How Not to Overwork Your Hands

Course Goal

- To introduce dental hygienists to instrumentation techniques that reduce pinch force and workload on the hands to prevent fatigue and injury.

Safety Issues

- Use ergonomically correct techniques
- Use techniques that do not increase risk of instrument sticks
- Above all cause no harm

Preface: What if?

RDH’s Demonstrating Risk Postures

PREDISPOSING FACTORS TO HAND INJURY

Benign Joint Hypermobility Syndrome (BJHS)

- Loose joints
- Rarely linked to medical conditions:
  - Ehlers-Danlos syndrome
  - Marfan Syndrome
  - Connective tissue


Treatment:

- Consult an orthopedic doctor

http://www.advancedbrace.com/orthocatalog/smith-nephew/finger/murphyrings.htm

Arthritis Comparison

Rheumatoid Arthritis
- Onset: Rapid
  - Anytime
- Painful, swollen joints
- Bilateral joints
- Morning stiffness > 1 hr.
- Whole body symptoms
  - Fatigue
  - Illness

Osteoarthritis
- Onset: Slow
  - Later in life
- Painful, little swelling
- Unilateral initially
- Morning stiffness < 1hr.
- Whole body symptoms
  - Not present

Hand Weakness

- More common in women vs. men
- More common in small hands

Treatment: Finger exercises and hand strengthening physical therapy


Long fingernails

- Long fingernails limit flexion of the finger joints, particularly the metacarpophalangeal joints. Lack of finger flexion will limit excursion of long flexors and extensors in clinicians. It is recommended that clinicians cut their fingernails to a length of 0.5 cm to achieve optimal functional outcomes.


COMMON HAND INJURIES
Carpal Tunnel Syndrome

- **Symptoms**
  - Nocturnal symptoms
  - Burning, tingling in palm, thumb, index, middle finger
  - Sense of swelling

Assessment of CTS

- Tinel’s Sign
- Phalen’s Test

J Hand Surg Am. 2014 Sep 18. pii: S0363-5023(14)01154-X
Arch Phys Med Rehabil. 2014 Aug 28

Carpal Tunnel

- **Treatment**
  - NSAIDS
  - Corticosteroids
  - Rest
  - Splinting
  - Exercises
  - Acupuncture
  - Chiropractic
  - Surgery

Harv Health Lett. 2014 Sep;39(11):4

Wrist Tendonitis

- Also Known As:
  - DeQuervain’s (“duh-kair-VAZ”) Tenosynovitis

- Sx: Pain in wrist area or with thumb movement

Skeletal Radiol. 2014 Jun;43(6):793-800
J Dent Hyg. 2002 Spring;76(2):126-32

Finkelstein’s test

Make a fist with your thumb inside. Bend wrist outward toward little finger. If you feel pain on the thumb side of your wrist, you may have De Quervain’s disease

Finkelstein test. Arrow indicates location of pain when test is positive. Adapted with permission from the American Society for Surgery of the Hand: Brochure: de Quervain’s Stenosing Tenosynovitis. Englewood, CO. 1993.

Cause of Wrist Tendinitis

- Over use of thumb and wrist
  - Pulling with thumb when scaling
  - Over use of wrist (“wrist motion”)

- Treatment:
  - splinting
  - cortisone injection
  - NSAIDS
  - surgery

Hum Factors. 2014 Feb;56(1):143-50
Ulnar Nerve Entrapment (Cubital Tunnel Syndrome)

Median Nerve Entrapment at Elbow (Pronator Syndrome)

- Symptoms:
  - No nocturnal symptoms
  - Pain in forearm
  - Numbness
    - Thumb
    - Index
    - Middle finger

Radial Nerve Entrapment

- Causes:
  - Pulling, pushing, gripping and pinching of fingers
- Symptoms:
  - Pain high on the forearm just below the elbow

Comparison

- Tennis Elbow
  - Pain starts where the tendon attaches to the lateral epicondyle.
- Radial Tunnel syndrome
  - Pain is centered about 2 inches further down the arm, over the spot where the radial nerve goes under the supinator muscle.

Surgical Glove Induced Injury

- Ambidextrous gloves
- Tight across palm
- Tight across wrist
- Improperly fitted

Why not just use ultrasonics on every patient?
Hand-Arm Vibration Syndrome

- High frequency vibration causes:
  - Numbness
  - Tingling
  - CTS

Tinnitus & Hearing Loss

- Research has shown frequent long term exposure to the noise from handpieces and ultrasonics to be linked to hearing loss.
- Must use ear protection

Pacemakers and ICDs

"Use of the ultrasonic scaler, ultrasonic cleaning system and battery-operated composite curing light may produce deleterious effects in patients who have pacemakers or ICDs"

Aerosols

Can’t see them so they must not be there!

