Oral Motor Skills in Children with Food Refusal Behaviors

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Introduction
- Feeding/eating is a basic need for survival
- Feeding skills develop from infancy into childhood.
- Feeding problems estimated as high as 25% general population, 33-80% in children with DD (Palmer et al 1975, Babbit et al, 1994).

Two Perspectives
- Oral motor/dysphagia perspective
- Psychology/Behavior perspective

Oral Motor Development
- Nipple feeding
- Spoon feeding
- Cup drinking
- Biting and chewing
- Critical period

Correlations & Complications
- Premature birth
- Cerebral Palsy
- Down Syndrome
- GERD
- Prolonged tube feeding
- Failure to Thrive

Psychological Theories of Feeding Difficulties
- Attachment theory
- Learning theory
- Developmental Model
  - Convergence of oral motor and psychology perspectives
  - Experience and learning factors in feeding skill development
  - Disruption in sequence and experiences due to medical and developmental factors

Applied Behavior Analysis of Food Refusal
- Food refusal behaviors = What child does to avoid food/drink
- Specific behavior does not tell what the function of the behavior
- Need to identify factors involved in the function of the behavior
  - Escape and avoidance (but why?)
  - Attention
  - Tangible, receiving preferred food.
  - Response effort-Oral motor factors
PURPOSE of CURRENT INVESTIGATION

1. Examine the relationship between oral motor skill deficits and the food refusal type in children referred to the Pediatric Feeding Disorders Service at UIHC.
2. Examine the relationship between medical history factors and oral motor skill deficits and food refusal

Pilot Study

- Retrospective study of patients evaluated in the Pediatric Feeding Disorders Service
- Children age 1 to 5 years
- Documented referral problem
- Documentation of oral motor skill status
- 186 of 245 records reviewed met criteria
- 56% of the subjects had OMD

Pilot Study Limitations

- Retrospective study
- Lack of specific oral motor deficit information
- Lack of indication of specific type of food refusal
- Need for further investigation to answer specific questions

Hypotheses

1. Children with specific oral motor deficits will exhibit particular food texture refusal types:
   A. Solid refusal--jaw control and movement.
   B. Pureed refusal--deficits in lip and tongue movement.
   C. Liquid refusal--deficits in lip, swallowing and sequencing of movements.

2. Children with oral motor deficits will have a greater number of medical factors than those children who do not have oral motor deficits.

Methods

- Prospective study
- IRB approval
- Subjects
  - Referred to Feeding Disorders Service at UIHC
  - Aged 11 months to 5 years
  - 11 months
  - Informed parental consent
Methods

- Health History (12 factors)
  - Structured interview & medical record review
- Current Feeding Concern
  - Pediatric Assessment Scale of Severe Feeding Problems (PASSFP)
- Oral Motor Assessment
  - Schedule of Oral Motor Assessment (SOMA)
- Meal Observation
  - Bite-by-bite scoring of acceptance/refusal

Classification of Feeding Disorder based primarily on PASSFP, Part B, item 10
- Modified definitions of Field et al. (2003)
  - Total food refusal
  - Type selectivity
  - Texture selectivity
    - Solid, Pureed, Liquid

Analysis

- Health factors and feeding disorder classification
- PASSFP and feeding disorder classification
- Oral motor and feeding disorder classification (FDC)

Results

- 44 subjects (28 males, 16 females)
- Males significantly older than females
- Majority referred by Pediatrics or Pediatric Specialties
- GI symptoms in 87%
- FTT in 60%
- History of tube feeding in 52%
- Syndrome or ASD 20%

3 Major Feeding Disorders

<table>
<thead>
<tr>
<th>Feeding Disorder</th>
<th>Number</th>
<th>Percentage of Total Subjects</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total food refusal</td>
<td>3</td>
<td>6.8</td>
</tr>
<tr>
<td>Type selectivity</td>
<td>24</td>
<td>54.5</td>
</tr>
<tr>
<td>Texture selectivity</td>
<td>17</td>
<td>38.7</td>
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</table>

Texture Selectivity

<table>
<thead>
<tr>
<th>Texture Selectivity Subclassifications</th>
<th>Number</th>
<th>Percentage of Texture Selectivity Group (n=17)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Refusal of liquids only</td>
<td>2</td>
<td>11.76</td>
</tr>
<tr>
<td>Refusal of Liquids + Pureed</td>
<td>1</td>
<td>5.88</td>
</tr>
<tr>
<td>Refusal of Pureed only</td>
<td>1</td>
<td>5.88</td>
</tr>
<tr>
<td>Refusal of Pureed + Solid</td>
<td>7</td>
<td>41.19</td>
</tr>
<tr>
<td>Refusal of Solid only</td>
<td>6</td>
<td>35.29</td>
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</tbody>
</table>
Oral Motor Dysfunction

