



Saliva & Sialorrhoea

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Updated: 30 May 2021

Disclosures: None





Objectives

This presentation aims to increase your understanding of the:

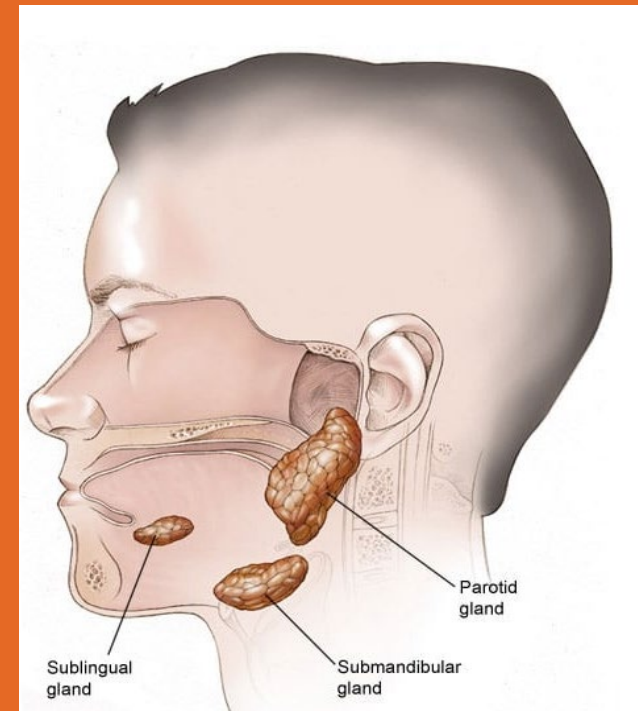
- Normal saliva production & benefits of saliva
- Causes, complications, and impact of drooling on neurologically impaired patients
- Different management options of drooling in neurologically impaired patients



Normal Saliva Production

Saliva is produced by six salivary glands:

- 2 parotid glands
- 2 sublingual glands
- 2 submandibular glands



Daily saliva secretion: 500 – 1500 mL

Most produced by two pairs of glands:

- Submandibular – mainly during rest
- Parotid – mainly during eating/chewing

Swallowing occurs:

- In rest: 600 times/day
- Total (in rest and eating/chewing): 1200 times/day



Functions of Saliva:

- ✓ Protects teeth and gums
- ✓ Prepares foods for chewing and swallowing
- ✓ Initiates carbohydrate digestion
- ✓ Lubricates tongue and lips for speech
- ✓ Assists with oral hygiene
- ✓ Regulates acidity
- ✓ Facilitates taste



Sialorrhea

Definition:

Inability to manage oral secretions

Age: Drooling beyond 4 years old is **ABNORMAL**

Prevalence in children with CP: 40.5%

DEVELOPMENTAL MEDICINE & CHILD NEUROLOGY

ORIGINAL ARTICLE

Prevalence and predictors of drooling in 7- to 14-year-old children with cerebral palsy: a population study

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Types of Sialorrhea

Anterior: Saliva spilled from the mouth that is clearly visible

Posterior: Saliva spilled into the pharynx possibly creating a risk of aspiration

Often both types exist together

Causes of Sialorrhea

1. Hypersalivation – mainly in dyskinetic CP
2. Dysfunctional oral motor control

DEVELOPMENTAL MEDICINE & CHILD NEUROLOGY

ORIGINAL ARTICLE

Drooling in cerebral palsy: hypersalivation or dysfunctional oral motor control?

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Predictors of Sialorrhea

- Head/body position
- Dental malocclusion
- Co-existing epilepsy
- Intellectual disability
- Poor or no speech
- GMFCS IV or V



Complications of Sialorrhea

Anterior Sialorrhea

1. Skin irritation
2. Caregiver and teacher stress
3. Social impact (e.g., isolation, rejection, poor self-esteem, shame, stigmatization)
4. Damage to clothing/bibs/communication devices
5. Interference with speech
6. Unpleasant odor

Complications of Sialorrhea

Posterior Sialorrhea

1. Recurrent/chronic respiratory symptoms: Cough, wheeze, choking Caregiver and teacher stress
2. Aspiration pneumonia:
 - Diagnosis of salivary aspiration through radionucleotide salivagram – done at MUMC

Complications of Sialorrhea

Anterior & Posterior Sialorrhea

1. Leads to frequent suctioning → injury
2. Dehydration

Methods to Quantify Sialorrhea

- Drooling Impact Scale – refer to resources
- DQ5 Scale – refer to resources
- Drooling Frequency and Severity Scale

Table 3. A rating scale for measuring the amount of drooling (Thomas-Stonell and Greenberg, 1988).

