize/prevent fracture/debonds  
If dentin is exposed, want it at facial mid-tooth, not at incisal or cervical  
Minimize enamel reduction--> stiffer--> less flex--> less fract. Of tooth/porcelain

Material as a function of shade/color:

Avoid multiple materials in same case:

a. Difficult to match shades, translucency, metamerism, fluorescence

b. More work and difficulty for lab; more mistakes likely:

Must keep track of different porcelains, veneering porcelains, etc.

Single Ant. tooth: Match with homog. crown; less metamerism in different lights

Darkest/most broken-down tooth dictates choice of materials

Non-transluc. core (eg. Zirc) look brighter in mouth; poss. use one shade darker

Ant., Good color, Bondable: Eris (Lithium disilicate)

Ant., Mod. discolor, Cementable: Procera (Alum. core)

Ant., Dark discolor, Sug-G, Cementable: Lava (Zirc); never on a single central

Make coping 1 shade darker (it looks bright)

Sub-G preps req'd for Changing dark (dis)color and Changing contour (closing diastema)

Lip dynamics: do margins and and gingiva show?

Must also break contact to close diastema so porc. has room to flare up and out

Veneers: Break contact (thru interprox) for Large color change, contour change (to close diastema), and old Class III restoration.

All posteriors: non-homogeneous (porc/alum, porc/zirc, porc/metal)

Must have (horiz) support for porc. so forces are compressive, not shear

Veneering Porcelain must be supported by extended core (metal or ceramic) framework to minimize fracture of veneering porcelain.

Use materials to reduce risk to teeth: eg. No circumf. shoulder preps on narrow teeth

All-ceramic: 1mm shoulder, 2mm inc., 2mm occl. Proper facial & lingual reduction

Dark teeth: compromise: Esthetics (bright, opaque white) if minimal prep vs.

Biomechanics (Heavy prep, decreased tooth strength)

B Anterior Margins:

Anteriors: Apical depth of Facial prep for hidden, intra-sulcular margins:

Biol. Width: 0.75mm-3.0+mm; Avrg = 2mm

Margin Placement is a fn. of sulcus depth:

If sulcus is 1.5mm or less, prep margin 0.5 to 0.7mm into sulcus

If sulcus is greater than 1.5mm, prep margin 1/2 depth of sulcus probing

Initially prep to gingiva: prep now = reference point for gingival height

Can Probe sulcus depth--> bleeding points prn @ sulcus base/ tpo epith. attachment

Can probe once to bone to verify bone height

Gently place cord untill proper amount of tooth is exposed

Prep to top of cord

Place second cord + smooth margin with (shaped) white stone prn

Large sulcus depth: to prevent recession/margin exposure:

a) Gingivectomy to give 1.0mm sulcus and handle standardly or

b) Gingivectomy to base of sulcus (attachment height) and allow sulcus to re-form

All-ceramic: 1mm shoulder, 2mm inc., 2mm occ., 1mm lingual, 1mm on up facial

Stacked (feldspathic): Deep chamfer--> to medium chamfer with rounded internals

Pressed (Empress): Deep chamfer--> shoulder with rounded internals

Zirconia (Lava): 90° - 110° with no drop-off ( if too thin, cannot mill)

Lingual Margins for Veneers:

Mark Anterior Lingual Centric stops prior to any prep

Final Lingual Margins must be above or below centric stops and first protrusive contacts

If necessary, reduce and recontour lower incisal edges prn

Anterior Margins: after crown lengthening and gingival recontouring procedures:

Soft-tissue procedures: allow 3 mo.s for tissue heal, mature, re-develop biologic width

Osseous procedures: allow 6 mo.s for tissue heal, mature, re-develop biologic width

Keep temp/provisional margins away from healing tissues.

C Marginating: Prepping and Gingival Protection Modified from Larry R. Holt, DDS

1. Start with healthy tissues, or plan a provisional treatment phase to restore gingival health prior to final margination, provisional reline, and final impressions.
2. Respect gingival tissues. Avoid rotary gingival curettage, electrosurgery, laser surgery, too-deep preps, or over-retraction in the critical esthetic zone.
3. Consider supra-gingival margins as possible for materials, position, structure, esthetics. Decide on materials and margin placement prior to preparation appointment.
4. Never prepare into the sulcus without probing for sulcus depth and poss. bone height. Always place retraction prior to preparing into the sulcus. Do not tear attachment.
5. Match restorative material, margin type, and margin placement to tissue biotype and bioform (thin, scalloped, easily lost vs thick, flat, more stable).
6. Preparations should follow the gingival crest. Flat preparations will violate interproximal biologic width and lead to red gingivae and black triangles.;
7. Do not bury the margins. If you violate the biologic width, poor impressions lead to ill-fitting restorations, future decay & future perio. Also, lack of root surface for attachment leads to inflammation, redness and future recession with black triangles.
8. Preparation and retraction techniques must be as gentle and non-invasive as possible. Use minimal preparation force, minimal cord pack force, minimal caustic chemicals.
9. Provisionals must have accurate/sealed margins, proper contours, and highly polished surfaces. Excess temporary cement must be avoided and removed.
10. Long-term provisionalization adds predictability as the gingival settle closer to their final positions and contours.
11. Use only the best excellence-oriented laboratory to match your quality. Restorations must be completely seated. If cord was required for final impressions, it is usually required for final restoration seating.
12. Interproximal tissue blanching is usually due to wider emergence profile of the final restoration from the lab. If it resolves in 5 minutes, the new contour is usually ok.

D Matching Hue, Value, Chroma:

Hue=Color; Value= Brightness (Light/dark, Grey scale); Chroma =Color Saturation  
Vita shade tabs: Cervicals usually off-color; remove cervicals to avoid confusion  
Incisals usually confusing: remove incisals  
Middle of shade tab: closest to true color

Hue:Color (Vita A, B, C, D): Hue-perception fatigues rapidly (do not stare)  
Cuspid is usually more saturated in the proper hue  
C-Range hues: Try to avoid; can look green  
Hue visually: quick glances, do not stare, no lipstick, neutral bib, neutral background  
Hue Photos: a. Body shot with neck off tab and b. Incisal shade incl. inc. part of tab

Value: Brightness/darkness, location on grey scale  
High value increases opacity by adding white  
Value of Vita tabs: B1 > A1 > D2 > C1 > C2 > C3 > C4 (Sometimes, A1 > B1)  
Value visually: Step back and squint to remove color perception  
Value Photos: with Vita value-only shade tabs/guide (B1, A1, D2, C1, C2, C3, C4)  
Black & white Full-face with matching 1, 2, or 3 tabs @F8  
Black & white Smile Close-up with matching 1, 2, or 3 tabs @F36 or F32

Chroma: Color saturation in the proper hue; intensity of color (also gives value)

Young: High value, less color-contrast, high translucency with mamelon effects  
More pinks and blues  
Middle-age: Warmer tones, more color-contrast, less translucency/mamelon effects  
More wear, more yellow/orange colors  
Mature: More color and value contrasts, more characterizations  
Deeper chroma, especially at CEJ

Shade selection: Neutral blue bib; look at frequently to recharge orange cones in eye

Camera: Digital SLR, (eg. Nikon D-200), dedicated Macro lens,  
Avoid ring flash; use double spot flashes  
Do not E-mail images; data is lost. Send photos or disk/flash memory  
Slight downward angle can minimize flash highlights and wash-out  
Shade tabs: Remove cervicals for accuracy. Include B&W for value  
In same plane as teeth; teeth and tabs approx. perpendicular to lens.

