

**American Dental Association
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WEBSITE SUMMARY OF PROGRAM □ □
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PROBLEM SOLVING GUIDELINES

**FOR FIXED AND REMOVABLE PROSTHODONTICS
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**PROBLEM SOLVING
FOR FIXED AND REMOVABLE PROSTHODONTICS**

“Knowledge in the sciences and technology doubles every 4.8 years.”

Hal Slavkin, DDS, PhD 1999
Dean, USC School of Dentistry

“It takes 5-10 years before one acquires enough information to feel comfortable treatment planning the more difficult patient problems.”

Does the profession understand:

Why some teeth become mobile, while others wear and/or fracture when adverse loads are applied to them?

How the first question relates directly to the type of restorative materials we select for these patients?

“The purpose of today’s program is to provide the clinician with guidelines that can be applied to restorative and prosthodontic problems.”

What is the etiology of:

Tooth wear and tooth fracture

Tooth Wear:

Erosion
Abrasion
Abfraction
Attrition

*“TMD is involved in
65-75% of Restorative and Prosthodontic complications and failures”*

*“Parafunctional habits (clenching and bruxing) are the primary causes of TM
Disorders”*

*Where do I obtain the necessary information about TM disorders and occlusion?
(Journals and books)*

Journal of Prosthetic Dentistry
CV □ MOSBY CO.

Management of TM Disorders & Occlusion, 4th ed.: Okeson- CV Mosby

Why read the Scientific Dental Literature?

Refereed journals usually provide a critical review of current topics: tooth-colored
restorative materials, new composites, resins, ceramics, luting agents
Articles include studies on wear, fracture and other properties

“Dentistry Today “and “Dental Products” magazines are not scientific journals. They are
publications designed to help the dentist understand how to use or manipulate the dental
materials. They are technique publications.

Just because a clinician presents an article on how to use brand X, does not mean that
Brand X has passed the scientific criteria for being a reliable and durable material.
Remember 2 out of 3 of these new tooth colored materials will not be on the market 3
years from today. Why?

Newer materials will have replaced them?

They will have failed the field testing in your offices?

Enough complaints will have been received by clinicians that the product will have been
withdrawn from the dental market and.....

Remarketed under a different name or

Discarded and never seen again.

Why read the Scientific Dental Literature?

2 out of 3 tooth-colored restorative materials are no longer being sold 3 years later.

(“CRA Report” Aug. 1997, by Gordon Christenson’s Clinical Research Associates, 119
dentist evaluators and over 1100 different composites, resins and ceramic materials)

Why read the Scientific Dental Literature?

Unless you read the scientific literature, you will probably accept what the advertisements say about a product or what the dental salesperson is selling this week.

“The patient expects you to read this information and not just the dental technique sales manuals.”

“Marketing Hype?”

“The trends in dentistry today are more the result of marketing hype than the result of a dental necessity.”

What should you read?

(The articles have been reviewed for accuracy and validity by a panel of experts in that particular field of study.)

Journal American Dental Association

Journal of Prosthetic Dentistry

Compendium (USC & U. Penn)

Journal of Operative Dentistry

Journal of Oral Rehabilitation

Literature Review

“Read not to contradict,
nor to take for granted,
but to weigh and consider.”

Problem Solving Skills:

“You are what you read”

(“You are what you eat”)

“If you expand your areas of interest you will begin to see that more factors are involved than you initially considered.”

Problem Solving Skills:

“If you expand your areas of interest you will begin to see that more factors are involved than you initially considered.”

This also allows you to consider several other treatment options

How can you improve your Problem Solving Skills?

The Dentist in the year 2000 must understand:

Pain and Pain Management

Masticatory Function

Parafunction and Occlusion

New Classification of Malocclusion

Force Management

Problem Solving Guidelines

Muscle Pain:

Pain does not originate from muscle tissues

Pain originates from the nerves and nerve endings that supply the muscles

(Show TMJ Anatomy Videos)

What should the dentist know about tooth contacts?

- Do they touch when chewing?

- How much bite force is applied?

- Is the bite force different during the day and during sleep?

- What protective mechanisms exist for the dentition?

Tooth Contacts & Bite Forces:

- Teeth touch during the chewing cycle during closing and opening

- 58 lbs. of force during chewing

- 68 lbs. of force during swallowing

- 85 lbs. of force between anteriors

- 160 lbs. of force between posteriors

- 975 pounds during sleep

What protective mechanism is present to protect the teeth?

- Sensory nerve fibers in the periodontal ligaments relay messages to the...

- Central Pattern Generator in the brain stem of any changes in tooth contacts which in turn acts to reduce the bite force and tooth contacts

The Adaptive Response, Restorative Implications:

- Changes in tooth contacts initiate an adaptive response with a new mandibular (centric) position, or,

- May result in pain and dysfunction.

