The Infant Spoon: A Real Power Tool in Pediatric Feeding

Peggy Eicher, MD
The Center for Pediatric Feeding & Swallowing
Food Selectivity

Difficulty advancing texture

Prolonged mealtimes

Difficulty initiating spoon feeding

When is a feeding issue a feeding problem?

- Persistence of problem
- Growth/Nutritional Outcomes
  - Caloric intake
  - Vitamins and other important nutrients
  - Dietary imbalance
- Associated Problems
  - Sleep
  - Irritability
  - Speech
  - Cognitive
- Educational/Social Compromise
Prevalence of Feeding Problems

- **30%-80%** children with developmental disability

- **25%-45%** children without developmental disability


- **3-10%** of children experience severe feeding problems

Why so many children at risk?

- A child learns how to eat
- Eating is a sequential progression
- Like any motor skill, practice is required to acquire the skill
- Anything that limits or prevents practice can interfere with oral motor skill acquisition
Overview of Workshop

I. Review normal oral motor ontogeny

II. Overview of risk factors
   - Medical
   - Motor
   - Learned Patterns

III. How spoon functions as
   - Identifier
   - Stimulator
   - Facilitator
   - Pathfinder

Swallowing Process

a  
b  
c  
d  
e  
f
GROSS MOTOR DEVELOPMENT

Rate of Acquisition = Maturation of Nervous System \times Positive Practice

Birth 3 mos 6 mos 9 mos 12 mos
ORAL MOTOR DEVELOPMENT

Suck Reflex

Phasic Bite

SUCK / SWALLOW
SUCKLE
SUCKING
MUNCH
CHEW

34 weeks
TERM
5-6 months
6-9 months
8-36 months

Conceptual Model

<table>
<thead>
<tr>
<th>STRUCTURE</th>
<th>MOTOR PATTERN</th>
<th>FACTORS</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1.png" alt="Image" /></td>
<td><img src="image2.png" alt="Image" /></td>
<td><img src="image3.png" alt="Image" /></td>
</tr>
</tbody>
</table>

TIME
## Oral Motor Development

<table>
<thead>
<tr>
<th>Suckle</th>
<th>Birth – 4 months</th>
<th>Anterior/posterior</th>
<th>Nipple feeding</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sucking</td>
<td>4-7 months</td>
<td>Up/down</td>
<td>spoon</td>
</tr>
<tr>
<td>Munching</td>
<td>7-12 months</td>
<td>Side to side</td>
<td>cheerios</td>
</tr>
<tr>
<td>Chewing</td>
<td>12-18 months</td>
<td>Diagonal</td>
<td>finger foods</td>
</tr>
</tbody>
</table>

**Suckling**

- Drinks 2 oz to 6 oz of liquid per feeding, 4 times per day

**Sucking**
Spoon Feeding Mastery

- Adequate mouth opening
- Pressure accepted onto tongue
- Lips stripping the spoon
- Jaw stability and tongue mobility to facilitate bolus formation and transfer

Who’s ready for spoon feeding?
Munching

Chewing

Conceptual Model

<table>
<thead>
<tr>
<th>STRUCTURE</th>
<th>MOTOR PATTERN</th>
<th>FACTORS</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1.png" alt="Image" /></td>
<td><img src="image2.png" alt="Image" /></td>
<td><img src="image3.png" alt="Image" /></td>
</tr>
</tbody>
</table>

TIME

St. Joseph's Health
ST. JOSEPH'S CHILDREN'S HOSPITAL
RISK FACTORS
interfere with Skill Acquisition

MEDICAL
• NEUROLOGICAL
• RESPIRATORY
• GASTROINTESTINAL

MOTOR
• ORAL MOTOR
• GROSS MOTOR

LEARNED PATTERNS

FAMILY

NEURO CONTROL

“swallowing center”
in brainstem

input from pharynx
heart
lungs
GI
cortex
Neurogenic modifiers to the swallowing complex

- Fortification of UES barrier
  - Esophago-UES contractile response to GER
  - Pharyngo-UES contractile reflex
  - Laryngo-UES contractile reflex

- Closure of the glottis
  - Pharyngoglottal adduction reflex
  - Esophagoglottal closure reflex

» Shaker & Hogan, AJM, 2000
Medical Influences: Respiratory

- Increased respiratory rate decreases time for swallowing

- Anything that affects breathing has potential to affect eating—congestion, asthma, tonsil, adenoids

- Body position critical

Head and Neck Alignment

Vallecular space eliminated

Vallecular space enlarged
**Medical Factors: GI**

- Irritation sensitive - reflux, gut flora toxins, allergens, food intolerance
- Pressure/flow sensitive - constipation delayed gastric empty

**GI issues highly prevalent**

- 50% of all babies have GER
- Up to 80% of children with DD have GER
- Constipation in 29% of all children and 80% of children with DD

Jadcherla & Shaker, 2001
GERD Mechanisms for Dysfunction

• Irritation
  • Acid stimulates chemoreceptors and causes cellular irritation
  • Cellular irritation weakens strength and speed of contractile propagation
  • **Food intolerance?**