Dentures/Partials: Often best solution for esthetics at least cost

XVI Implant CaseTx Planning: Edentulous Arch

Max: Crown and Bridge: Requires many implants

PFM Hybrid: Compromise of cleansability/access vs seal for phonetics; 6 v. 8

Use CAD/CAM milled frame for lightweight, accuracy/fit, cost

If fractured unit: prep single unit and cement over-unit crown

Denture teeth/acrylic Hybrid; 6 v. 8

UCP on implants/locators 4 v 6 v 8

Overdenture on bar (poss with locators) 4 v 6

Overdenture on locators 4 v 6

Mandib: all of above except cast PFM (weight); ideal: fixed resin/metal hybrid

Max/mandib: Avoid porc on porc: poss Max PFM over Mandib acrylic hybrid.

If porc/metal on porc/metal: high poss of fracture due to lack of proprioception

Risk Management; Full-arch implant cases : poss separate anterior crowns or splinted crowns on preps: so able to replace only one or two if porcelain fractures.

Thin ant. tissue w. high lip line: use zirconia abutment for show-through (+~\$300 in 2007)

Max hybrid for edentulous arch; four problems:

1. We want tissue contact for speech.
2. We want access for hygiene.
3. The maxilla resorbs up and in causing problems w. implant placement and angulation.
4. Attempting to satisfy #1,2,3 will cause speech problems due to tongue position and air escape.

So overdenture or fixed porc/metal bridgework are better.

Max fixed: Definite speech problems; easiest with removable

Jaw relations for implants in edentulous arch:

1. First on wax rim.
2. Next with verification index (to verify impression and implant location accuracy).  
Take bite index over verification index at the proper VDO.
3. Final bite reg on fixtures/frame; possibly confirm on hybrid prior to processing.  
Do wax-up try-in (on frame) at abutment/frame try-in.  
Can modify abutments to make more subgingival with new framework try-in prn.
4. Diagnostic wax-up and wax-up try-in: verify esthetics, phonetics, occlusion  
Verify jaw relations, cast accuracy, abutment position, patient acceptance

Fixed hybrid: Gingival space must be closed at the anterior for phonetics.

Gingival space may be open at posteriors for hygiene access.

Maxillary: if acrylic teeth, need enough room for teeth/acrylic thickness.

Maxillary: Metal ceramic fixed restorative: Lab fee ~ \$8000 (2007).

Lab fee with rims/temps/bridgework ~ \$10,000 (2007).

Mandib full arch on implants: Geller teeth (hard)

Maxillary: Restore to M2's for esthetics.

Mandibular: Restore to M1's to reduce cantilever as needed

Use CAD-CAM milled bar for hybrid: lighter and more accurate than casting

Lab fee: Mandib acrylic hybrid on 5 implants w CAD-CAM bar ~\$4000 (2007)

Mandib Bar Overdenture: Bar screwed to implants; overdenture to bar with locators

Bar overdentures (Max or mand) with non-parallel implants (no line of draw):

Use external hex abutments or internal hex with attachments to convert to external hex.

Mandib Overdenture on Four Locators: Retorative fee ~ \$6000 (2007)

Each locator: Fee: ~ \$900 (2007)

Patient fee = Denture Fee + \$3600 (ie. \$900 x 4) = \$6000

Locator retention: Clear > pink > green > blue

Max Overdenture on 4 or 6 individual Locator attachments:

1. Custom tray: border mold.
2. Locator; want height to deepest tissue height (depth).
3. 3mm height healing cap to tissue indicates need for 3mm high locator.
4. 4mm height healing cap 1mm high above tissue indicates need for 3mm high locator.
5. Place locator abutment on implant, tighten to 20Ncm.
6. Snap on Locator impression copings; clear/relieve around copings
7. Impress in custom tray, remove and replace locator abutments with healing caps.
8. Place lab analogs on impression copings and pour up.
9. In wax rim acrylic: place housings with black males.

Massad-type impressions in Massad-type trays:

1. Place locators, torque to 20Ncm, place pick-up copings.
2. Place tissue stops in heavy/fast-set material, try to avoid pick-up copings.
3. Seat tray, let set, remove, remove any attached pick-up copings.
4. Replace pick-up copings on locators, clear impression material around coping areas
5. Border mold tray in medium/heavy fast, remove tray, remove areas of tray burn-through
6. Trim/reduce all border areas by 1mm.; adhesive prn; re-seat all pick-up copings.
7. Final Impression with medium-body, border mold, set, remove impression.
8. Remove locators and replace healing caps.

Impressions for connected/fixed implanted-supported prostheses:

- Notes:
1. Use GC pattern resin, not duralay (lower shrinkage)
  2. Custom tray: made 24 hours ahead (shrinkage/warping mainly done) with spacer, plus 5+mm height/thickness at impression copings
  3. Always use open-tray techn. (impr. Copings unscrewed to remove impression) for greater accuracy.
  4. Tissue punch for tissue overlying implant, preventing seat of impr. Coping Premier Uni-Punch Disposable Derm. Biopsy Punch; Ace Surgical Supply Purchase Various Diameters: requires anesthesia

- Steps:
1. Remove healing caps (soak in Peridex)
  2. Immediately place impression copings (prevent tissue collapse)  
Verify with Xrays prn
  3. Figure-eight around copings with heavy cotton thread or floss; tie off
  4. GC Pattern Resin thin bead to cover thread; powder & liquid w. small brush
  5. Cut each bead bt. copings, reconnect bead/resin --> complete bridge of resin
  6. Tray: insure clearance around copings and border-mold/trim
  7. Medium-body PVS material; inject around copings; load and seat tray
  8. Re-border mold; let set
  9. Loosen all screws, remove tray/copings; immediately replace healing caps

Verification Index: by lab; from master model:

1. Temp cylinders on master model; bridged together with Pattern resin or Triad
2. At next appointment: try in mouth on implants with only 1 screw on 1 implant  
Verify seats on all implants with no rocking, lift-off, gaps or torque
3. If any rocking; Re-impress and start over

XVII Review with patient:

1. Options, including no treatment
2. Levels of health/decline/risk; not just repairs
3. Wear: presence, responsibility, results of no tx, benefits of tx  
! Do not review tx plan now!
4. Poss. future Endo's
5. Immediate Nightguard
6. Final Nightguard Always!
7. Risk of Restoration Failure
8. Warrantee/Guarantee (Years?) Not from trauma or caries

XVIII Kois: Dx Opinion then Tx-Planning Management 10 Steps: Move all areas from high to low risk

Diagnostic Opinion: Four Areas:

- A. Periodontal: Gum and Bone: Got Bone?
- B. Biomechanical: Tooth Structure: Caries, structural, lost structure, pulpal, erosion, etc.
- C. Functional: Joint (TMJ), Bite and Chewing

Five Categories:

- 1) Acceptable Function: Low Risk: Green Dot
  - Envelope of function is WNL: MIP is ok for restorative
  - Extrinsic Factors may cause premature loss of tooth structure
- 2) Constricted Chewing Pattern: Mod Risk: Yellow Dot
  - Anterior teeth in the way of normal arc of closure
  - See wear, mobility on anteriors; no wear, no mobility on posteriors
  - Wear on max ant linguals (ling and inc facets communicate) and mand ant facials;
  - Deprogrammer--> init. contact on anteriors; is a P-3 (Pathway) problem
  - Tx: move anteriors out of the way for tx
- 3) Occlusal Dysfunction: Mod Risk: Yellow Dot
  - Posterior interferences into MIP &/or TMD create avoidance patterns
  - Deprogrammer--> init. Contact on posteriors; may have gen'd (incl. post) wear facets
  - P-2 (Place) Problem: Cannot reach home due to occl. Interf.s
  - Wear on max and mand inc edges: If there is wear on max linguals, the facets do not comm.; the ling facets are well-defined and sep from the inc. edges
  - First deprogrammed contact is on a post tooth: any max ant notching is due to the widened arc of closure of the (posterior-) avoidance pattern
- 4) Parafunction: High Risk: Red Dot
  - Nightly/daily bruxism: no useful function; poss aggravated by occlusal dysfunction
  - Pathological occlusal conditions may develop secondary to extreme tooth wear
  - Tx: Nightguard after any occlusal/restorative treatment
- 5) Neurological Disorders: High Risk: Red Dot
  - Destructive use of the system due to extrinsic (drug) & neurological problems
  - Tx: Nightguard after any occlusal/restorative treatment

Functional Questions:

- 1) Any problems chewing gum? Yes--> poss constricted chewing envelope
- 2) Any problems chewing bagels/chewy foods? Yes--> poss occlusal dysfunction
- 3) Have your teeth changed in the last 5 years? (Shorter, thinner, looser, spaces?)
  - Yes--> Active (not well-adapted) problem
- 4) Do you have more than one bite or clench your teeth?
  - Yes--> poss occlusal dysfunction
- 5) Do you have problems with sleep?
  - Yes--> poss sleep bruxism or neurologic disorder
- 6) Do you clench or grind daily or nightly?
  - Yes-> poss bruxism
- 7) Do you have jaw joint problems; pain, popping, clicking, etc?

D. Dentofacial: Smile Characteristics and placement of the smile in the face

Color plus all other individual esthetic tooth factors

Positions of:

- 1-4) Max inc edges, max occl plane, mand inc edges, mand occl plane
- 5) Teeth in the arch: arrangement & form: midline, inclinations, spacing, rotations, etc.
- 6) Gingival tissue including lip dynamics and reveal at rest and full smile

Treatment Planning: Management Considerations: 10 Steps:

Medical Risk Factors  
Dentofacial Smile Characteristics

1. Develop Maxillary Incisal Edge Position: Vertical and Horizontal
2. Develop Maxillary Posterior Occlusal Plane: Vertical and Horizontal
3. Develop Mandibular Incisal Edge Position: Vertical and Horizontal; Overbite/Overjet
4. Develop Mandibular Posterior Occlusal Plane: Vertical and Horizontal
5. Intra-arch tooth positions: Arrangement, form, midline, inclinations
6. Gingival Assessment: Tissue levels

Functional (Therapeutic Considerations) Joint (TMJ), Bite (Occlusion) and Chewing

7. Condylar Position
- |  |                  |
|--|------------------|
| Anterior Guidance: Acceptable Function vs. | Steeper Guidance |
| Constricted Chewing Pattern vs.            | ^                |
| Occlusal Dysfunction vs.                   | -                |
| Parafunction (Sleep Bruxism) vs.           | v                |
| Neurologic Disorders (eg. Meds)            | Flatter Guidance |

Vertical Dimension of Occlusion (VDO)

Centric Contact Points

Eccentric Contacts: Cuspid Rise v. Anterior Group Fn. v. Posterior Group Fn.

Biomechanical Tooth Structure

8. Restoration Design/Materials + Maintenance/Fluoride  
Root Canal Therapies, Extractions (non-restorable), Direct Restorations, Cores  
Maintain vs. Extract (--> Implants, Crown & Bridge, Removable, etc.)

Periodontal Gum and Bone

9. Gingival Management and Control loss of attachment
10. Restoration Enhancement/Concerns: Prep length, prep strength, biol. width, ridges  
Corrections: Endo, Ortho, Surgical, etc.

XIX Full Treatment Plan

Exam + Consultation + Treatment Plan  
Radiographs + Photographs + Study Models/Jaw Relations (Alg.-substit or PVS, not alg.)  
Analysis: Clinical + Models + Facial + Joints + Musc. + Occlusal + Smile/Phonetics  
Periodontics  
Susceptibility (--> more perio tx) vs resistance (--> less perio tx)  
Prophy vs Deep Scale/Root Plane  
Pocket Elimination  
Recontouring: Gingival  
Recontouring: Flap/Osseous  
As possible: Melker: Recontour/Bevel tooth; avoid removal of supporting bone!  
Grafting: Soft Tissue  
Endodontics  
Vitality test all teeth to verify WNL vs. endo-required for long-term restorative success  
Teeth: Maintain vs. Extract (--> Implants, Crown & Bridge, Removable. etc.)  
Orthodontics- Arch form, Tooth positions alignment, angulation, rotations  
(Orthodontist determines ideal position/form for waxup)  
VDO and Centric/condylar position?  
Ideally: tooth form to ideal prior to ortho completion

Full Tx Plan

Incisal wear cases with Ortho & small/peg teeth with ortho:  
If room is available, restore required incisors (length, width, size) prior to ortho so tooth structure is placed in correct position for final restoration.  
If room is not available, have ortho. intrude anteriors and/or extrude posteriors to give room for anterior restorations, remove anterior brackets, then do temp. composite veneers to proper length, width, size. Then rebracket, finish ortho to final positions, then restore.  
If peg lateral, have ortho. over-open space, then restore to full contour temp'ly with composite so ortho. can maintain proper spacing, length and incisal position.  
If temp./composite restorations not done to or mid-ortho, orthodontist may leave (worn or peg) teeth with incisal edges at final inc. edge position with need to then cut down teeth for final restoration. Also, short teeth may be left so that perio surgery (and loss of bone support) is needed to create length/room for full-length teeth.

