



Hypersalivation (Sialorrhea or Ptyalism)

Salivary glands are controlled by both the “rest and digest” and “fight or flight” branches of the nervous system, however parasympathetic innervation (“rest and digest”) accounts for the majority of their controlled function.

Hypersalivation, too much saliva in the mouth, is not a disease or illness, but can be a symptom of an underlying medical condition. It can lead to excessive mineral buildup around the mandibular teeth (calculus formation) and can result in saliva spilling over the bottom lip (drooling). Hypersalivation is normally compensated for by increased swallowing, but treatment of the underlying cause/disorder normally resolves the excessive production of saliva.

Depending on the cause, hypersalivation can be occasional or constant, acute or chronic. Saliva is produced by the salivary glands, usually in response to a stimulus, and helps to moisten food and form a food bolus for swallowing. It contains enzymes that initiate the breakdown of certain food molecules, saliva can help heal wounds, remove bacteria from the mouth, prevent mouth dryness and helps the teeth to buffer against acids and other irritants. Saliva often contains necessary minerals (many retained from the foods we eat) to rebuild tooth enamel.

The average daily saliva production of a healthy adult is between $\frac{3}{4}$ and $1 \frac{1}{2}$ liters, with a peak production during periods of eating and a it is at its lowest during sleep.

Too much saliva can cause problems with talking, eating, excessive calculus buildup and drooling.

Hypersalivation can be associated with excessive saliva production (hyperactive salivary glands), problems with swallowing, a bite arrangement that makes it difficult to keep the mouth closed (poor tooth or jaw alignment). In this latter example, open mouth breathing can stimulate additional saliva production in an effort to prevent the mouth from drying out.

The excessive saliva production can be caused by:

- Sinus, throat, or peritonsillar infections
- Ulcers (canker sores), inflammation or pain in the mouth
- Baby tooth loss
- Adult tooth eruption
- Fixed oral appliances (space maintainers/braces, etc.)
- Poor oral hygiene
- Tuberculosis
- Gastroesophageal Reflux
- Venomous Snake Bite, Scorpion Sting, Rabies



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Underlying Medical Conditions that are associated with Hypersalivation:

- Cerebral Palsy (Poor neuromuscular control of muscles around the mouth result in inability to keep mouth closed)
- Rett Syndrome
- Parkinson's Disease
- Swallowing dysfunction (associated with Down Syndrome, Autism, AS, Stroke, Parkinson's Disease)
- Obstructive Sleep Apnea
- Epilepsy

Hypersalivation can also be caused by non-medical conditions:

- Seeing, smelling, talking about, or even thinking about food
- Gum Chewing (this is actually one of the positive, anticavity benefits of chewing a xylitol sweetened gum for 5 minutes after a meal/snack)
- Feelings of excitement or anxiety

Treatments

- Therapy:
 - Regardless of the root cause of hypersalivation, working with a speech therapist and/or myofunctional therapist can be helpful in retraining the muscles in and around the mouth (including the tongue) to better keep the mouth closed throughout the day and to help with the process of swallowing to clear the saliva.
- Medication:
 - The goal of intervention with medications is to reduce the saliva production. Anticholinergic medications can be used (glycopyrrolate, scopolamine and atropine), but often have additional systemic effects (drowsiness, restlessness, urine retention, constipation).
- Other Interventions:
 - Hydrating well with water throughout the day can help reduce hypersalivation. Toothbrushing followed by a mouthwash can also help by temporarily drying out the mouth.



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- Surgical intervention would focus on selectively cutting part of the parasympathetic supply to the salivary glands, repositioning the salivary duct to bypass the swallowing defect, or eliminate the salivary glands all together.

Long-Term Prognosis

In some cases, the underlying causes of hypersalivation resolve on their own, without need for treatment or intervention, as the child ages. In other cases, improvement might be observed once the underlying cause is effectively treated with Therapy, Medication, or other Medical/Surgical Intervention. Sadly, there are some conditions which are chronic and might require lifelong management of an individual's hypersalivation. It is important to understand that any corrections made to the individual's salivary flow could result in xerostomia/hyposalivation. Xerostomia introduces many challenges to maintaining oral health, such as an increase in caries.

Hypersalivation related to the development of supragingival calculus.

The accumulation and metabolism of over 300 different strains of bacteria on hard oral surfaces is considered the primary cause of dental caries, gingivitis, periodontitis, peri-implant infections and stomatitis.

Dental plaque contains this bacteria, along with a myriad of other substances, and following a snack with fermentable carbohydrates, these bacteria can release acids that attack tooth enamel. Repeated attacks can break down tooth enamel, lowering the pH of the saliva, allowing for this plaque to harden into calculus (tartar) making it more resistant to at-home efforts for cleaning.

This calculus may accumulate above or below the gumline. Because the saliva is constantly full of bacteria, plaque formation actually begins immediately after a tooth is cleaned. Saliva delivered into the mouth through salivary ducts arrives to the teeth supersaturated with calcium and phosphate ions, which is why there is always a tendency for calculus to deposit when the pH in the mouth drops. As this bacterial mass increases and hardens, it becomes increasingly difficult for the biofilm to be penetrated and removed.

Supragingival calculus formation, in most cases, can be controlled by chemical mineralization inhibitors, applied in toothpaste or mouthrinses. These agents act to delay plaque calcification, keeping deposits in an amorphous non-hardened state to facilitate removal with regular hygiene. Topically applied mineralization inhibitors can also influence adhesion and hardness of calculus deposits on the tooth surface, facilitating removal.