- Lateral pterygoid is very important

- Adaptive responses occur during the day and night.

TMD and Occlusion: Muscle Incoordination Treatment

- Splint Therapy - stabilizing splint (Type A)

- Muscle relaxants (Flexeril)

- NSAIDs

- Behavioral therapy

Medication for TMD:

- Muscle relaxants - Flexeril 10 mg at bedtime (1/2 tab may be OK)

- NSAIDs - Ibuprophen 1800 mg/day:

- Aleve - 900-1125 mg/day

- Relafen - 500 mg tabs (1000 mg/day)

- Voltarin - 50 mg tabs (100 mg/day)

- Elavil - 10 mg at bedtime

Anatomical factors that affect occlusion:

- The mandible bends 1 mm or more as the mouth opens
- The wider the mouth opening, the greater the flexion (Burch)
- Rest Position (Freeway Space) will vary with muscle physiology
- Tooth contacts will vary depending upon muscle tonicity

A New Classification of Malocclusion for Restorative and Prosthodontic Problem Solving

Terry T. Tanaka, DDS

Richard Mc Laughlin, DDS, MS

Classification of Malocclusions

Tanaka/McLaughlin

- Vertical Disorders
- Horizontal Disorders
- Transverse Disorders

Classification of Malocclusions

Tanaka/McLaughlin

- Vertical** - Anterior, posterior or unilateral open-bite occlusions
- Horizontal** - Anterior slides, retrusive forces, cross bite or edge-to-edge occlusions
- Transverse** - Side-to-side discrepancies

Transverse Disorders:

- Congenital disorders
- Surgical complications at birth
- Trauma during growth stages
- Trauma after growth complete
- TMJ arthrosis
- Iatrogenic - (orthodontic, etc.)

Transverse Problems

- Transverse angle of occlusal plane
- Etiology
 - Developmental:
 - Trauma, fracture of maxilla
 - Iatrogenic: surgical, restorative
 - Orthodontic

What is the significance of the CR-CO slide?

Is the CR-CO slide causing the pain and dysfunction? Why don't all patients with slides have pain?

Is parafunction a factor?

Is muscle incoordination a factor?

Is the pain related to a previous painful experience or referred?

When is occlusal adjustment not indicated?

□ *“Do not attempt any occlusal adjustment procedure in the presence of pain and/or dysfunction of the muscles or joints.”*

Why should you “not” adjust the teeth while the patient is experiencing pain and dysfunction?

After the joint pain due to synovitis or disc displacement is resolved, the condyles will settle back into the previously stable, physiologic position

Centric Records

How exact must you be and which technique is the most accurate?

The Adaptive Centric Position

Centric Relation is a point within a range (0.3 mm)

Simon and Nicholls, JPD 1980

Compared Chin Point Guidance

Chin point guidance with mandibular support and bi-manual manipulation

“Variability of Passively Recorded Centric Relation; A comparison of chin-point guidance, chin-point guidance with mandibular support and bimanual manipulation.”
Simon, RL, Nicholls, JL; JPD, Vol.44, 1980

“The Centric Relation Position Will Change”

Centric Relation will change in time, due to remodeling of the TMJ structures:

Disc thinning

Condyle remodeling

Articular eminence remodeling

Does Centric Relation change? (YES)

Celenza, FV, The centric position: replacement and character. JPD 30:1973

Harvold, EP, Centric relation, Dent.Clin No.Amer, 19, 1975

What should the dentist do with the new CR-CO slide?

If the patient is asymptomatic, do nothing

If significant wear is seen, or if the patient is symptomatic, consider appropriate therapy

When is Occlusal Adjustment indicated?

As part of crown preparation and cementation procedures.

Removal of interfering maxillary buccal cusps on premolars and molars and,

Before performing occlusal adjustment procedures on patients: (video)

Equilibrate mounted study casts first to determine how much should be removed and where to remove it from in order to explain to the patient the need for crowns, etc., after the occlusal adjustment.

Occlusal Adjustment On Study Casts

If the anteriors cannot be coupled, treatment options should include:
Orthodontics, Surgery, or alternative restorative treatment

Canine Guidance:

How frequently does bilateral canine guidance occur in a normal population?

3%, 30%, 60%, 90%?

2.3% bilateral canine guidance

10.7% unilateral canine guidance

-Ogawa, Koyama, JPD, 1998

How often do non-working side contacts occur?

40% of a normal population

Ogawa and Koyama, JPD, 1998

60% of a normal population

Ingervall, JPD 1975

Stallard and Lytle

“The reason we have trouble understanding the coupling of teeth is that we diagnose relationships by movements not used in chewing.”