Ortho intrusion/extrusion to even gingival levels and/or compensate for bone loss/perio  
Post-ortho (Kois): wait 6 months to equilibrate and/or restore due to settling  
Orthognathic Surgery

Occlusal Scheme + VDO?  
Appl. to seat condyles >> FM Occl. Adj vs. Restore at this VDO/Conylar Posit.?  
Occlusal Adjustment to CO=CR

If changing Occl./VDO: maint. in transitional bonding/processed provisionals 3 months\*\*\*  
Verify comfort/stability & lack of breakage/loosening/wear: if problems:  
Mult. teeth --> prob.s w. env.s of motion/function: Single tooth --> prob. of occl. adjust.  
Occlusal Build-ups prn  
Gingival Recontouring  
Bleaching/Whitening  
(Removing old composite: acetone --> composite white & frosty)

Lab: Diagnostic Wax-up + Matrices + Stents + Possible Long-term Provisionals  
Trial Smile

Phased Tx Generalized:

0. Occlusal Phase: a) Deprogrammer + b) Occlusal Adjustment
1. Stabilization Phase: Transitional Bonding Ant/Post or Provisionals: 3 mo.s verify stabil.
2. Referral Phase: prn. Perio, Endo, Ortho, Surg., etc.
3. a) Restorative Phase: (Staged prn): Prepped after/from transitional bonding/ideal  
b) Prototype Phase: 1-2 months
4. Protection/Monitoring Phase

Phased Tx choices:

1. If maint. same VDO, can refine centric and restore in segments per patient choice.
2. If increasing VDO, can build up posteriors and ant. guidance and restore in segments  
ie: transitional veneers, cores, buildups, bonding
3. If increasing VDO, can do full arch mand. prep/temp, then full arch max prep/temp then maint. 1+ mo.s, refining occl., esth.s, phonetics, comfort prn, then restore segmentally.

Phase Tx Steps for Full-Mouth Rehab w. Change in VDO adapted from Dr. George Priest:

- Ph. I: a. Impressions, radiographs, photos, jaw relations  
b. Tx plan, consult, acceptance  
c. Establish ant. esthetics  
d. Establish centric relation/occlusion + determine VDO  
e. Ideal wax-up (accepted) + Processed temps (accepted) w. open ging embrasures  
f. Matrices and reduction guides prn  
g. Trial smile prn
- Ph II: Full arch mandib preps + temps relined/seated + even occl. on max.
- Ph III: Full arch max. preps + temps relined/seated + occl. adjusted for stable centric occl. and excursions.  
Maintained 4+ weeks: refine occl., esth.s, phon.s, comfort prn -> pt. acceptance
- Ph IVa: Remove mandib. ant. temps + refine preps  
Reline temps + impress + bite indexes + reseat temps
- Ph IVb: Seat mandib. ant.s + remove mandib. post. temps + refine preps  
Reline mand. post. temps + impress + bite indexes + reseat mand. post. temps
- Ph IVc: Seat mand. posteriors + remove max. ant. temps + refine preps  
Reline temps + impress ant.s + bite indexes + reseat temps
- Ph IVd: Seat max. ant six + remove max. post temps + refine preps  
Reline temps + impress post.s + bite indexes + reseat temps
- Ph IVe: Seat max. post.s + refine occlusion in centric and excursions  
Immediate occlusal guard
- Ph. V: Refine occl. prn + Maint. schedule + Home care tools and techniques  
Final Nightguard: Standard vs. NTi vs. E-Appl. vs. Spear Appl.

Long term provisionalization/temporization in ortho/perio cases:

- Ideal: if final anterior restoration = direct comp or veneer; provisionalize with direct bonding  
Spear technique: direct bonding to hold/manage spacing/esthetics/ function during ortho
1. After ortho has opened space(s) and aligned teeth (ie: mid-ortho):  
Remove archwire, take alginate, replace archwire, and pour model.
  2. Grind brackets off model, do ideal wax-up, duplicate wax-up in stone model
  3. Make clear, pressure-formed, matrix; poss 2-layer (inner/soft + outer/stiff)  
Lingually: apically only as needed, with poss vent holes
  4. Matrix tried in intra-orally: teeth or matrix adjusted prn to fit
  5. Non-involved teeth isolated from micro-etch and etch  
Teeth micro-etched, etched, washed, dried, primed, bonding-resin'd
  6. Composite (warmed prn) loaded into matrix, seated, excess removed, cured
  7. Teeth separated with Ceri-saw, contoured, smoothed, occl adjusted, polished
  8. After ortho completed: temp bonding replaced with final comp or porc veneers

Transitional Bonding? Transitional Veneers?

Long-term (processed) provisionals?

(Dx Waxup + Processed Provisionals ~ 35% of Crown Fee)

(Long-term provisionals: Hourly Maintenance Fee)

Bonding

Veneers

Implants

Girls ~ 17+ yrs; Boys ~ 21+ yrs; Confirm facial growth compl'd w. ceph.s ~ 1yr apart

Cores/Build-ups

Crown & Bridge

Shade: Custom/unit?

Restoration Type:

Tx: FM? vs Full Arch? vs Sectional/Segmental?

Cracked Cusps: Cover (Not bond due to fatigue)

Comps vs Inlays (Margins in Dentin; Isthmus W. > 1/2 Cusp W.; Occl. on Restor)

Indirect/Pressed: Size, Mult. Units, Heavy Function, Ability to Isolate

Bonding?: Ability to Isolate?

Spacing/Contour/Color Changes --> Full Coverage + Sub-G Preps

Cuspid Design

Nightguard, Immediate vs. NTi vs. E-Appliance vs. Spear Appliance

Nightguard, Final vs. NTi vs. E-Appliance vs. Spear Appliance

Maintenance/Recall

Review with patient: Section XVI: Items #1 - 8

XX Treatment Plan Fee Proposal [Phased Treatment: List Phases + Sequence]	Treatment Fee:
1. Exam + Consultation + Treatment Plan	.....
2. Radiographs	.....
3. Photographs	.....
4. Study Models + Jaw Relations	.....
5. a. Prophy or Deep Scale/Root Plane	.....
b. Caries Control: Cores and Temp. Restorations/Fillings	.....
c. Perio (for disease or esthetic flap tx or esthetic recontouring)	v. Refer .....
d. Endo (for symptomatic vs. prophylactic)	v. Refer .....
e. Ortho (compr. vs. limited, align giing. levels, ortho-erupt for bone loss)	v. Refer .....
f. Implants/Surgery/Grafts	v. Refer .....
6. Esthetic Diagnostic wax-up + matrices*	.....
7. Trial Smile	.....
8. Gingival Contouring	.....
9. Bleaching	.....
10. a) Deprogrammer	.....
b) Occlusal Adjustment	.....
11. Occlusal Build-ups	.....
12. Transitional Bonding + Transitional Composite Veneers	.....
13. Cores + Build-ups	.....
14. Provisionals/Processed Temporaries*	.....
15. (Dx Waxup + Provisionals~ 35% of Crn Fee)*	.....
16. (Long-term provisionals: Hourly maint. Fee)*	.....
17. Composite Veneers	.....
18. Porcelain Veneers	.....
19. Crowns	.....
20. Custom Shades (# units x cost/unit)	.....
21. Nightguard: Immediate vs. NTI vs. E-Appl. vs. Spear Appl.	.....
22. Nightguard: Final vs. NTi vs. E-Appl. vs. Spear Appl.	.....
23. Maintenance/Recall	.....
Total	.....