Severity	Frequency
1 Dry – never drools	1 Never drools
2 Mild – only wet on the lips	2 Occasionally drools
3 Moderate – wet on the lips and chin	3 Frequently drools
4 Severe – drools to the extent that clothing becomes damp	4 Constant drooling
5 Profuse – clothing, hands, tray and objects are wet	

The drooling rankings from both scales are added together to make a combined drooling score

Management of Sialorrhea

No/minimal complications

+

Patient/parents not bothered by it


=

No treatment



Management of Sialorrhea

Conservative measures

1. Positioning
 2. Bibs
 3. Suctioning
 4. Oromotor therapy (by an occupational therapist)
 5. Behavioral therapy
 6. Intra-oral appliances
 7. Optimizing TFI
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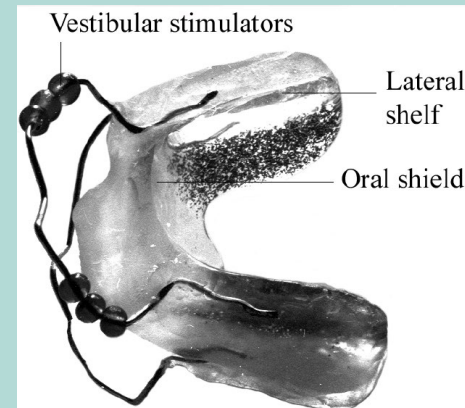
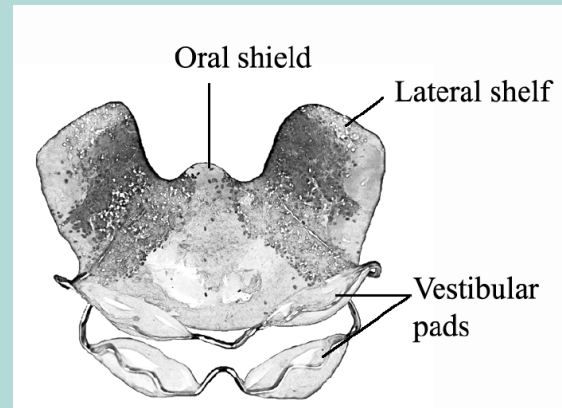
Management of Sialorrhea

Conservative measures

Intra-oral appliance

Innsbruck Sensory Motor Activator and Regulator (ISMAR)

- Stabilizes the jaw to facilitate lip and tongue movements
- Worn for short periods each day then overnight



Management of Sialorrhea

Conservative measures

Intra-oral appliance

Innsbruck Sensory Motor Activator and Regulator (ISMAR)

- Evidence: Effective in some patients with CP
- Careful candidate selection is necessary
- **Good cognitive function and motivation** are key to successful outcome

Management of Sialorrhea

Medications (anticholinergic)

Scopolamine (patch) – often **SECOND LINE** in Canada among **Pediatric Complex Care patients**

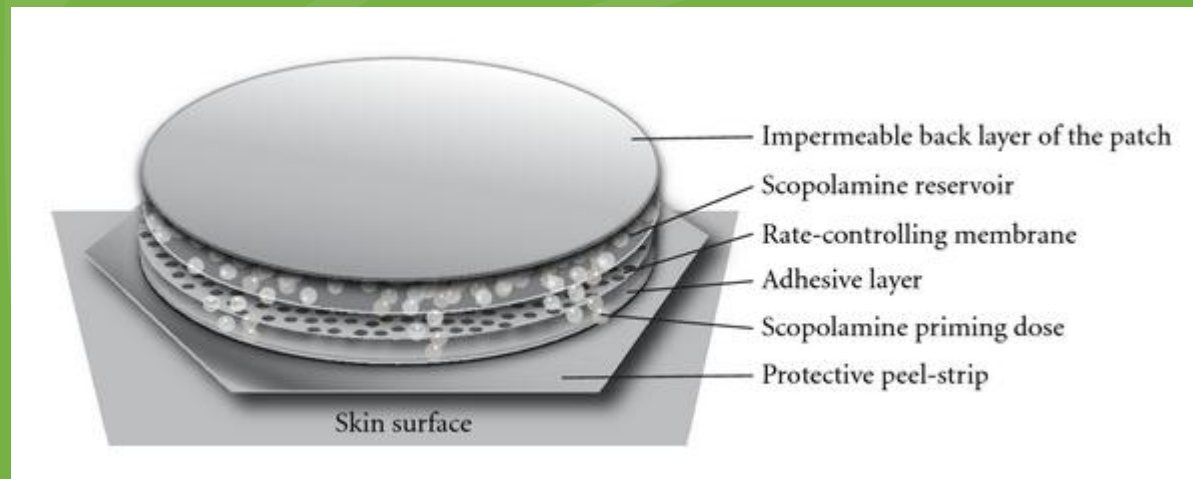
- Uses: For sialorrhea and nausea (used for motion sickness)
- DOSE (patch = 1 mg scopolamine):
 - < 20 Kg = ¼ patch.
 - 20-50 Kg = ½ patch.
 - > 50 Kg = 1 patch.
- Apply the patch on the mastoid process behind the ear
- Change every 72 hours
- Cost: 17 Canadian dollars = x2 patches

