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Retained Infantile Swallow and Its Link to Tongue Thrusting: A Narrative Review

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Abstract: ***Retained infantile swallow is a persistent oro-motor pattern characterized by anterior tongue placement during swallowing beyond the normal developmental age. This condition often manifests as tongue thrusting, which can result in malocclusion, speech distortions, and altered craniofacial growth. Early identification and targeted intervention are crucial to prevent long-term functional and aesthetic consequences. This review explores the normal development of swallowing, the differences between infantile and mature swallow, the mechanisms and consequences of retained infantile swallow, its association with tongue thrusting, and evidence-based strategies for management.***

Keywords: Retained infantile swallow, tongue thrusting, orofacial myofunctional disorders, swallowing development

1. Introduction

Tongue thrust, an orofacial myofunctional disorder, involves the habitual forward placement of the tongue against or between the teeth during swallowing, speech, or rest. One of the primary causes is the persistence of the infantile swallow pattern beyond the expected transition period of 4–6 years of age [1,2]. While infantile swallowing is appropriate for early feeding, failure to adopt a mature swallowing pattern can disrupt occlusal development, speech articulation, and facial aesthetics [3].

The etiology is multifactorial, including prolonged non-nutritive sucking habits, airway obstruction, anatomical anomalies, and neuromuscular immaturity [4–6]. Untreated tongue thrusting can lead to anterior open bite, dental protrusion, and orthodontic relapse, making early diagnosis and multidisciplinary management essential.

Normal Swallowing Development

Swallowing (*deglutition*) is a complex process that begins in utero, with swallowing movements observed as early as the 12th week of gestation. This early function plays a role in amniotic fluid regulation and neuromuscular development. After birth, swallowing undergoes a sequence of developmental transitions that correspond to anatomical growth, neuromuscular maturation, and changes in feeding demands [7,8].

In Neonatal Stage (0–6 months) Oral cavity is small; the tongue fills the space. Larynx is positioned high, close to the epiglottis, enabling simultaneous suckling, breathing, and swallowing. The *infantile swallow* involves tongue protrusion between gum pads and active contraction of orbicularis oris and mentalis muscles. Jaw stability is achieved through facial muscle contraction.

During Transitional Stage (6 months–4 years), Primary teeth eruption and widening of dental arches create more space for posterior tongue movement. Mandible grows downward and forward, enlarging oral cavity volume. Spoon feeding, cup drinking, and chewing require increased tongue retraction and lip closure. Cortical control over swallowing improves, allowing greater voluntary modulation.

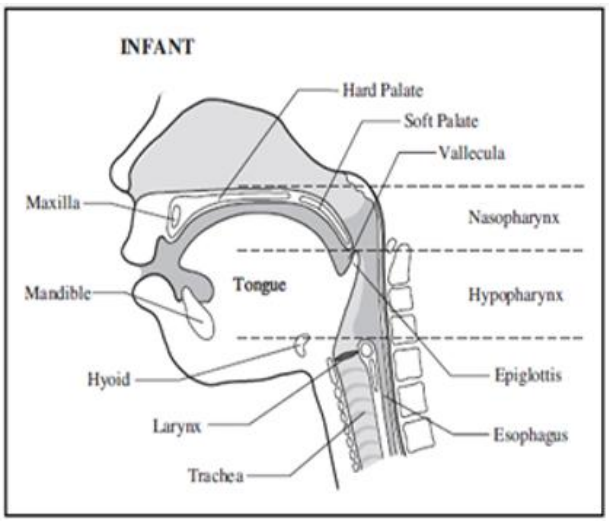
At Mature Swallow Acquisition (4–6 years) stage there is loss of sucking pads, descent of hyoid and larynx, and development of a defined palatal vault occur. Tongue tip contacts alveolar ridge; teeth are lightly occluded; lips remain relaxed. Jaw stability is maintained by masticatory muscles rather than facial muscles. Swallow becomes predominantly voluntary, with reflexive protective mechanisms retained.

