Saliva Control
Challenging our SLT practice
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August 2016

Sialorrhea/drooling: major impact for children and families
- Wet skin and clothing
- Need for changes /protection
- Skin damage/infection
- Damage to communication eqpt computers
- Oral health issues
- Extra caregiving needs
- Self image and social acceptance
- Potential activity and participation restriction

High Prevalence in children with complex needs
40% of children with CP in Victoria
- Significantly higher prevalence with poorer motor function
- Significantly associated with both intellectual disability and epilepsy
Reid et al 2012

Survey 160 children in UK special school population
- 58% drooling problem
- 38% at severe level
Tahmassebi & Curzon 2003

Evidence for saliva control interventions
Walshe et al 2012
Cochrane review
Interventions for drooling in children with cerebral palsy (review)
RCTs and controlled clinical trials of surgical, physical, oro-motor, oro-sensory therapies, behavioural interventions, intra-oral appliances and acupuncture.
Six studies eligible: 4 BoNT-A, 2 pharmacological interventions.
"There is no clear consensus on which interventions are safe and effective in managing drooling in children with CP. This makes it hard to decide which intervention is safest and most effective."

Evidence base for SLT treatment of drooling
- "Generalised paucity of evidence for intervention by SLT for drooling. Some studies show limited improvements, but the evidence is very limited" Montgomery 2016
- 'Oral motor treatment' is preferred first treatment option for children as its non-invasive.
- Creates a dilemma for the SLT given lack of evidence for oral motor treatment for dysphagia (see Arvedson et al 2010)

Out of the mouth of the researchers!

Saliva control in Cerebral Palsy:
multidisciplinary management and research findings from the Australian and Dutch drooling team

AACPDM 67th Annual meeting
Milwaukee, October 16-19, 2013
Linda Barton, M哲学
Louise Daley, MPhil
Sue Bass, PhD
Jan van der Berg, PhD
Karen Clark, MS

Why treat drooling impairment- Goals
- Reduction of social affects
- Reduction of health impacts
- Overall improved quality of life for patients
- Reduction in burden of care for caregivers

Scolamo Dias BL et al 2016 in press

Measurement of improvements in caregiver’s life is now recognised as an imp treatment outcome measure in addition to the reduction in saliva flow achieved
Van der berg JJ 2006

Physiology of saliva production

3 major pairs of glands
- Submandibular glands
  - 60%-70% total saliva
- Sublingual glands
  - 25% total saliva
- Parotid gland
  - Serous
  - Mucoid (viscous)

Scofano Dias BL et al 2016 in press

Reduction in burden of care for caregivers

Neural control- an automatic behaviour

Autonomic Nervous System
- Sympathetic branch ( subling/ submandib glands )
- Parasympathetic (parotid)

Saliva secretion is elicited by
- Taste
- Intra-oral tactile/ pressure stimulation
- Preferred foods
- Gastrointestinal reflexes

Refer Erasmus et al 2011 for more info
Parent resource : www.scopevic.org (the profile of saliva)

Anterior and posterior sialorrhea

Drooling in children with developmental impairments is not caused by hyper salivation Senner 2004.

Widely accepted that in CP its caused by dysphagia and intraoral sensitivity disorder- i.e. a disorder of swallowing.

2 impairments:
- Anterior sialorrhea ‘The loss of saliva from the mouth’
- Posterior sialorrhea said to occur when ‘Saliva spills posteriorly over the tongue via the tonsilar isthmus’

Aspiration risk Jongerius et al 2003, Erasmus 2011

Joint OZ and Dutch researchers Reddihough et al Causes- CP

- Indirect causes
  - Inadequate posture
  - Cognitive level < 3 years
  - Reduced awareness
  - Malocclusion
  - Mouthing
  - Medication
  - Reflux
  - Dentition