XXI Lab Waxup

Jaw Relations: Models (Alg-substit or PVS, not alginate) + Facebow + CR Bite Reg.  
Custom Incisal guide table from prior models/occlusion  
Waxup and Matrices (Hard over soft vacuum/pressure-formed, or putty/relined)  
or Raigrodski technique: Clear Triad custom tray over putty spacer; impress with clear  
PVS, trimmed 1-2mm shy of gingiva, for composite temps: body in matrix, cured,  
margins then added with flowable composite and cured. (See XXIV-35- Provisionals)  
Ideal waxup (by Orthodontist if ortho --> approx. future tooth position)  
Length: can mockup in mouth < alg.: Facial fullness: lab estab. in waxup

Wax-up Esthetics + Acceptance by patient: [See smile analysis section XIV Items A -R]

Centrals Length = 10-11+mm: w/l + 3/4 = 75%: Visib. Golden Prop = 1.6; 1; .6

Laterals not compete for domin; papillae height: prox.'s filled:

Inc. thirds perpendicular to occl. plane:

Inc. edge to length: "F", "V", "55" : Just Touch Lower lip at wet/dry line

Inc. edge to length: "S", "Ch", "66" : Inc. Edges just miss

Lingual concavities for env. of function and envelope of motion

Wax-up Function + Acceptance by patient

Broad areas on centrals

No centric stops on margins

Lower cuspids miss upper laterals

Avoid contacts of max. laterals

If on: a. Only central area

b. Broad center area

c. Avoid M & D corners

Ant. Guidance/Crossover: Smooth with no catches

Contour Reduction Guide (CRG) for Trial Smile ie: areas on model & teeth outside ideal form:

- 1) Make soft matrix on pre-op model and leave on model during reduction of over-contoured areas of teeth. ie: those areas outside of ideal wax-up contours
- 2) Use ortho archwire as guide to reduce tooth structure and matrix outside ideal form
- 3) This primary reduction guide has holes of areas of required tooth reduction
- 4) Color mark to identify over-contoured areas now removed/reduced

Ideal Waxup Verified and accepted

Ideal Waxup Duplicated

Preparation Reduction Guides: decide:

- a) Magne Technique: Contour Reduction Guide (CRG) + Ideal Trial Smile+ Reduce ideal depths from Trial Smile or
- b) Clear Matrix from Ideal Wax-up with Depth-Checking holes or
- c) Reduction Guide Putty Matrices X 3 to check reduction @ Facial, Lingual, Incisal

Clear Stent Reduction Guide

Wax Shim Reduction Guide

Putty Matrix Reduction Guide: Fac. + Pal.

Putty Matrix Reduction Guide: Layered

Putty Matrix + Stent for Trial Smile (2-layer hard-over-soft vac/press formed or putty/relined)

Trial Smile (mock-up) Stent: Ideal: rigid 1.5mm over inner soft .3mm with pal. support or putty relined with light-body for accuracy/detail.

or Raigrodski tech; bulk of temp teeth composite cured in clear matrix, margins then added in flowable comp and cured. (See XXIV-35, Provisionals)

Plan Preps

Ideal Waxup  
+ Matrices

XXII Trial Smile: Verify Smile Analysis and Design, [Section XIV, Items A - S]

Esthetics ~ Waxup + Acceptance by Patient (Signed)

Function ~ Waxup + Acceptance by Patient (Signed)

Trial Smile

XXIII Esthetics Case Set-up and Pre-Preparation Protocol:

- 1 Verify Smile Analysis & Gingival Analysis: [Section XIV Items A - S]

A. Smile, current	G. Buccal Corridor	M. Gingival Height & Shape
B. Smile Line	H. Incisal Embrasures	N. Gingival Margins
C. Uppr Lip Reveal/Display	I. Proportions/Shapes/Ratios	O. Shade
D. Phonetics	J. Profile/Anatomy/Contour	P. Surface
E. Midline	K. Cervical Embrasures	Q. Lingual of Anteriors
F. Axial Inclination	L. Periodontal Health	R. Incisal Length
- 2 Verify Shade(s) Chosen + Color Mapping: Centrals + Laterals + Cuspids + Bicuspid:  
Poss: B1 + A1 + A2 + A1  
Poss: B1 + B1 + A1 + B1
- 3 Verify Shade/Mold according to Trial Smile &/or smile guide
- 4 Verify Pre-op Photos x 12 + "E" + "M"
- 5 Verify Occlusal analysis: a) Joints + Centric CO=CR + Occlusal Stability  
b) Anterior Guidance + Crossover + Mandib. Ant. Incisal Form
- 6 Verify Pre-op a) Alginate/models: Max x 2 + Mandib x 2  
b) Facebow + Waxbites (Cr vs ICP) + Ant. midline/horiz. jig  
c) Models mounted with facebow/jig/bite on articulator  
d) Diagnostic (ideal) wax-up, duplicated in stone
- 7 Verify a) Processed provisionals with positioning matrix (or)  
b) Matrix, putty, full-arch for provisional (memosil = clear) or Biostar soft inside hard  
c) Matrix (duplicate) for Trial Smile  
b) and c) matrices: 2-layer vac/press-formed v putty/relined v Raigrodski tech.)  
d) Contour Reduction Guide/Model to verify seating of Trial Smile (prn)  
e) Matrix, putty, vertical split for Incisal Matrix + Facial Matrix  
f) Matrix, putty, facial horizontal slices to verify facial reductions  
g) Biostar or suckdown matrix w. holes + gingival levels marked  
h) Wax occlusal shim  
i) Custom Trays x 3
- 8 Verify restorative materials chosen [Section XV] and preparations/margins planned
- 9 Verify a) Occlusion Adjusted or b) in deprogrammer or c) opening VDO

XXIV Esthetics Case Preparation Protocol + Provisionals:

- 1 Sedation Protocol (prn) + Nitrous/Oxygen (w. "cancel" button)
- 2 Occlusal Adjustment performed or verified [Section XIII- I: Occlusal Adjustment Protocol]
- 3 Gingiva Contoured: E-surge prn (vs. flap/osseous surgery)
- 4 Optigate or lip/cheek retractors placed
- 5 Composite cores + build-ups prn
- 6 Tooth Contours reduced/modified prn for seating of Trial Smile Matrix using CRG (Contour Reduction Guide/Model to remove excess (out-of-contour) tooth structure.