• Reflexive
  • Volume stimulates mechanoreceptors
  • **Texture selectivity?**

• Neurogenic
  • Vagally mediated bronchospasm
  • Vagally mediated posturing?
  • **Food refusal?**

The Influence of Pediatric Gastroesophageal Reflux on Swallow Apnea Duration and Respiration Patterns
Swallow Apnea Duration
0.986s

GER influence on respiratory pattern

• Inspiration-Swallow-Inspiration Pattern
  Least preferred most associate w/ aspiration

• Expiration-Swallow-Expiration Pattern
  Most Preferred
**GER Influence on Tongue**

- Backward tension on tongue to retract
- Increased gag
- Influence on oral motor pattern
- Influence on practice

**GI Tract**

**Constipation**

- Infrequent, hard or effortful stools
- Increase pressure within GI tract

**Impact of Constipation on Growth**

Chao et al. Pediatric Research 64: 308-311, 2008

**Influence on gastric emptying**

What is Constipation

- Traditional definition= less than 1 stool every 3 days
- Functional definition= hard, infrequent or effortful stooling
- For feeding= 1-2 large, mushy, effortless stools each day
- Can't get more in ‘til you get more out!

Medical Influences:
GI/RESP INTERACTION

- Inverse pressure relationship
- Relationship of GI and respiratory infection
- Relationship of GI and congestion
Optimal Postural Alignment

- Head and neck alignment: ear falls directly above humeral head
- Neutral alignment of spine with natural S-shaped curve
- Neutral pelvis
- Hip, knee and ankles at 90 degrees

Neutral Pelvis
Posterior Pelvic Tilt
Forward Head Posture (FHP)

- Effects:
  - Tongue muscle is shortened and stays in a lower, posterior position
  - Reduced tongue range limits oral motor pattern to a suckle transport pattern
  - Limited mobility of hyoid bone-risk of aspiration
  - FHP pulls hyoid superior and posterior
  - Pharyngeal airway space is reduced
Head and Neck Alignment

Vallecular space eliminated

Vallecular space enlarged

Oral Motor
Important roles of the spoon

• Indicator – difficulty introducing spoon signals a potential problem
• Stimulator - advancing oral motor pattern
• Facilitator - introducing variety
• Pathfinder - spoon skills translate into open cup skills

Conceptual Model

<table>
<thead>
<tr>
<th>STRUCTURE</th>
<th>MOTOR PATTERN</th>
<th>FACTORS</th>
</tr>
</thead>
<tbody>
<tr>
<td>![Structure Icons]</td>
<td>![Motor Pattern Icons]</td>
<td>![Factors Icon]</td>
</tr>
</tbody>
</table>

TIME

[St. Joseph's Health Logo]
Spoon as INDICATOR
Difficulty Introducing spoon—won’t open, can’t get on tongue

• Look for factors contributing

• RESPIRATORY
  • Nasal obstruction
  • Increased work of breathing

• GI
  • GER
  • Formula intolerance
  • Volume limitation
  • Constipation
SPOON as STIMULATOR
Spoon Refusal

| STRUCTURE |  
| MOTOR PATTERN |  
| FACTORS |  

TIME

Bottle sole nutrition
Consequences of spoon refusal

SPOON as STIMULATOR

Difficulty introducing spoon

<table>
<thead>
<tr>
<th>STRUCTURE</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>MOTOR PATTERN</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>FACTORS</td>
<td>--</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

TIME
Inadequate tongue stimulation with spoon feedings of puree

Difficulty advancing texture
Risk inherent to baby led weaning

Difficulty cup drinking
SPOON as FACILITATOR
Difficulty introducing spoon

<table>
<thead>
<tr>
<th>STRUCTURE</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>MOTOR PATTERN</td>
<td></td>
</tr>
<tr>
<td>FACTORS</td>
<td></td>
</tr>
</tbody>
</table>

Eating avoiding tongue-selective
Spoon Histories?

SPOON as THERAPIST

<table>
<thead>
<tr>
<th>STRUCTURE</th>
<th>MOTOR PATTERN</th>
<th>FACTORS</th>
<th>TIME</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
# Conceptual Model
For YOU as ANTICIPATOR

<table>
<thead>
<tr>
<th>STRUCTURE</th>
<th>MOTOR PATTERN</th>
<th>FACTORS</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image1" alt="Structure" /></td>
<td><img src="image2" alt="Motor Pattern" /></td>
<td>__________</td>
</tr>
</tbody>
</table>

TIME

---

[Image of children participating in activities]
RISK FACTORS
interfere with Skill Acquisition

MEDICAL
• NEUROLOGICAL
• RESPIRATORY
• GASTROINTESTINAL

MOTOR
• ORAL MOTOR
• GROSS MOTOR

LEARNED PATTERNS

FAMILY

Common Feeding Problems
• Food refusal
• Bottle dependence
• Failure to advance texture
• Food selectivity
The Center for Pediatric Feeding & Swallowing

Collaborative Full Time Interdisciplinary Team:

Physician
Nurse Practitioner
Speech Pathologist
Applied Behavioral Analyst
Physical Therapist
Occupational Therapist
Family Counselor
Feeding Specialists
Financial Administrator
Child Care Aides

www.feedingcenter.org