AIRWAY - BREATHING - HABITS
&
MYOFUNCTIONAL CONSIDERATIONS
in
ORTHODONTICS

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ORAL HABITS

Most prevalent habit in children (50%)

- TONGUE THRUSTING
- DIGIT SUCKING
- TONGUE SUCKING
- NAIL & LIP BITING
  - foreign objects
Infantile (Visceral) Swallow

- Tongue thrust
- Pursed lips
- Peri-oral sphincter action
- Mand. thrust

- Tongue:
  - away from palate
  - narrow, elongated
  - depressed central furrow

- Peri-oral sphincter action
- Separated gum pads
Mature (Somatic) Swallow

- Tongue:
  - humped up
  - approximates palate
  - shallow central furrow
  - peristaltic action
  - border between teeth

- Peri-oral sphincter action
- No mand. thrust
- Momentary inc. contact
SYNONYMS:
- NORMAL, MATURE, SOMATIC SWALLOW

FACTS:
- MAY APPEAR AS EARLY AS AGE 3
- CONSIDERED NORMAL BY AGE 4-5
- ACHIEVED BY 50% AT AGE 6

FREQUENCY & DURATION:
- ...

ADULT SWALLOW
ADULT SWALLOW

- FREQUENCY & DURATION

FREQUENCY: Estimates = 1200-2400x / day

Swallowing: 1x / min. x 1 sec. duration

x 60 min. x 24hr = 1400 sec. / day

DURATION ≈ 1400 sec. / day = 23-25 min.

Variable (Sleep = 4-8 x / hr)

Reality: 800-1000 sec. / day = 13-16 min.
TONGUE THRUSTING
(terminology)

- “RETAINED” INFANTILE SWALLOW
- MISNOMER: THRUSTING vs FORCE
- “HABIT” vs ABNORMALITY
- DELAYED LEARNING
### INCIDENCE OF TONGUE THRUSTING

<table>
<thead>
<tr>
<th>AGE</th>
<th>INCIDENCE</th>
<th>REFERENCE</th>
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</thead>
<tbody>
<tr>
<td>newborn</td>
<td>97.0%</td>
<td>LEWIS et AL (1965)</td>
</tr>
<tr>
<td>1</td>
<td>50-70%</td>
<td>DAVIDSON (1967)</td>
</tr>
<tr>
<td>4</td>
<td><em>most have stopped</em></td>
<td></td>
</tr>
<tr>
<td>4.9</td>
<td>58-86%</td>
<td>HANSON</td>
</tr>
<tr>
<td>5</td>
<td>82.0%</td>
<td>BELL et AL</td>
</tr>
<tr>
<td>6</td>
<td>52.3%</td>
<td>FLETCHER et AL (1961)</td>
</tr>
<tr>
<td></td>
<td>35-71%</td>
<td>HANSON</td>
</tr>
<tr>
<td></td>
<td>50%</td>
<td></td>
</tr>
<tr>
<td>8</td>
<td>38.0%</td>
<td>FLETCHER et AL (1961)</td>
</tr>
<tr>
<td>9</td>
<td>41.9%</td>
<td></td>
</tr>
<tr>
<td>10</td>
<td>34.0%</td>
<td></td>
</tr>
<tr>
<td>16</td>
<td>23.5%</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>24.5%</td>
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</tbody>
</table>

*10-15 % NEVER ACHIEVE ADULT SWALLOW*
Prevalence vs Age

Tongue-thrusters (White)
Female Thumbsuckers
Male Thumbsuckers

Black Children
White Children

Open Bite
> 2mm

% POPULATION

AGE

Fletcher et al. 1961
ROLE of the TONGUE in MALOCCLUSION

- **DURATION**
- **INTENSITY**
  - LIGHT vs HEAVY PRESSURE
  - OPEN BITES: 2 X normal tongue pressure
  - PROTRUDING INC.: less pressure against incisors
- **FREQUENCY**
  - T. THRUSTERS SWALLOW LESS OFTEN
- ✓ **RESTING POSTURE**
TONGUE THRUSTING vs MALOCCCLUSION
... SOME CONCLUSIONS

✧ T.T. & malocclusion relationship is *unclear* (WHITE, 1979)

✧ Chronic / persistent T.T.
  ● may prevent spontaneous self-correction of a malocclusion or exacerbate it. (AAO, 1991)

✧ *Direct* cause-and-effect relationship is *questionable* (AAO, 1991)

✧ T.T. = *Contributing factor* in the development of malocclusions

✓ *Multifactorial Etiology*
GLOSSECTOMY EXPERIMENT
CONCLUSIONS

HARVOLD et AL, 1968

✧ TONGUE FUNCTION & POSTURE
- greater influence on the mand. arch (stability)

✧ OCCL. & INTERDIGITATION of TEETH
- minor influence on arch form

✧ SHAPE OF THE TONGUE
- adapts to its surroundings
Resting Pressure: Tongue vs Lips

PDL metabolic activity

< 5 gm

10 gm

Tongue

5 gm

5 gm

Balanced Forces

≠

Equal Forces

JHL
JJ
Goals and Limitations of Orthodontic and Orthognatic treatments are determined by the soft tissues of the mouth and face and not by the teeth and bones
RESPIRATORY NEEDS

= Primary determinant of jaw & tongue posture
  (CAN ALTER JAW & TONGUE POSITION)

Newborns = Obligatory nasal breathers

HUMANS = Nasal breathers primarily

TOTAL NASAL OBSTRUCTION

= Very rare in humans

TERMINOLOGY: “ORONASAL” RESPIRATION
MOUTH BREATHING: Possible Etiologies

- ENLARGED T & A
- STRUCTURAL NASAL DEFECTS
- NASAL POLYPS
- CHRONIC ALLERGIES
- INFECTIONS
- ASTHMA
- FOREIGN BODIES
- UNREDUCED FRACTURES
- AGGRESSIVE SURGICAL TX
  (cleft palate)