Harvey Stallard, Nov. 1970

Non-Working Side contacts should not be removed when:

The etiology of the contacts is a worn canine on the opposite side

The proper treatment is to build up the worn canine

*Remove the contacts if they still exist after the build-up

Non-working side contacts should not be removed when:

Pain and crepitis is noted on that side

If a decreased point space is noted on that side

- Koriath, 1998 Science and Practice of Occlusion

(Show “Anterior Guidance and Condylar Guidance Video)

Semi-adjustable Articulators

Settings:

Panadent

Denar Mark II

SAM

Whip-Mix

Hanau-Teledyne

Semi-adjustable Articulators Adjustments:

Intercondylar distance is pre-set at 110mm

All models have the same intercondylar distance

Eminentia Angle: 36°

Set at 30° for unworn teeth

Set at 20° for worn teeth

Semi-adjustable Articulators □ Adjustments:

Eminentia angle:

Set at 30° for restoring teeth with minimal tooth wear

Set at 20° for restoring severely worn teeth

Incisal Guidance and Protrusive Angle

10 Protrusive Angle studies:

Average 36°

How far does the condyle travel from a closed position to anterior edge-to-edge position?
(Anterior Guidance Video)

Protrusive /Condylar Angle Studies:

35.7°-Zamacoma et al, JPD, 1992

36.7°- Beard et al, JPD, 1986

32.4°-wax rec.-Ecker et al, JPD, 51; 1989

48.4°-Whip-Mix-Ecker et al, JPD, 51; 1989

37.4°-Panadent-Ecker et al, JPD, 51; 1989

33.0°-Prete et al, JPD, 48; 1982

37.7°-Aull, JPD 15, 1965

35.5°-Issacson, JPD 9, 1959

Guidance System During Protrusion

The influence of the incisal path on any tooth path was consistently greater than that of the condylar path.

-Ogawa, Koyama, Suetsugu, J.Oral Rehab, 1992

Semi-adjustable Articulators Adjustments

Progressive side-shift:

Set at 7°-10° for patients with minimal tooth wear

Set at 10° to 13° for patients with extensive canine and posterior tooth wear.

Immediate Side-shift: (does not exist)

Set at 0 side-shift for patients with minimal to no wear

Set at .5 mm for patients with moderate canine and posterior tooth wear

Set at 1.0 mm for patients with extensive canine and posterior tooth wear

Determinants of Mandibular Movements - Side-shift

Progressive SS = 7-10° (unworn teeth)

Progressive SS = 10-13° (worn teeth)

Immediate SS = 0.5 mm (unworn)

Immediate SS = 1.0 mm (worn)

(Hobo, Clayton)

Splint Therapy

for the

Restorative Dentist

Type A and B Splints

Type A - Stabilizing Splints

Minimal thickness; wear part or full-time

Type B - Stabilizing Splints

Made slightly thicker for decreased OVD; wear full time

Type C Splints

Type C - Repositioning Splint

For acute disc displacement; wear 3-4 weeks only, then adjust to ICP

“Anterior deprogrammer type splints are recommended only as long as the contacting surface of the splint is flat.”

“The small pea shaped, rounded, anterior splints have been known to fracture lower incisors when patients clench or brux during sleep.”

Splint Therapy

Concurrent Therapy:

- Splints should be used with NSAIDs, muscle relaxants, or analgesics, when pain is involved
- Pain memory
- Deep Pain input
- Orofacial Pain Disorders

(Show Splint Therapy Video)

TMD and Rehabilitation

Establish occlusal stability first

Use a splint to determine the proper OVD, CR position, and anterior guidance before final restorations are started

The splint is the same as complete rehabilitation in acrylic

TMD and Rehabilitation

If you equilibrate the natural teeth first at the same OVD, you can perform the rehabilitation in segments.

Start with the anterior teeth, then..
proceed to the posteriors.

Management of Occlusal Forces

What should the restorative dentist know about occlusal forces?

Time

Load

Direction

Occlusal Forces:

How much force is applied?

•Day forces:

58 pounds when chewing

68 pounds when swallowing

85 pounds bite force (anterior)

150 pounds bite force (posteriors)

•Night forces: 200-975 pounds

Are the forces constant (sustained) or intermittent?

•Okeson and others have determined in sleep lab studies that patients clench and/or brux in 4-8 second periods, stop, and then resume clenching.

•These clenching periods usually occur during REM sleep, but can also occur during NREM sleep.

•Significantly less load is applied to the teeth during the day due to the sensory nerve fibers in the PDL and the Peripheral System

•Parafunctional habits and loading during the day can be altered with biofeedback training

•Nocturnal habits are more difficult (biofeedback is not effective during sleep)

How effective are splints in reducing loading forces on the teeth and TM joints?