"Blood-contaminated aerosols can be suspended in air, even in general dental settings"
"The most intensive aerosol and splatter emission occurs during the work of an ultrasonic scaler tip"
"Aerosols are not only from the patient you are treating they are from your dental water lines"

Research

**HuFriedy EMS Air-Flow Piezon**
- Removes hard and soft deposits
- Removes less cementum than other ultrasonics
- Light handpiece
- Self contained water supply

**Plan**
- Use a combination of ultrasonic and hand-instrumentation
- Take all necessary precautions for yourself:
  - Hearing loss
  - Aerosols
  - Hand vibration syndrome
- Patient concerns:
  - Pulmonary disorders
  - Pacemakers/ICDs
  - Tolerance

**Dental Hygienist’s Formula for Injury**
- Force
- Vibration
- Repetition
- Improper Position
- Lack of Rest


**Key to Working Smarter**
- Leverage and Precision
  - Instruments are designed to do the work for you if:
    - They are sharp
    - Held with a perfect grasp
    - Placed with precision
    - Fulcrum leveraged and controlled

**Magnification**
- Positioning is greatly improved by magnification loupes that are perfectly fitted
- Positioning is greatly **worsened** by magnification loupes that are **NOT** perfectly fitted
No matter how perfect the fit, and how expensive the loupes:

You can’t see through gingiva!

Trying to see what you can’t feel

- Causes
  - Poor tactile sense
  - Poor control of stroke
  - Poor posture habits

Subgingival scaling requires:

- Seeing
- Hearing
- Smelling
- Tasting
- Feeling

Most Common Positioning Errors

- Patient positioned too high!
- Craning neck instead of bending at the waist.
- Sitting too close to the patient limiting whole arm motion.

Grasp

- Fingers together as if in a mitten
- Soft C formed by index & thumb
- Fulcrum finger advanced beyond other fingers
- Side of middle finger against shank

Resting Between Strokes

- Soft “C” Grasp during exploratory stroke
- Tightened Grasp during working stroke
Grasp Errors

The whole hand must function as a unit.

Large Handles

- Large diameter -3/8 inch
- Lightweight
- Hollow handle
- Bumpy texture

Fulcrum

- Controls all aspects of the stroke
  - Activation
  - Lateral Pressure
  - Stopping the stroke on the tooth

- Types of Fulcrams:
  - Extraoral
  - Intraoral (1 finger)
  - Intraoral (2 fingers)
  - Facilitated

Extraoral or Opposite Arch

- Assist fulcrum with index of the nondominant hand

Fulcrum with least pinch force


Newton’s 3rd Law

- Forces always come in pairs
  - Equal and opposite action-reaction
- For every action force, there is an equal and opposite reaction force
  - Occur at the same time
Mx Posterior Fulcrum Leverage

- Place fulcrum in opposition to the instrument working end:
  - Working on the posterior facials
    - Fulcrum on the occlusolingual line angle between teeth
  - Working on the posterior linguals
    - Fulcrum on occlusofacial line angle between teeth

Direction of Forces

- Opposing forces
  - Dynamic Equilibrium = Great Control
  - Less effort

- Unopposed forces
  - Lack of equilibrium
  - Poor control = More effort

Opposition = leverage

- Quad II Palatal Right Handed
- Quad I Palatal Left Handed

Placing the fulcrum in line with instrument toe 1/3 (opposite side of tooth) provides peak efficiency in the opposition of forces, known as Dynamic Equilibrium, as stated in Newton’s Laws.

Fulcrum in Opposition

Facilitated Fulcrums

- Provide the following:
  - More apical placement of fulcrum
    - Increased leverage to lift off deposits
  - Increased parallelism
    - Increased access to
  - Middle finger on shank
    - Increased leverage
    - Decreased pinch force on clinician’s hands

Facilitated Fulcrum: Apical placement

- Incisal Edge Fulcrum = less leverage
- Apical fulcrum + Index Assistance = the most Leverage
Stay Out of the Line of Fire

DVD "A Focus on Fulcrums"

Facilitated Fulcrum
Non-Dominant Index finger in mucobuccal fold

NOT on occlusal surface

Quad I Facial
Right Handed

Quad II Facial
Left Handed

Quad III Facial
Right handed clinician

Quad IV Facial
Left handed clinician

Mandibular Facilitated Fulcrums

Quad II
Right handed clinician

Quad I
Left handed clinician

Quad III Facial
Right handed clinician

Quad IV Facial
Left handed clinician

Index of non dominant hand serves as platform for fulcrum

• Increased parallelism
• Access to deeper pockets
• Alignment for vertical strokes
• Apical fulcrum placement

