The Primary Respiratory Mechanism- A Dental Interface

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I. Introduction

A. The tools you need to understand the application of OCF to dentistry are:
   1. A basic understanding of:
      a) Osteopathy in the Cranial Field
      b) Myofunctional theory
      c) Common dental procedures
   2. A sense of touch

B. Topic include:
   1. Simple Mechanical problems
   2. Complex Mechanical problems
   3. Developmental and myofunctional problems

II. Simple Mechanical problems

A. Simple Mechanical problems generally involve few points of contact
   1. Single joint
   2. Pair of teeth
   3. Point on a simple dental device

B. Simple Malocclusion
   1. Simple Trauma
      a) Somatic dysfunction anywhere affects everything
      b) Any problem can potentially interfere with the balance of the mandible causing
         malocclusion; this can possibly lead to many other types of dental pathology
      c) Uncomplicated Dental procedures
   2. Uncomplicated Dental Procedures
      a) Fillings
         (1) High fillings
            (a) Easy to detect by palpation
         (2) Effects of materials
            (a) Compatibility
      b) Crowns
         (1) Different types, different materials
            (a) Many combinations
         (2) Compatibility of materials and too much height can cause palpable strains
      c) Bridges
         (1) Fill spaces
            (a) Avoid shifting of the teeth to fill in spaces
            (b) Worse when running in a lateral direction
III. Complex Mechanical problems

A. Description

1. Complex Mechanical problems
   a) Complex Malocclusion
      (1) Numerous points of contact or foci are involved
      (2) They can have forces over large areas (versus a focal area)
      (3) Causes
         (a) Myofunctional problem
         (b) Dental appliances
         (c) Gut tube/respiratory tree
         (d) CNS problems
         (e) Endocrine problems
         (f) Material incompatibility

B. Complex Malocclusion

1. Dental Appliances
   a) Principle
      (1) Any rigid material crossing the midline will cause problems—needs to be flexible
   b) Night guards
      (1) Good concept, poor execution
      (2) Rigid materials can be unphysiologic
      (3) Usually not flexible
across midline

c) Retainers
(1) Unnecessary if treatment is physiologic
(2) Retainers interfere with the PRM
(3) Maintain somatic dysfunction caused by orthodontics

d) Orthodontia
(1) Analogy- often like putting a tight band around the head
   (a) Produces strains adversely affecting primary respiratory mechanism
(2) Generally treats effects and not the cause
   (a) OK if oral volume is adequate and light forces are used
(3) Weakens the periodontal ligaments
   (a) Can only be used no more than 3 times in a patients lifetime- teeth may fall out

e) Veneers
(1) Concept OK
(2) Problematic if there is compromised oral volume

f) Palatal expander
(1) Non-physiologic approach
   (a) Does not expand the front of the palate (premaxillae)
   (b) Can “expand” the back
   (c) Cause greater disparity between the size of sides of the oral cavity (maxillae)
   (d) Can disarticulate bones
   (e) Causes trauma to the maxillae and articulating structures
      i) Alveolar processes and or palatine processes rigid and warped
      ii) Cause somatic dysfunction in the premaxillae
         (1) Key to differential growth in the palate
   (f) Can cause strains in the septum (vomer, ethmoid) translated to the sphenoid
   (g) Can cause crowding of base, especially if used with traditional orthodontics

g) Material compatibility
(1) Incompatibility depresses the magnitude of and force behind the primary respiratory mechanism
(2) Dental materials can be incompatible with other materials
(3) Different metals in the mouth, can cross-react
   (a) Stimulation or irritation of the tissues surrounding the metals
(4) Certain materials can be incompatible with particular patients due to their unique body chemistry
   (a) Can cause inflammation
(5) There is no true accepted method to determine compatibility
   (a) Most methods used are not totally reliable
   (b) “Osteopathically trained” dentists feel sense of touch is acceptable

h) Angle system of classification
(1) Used by dentists to classify major patterns of malocclusion
C. Gut tube
   1. GI pathology
      a) If the top of the gut tube does not function properly there can be problems with
         the function of the rest of it
      b) When there are problems with myofunction, it can affect:
         (1) Digestion
         (2) Peristalsis
            (a) Often from locked TM Joint
            i) Often accompanied by tachycardia
         (3) Reflux
            (a) Shorter pharyngeal space, and smaller airway
            i) Tongue falls back when sleeping
               (1) $O_2$ desaturates at night (sleep apnea)
               (a) $NO_2$ builds up- relaxes sphincters
         (4) Enuresis and encopresis
            (a) Relaxed sphincters for aforementioned reasons