Splints are effective during the day

Initially, splints used at night are effective, however 10-15% may start to clench and brux again on the splint

Splints, therefore, serve two purposes:

Day use- splints act as a biofeedback device or as a reminder to not touch the teeth together

Night use - splints act to protect the teeth from wear

Splints serve two purposes:

***Make splints for all clenchers and bruxers after restorative treatment is completed to protect the restored crowns from wear and/or fracture.

Restorative procedures for the management of occlusal forces:

Splint teeth together: fixed and removable

Make vertical the occlusal (incisal), forces

Decrease the B-L surfaces of the posterior teeth

Improve the crown to root ratio

Occlusal Vertical Dimension

What is it?

Why is it important?

How is it determined?

How stable is it?

Can it be altered without harmful effects?

“Whether or not the OVD can be increased is no longer in question. The real questions are when and how much?”

Interocclusal Rest Space

is synonymous with Freeway Space: GPT-6

“The **difference** between the vertical dimension of rest and the vertical dimension while in occlusion”

Why is occlusal vertical dimension important?

For maintaining:

1. Proper face height and esthetics

Overclosed = Popeye appearance

Overopened = strained muscles

2. A stable occlusion

OVD Controversy No.1:

1. “*The neuromuscular system has an optimal vertical dimension*” ?

Skeletal muscles have a certain resting muscle length determined by neuro-anatomical characteristics of the active length of the muscles

Muscle pain and/or dysfunction does not mean that the OVD is decreased.

It usually means that the patient is engaging in parafunction, (clenching or bruxing). ”

Question #2: Can you restore the patient at the current OVD? (worn dentition)

1. Is there is enough interocclusal space at rest?

No: Do gingival crown lengthening (limited to anteriors and premolars)

If there is not enough interocclusal space at rest:

2. What are the restorative possibilities?

Reestablish the OVD using:

- Occlusal splint (2-3 months)

- Bonded occlusal restorations
- Provisional restorations

Literature Review

1. “Vertical dimension problems are more likely to be inherited than antero-posterior problems” (Study of twins)
Tr. European Ortho Soc pp 103-119; 1965

Alteration Of OVD

Univ. Washington study

When patients went from natural teeth to an edentulous condition, the OVD decreased 5.1 mm. and the rest position decreased 3.5 mm

OVD and effect on muscle length:

Clinical Evaluation Parameters

Four Esthetic concerns:

1. Phonetic concerns - SS sounds
(patients adapt easily to new lingual designs)
2. Functional concerns
3. Structural concerns
4. Visual concerns

Problem Solving:

A series of patients with the various Vertical, Horizontal and Transverse problems were presented and the participants were able to follow the clinical slides and apply the guidelines regarding the management of occlusal forces, centric relation to centric occlusion slides and problems related to occlusal vertical dimension.

“Restorative Tips”

FUJI-ROCK .04% expansion (brown)

DI-KEEN expansion (green)

Tooth Preparations:

“More time is wasted during tooth preparation appointments than any other restorative procedure.”

Bien Air (electric handpiece)

What Is The Etiology Of Tooth Wear?

Erosion - acidic foods, reflux

Abrasion

Abfraction

Attrition - Tooth contact wear:

-Enamel-enamel; enamel against gold, porcelain, composites, resin

Why Does Tooth Wear Occur?

Normal function

Parafunction (peripheral, central, extrapyramidal)

Failure of restorative materials

Medications (Compazine, Phenergan)

Terminology:

Overbite - Vertical overlap

Overjet - Horizontal overlap

Balancing side - Non working side

Working side - Working side

Show video:

“Worn Dentition”

For preview of this video or CD-ROM, logon to WWW.TerryTanakaDDS.Com

Treatment Planning the Worn Dentition:

The E Line

The highest smile line

The gingival excess line

The Rule of Thirds

Upper third

Middle third

Lower third

Age Related Tooth Display

Male, age 30

- 3.0 mm of max. incisor

- 1.3 mm of mand. incisor

Male, age 70

- 0.5 mm of max. incisor

- 3.0 mm of mand. incisor

Prosthodontic Guidelines

Esthetics: Function

Rule of Thirds

Anterior guide

Posterior guide

Curve of Spee

- Anterior-Posterior guide

“Fabricate a full arch splint for these patients as opposed to an anterior programmer. This will allow the patient to get used to the final prosthesis.”

“If implants are to be placed in the posterior, keep the anteriors as vertical stops until the implants are uncovered and then crown the anteriors with the posteriors.”

Whenever possible splint the remaining anterior teeth together

“Place a ledge on the lingual of the maxillary anteriors in order to apply more vertical closing forces.”

For more information regarding the above topics and other lectures, logon to:

WWW.TerryTanakaDDS.Com