Quad I Facial
Right Handed

Quad II Facial
Left Handed

Quad III Facial
Right handed clinician

Quad IV Facial
Left handed clinician

Buccal aspect

Lingual aspect
Phrases
These phrases mean insertion and activation have the same force - hand not relaxed between strokes:
- Wrist rock
- Rock & Roll
- Windshield wiper
- Pendulum
- Metronome

Two Types of Strokes
- Scaling
  - A short controlled bite 1-2 mm. long
  - Handle moves away from tooth on activation
- Planing/Shaving
  - A longer lighter shaving stroke >2mm long
  - Handle moves toward the tooth on activation

Do not make scaling stroke length as long as the height of deposit

Working Stroke
- **Use whole hand as a unit, arm as a continuum** Do not pull with thumb and index
- **Use** rotating motion (like turning a door knob) turning hand and wrist as a unit.

Lateral pressure - **during** opening of blade

Easier on the hands

Adaptation
- Lock on toe third before activating
- If you don’t feel toe third cutting edge engage:

Abort the Mission!!!

Calculus should be lifted and fractured off, not scraped off!
Angulation > with size of deposit

Most Common Errors
 Not relaxing grasp in an exploratory stroke first
 Not locking toe 1/3 under deposit before activating
 Pulling instead of leveraging and lifting off deposits
 Closing on face during activation
 Too much pressure
 Scaling stroke too long
 Not using sharp instruments

AND NOW A WORD FROM OUR SPONSOR

Breakthrough in Instrument Sharpening

The Sharpening Horse Kit

DH Methods of Education, Inc.

Current Research

Stationary Instrument, Moving Stone Against Blade Perpendicular to Cutting Edge

Moving Instrument Along Length of Blade Parallel to it produces perfect edge

Drs. Andrade Acevedo RA, Sampaio JEC, Shibli JA.
J Contemp Dent Pract 2007 November; (8)7:070-077
Scanning Electron Microscope Assessment of Several Resharpening Techniques on the Cutting Edges of Gracey Curettes.

The Sharpening Horse

Advantages:
EASY!!!
Stone is set at the proper angle
Fulcrum control while sharpening
Safe for chairside

Autoclavable
Fixture easily fits in a barrier bag for continuous daily use with sterilized stones
Inexpensive
Positioning the Instrument and Stone

- An important component of correct technique is the position of the instrument face.
- Position the face parallel to the table top for sharpening.

Sickle Scaler & Universals

- Face parallel to the table top
- Lower shank will be perpendicular to the table top

Area-Specific Curet

- Face parallel to desk top
- Because of the tilted face, the lower shank will NOT be perpendicular to the table top when the face is parallel to table top.

Lining Up to Sharpen

- The face of the blade must be parallel to the table top
- place test rod on the face of blade and line up for parallelism

Right Handed Clinician

- Bird’s eye view from the Beam
- Start on
- The Sharpening Horse Beam
- Slide the stone from back to front parallel to the table top
- Hold the stone in a vertical position parallel to the table top
- Maintain the original curve of the stone and slide from back to front
- Maintain the original curve of the stone and slide from back to front
- The original curve of the stone and slide from back to front
**Left Handed Clinician**

Bird's eye view from the

Start on Toe

Toe 1/3 Middle Heal

The Sharpening Horse Beam

Starting at the far right of stone place heel of the lateral surface of blade on stone.
Slide fulcrum finger along beam (from far right to far left) as you place heel of the lateral surface of the blade on the stone. You must pivot as you slide on your fulcrum to stay adapted to maintain the original shape and contours of the blade from heel > middle > toe third > toe.

**Sharpening Horse**

- Is the best technique because:
  - Research
  - Sharpening along the length of the blade produces a superior cutting edge
  - Ease and visibility for maintaining instrument shape
  - Safe to sharpen contaminated instruments
    - You are out of the line of fire – stroke is going away from you
  - Fully autoclavable
  - Inexpensive

**Sharpening Technique**

Face parallel to table

Heel of instrument blade adapted to the stone, press while gliding fulcrum.
Continue gliding on beam and pressing instrument blade against stone to sharpen toe bird.

**Closing Remarks**

- Use sharp instruments
- Use leverage, not exertion
- Keep your body healthy & pain free
- Work smarter, not harder

ADHA
http://members.adha.org/source/members/rsignup.cfm

**Thank you**

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