D. Respiratory tree
   1. Insufficient facial development
      a) Palate is narrow and high
         (1) Airways narrow
         (2) Greater chance of ENT problems
            (a) Mouth breathing
            (b) Allergies
            (c) Chronic Sinus Problems
            (d) Asthma
            (e) Sleep apnea
            (f) OM
            (g) Recurrent Colds
            (h) Other upper respiratory /breathing problems

E. CNS problems
   1. Attention deficit hyperactivity disorder
   2. Tourette’s
   3. Altered sympathetic tone and/or parasympathetic tone

F. Cranial Nerve problems
1. Dental traumatic lesions
   a) Extractions cause petrosphenoid lesion
      (1) CNV- TG neuralgia
2. Facial nerve
   a) Learning problems
   b) Verbal ticks
3. Speech issues
   a) Compression of hypoglossal nerve, especially with difficult to decompress condyles
4. Restrictive and compressive devices- increased susceptibility to CN problems
5. CN pathology can cause dental pathology
   a) Affects chewing, swallowing/tongue V3, XII
      (1) Affect facial development setting up a cascade of problems
6. Narrow face-increased potential for crowding affecting cranial nerves
   a) Decreasing the amount of pathology needed to compromise them
7. Stimulating facial development will allow more room and “play” for CNs

G. Endocrine problems
1. Pituitary problems
   a) Development problems- poor growth
      (1) Rapid palatal expander affects pituitary by creating strains
         (a) Warps septum- expands the maxillae too fast
         (b) Strain through the body of the sphenoid via the vomer
   b) Dysmenorrhea
2. Infertility/difficulty becoming pregnancy
   a) Inability to conceive
      (1) Can be pituitary from maxillary crowding
   b) Mandible dysfunction (spontaneous abortion)
      (1) Pelvis to TMJ relationship
3. Estrogen receptors in TMJ
   a) OCAs can contribute to retrognathia

H. Behavior problems
1. Increased restlessness
2. Difficulty concentrating
3. Poor comprehension
4. Attention deficit hyperactivity disorder
5. Poor behavior
6. Obsessive compulsive disorder

I. Other problems
1. ENT
   a) Otitis media
   b) Extension face
   c) Chronic vertigo
   d) Tinnitus
   e) Meniere’s
2. Cardiac arrhythmias
   a) Via the scalenes affect on the vagus
3. Mandibular rotation/deviation
   a) Lateral tongue thrust that activates one side
   b) Shift in occlusion
4. Oropharyngeal dysfunction inhibits growth of basicranium
5. Myofunctional disorder- immature swallow

IV. Myofunction

A. Myofunction must be optimal for optimal primary respiration
   1. Key concept
      a) There needs to be enough space in the mouth for the tongue
   2. Catch-22
      a) For good facial growth, there has to be enough space for the tongue
      b) For there to be enough space for the tongue to work, facial growth has to proceed properly
      c) Elevating the tongue to the proper position helps develop face
         (1) The fulcrum of tongue when swallowing is directly below SBS
            (a) Believed to help “pump” the head and augment CSF and venous drainage and base development
         d) Proper myofunction augments general function
            (1) Restoring it can help many problems

B. Causes of poor myofunction
   1. Anything that interferes with proper contact of the tongue with the alveolar processes after 18-24 months:
      a) Nursing
      b) Bottles
      c) Pacifiers
      d) Thumb sucking
      e) Sippy cups
   2. Anything that prevents completely closing the mouth
      a) Mouth breathing
         (1) Allergies
         (2) Nasal congestion, nasal obstructions
         (3) Enlarged tonsils/adenoids
         (4) TMJ or dental problems
      b) Difficulty swallowing
         (1) Large tonsils/adenoids
         (2) Recurrent throat infections
   3. Improper function of muscles of tongue
      a) Condylar compression
         (1) CN XII
   4. Abnormally large tongue
      a) Short lingual frenum

C. Swallowing mechanics
1. Infant
   a) Facial structure designed for suckling
   b) In an infantile swallow:
      (1) Gum pads apart- mouth open
          (a) CN V3
      (2) Tongue forward between gum pads
          (a) CN XII
      (3) Significant use of facial muscles
          (a) CN VII

2. Maturing Swallow- 1+ year old
   a) Front incisors erupt and feedback through their periodontal ligaments of front incisors
   b) CN V2-3

3. Maturing Swallow- 2-4 years old
   a) First molars
      (1) Begin to erupt at ~18 months
      (2) Fully erupted ~ 24 months
      (3) Occlusion provides feedback to change the swallow
      (4) Muscles of facial expression
          (a) No longer responsible for infantile suckling and swallowing
          (b) Begin to use for facial expression and speech
      (5) Marks the beginning of a shift to a mature swallow