- 7 Trial Smile: a) Pumice, etch, wash  
 b) Primer + Bonding Resin, cure  
 c) Bis-acryl, set (if all to be removed) vs composite, cured (if some poss to be left)  
 d) Matrix filled and placed: set or cured  
 e) Contoured, polished, flash removed  
 f) Polish

8 Verify Trial Smile [Smile Analysis: Section XIV, A - S]

9 Sound to bone: Biol. Attach: CT ~1mm, Epith. ~1mm, Sulcus (Facial ~1mm), (Prox. ~ 2mm)  
 Bleeding Points: Facial Margins ~ 2.5mm to bone; Prox. Margins ~ 3.5-4mm to bone

If Teeth Short: determine inc. edge position + tooth length to determine gingival margin.  
 Ideal wax-up --> carve gingiva ideal --> duplic. model --> surgical matrix  
 Supra-G margins: osseous surg. so bone [Biol. width + 1 mm] from matrix  
 Sub-G margins: osseous surgery so bone [Biol. width + 0.5 mm] from matrix

10 Anteriors: Apical depth/extension of Facial prep for hidden, intra-sulcular margins:  
 Biol. Width: 0.75mm-3.0+mm; Avrg = 2mm  
 Margin Placement is a fn. of sulcus depth:  
 If sulcus is 1.5mm or less, prep margin 0.5 to 0.7mm into sulcus  
 If sulcus is greater than 1.5mm, prep margin 1/2 depth of sulcus probing  
 Initially prep to gingiva: prep now = reference point for gingival height  
 Can Probe sulcus depth--> bleeding points prn @ sulcus base/ tpo epith. attachment  
 Can probe once to bone to verify bone height  
 Gently place cord untill proper amount of tooth is exposed  
 Prep to top of cord  
 Place second cord + smooth margin with (shaped) white stone prn  
 Large sulcus depth: to prevent recession/margin exposure:  
 a) Gingivectomy to give 1.0mm sulcus and handle standardly or  
 b) Gingivectomy to base of sulcus (attachment height) and allow sulcus to re-form

11 Pack thin cord: Facial + proximals: one single continous cord with no chemicals  
 Spear + Crispin: only pack cord after prep to gingival margin: gives reference.

12 Matrices + Reduction Guides: Place and check

13 Facial Prep.: Proper depth from (ideal) trial smile (or reduction guides, if no trial smile):  
 a. Depth cuts from (ideal) surface w. depth cutters or small ball or tapered cyl. w. round end  
 b. Depth cuts only as required from trial smile or reduction guides/matrices  
 c. Preserve enamel !!!: minimal reduction for porcelain/restorative thickness  
 d. 3 Planes: Cervical 1/3: .3mm, Middle 1/3: .5mm, Incisal 1/3: 1mm, Incisal: 2mm  
 e. Follow mesial-distal curvature  
 f. (Removing old composite: acetone --> white/frosty)

\*Closing diastema: prep proximal sub-gingival & through to lingual for proper porcelain emergence/extension to close contacts.

15 Crispin: Enamel thickness	Gingival	Middle	Incisal	(in mm's)
Central	.25	.8	.9	
Lateral	.26	.9	1.0	
Cuspid	.24	1.0	1.2	
Bicuspid	.26	1.2	1.4	

- 16 Crispin: Veneer Preps: Ideally prep inward from trial smile from ideal wax-up
- \* All anterior lingual centric stops & first protrusive contacts must be marked prior to any prepping so that centric and first protrusive contacts are above or below the margin.
  - 1) Horiz. depth grooves: at junction of inc/mid thirds and at junction of mid/ging thirds  
use depth-cutting burs with goal of staying in enamel
  - 2) Gingival Margins: with round-ended, tapered-cylinder bur (tip: fine grit; rest: med. grit)  
If decay or dark color to change, go sub-gingival; if not, prep equi-gingival (w. cord?)  
Prep margins gently into enamel, following curve of gingival margin
  - 3) Interproximal: with same round-ended, tapered-cylinder bur  
Try to maintain contact; breaking contact requires more taper (like a crown)  
Big color change req.s more prep to lingual, with "elbow" to tissue levels (to hide)  
Closing diastema req.s breaking contacts + more gingival/apical reduction for more room to build out contacts with normal contours (ie: "Slice")  
If interprox. filling or decay, prep until "you hit something good" (tooth structure)  
Replace proximal lesions/restorations as necessary  
If papillae are blunted: prep papillae to good form and prep tooth more apically to gingiva to close prox and avoid black triangles
  - 4) Incisal Edge: All anterior lingual centric stops and first protrusive contacts are marked prior to any prepping so we may control (limit) or extend the lingual margin of each prep so it is above or below the centric stop &/or first contact.  
Ower incisal edges may be recontoured now or at final seat to this end.  
Incisal Edge: a) To facial only, for intact tooth or  
b) Just over incisal edge to inciso-lingual or  
c) Incisal Wrap/Butt for more resistance (usual)  
Prep "until you hit something good" (tooth structure)  
Prep chamfer if you need positive stop/seat  
Prep less or further up lingual to avoid centric stops on margins  
Incisal butt margin: reduce 2mm at incisals (from trial smile or reduction guide/matrix)
    - a. Incisal reduction: 2mm at same angle as incisal edge, with same diamond
    - b. Surfaces parallel to functioning surfaces, perpendic. to contact of mandib inc.s
    - c. Porcelain to always be in compression from incisal and occlusal forces
    - d. Round incisal-facial line angle, rolling in facial incisal third (third facial plane)
    - e. Lingual incisal: lingual chamfer only if required for 1) positive seat or
      - 2) Avoiding centric stop on margin
      - 3) Reaching solid tooth structure

Check reduction with reduction guides  
Round mesial and distal incisal angles/corners for more bulk to reduce fracture
  - 5) Lingual Reduction only prn (eg. endo) for structure "until you hit sometning good"  
Maintain palatal/lingual margins supra-ging prn, past fg/decay and cores: 2mm ferrule  
\* Maintain cingulum as poss. (--> tooth strength), esp. w. porcelain restorations
  - 6) Remove facial islands of enamel; stay in enamel as possible.  
If much cervical abrasion/abfraction: poss. occl./cervical groove for rigidity
- 17 Determine margin placement (apical depth/extension): see [#10 (Above, prior page)]  
(See Section XV-C: Marginating: Prepping and Gingival Protection)
- 18 7) Place cord: smooth margins and round all line angles and corners  
Confirm: a) 3 facial planes, b) mesial/distal curve, c) rounding/smooth, d) cont. margin
- 19 8) Lower veneers: usu. cover full incisals/occlusal cusps to stress at functional cusp  
UpperVeneers: usu. "c)" wrap/butt until "you hit something good" & contour is normal
- 20 Margins connected, squared, smoothed with end-cutting diamond (for procelain)  
Margins: Crowns with cores: via probe to bone/attachment: ~ 2-2.5mm from bone  
Porcelain: just to or into sulcus (cord --> margins sub-G with no prep sub-G)  
Sulcus: Shallow has min. recession risk; Deep has more recession risk  
Anteriors: Prep to gingiva, pack cord, prep to top of cord, finish margins with stone
- 21 Verify centric contact plus initial excursive contacts not on margins: extend prep prn

22 Verify Reduction w. matrices/guides:

Anteriors: Clearance in centric + ok w. proposed guidance + not over-reduce cuspid lingual  
Verify anterior crossover positions (right, left, protrusive) + clearance in protrusive  
Posteriors: Clearance in centric + excursions (right, left, protrusive)  
Verify right and left crossovers

23 Fox Plane: verify reduction clearance, orientation, occlusal plane

24 Preps/margins smoothed with a) fine diamonds or stones then b) pumice  
Protect gingiva with Zecharya or Kinchillo instruments