- Direct causes
  - Poor saliva bolus formation
  - Inadequate lip closure
  - Reduced frequency of swallowing
  - Absent oropharyngeal sensation
  - Hypo/hypertonia tongue, lips, cheek
  - Disorganised tongue movements
  - Delayed coordination of swallowing/dysphagia

Range of treatment options

- Oral motor treatment
- Behaviour modification/ feedback
- Oral appliances
- Pharmacotherapy
- Botulinum toxin A
- Surgery

Most INVASIVE Least
Montgomery et al 2016
Saliva Control clinic Glasgow

Assessment - child and caregiver perspectives
Frequency and Severity scale
- Frequency and Severity scale
  - e.g. Scott and Johnson 04
  - The drooling impact scale: pre and post treatment questionnaire for caregivers
  - Reid et al 2009 (RCH Melbourne)
  - Johnson and Scott 2004. Chapter 3 and appendices
    1. Saliva control assessment form
    2. Drooling rating scale
    3. Post saliva surgery form
    4. Oral secretion assessment

Motor aspects of drooling CP
Lespargot et al 1993
- 10 neurotypical children, 10 CP children (no saliva control issues), 10 children with CP with saliva control issues
- Measured intraoral pressure and swallow muscle activity with EMG
- Main cause of saliva loss: problems with suction stage of oral phase with low suction pressure and prolonged delay between suction and posterior propulsion stages
- Incomplete lip closure also implicated, but occurred in the non drooling group, so not primary cause

Oral sensation and drooling in CP
Weiss- Lambrou 1988
- Children 5-21 yrs 20 with drooling, 20 without
  - Oral stereognosis
  - Lingual two point discrimination
  - Oral form discrimination children
- Results suggested a relationship between oral stereognosis and drooling.
- “The assessment and treatment of drooling in people with CP should address sensory and motor elements”

Frequency / severity scale

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Severity</th>
<th>Details</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>1</td>
<td>No drooling - dry</td>
</tr>
<tr>
<td>2</td>
<td>2</td>
<td>Occasional drooling (not every day)</td>
</tr>
<tr>
<td>3</td>
<td>3</td>
<td>Frequent drooling (every day but not all the time)</td>
</tr>
<tr>
<td></td>
<td>4</td>
<td>Constant drooling-always wet</td>
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Score independently across 5-10 days at days end; longer if drooling varies day to day
The Saliva control assessment
Scott and Johnson 2004 Chap 3

<table>
<thead>
<tr>
<th>Area assessed</th>
<th>How might this assist treatment decision making</th>
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<tbody>
<tr>
<td>Communication</td>
<td>Saliva control is frequently associated with communication difficulties</td>
</tr>
<tr>
<td>Mobility</td>
<td>Gisel et al 2000, Thomas – Stonell – good mobility linked to successful treatment for saliva control</td>
</tr>
<tr>
<td>Head position</td>
<td>A head down position often results in saliva loss. Seek PT advice re head control and consider need for environmental modification</td>
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Area of assessment Rationale

<table>
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<tr>
<th>Impact questions</th>
<th>Is it a functional priority for treatment?</th>
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<tr>
<td>Sensory feedback</td>
<td>Specific treatment ideas</td>
</tr>
<tr>
<td>General health</td>
<td>Onward referral to paed/saliva team</td>
</tr>
<tr>
<td>Frequency of drooling</td>
<td>When does it occur? When is it worst?</td>
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</table>
| Impairments of saliva control
Johnson and Scott 2004 |

- Head and neck control issues → downward head posture
- Oral sensory impairments
  - Poor oral sensation (NB in children with CP)
  - Oral motor impairments
  - Inadequate oral suction
  - Incomplete lip closure (may co-exist with malocclusion often anterior open bite linked to tongue thrust) |
  - Infrequent swallowing
  - Impairments of tongue movement for bolus formation/propulsion
  - Jaw-TMJ contracture with overbite in CP most likely in non orally fed (Pelengano et al 1994)