Management of Sialorrhea

Medications (anticholinergic)

Scopolamine (patch) – often SECOND LINE in Canada among Pediatric Complex Care patients

Do **NOT** cut the patch into $\frac{1}{2}$ or $\frac{1}{4}$ as it will lose its efficacy!



Management of Sialorrhea

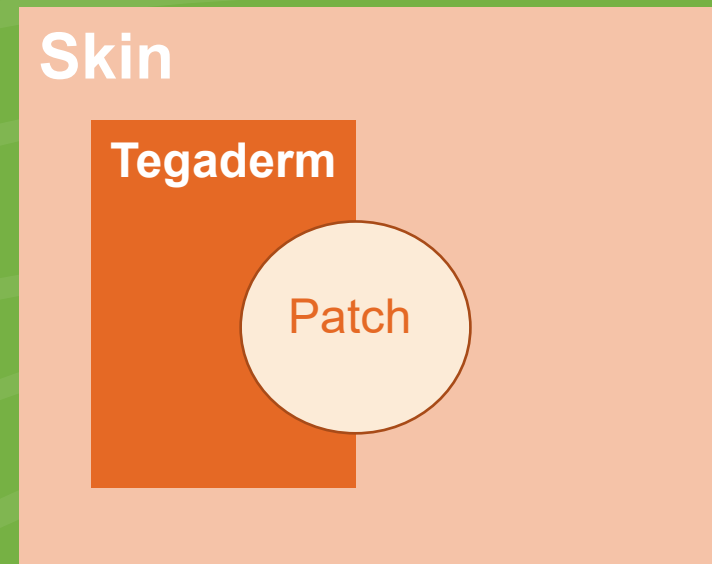
Medications (anticholinergic)

Scopolamine (patch) – often SECOND LINE in Canada among Pediatric Complex Care patients

Example of how to apply
1/2 scopolamine patch

After 72 hours, **rotate the patch 180 degrees**

- Each patch can last for 6 days



Management of Sialorrhea

Medications (anticholinergic)


Glycopyrrolate (Robinul) – often FIRST LINE in Canada among Pediatric Complex Care patients:

- DOSE:
 - Initial dose 0.02 mg/Kg/DOSE TID, titrate up (every 5-7 days) to 0.1 mg/Kg/DOSE TID, max 3 mg TID
- Route: PO
- Expensive/not covered by OHIP

Management of Sialorrhea

Medications (anticholinergic)

Atropine (drops) – weaker evidence

- 0.5-1% ophthalmic solution
 - DOSE: 1-2 drops given sublingually every 4-6 hours
 - Route: Sublingual (make sure to dry mouth/suction before use)
 - Wash hands after use (can cause dilated pupils if comes in contact with eyes)
 - 1% atropine covered by OHIP
 - Inform parents that the container says “eye drops”
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- A decorative graphic of a leaf with visible veins, rendered in a light orange color, is positioned in the bottom-left corner of the slide.

Management of Sialorrhea

Medications (anticholinergic)

Other options: Atrovent MDI/nebulization, Artane

Management of Sialorrhea

Medications (anticholinergic)

MOA: Reduction of saliva production.