4. Mature swallow
   a) Tip of the tongue held just above upper central incisors against palate
   b) Teeth together
      (1) Mandible Stabilized via V3
   c) Minimal contraction of lips with minimal use of the facial muscles
   d) Stages of mature swallow
      (1) Bracing of the tip of the tongue above the 2 upper central incisors
      (2) Lateral aspects of the tongue bracing force against teeth
      (3) Tongue sweeps up and back
   e) Immature swallow characterized by anterior tongue movement instead of posterior
   f) Sufficient oral volume must be present for mature swallow

D. Ramifications for facial development
   1. Proper facial development occurs when
there is a balance between the muscles of swallowing and the muscles of mastication

a) Tongue (swallowing), "spreads" the palate in mature swallow (CN XII)
   (1) Widen face
b) Muscles of mastication pull up and in (CN V3)
   (1) Narrow the face
c) Normal Forces
   (1) 50 gm of force from the front of the tongue in a normal swallow
   (2) 20 gm in the opposite direction from the lips
   (3) ~125 gm of lateral force produced by tongue, and 50 gm from the cheek in the opposite direction
d) Pathological forces
   (1) Lip contraction
      (a) 100-300 gm
   (2) Tongue thrust
      (a) 300-500 gm
e) Normal force to move a tooth
   (1) 1.7 gm
f) Wolff’s law
   (1) Bone Remodeling
   (2) Swallow 1500/day
g) An inappropriate juvenile swallow produces large pathological forces
h) Facial development usually proceeds properly with a good mature swallow
E. A persistent immature swallow
1. Impedes facial development
   a) Lack of room for the tongue and teeth
      (1) Capturing a mature swallow without intervention not possible without adequate volume
2. Causes development of an extension face
3. Causes structural changes in the rest of the body

V. Diagnosis and treatment
A. Diagnosis
   1. Specifics deferred to breakout session
B. Treatment
   1. Many approaches
      a) Small percentage are functional
         (1) Small percentage of functional treatments are physiologically sound
   2. Osteopathic treatment
      a) Often in addition to other modalities
   3. Myofunctional therapy
      a) Teach proper use the tongue and lips when swallowing - all ages,
         (1) Optimal results occur with patients who are still growing
            (a) Bone metabolism turns over at a faster rate
   4. Pre-made functional appliances
      a) T4K
      b) Myomunchie
   5. Custom appliance
      a) ALF
C. History of functional dental appliances
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<td>Nordstrom</td>
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1. ALF
   a) Elgalloy
   b) Springy
   c) Designed to accommodate motion
   d) Now numerous designs from others- some good some not so good

D. Application of functional dental appliances
   1. The philosophy behind application is important
      a) Can be applied in a non-functional manner
         (1) Decreased results
         (2) Most common application
   2. Some are much more functional that others
      a) Most dental appliances interfere with proper function of the body
      b) A properly fitted functional appliance can enhance function significantly
         (1) Prevent many problems- some dental, and some systemic

VI. Philosophy of Osteopathic Dental Work

A. Work with the body
   1. Use the inherent forces whenever possible
   2. Don’t mess with Mother Nature!

B. Osteopathic Dentistry should:
   1. Respect
      a) Inherent motion
      b) Normal growth and development
      c) Spatial relationships in the face
      d) The whole body
   2. Use inherent forces
      a) Harness forces of swallowing to do work
b) Allows these forces to express themselves properly and dynamically

3. Enhance development as opposed to moving teeth

VII. Summary

A. We discussed simple and complex mechanical problems
   1. Simple and Complex Malocclusion
      a) Fillings
      b) Crowns
      c) Bridges
      d) Implants
      e) Dental Appliances
      f) Orthodontia
      g) Veneers
      h) Palatal expanders
      i) Dental materials
   2. CNS problems
      a) Attention deficit hyperactivity disorder
      b) Tourette’s
      c) Cranial Nerve problems
         (1) TG neuralgia
         (2) Bells Palsy
         (3) Tourette’s
         (4) Speech problems
   3. Gut tube
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      b) Peristalsis
      c) Reflux
      d) Enuresis/encopresis
   4. Respiratory tree
      a) ENT problems
         (1) Mouth breathing
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         (3) Chronic Sinus Problems
         (4) Asthma
         (5) Sleep apnea
         (6) OM
         (7) Recurrent Colds

B. Developmental and myofunctional problems
   1. Extension face and malocclusion
   2. Poor posture
   3. ENT pathology
   4. Sleep apnea
   5. Malocclusion causing a whole host of dental problems
   6. Endocrine problems
   7. Delayed development
8. Learning disabilities
   C. Improper treatment can cause these problem to worsen or cause frank pathology
   D. All these can inhibit optimal function of the primary respiratory mechanism
      1. With further study you can effectively treat them

_The important message to take home is to work with a cooperative dentist to pick the most healthy options possible for your patients._ Encourage your dentist to take a course in osteopathy in the cranial field so he or she understands your approach.