Smooth progression through these stages is essential for normal dentofacial development; disruption may predispose to tongue thrusting [9,10].

Infantile vs. Mature Swallow

The transition from infantile to mature swallow represents a fundamental change in oral function. These two patterns differ in tongue posture, muscle activity, jaw stabilization, and overall coordination.

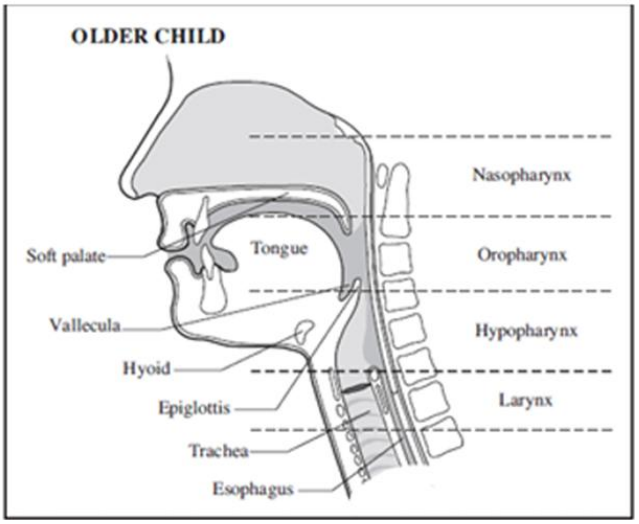
Infantile Swallow



- Tongue posture: Forward placement between gum pads or teeth during swallowing.

- Muscle activity: Strong contraction of orbicularis oris and mentalis muscles to achieve jaw stability.
- Jaw position: Stabilized by perioral and facial muscles rather than teeth in occlusion.
- Dental contact: Absent; jaws remain apart or slightly closed without tooth contact.
- Breathing coordination: Often associated with partial lip seal or open-mouth posture.
- Feeding suitability: Adapted for suckling; efficient for liquid intake in infancy but not suitable for mastication.

Mature Swallow



- Tongue posture: Tip rests against the alveolar ridge just behind maxillary incisors, with the rest of the tongue pressing against the palate.
- Muscle activity: Minimal perioral muscle involvement; primary stabilization from masticatory muscles.
- Jaw position: Teeth lightly occluded during swallow.
- Dental contact: Present, aiding in efficient bolus propulsion.
- Breathing coordination: Lips closed and nasal breathing maintained during swallowing.
- Feeding suitability: Optimized for mastication, speech articulation, and varied textures.

Key Differences

Feature	Infantile Swallow	Mature Swallow
Tongue position	Between gum pads/teeth	Alveolar ridge contact
Perioral muscle activity	High	Minimal
Jaw stabilization	Facial muscles	Masticatory muscles
Dental contact	Absent	Light occlusion
Associated breathing	Often open-mouth	Closed-mouth nasal breathing

Persistence of the infantile pattern beyond the transitional period can directly contribute to the development of tongue thrusting and related malocclusions [9].

Retained Infantile Swallow and Tongue Thrust

A retained infantile swallow refers to the persistence of the infantile pattern beyond 4–6 years of age. The tongue continues to thrust forward during swallowing, often between the teeth, instead of resting against the alveolar ridge.