 Bobath NDT concept

“A problem solving approach to the assessment and treatment of individuals with disturbances of movement, function and postural tone due to a lesion of the CNS” IBTA 2002

Takes into account sensory, cognitive and perceptual ability of the individual
Proximal control for distal function - saliva control

- Postural basis of head and trunk allowing for midline head, elongated back of neck, chin tuck

- Jaw stability, sustained adequate closure at rest, graded movements in eating, drinking, swallowing, saliva management

- Selective oral movement for swallowing
  - Lips actively moving/ seal, inward cheek pressure for bolus formation & propulsion/tongue tip elevation, bolus control and transport for pharyngeal phase

Postural tone and movement patterns of whole body affect oral motor patterns & swallowing

- Extension patterns → jaw extension, lip retraction, tongue thrust and reduced hyolaryngeal excursion
- Flexion patterns → jaw and teeth clenching and reduced hyolaryngeal movement

SLT treatment components Winstock 2005

1. Handling and positioning
   - Sit/lie or stand to improve upright head control lip closure and saliva
   - Aim for automatic control
   - Ensure elongated neck
   - Provide oral control if needed
   - Child calm
   - Observe ability to swallow independently

2. Sensory stimulation and oral control
   - Position child’s head and neck upright and midline with good alignment
   - Use oral control
   - Can stimulate saliva flow if needed with pressure down above top lip, elongating neck
   - Strategies to normalise sensation (detailed)
   - Gum and cheek massage with fingers or toothbrush trainer etc - watch for need to swallow
   - Oral play with toys if not too much saliva flow produced

Treatment continued

3. Mouth wiping
4. Oral motor skills
5. Jaw stability
6. Changing behaviour teaching concepts of open/closed mouth, wet/dry

A note - NDT ‘Preparation’ for function Alexander

- Must provide good head/neck/body alignment
- Child must be posturally ready to integrate this input
- Must be modified for each child (pace of presentation, level of pressure)
- Oral sensory preparation is essential to stimulating active oral motor function
- Caregivers need to feel secure in implementing so they can incorporate into child’s daily routines e.g. tooth brushing, face wiping, play
- Must be ROUTINE, POSITIVE AND NON STRESSFUL for child and caregiver
Progressing more able children to automatic control - “Marshalla Eye Dropper Technique For Drooling Elimination”

Role of SLT in management of saliva-more than oral motor treatment!
- Communication/ information/advocacy with parents/child caregivers/ MDT clinic
- Assessment & Management of oral sensory/ oral motor function and impacting influences
- Cognition, temperament, behavioural, parental resources/ time/ availability of therapy and practice
- Input to oral hygiene management
- Support with compensatory approaches (with PT/OT team) protective clothing, sweatbands, elevating work surfaces, positioning of comm devices, wheelchair tilt

Therapeutic toothbrushing
- Positioning Oral control and appropriate positioning should be utilised e.g. on your lap, standing at basin
- Can begin with your finger, gauze or an infadent or rubber headed toothbrush trainer moistened
  - If brush not tolerated the stimulation to the gums and abrasion to the teeth is still of benefit
- Toothpaste can be introduced after water
  - Children who tolerate strong stimulation may also use an electric toothbrush

Practical resources
Scott A. Johnson H 2004 A practical approach to the management of saliva 2nd Edition, pro Ed
Winstock A 2005 Eating and Drinking difficulties in children A guide for practitioners Speechmark Publishing
www.pammarshalla.com
For parents
Good Info for families
www.scopevic.org.au
Saliva control pamphlet - Royal Children’s Hospital Melbourne
For oral motor equipment:
www.sensorycorner.co.nz
www.arktherapeutics.com (US)

References 1
Alexander K Holm advanced speech workshop, ABHNTA, Melbourne 2010
Evans and Johnson 2004 A practical approach to the management of saliva 2nd Edition, pro Ed
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