<table>
<thead>
<tr>
<th>Specific OMD</th>
<th>Number</th>
</tr>
</thead>
<tbody>
<tr>
<td>Pulled only</td>
<td>3</td>
</tr>
<tr>
<td>Semisolid only</td>
<td>1</td>
</tr>
<tr>
<td>Solid only</td>
<td>1</td>
</tr>
<tr>
<td>Cracker only</td>
<td>2</td>
</tr>
<tr>
<td>Pulled &amp; Semisolid</td>
<td>1</td>
</tr>
<tr>
<td>Pulled &amp; Solid</td>
<td>1</td>
</tr>
<tr>
<td>Pulled &amp; Cracker</td>
<td>2</td>
</tr>
<tr>
<td>Pulled &amp; Trainer Cup</td>
<td>1</td>
</tr>
<tr>
<td>No OMD</td>
<td>32</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>44</strong></td>
</tr>
</tbody>
</table>

Health History Factors and Disorder

- Syndrome and ASD associated with texture selectivity (p=0.012)
- Trend for Cardiac disease to be associated with texture selectivity (p=0.051)

OMD and Feeding Disorder

- OMD found in both Type Selectivity (3/24) and Texture Selectivity (7/17)
- No significant associations between OMD on OMC's and 3 Major Feeding Disorder Classifications.
- OMD on cracker OMC associated with solid refusal

OMC scores and Feeding Disorder

- Higher cracker OMC score associated with texture selectivity.
- Higher cracker OMC score specifically associated with solid refusal

Functional Units/Areas and FDC

- Texture selectivity was associated with higher score on Swallow functional area
- Trend for texture selectivity associated with higher score on Jaw functional unit

OMD and Number of Health Factors

<table>
<thead>
<tr>
<th>Oral Motor Status</th>
<th>Number</th>
<th>Mean Number of Health Factors SD</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal</td>
<td>32</td>
<td>4.55 (SD 2.55)</td>
</tr>
<tr>
<td>Dysfunction</td>
<td>12</td>
<td>7.54 (SD 2.16)</td>
</tr>
</tbody>
</table>

- Subjects with OMD had significantly greater number of health factors reported than those without OMD (p<0.001)
Discussion

Hypothesis 1-A. Children who refuse solids will have deficits in jaw control and movement.
- Subjects with solid refusal only had a trend for jaw difficulty
- Other subjects also had difficulty with jaw control and movement
- Subjects with solid refusal also had difficulties in other areas and units on the SOMA
- Subjects with solid refusal had higher scores on Swallow than other classifications

Hypothesis 1-B. Children who refuse pureed foods will have deficits in lip and tongue movement.
- Subjects with pureed refusal had lip and tongue difficulty but so did subjects with other feeding disorders
- Subjects with pureed refusal also had difficulties in other areas and units on the SOMA

Hypothesis 1-C. Children who refuse liquids will have deficits in lip, swallowing and sequencing of movements.
- Subjects with liquid refusal had lip, swallowing and sequencing difficulty but so did subjects with other feeding disorders
- Subjects with liquid refusal also had difficulties in other areas and units on the SOMA

Other Oral Motor Findings

Texture selectivity had higher score on the Cracker OMC which may indicate more subtle difficulties than the criterion for OMD
Higher Swallow scores for texture selectivity may relate to multiple oral motor difficulties
Some children with type selectivity also had oral motor difficulties.

Implications of Oral Motor Findings

Oral motor difficulties may have different influence on response effort for each individual
All children with feeding disorders need oral motor assessments
- Feeding disorder is not specific to OMD
Oral motor difficulties need to be considered in treatment
- Direct therapy
- Food placement/amounts
- Utensils/compensations

Discussion

Hypothesis 2. Children with oral motor deficits will have a greater number of medical factors
- Children with oral motor deficits had significantly greater number of health factors than children with normal oral motor function
- Extends research in premature infants
- Infants & children with complex medical issues should be monitored for difficulties
  → referral for evaluation/treatment
Limitations

- Small numbers in some subclasses
  - Disorder not known until evaluation
- Refusal of some OMC limited assessments
  - Studies have used nonfood oral praxis test but unproven relationship between assessments with and those without food

Future Research

- Identification of patterns of OMD for texture selectivity
- Behavior analysis of texture selectivity without OMD to identify other factors
- Behavior analysis in children with type selectivity and OMD to identify the other possible factors (attention, taste, texture, escape)
- Oral motor assessment during texture fading to determine if oral motor learning is occurring
- Connection between oral motor assessments with and without food

Conclusion

- Feeding disorders are concerning for multiple reasons
- Complex relationship of environment, social, and biological factors
- Oral motor difficulties are a factor that may be more subtle than overt dysfunction
- OMD influence on response effort is likely different for each child
- Children with complex medical histories need to be monitored to minimize and/or prevent feeding difficulties