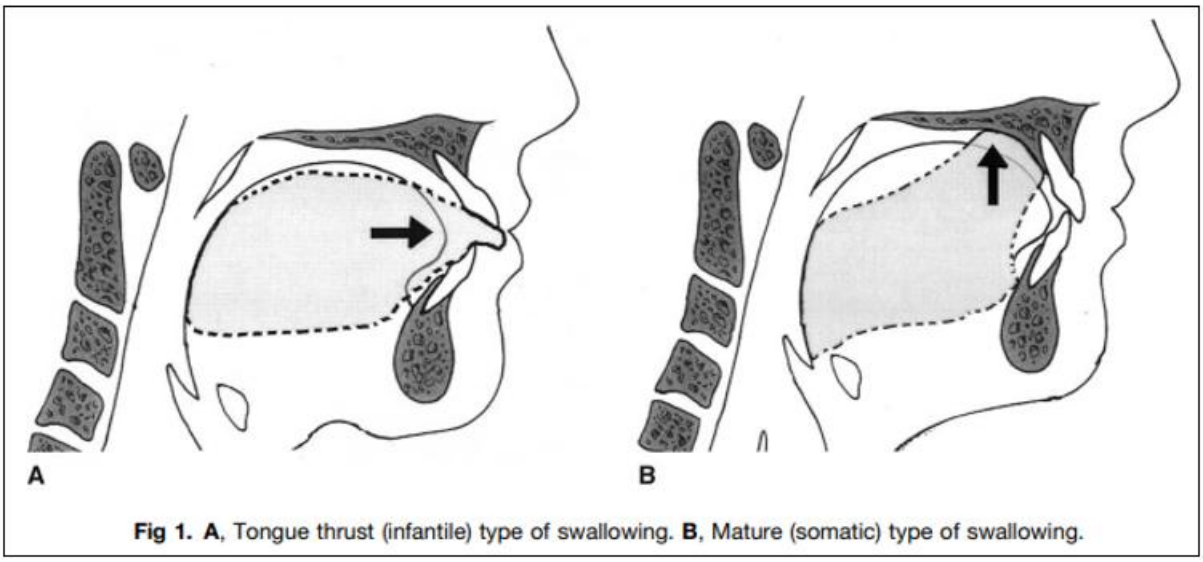


Fig 1. A, Tongue thrust (infantile) type of swallowing. **B**, Mature (somatic) type of swallowing.

Pathophysiology

- Jaw stability relies on perioral and mentalis muscle activity.
- Tongue remains low and forward, exerting chronic anterior pressure on teeth and alveolar bone.
- Weak posterior oral seal leads to compensatory forward tongue placement.
- Continuous pressure can alter dentition and skeletal growth.

Functional Characteristics

- Tongue protrusion during swallowing, speech, or rest.
- Excessive contraction of lips and chin muscles.
- Lack of posterior tooth contact during swallowing.
- Audible swallowing sounds (“slurping” or lip smacking).
- Habitual mouth breathing and low tongue posture.

Risk Factors

- Prolonged pacifier, thumb, or bottle use [4].
- Chronic nasal obstruction (adenoids, tonsils, rhinitis) [5].

- Neuromuscular delays or dysfunction.
- Cleft palate or craniofacial anomalies [6].
- Malocclusion preventing proper tooth contact.

Clinical Significance
If uncorrected, RIS can cause:
- Malocclusion (anterior open bite, overjet, crossbite).
- Speech issues (lisping, sibilant distortions).
- Aesthetic changes (long lower face, lip incompetence).
- Orthodontic relapse.
- Inefficient bolus propulsion in severe cases.

Multidisciplinary management involving dentistry, orthodontics, ENT, and speech therapy is often required [3,11].

2. Diagnosis

History: To rule out any upper respiratory tract infections, digit sucking habit, neuromuscular problems, swallow pattern in siblings and parents to check for the hereditary factor is done.

Clinical observation: Tongue posture at rest using lateral cephalograms or by seating patient upright, here tongue assumes a lower posture at rest with the tip touching the cingulum/lingual fossae.
Functional examination: Observe the tongue position, while the mandible is in the rest position Observe the tongue during various swallows like conscious swallow, Command swallow of saliva, Command swallow of water and Conscious swallow during mastication. [12].