Anything causing obstruction may lead to mouth breathing
Effects of M. Breathing Caused by Nasal Obstruction
(Rhesus monkey experiment - Harvold et al., 1973)

CONCLUSIONS

✦ CHANGED MODE OF BREATHING
   GRADUAL: NASAL → ORAL

✦ DIFFERENT ADAPTATIONS (individual variation)

✦ VARIOUS MALOCCLUSIONS DEVELOPED:
   CL II-III, OPB, ANT. XB, SPACING, 2-BITES
   = ADAPTATIONS / COMPENSATIONS

✦ PARTIALLY REVERSIBLE
ROLE of TONSILS & ADENOIDs

- IMMUNOLOGY: autovaccination
  - lymphocytes, antibodies

- “GATE - KEEPERS”:
  - strategic locations

- EARLY PROTECTION:
  - 1st few weeks of life
  - Tonsils vs Adenoids
CHILDREN WITH ENLARGED ADENOIDS & OBSTRUCTION

(Linder-Aronson et al., 1970)

- REDUCED NASAL AIRFLOW
- STEEPER MAND. PLANE ANGLE
- MORE RETROGNATHIC MANDIBLES
- LONGER ANT. FACIAL HEIGHT
- MAX. CONSTRICTION TENDENCY

PROFFIT, 1986:

- MAX. CONSTRICTION TENDENCY
- MORE UPRIGHT INCISORS
Tonsillectomy & Adenoidectomy

- T&A used to be removed routinely

- 1980’s: Still very common

- Trend:
  - 2 x Adenoidectomy only
  - Tonsillectomy: slight increase
  - 2 separate procedures

- Relapse:
  - Adenoids: common before age 3
  - Tonsils: less frequent
INDICATIONS FOR T&A REMOVAL

✈ INFECTIONS
- ACUTE & REPETITIVE (T & A)
- CHRONIC (T & A)
- RECURRENT (middle ear)

✈ HYPERTROPHY LEADING TO OBSTRUCTION

✈ FUNCTIONAL DISTURBANCES
- SWALLOW
- SPEECH
- SLEEP - RESPIRATION
T & A ...FACTS

- GROWTH PEAK (adenoids): 10-11 ➔ 14-15 yo
- PUBERTY: involution of lymphoid tissues
- REGRESSION: Doesn’t always occur
- NASOPHARYNX SIZE:
  Increase: 150% (1➔17y)
- ADENOID RATE > NASOPHARYNX
  Obstruction may disappear
Non-Nutrivite Sucking Habits (N-NSH)
THUMB SUCKING & DIGIT HABITS

- **INTENSITY** (force)
- **FREQUENCY**
- ✔️ **DURATION** (treshold)
- ✗ **CHRONOLOGY** (age)
  - Deciduous vs Permanent Dent.
## Non-Nutritive Sucking Habits (N-NSH) Prevalence

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Prevalence</th>
<th>Notes</th>
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<tbody>
<tr>
<td>Infants</td>
<td>± 100% (natural)</td>
<td></td>
</tr>
<tr>
<td>0-1 y</td>
<td>50-70%</td>
<td></td>
</tr>
<tr>
<td>3-4.5 y</td>
<td>45%</td>
<td></td>
</tr>
<tr>
<td>4-5 y</td>
<td>SHOULD STOP NATURALLY IF PERSISTS = CHRONIC N-NSH</td>
<td></td>
</tr>
<tr>
<td>6 y</td>
<td>13.6%</td>
<td>(females &gt; males)</td>
</tr>
<tr>
<td>11 y</td>
<td>5.9%</td>
<td></td>
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Digit Habits (NNSH): Possible Sequellae

- PRIMARY DENTITION
  - Affects mainly the anterior area
  - Temporary & Reversible
Digit Habits (NNSH): Possible Sequellae

- **PROLONGED HABITS**
  - Maxillary arch contraction
  - U. INC.: Spacing, Flaring
  - L. INC.: Lingual tipping
  - Ant. Open Bite & Secondary T.T.
BOTTLE FEEDING vs MALOCCLUSION
(Meyers et Al, 1988)

- 700 CHILDREN, age 10-12 y
- METHOD & DURATION OF FEEDING
- TYPE OF NIPPLE USED
- PACIFIER USE
- SUCKING HABITS (thumb / finger)
- HIST. OF ORTHO TX (child & parents)
Findings:

- Need for Treatment associated with:
  - Bottle feeding (trend)
  - Exposure to bottle = incr. need for Tx (trend)
  - Parental Hx of ortho Tx (genetics): significant
- No assoc. between method of feeding & N-NSH
- NUK vs other brands: no proof of a protective effect

Bottle-F. may contribute to malocclusion by:

- ALTERING sucking mcx → growing facial bones
- CREATING an ABNORMAL SWALLOWING PATTERN
- INCREASING the PREVALENCE of N-NSH

Meyers et al, 1988
FEEDING METHODS vs ORAL DEVELOPMENT (breast vs bottle-feeding)

- NO DIRECT RELATIONSHIP DOCUMENTED
- NO SIGNIF. INFLUENCE ON THE INCIDENCE OF T. THRUSTING

BREAST-FEEDING ADVANTAGES:
- GREATER O. MUSCULATURE EXERCISE
  - REQUIRES 60 X MORE ENERGY
  - DIGASTRIC = 2 X STRONGER
  - CONSTANT PULLING = MAND. GROWTH

Westover et al, 1988