25 Verify (proximal) margins will be hidden by porcelain

26 Stump shades: Photo's: not dried, shade tab in same plane as tooth

27 Retraction/cord (2nd) prn: See margins 360 degrees around teeth --> E-surge or cord prn  
Margins/tissue: E-surge (fine tip) prn + Superoxol on micro-brush for 5 - 10 seconds  
then repeat E-surge (Rxn between Superoxol & E-surge cleans sulcus)

28 Fill in lingual undercuts with block-out resin so impressions do not tear or distort

29 Master Impression #1

30 Master Impression #2

31 Remove all cords

32 Bite Registration: \*If prepping full-arch or bilaterally so that posterior occlusal stops are gone:  
First prep one side, then 2 identical bite registrations on that side, then prep the other  
side and take 2 bites on second side w. first side bite reg in place.  
Also take anterior bite reg.: --> full arch bite reg. for accuracy/stability

33 Verify all cords removed!

34 Facebow prn + Horizontal/Vertical anterior alignment jig w. midline marked with photo  
Inc. edges perpendicular to facial long axis (not nec. parallel to pupillary plane)  
Midline parallel to long axis of face (not nec. perpendicular to pupillary plane)

35 Provisionals: a) Processed: clearance/fit checked + relined (not allowed to over-heat) or  
b) Matrix filled and placed, set + removed or  
c) Matrix filled and placed, set, shrink-fit and left  
Matrices: original study/pre-op models: Alg-substitute or PVS, not alginate (for accuracy)  
Two-layer hard/soft vac/pressure-formed or putty/relined or Raigrodski cure-through type  
Teeth disinfected, poss desensitized prior to provisionals.  
Always leave open gingival embrasures.

Spear: Matrix from ideal waxup: 1mm copyplast with rigid shell or full-arch stiff support  
a) Alg. impr poured up with Mach II Slow, base of bite registr. on flat slab  
Bis-acryl into copyplast matrix, into place on Mach II model or  
b) Impress preps --> stone model w. foil substitute  
Bis-Acryl or acrylic into copyplast matrix, onto model, with pressure, heat, etc.

Crispin: Matrix from ideal wax-up with good lingual bulk, duplicated in stone.  
a) Putty matrix; short of margins, shy of papillae!!; scalloped to expose papillae  
b) Cord in  
c) Bonding resin to teeth; no etch!, no primer!, blown thin, cured  
d) Fill matrix with composite, seat, remove gingival excess, contour, cure.  
e) Fill out contours, extend to gingiva, fill voids, contour/thin, cure.  
f) Smooth, (Enhance Cups, etc.), Adjust occlusion, polish  
g) Home care: Therasol Rinse, brush, rubber tips

Raigrodski: Matrix from ideal wax-up, duplicated in stone

- a) Thin putty layer as spacer over teeth to tx
- b) Triad custom tray (clear) over putty spacer, add holes for retention
- c) Clear PVS "final" impression of ideal wax-up including palate + other teeth
- d) Trim gingival of tray/impression to just shy of margins/gingiva/papillae by 1-2mm
- e) Spot etch; no primer, no resin
- f) Fill matrix with heated/warmed composite, seat, clean excess so margins are bare.
- g) Cure through matrix, remove matrix, cure, add flowable at margins and cure,
- h) Smooth and polish

Raigrodski shell technique for posteriors:

- a) Ideal wax-up duplicated in stone; impression is made of wax-up
- b) Impression: bisacryl thin shell painted over facials & linguals, pontics left more filled
- c) Shell is set, removed & thinned; left as matrix to be acrylic-relined over prepped teeth.
- d) Same shell technique can be made from minimal prep of ideal wax-up, lubricated, then bys-acryl into matrix/impression placed over min-prepped model, set, removed.
- e) Same shell technique can be adapted intra-orally: minimally prep abutments, place cavit into adjacent tooth undercuts, lube teeth, place acrylic or bis-acryl into matrix/impression, place in mouth, allow to set, remove, reline intra-orally after completion of preps and teeth are lubricated.

Temps for full-arch cases where all occlusal stops removed &/or VDO is opened:

- a) Full arch case mounted at new VDO with Pre-op models
- b) Full-arch (Posterior & anterior) jigs made for pre-op models at new VDO
- c) Ideal waxup is done of the full arch, duplicated in stone, mounted at new VDO
- d) Full-arch (Posterior & anterior) jigs made for ideal wax-up models at new VDO  
( to position temp shells)  
ie: Articulator pin maintained at position of new VDO/ideal wax-up --> post + ant jigs
- e) Impression/matrix is made of the ideal wax-up/model, full arch with palate
- f) Model is minimally prepped, lubed, thin bis-acryl or processed acrylic shells made in segments, usually sextants, using the impression/matrix  
Biocryl seating stent is made if full-arch provisional shell is to be totally 1step relined  
Stent must include palate, retromolar, and facial tissue stops
- g) Posterior and anterior provisional shells are finished/thinned, ready to reline in mouth
- h) First segment is prepped, using the other two matrices (from the pre-op models at the new VDO) to establish VDO and clearance
- i) This segment's shell is relieved for easy seating &/or preps are adjusted
- j) This shell is relined at proper VDO/position as indicated by pre-op/new VDO matrices
- k) Each segment is handled the same way, utilizing the remaining occlusal jig(s) and the previously completed/relined provisional/temp segment(s).
- l) Alternately: individual segments can each have two abutments relined along the way, then remaining abutments all relined together after preps completed
- m) Or: (less control) the full arch may be prepped and the full-arch provisional shell totally 1-step relined using the Biocryl seating matrix, full-arch, full-palate, with tissue stops at retro-molar pads and facial.

Very Long-Term Temps (Provisionals):

- a) Direct Composites: See [Full Treatment Plan: Section XVIII] or
- b) Lab-Processed Temps; Shells to be relined, fiber-reinforced for multiple pontics

36 Voids filled with acrylic (processed temps) or flowable comp (bis-acryl) + cured

Temps, acrylic: cure under hot water/pressure

Temps, bis-acryl: in boiled water or light oven for 3 min.s, rinsed in rubbing alcohol 10 sec

37 Povisionals smoothed, polished; open room left for papillae!

38 Occlusion on provisional adjusted/verified

39 Sedation/nitrous off: all intra-op instructions "Cancelled"

- 40 Rx: Peridex (BID) or ProHealth (TID) + Multivitamin daily + Vitamin C 1000mg. daily
- 41 Review post-op instruction sheet, precautions, home care  
Give patient photo of temps to note changes desired
- 42 48 Hours: Verify occlusion, phonetics, esthetics, contours, shade  
Review photo for desired changes
- 43 Schedule provisional approval appointment (approval --> signed) + seat appointment
- 44 Notes: a) Cleaning porcelain or tooth with air-abrader: min. pressure (max: 20psi)  
b) Removing old composite: acetone --> white/frosty  
c) Maintain cingulum of ant. teeth to maximize strength and rigidity  
d) Tissue healing ~ Bone level + Tissue thickness/density + Tooth/Restorative smooth
- 45 Bis-Acryl Temps: After cure/set:
- Heat for 2 minutes in Triad oven or very hot water (to further drive the set/strength)
  - Agitate in cup of rubbing alcohol for 15 seconds (to help remove slime)
  - Lightly scrape out softer/unset layer inside abutments  
If internal fully set, lightly abrade for temp cement space
  - Open gingival embrasures to give room for papillae, final contour, polish
  - Modify facial shade with mix of Palaseal & porcelain stain as needed; cure
  - Palaseal and cure areas that are visible, pontic sites, or contact the gingiva
  - Seat with non-eugenol temp cement; if mult. abutments, use slow-set temp cement