Palpatory examination:
1) Place water beneath the patient's tongue tip and ask him to swallow
   Normal: Mandible rises and teeth are brought together, but no contraction of lips or facial muscles
   Tongue thrusting: Marked contraction of lips and facial muscles
2) Place hand over temporalis muscle and ask to swallow
   Normal: temporalis contracts and mandible is elevated
   Tongue thrusting: no temporalis contraction
3) Hold the lower lip and ask the patient to swallow
   Normal: Swallow can be completed
   Tongue thrusting: Patient cannot complete swallow

Management Strategies
Orofacial Myofunctional Therapy (OMT)
Garliader proposed this method in which the patient can be guided regarding the correct posture of the tongue during swallowing by various exercises

1) Orthodontic Elastics
The tongue tip is held against the palate using orthodontic elastic of 5/16 and sugarless fruit drop.

2) 2S Exercise
This includes identifying the spot and the squeezing the spot keeping the tongue at same position

3) 4S Exercise
This includes identifying the spot, salivating, squeezing the spot, and swallowing. Using the tongue, the spot is identified, the tongue tip is pressed against this spot, and the child is asked to swallow keeping the tongue at the same spot.

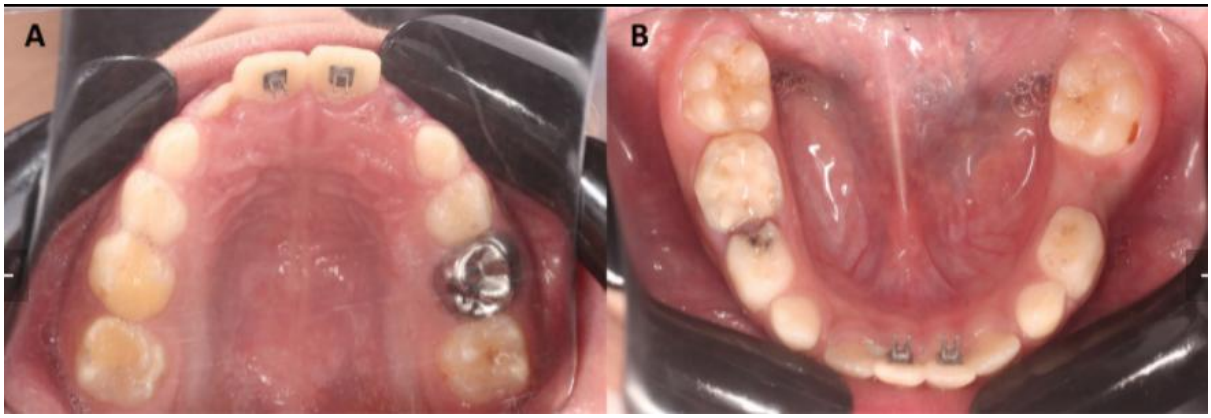
4) Lemon Candy Exercise
Instead of the elastic, a lemon candy is put on the tongue tip. Patient is asked to hold the candy against the palate by the tongue tip and then asking the child to swallow

5) Other Exercises
The child is asked to perform a series of exercise such as whistling, reciting the count from 60 to 69, gargling, yawning, etc. to tone the respective muscles[13-16].

Orthodontic Appliances

Removable appliances
A variety of modifications of Hawley's appliance can be used to treat tongue thrust. It has an active labial bow, retentive clasps, a crib or rake or spikes present posteriorly to the upper anterior teeth. The crib can serve as a reminder. [3,14].

Tongue tamers
small orthodontic appliances or attachments placed on the inner (lingual) side of the upper front teeth to help correct tongue thrusting habits and encourage proper swallowing patterns.



Pre orthodontic trainers

It aid in correct positioning of the tongue with the help of tongue tags. The tongue guards prevent tongue thrusting when in place

Adjunctive Measures

- ENT management for airway obstruction.
- Speech therapy for articulation errors.
- Surgical correction for severe skeletal discrepancies.

3. Conclusion

Retained infantile swallow is a failure of normal swallowing maturation, closely linked to tongue thrusting and its adverse dental, speech, and facial effects. Early recognition and a multidisciplinary approach combining myofunctional therapy, orthodontics, and correction of underlying causes are key to lasting success.

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