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Editorial Open Access

Could Sucking Be a Therapeutic Process for Rehabilitation of Speech and Swallow?

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Editorial

We know the act of nutritive sucking in normal full-term infants is reflexive and can be elicited immediately following birth. The primary articulators involved in nutritive sucking are the tongue, lips, hard and soft palate, and jaw. The articulators function in the following manner: (1) the movements of the tongue and mandible express milk, (2) the lip seal assists in generating the negative intraoral pressure associated with sucking, (3) the piston-like tongue protrusion and retraction movements toward the hard palate assist in squeezing the nipple, and (4) the soft palate elevates to form a velopharyngeal seal. And finally, if sucking is to be nourishing, it must be accompanied by regular rate and force generated by the jaw and tongue [1,2].

Structural intra-oral abnormalities can be congenital or acquired, and congenital aglossia (CA) is one such congenital abnormality. This rare condition, when a person is born without a tongue, typically decreases or prevents the lingual control required for sucking. This physiological response in turn can cause insufficient buccal movement and a lack of velopharyngeal closure with subsequent nasal regurgitation and a profound impairment of swallow. Eventually, the act of mastication may produce a concomitant impairment due to the micrognathic mandible in a person with congenital aglossia (PwCA) and subsequent dental abnormalities. In a PwCA, impairments affecting the jaw and lack of tongue can severely impair the oral preparatory and oral phase of swallowing. Further, weak contraction of the residual oral musculature and soft palate can cause premature leakage of the bolus into the pharynx, especially with liquids. Without a tongue, food can be trapped in the buccal or labial sulci. As such, lack of tongue is generally associated with an impaired ability to suck, and form and transport the bolus [2,3].

Congenital aglossia has presented unique challenges when considering the anatomical and physiological demands of speech, tasting, chewing, and swallowing [2,3]. When studied, it also presents unusual opportunities to analyze the compensatory measures used by individuals who are able to accomplish these tasks successfully and without medical, surgical, or therapeutic intervention.

Due to the rarity of the disorder and the low survival rate [3,4,6-9], there have been few opportunities to conduct in-depth studies of this population to determine the specific mechanisms that are used to compensate for the role of the tongue in these processes. Fortunately, in 1986, one PwCA was identified, and became the subject of subsequent research based on cineradiographic films, audio/visual recordings, videoflouroscopy, electropalatography (EPG), taste testing, and in-vivo analysis that has provided a wealth of information regarding the adaptations in vocal tract characteristics and modifications to articulatory processes, alternate neurological pathways to taste discrimination, and altered patterns of chewing and swallowing [6,8,10,11]. The ability of this PwCA to produce intelligible speech with the congenital absence of a tongue, arguably the most important and versatile articulatory structure [2], demonstrates the remarkable ability of individuals to employ compensatory strategies that override physiological limitations.

In the case of CA, where an individual's phonetic system develops along with the musculoskeletal system, research has demonstrated that structures outside of those typically associated with speech (e.g., glottis, glossopalatal arches, sublingual ridge, hypertrophied mylohyoid) can be recruited to generate sufficient constriction to produce intelligible consonants [10,11]. While the PwCA reported by McMicken et al. [6,8,10,11] never received any therapeutic intervention to address sucking, chewing, swallowing, or speaking, it is likely that the energetic suck and swallow activity that occurred in infancy in the absence a tongue resulted in hypertrophying of oral-peripheral structures including the mylohyoid, tongue base, velum, and pharyngeal walls, which ultimately acted as compensatory structures for speech. This energetic suck may have also provided greater than normal elevation and depression of the larynx [7,8].

Over the course of multiple articles, the authors have attempted to understand the compensations this PwCA employs to substitute for the absence of tongue. The speech science that underlies her intelligibility, once understood, could potentially be applied to rehabilitation of selected cranio-facial and glossectomy patients. However, this capacity to generate intelligible speech in the case of CA exists in sharp contrast to the speech produced in the case of the surgical removal of the tongue as a result of injury or disease, as in the case of full or partial glossectomies, where lack of tongue mobility and bulk has been highly correlated with lack of consonantal intelligibility [12,13]. This correlation may be related in some cases to the replacement of oral tissue with non-oral tissue or the residual effects of radiation, chemotherapy, or surgical scarring, which may contribute to lack of flexibility. In light of these findings, a logical and inferential question follows: could the introduction of post-surgical sucking exercises in these patients improve mobility and eventual intelligibility of speech?

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