Side-effects:

- Constipation
- Urinary retention
- Tachycardia
- Hypertension
- Vomiting
- Pupil dilation
- Behavioral changes
- Over-drying of secretions
- Facial flushing

Management of Sialorrhea

Medications (anticholinergic)

Contraindications:

- Glaucoma
- Tachyarrhythmias
- Paralytic ileus/GI obstruction
- Urinary tract obstruction
- Hyperthyroidism
- Pregnancy
- Myasthenia graves

Management of Sialorrhea

Botulinum toxin type A (Botox) Injection

- **MOA:** Reduction of saliva production
- **Sites of injection:** Inject submandibular and parotid glands
- **Timeline:**
 - Onset: 1-3 days
 - Peak: 3-6 weeks
 - Duration of action: 3-6 months
- **Done by ENT, under local anesthesia** (does not require GA)
 - Often done with an image-guided approach (less side-effects)

Management of Sialorrhea

Botulinum toxin type A (Botox) Injection

Side-effects:

- Saliva thickening
- Pain, swelling and hematoma at injection site
- Mild dysphagia in first 2 weeks

Severe side-effects are rare:

- Severe dysphagia in first 2 weeks
 - May require brief hospitalization and NG feeding
- Aspiration pneumonia
- Loss of motor control of the head

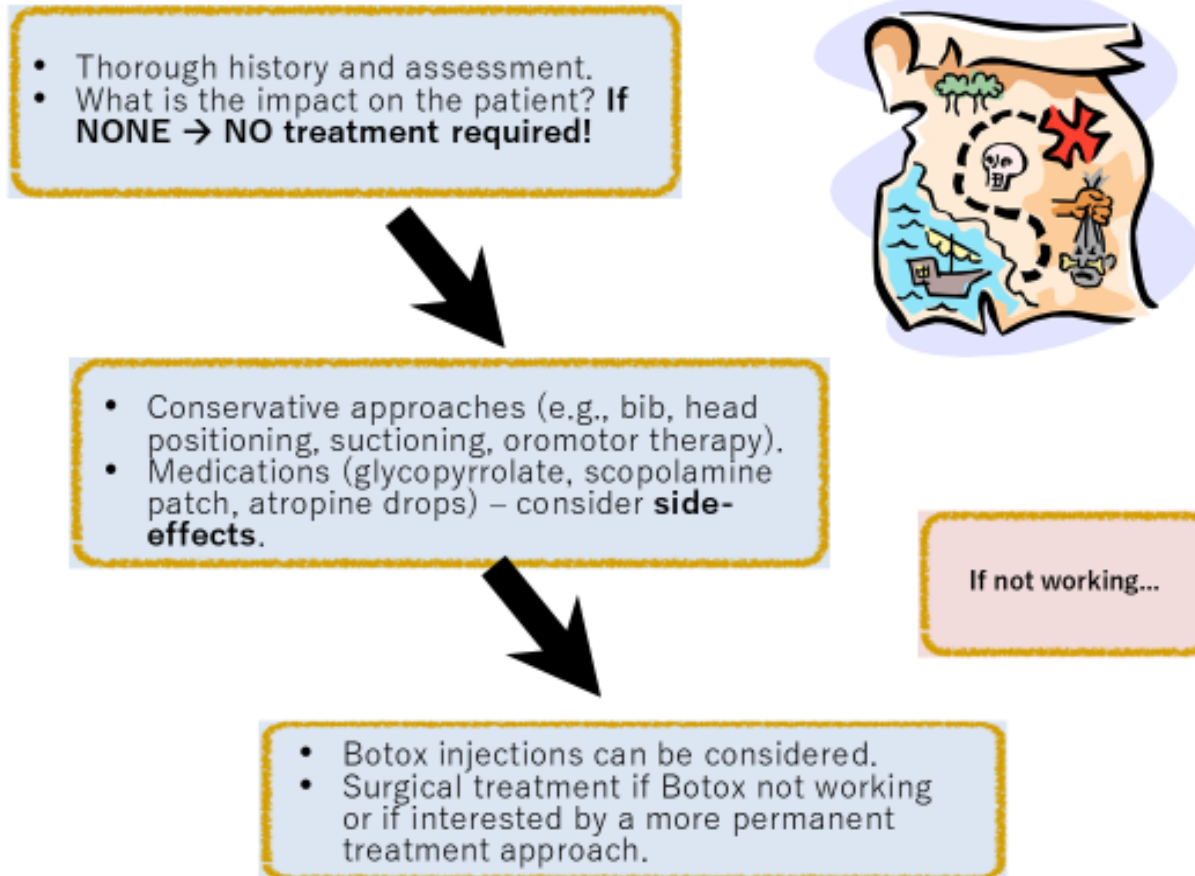
Management of Sialorrhea

Surgical approaches

- Duct ligation (parotid, submandibular or both):
 - Parents must be aware that it is irreversible, and the child won't be able to feed orally after it's done
- Bilateral submandibular gland excision
- Submandibular duct relocation



Management of Sialorrhea



References

- Prevalence and predictors of drooling in 7-to-14-year-old children with cerebral palsy: a population study; 2012. Susan M Reid, et al.
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Thank You!



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