Lab Info:

- Dr. Crispin's website: [Estheticprofessionals.com](http://Estheticprofessionals.com)  
Dr. Dorfman's Smile Design Book
- Pre-op models (untouched!) + Bites + Diagnostic Wax-up with duplicates
  - Master Impressions + Opposing Models
  - Model of Accepted Provisionals
  - Digital Photos:
    - Pre-op Face, Closeup smile, Lateral, Profile, w. shade tabs in same plane\* F8
    - Pre-op B&W Face, Closeup smile, with shade tabs in same plane\* F32/36  
\*Shade tabs: Parallel to & in same plane as teeth; perpendic. to lens
    - Preps with stump shade tabs (cervical, middle, incisal)
    - ProvisionalsBefore/after photos: Lipstick is ok. Shade photos: No lipstick!
  - Stick bite; horiz. jig
  - Kois Facebow (Faceplane Relator)
  - Rx form: Length each for centrals, laterals, cuspids (central usu. 10 -12mm)
  - Stump shades at three levels; cervical, middle, incisal
  - Desired shade/color change at three levels  
(Vita shade guides: a. Regular, b. Necks ground off, c. Value-ordered (See sect. XV C))
  - Desired opacity/translucency
  - Incisal translucency and halo desired (vs. blended)
  - Function/guidance
  - Surface texture
  - Close gingival embrasures!
  - Geller Model: Solid model with gingiva intact for soft tissue levels and papilla height:  
From: a. Second retracted impression with gingival margins untouched/unmodified  
or b. Intra-oral pick-up impression with copings or bisque-bake crowns in place  
For: Lab to avoid tissue gaps and eliminate black triangles

XXV Composite Veneers: (using nano-hybrid, polishable, dentin/body/enamel composite)

1. Photos, radiographs
2. Smooth mandib incisal edges prn; verify function/guidance and smooth anterior crossover
3. Study models, jaw relations, models mounted on fully-adjustable articulator
4. Ideal wax-up including full lingual contours and anterior/incisal guidance
5. Putty matrix including lingual and incisal

Intra-orally:

6. Decide: Overall shade, Dentin Shade (D,O), Body Shade (B), Enamel Shade (Trans, E)  
Translucency, Halo  
Possibly: Body shade only will give correct shade and translucency  
(Eubank: All layers (eg. Dentin, Body, Enamel, Opaquer) = basic shade)

\*\*\* Single Tooth Simplified:\*\*\*

- a. Lingual: Opaque/dentin to avoid show-through
  - b. Mid/Full: Body Shade
  - c. Facial: Incisal: Incisal/Translucent if there is inc. translucency of adj. teeth  
Gingival: Inc/Translucent vs. Body Shade dep. upon transluc. of adj. teeth
7. Trial smile for patient to accept esthetics, phonetics, function prn
  8. Verify: a. Incisal length, position                      f. Occlusion, function  
          b. Tooth width    g. Facial margins  
          c. Tooth proportions                                    h. Developmental depressions  
          d. Embrasures, incisal/cervical                    i. Surface characterization
  9. Gingival recontouring prn (E-surge, laser)
  10. Pack cord prn
  11. Surface prep: 45' bevels, bevels, long bevels, extended/infinite bevels
  12. Isolation: Rubber dam v. lip retract/packing: verify matrix goes to place
  13. Etch, wash, prime, bonding resin (unfilled), cure
  14. Composite to lingual bevels, adapted, sealed, matrix placed, composite burnished into lingual and incisal of matrix; all teeth done together but not touching interproximally  
Shade of lingual composite determined prior to beginning:
    - a. If halo: use halo shade
    - b. If translucency with no halo: use enamel shade
    - c. If all body shade: use body shade
  15. Lingual composite to full lingual and incisal edge with ball burnisher, flat instr's brushed  
Approx. 0.3mm thick; enough for strength but not to determine final translucency  
Halo, translucency or opacity determined by bringing this layer fully to incisal  
Now have lingual/incisal shells; not touching, not to full contour at proximals  
If touch at proximals, build to full lingual/proximal contours per the matrix.
  16. Cure each tooth 20+ seconds
  17. If teeth touch: separate with Ceri-saw (DenMat) at mid-proximals
  18. Each Proximal: place metal strip: Same composite, small increments, contoured against the strip to form the proximal/incisal embrasure then cured  
Place metal strip and complete each/all (M & D) proximal/incisal corner at each/all  
Now have completed lingual/incisal shells to full contour for each/all teeth with slight facial hollows for dentin, body, and enamel/incisal composites as needed.  
Each tooth now done with strips interproximally as needed:
  19. Dentin (D, O) shade composite blended from tooth structure into shell w. lobes = dentin shape with dentin lobes and incisal irregularities  
Then bring to full contour with regular (body) shade.  
If no special translucency or opacity: poss use regular (body) shade only to full contour
  20. If tooth has visual depth (opalescence), this (last step) body shade is left slightly shy of full contour; enamel (translucent) shade is brought to slightly over-contour, leaving slight excess for final smooth, contour, polish.
  21. If there are internal special stains and characterizations, they are added after placement and curing of the dentin or body shade, but prior to the final/outer layer of enamel comp.  
\*If there is no halo, translucency, dentin/enamel distinction, or special characterization: just build all to full contour with the basic body shade.  
\*If there is slight distinction between dentin and body, use both of same shade.

22. If replacing lots of incisal/facial tooth structure: build the incisal dentin/lobes and bring the body composite to fill the facial contour over the dentin and to full contour in the gingival 1/3 or 1/2.
23. Can use a composite roller to speed placement without voids or use flat insrt's/brushes  
Possibly place final increment as small comp ball spread onto surface to avoid voids.  
Finish contouring to margins and rounded into proximals.
24. Form developmental grooves, facial embrasures, incisal-facial contours
25. Cure each as completed and then re-cure all
26. Form, smooth incisal embrasures with disks
27. Form, smooth facial embrasures with disks
28. Adjust, refine occlusion and occlusal guidance: verify cuspid guidance and ant. crossover
29. Refine facial surfaces with flame-shaped comp finishing bur, points, cups, disks  
including developmental grooves and breaking up facial surface/reflection.
29. Surface characterizations poss with flame-shaped diamond in slow handpiece, light touch
30. Polish
31. Etch, wash, dry, surface-penetrating sealant (eg. Fortify)