

Sucking and swallowing

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ABSTRACT

Absence of bilabial contact rules out any possibility of using negative pressure inside the oral cavity. The patient cannot use suction gulp to swallow saliva. Molar occlusion creates a lingual dome that can act as a functional matrix, restoring nasal breathing.

Froggy Mouth® is a small removable appliance particularly adapted to young children. It is worn 15

minutes a day in front of the television, thus conserving sleep quality.

It stimulates the neural circuits governing automatic but not voluntary movement.

KEY-WORDS

Suction-gulp, swallowing in dentate subjects, neural circuits of voluntary movement, neural circuits of automatic movement, Froggy Mouth

While, during gestation, the fetus was in an aquatic environment at constant temperature and with continuous nutrient input. Delivery propels it into an aerial environment in which it must breathe and feed by itself. Fortunately, it has been training *in utero* since the 11th week, swallowing amniotic fluid, to develop a functional unit enabling it, in the first minutes of life, to find the breast and meet its nutritional needs.

This swallowing program, of paleocortical origin, remains physiological as long as the mouth has no teeth^{2,3}; the tongue fills the oral cavity completely, in contact laterally with the cheeks and anteriorly with the labial mucosa. The airtight joint required for suction is created by contracting the lips. Once the dental system, however, develops, alternating unilateral mastication begins slowly to mature in successive stages, from soft to compact foods¹.

Persistent suction-gulp slows down these developments and labio-jugal muscle activity impairs physiological growth, causing variable 3-dimensional skeletal disorders.

A new swallowing program is therefore required, and develops spontaneously in young children, 60% of whom discover a new way of swallowing by 4 years of age, and will be among those 50% of children who never require orthodontic treatment.

They spontaneously discover the need for a high posterior lingual dome position, achieved by tensing the styloglossus, a muscle which also narrows the tongue, bringing the apex of the tongue into a physiological area without sensory reference. There is thus posteriorization of the baseline motor configuration, from exofacial to endofacial.

If this does not happen naturally, then, like with a computer, a new program will have to be installed³. This is what the practitioner or speech-therapist does, in a series of codified exercises to program a new

praxis⁶ in the short-term memory circuits. This then has quickly to become long-term. The child at this point has two swallowing programs, as, just like in a computer, a program cannot actually be deleted from the hard drive or cortex. The old program just has not to be used: the child should stop clicking on that icon but rather on the new one. The old icon, is for “My lips are contracted” (Fig. 1), and the new one means “my lips are relaxed (Fig. 2) and my back-teeth are touching”. If, when the child swallows saliva, the lips are contracted by facial nerve activity, the old program will automatically be switched on. If, on the other hand, the lips are relaxed and the teeth closed together under trigeminal control, the right program will be launched.

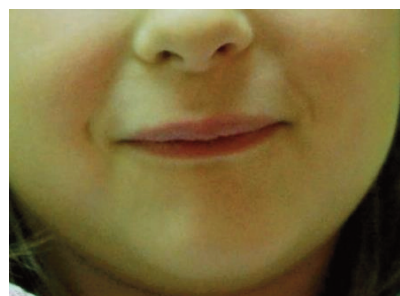


Figure 1: Lips contracted, and depressor labii inferioris and chin also: the suction-gulp program will be launched.



Figure 2: Lips apart; a tight lip joint is impossible and the new program will govern the swallowing sequence.

Thus, swallowing rehabilitation needs to be based not on control of voluntary movements but on stimulating the subcortical connections that are functional in all children by 4 years of age and on activating the inhibition of the suction-gulp circuit⁵. This approach is founded on the work of Eric Kandel, 2000 winner of the Nobel Prize for medicine.



Figure 3: Froggy Mouth[®], worn for 15 minutes a day in front of the TV, facilitates automatic acquisition of the new swallowing program which is spontaneously established in 60% of children by the age of 4 years.

Froggy Mouth[®] is a device that helps choose the right icon (Fig. 3). It is placed sagittally between the lips and teeth, separating the upper from the lower lip. Absence of bilabial contact prevents any negative pressure within the oral cavity and thus any use of suction-gulp to swallow saliva.

Initially, it should be worn for 15 minutes a day, in front of the TV or computer screen, so as to activate the neurologic circuits governing automatic movement under the control of the trigeminal nerve, which also controls the respiratory centers⁴, promoting recovery of nasal breathing. This very short daily practice does not interfere with the child's sleep, which is very important, and the playful activity that continues during the exercise acts as a reward from the point of view of the limbic system.

The approach is just as well suited for older children: acquisition may take longer after the physiological age.

But none of this can happen unless suction habits, which are physiological during the first months of life, have disappeared (Figs. 4, 5).



Figure 4: a) Wide incisor gap caused by use of a dummy. b) Spontaneous improvement after withdrawal of dummy. c) Swallowing rehabilitation provides complete correction of dysmorphism. d) Occlusion, with no further intervention, 3 years later.

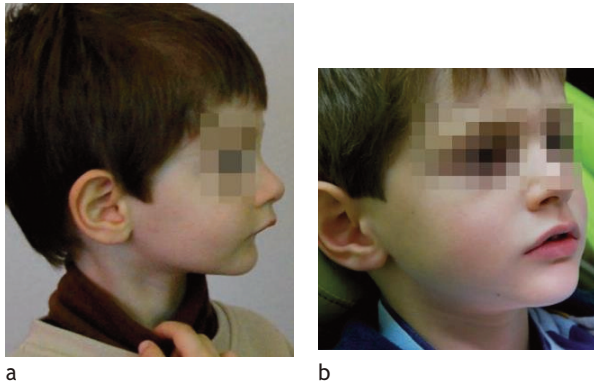


Figure 5: a) Retromandibulism in an inveterate thumb-sucker, aged 3; b) end of treatment.

This is why it is important to be sure that baby-bottles and dummies have been withdrawn.

During the first year of life, a dummy can significantly reduce the risk of sudden infant death and facilitate sleeping, but should ideally be withdrawn by 1 year of age. A Swedish study published 30 years ago reported that use of dummies beyond 2 years of age impaired communication and language acquisition.

But we should perhaps go further and analyze the psychological impact of dummies. It is not the same for thumb-sucking: many *in utero* ultrasound images show that digital sucking is discovered early on; during childhood, children manage this body part themselves, on the road to *autonomy*.

Dummies, in contrast, are foreign bodies introduced by parents or care-givers, and are integrated psychologically as part of the child's outside world.

Worn-out dummy, dummy lost: the child, to get satisfaction, is *dependent* on a third party (here, a parent).

Dummies should have disappeared by 2 years of age at the latest, as should feeding bottles. Withdrawal from thumb-sucking, on the other hand, can await 4 years.

Beyond this age, withdrawal can be helped by wearing a very simple intra-oral device which, by altering the afferent message reaching the brain, enables a new efferent message to be formed. In 95% of cases, thumb-sucking is a question of habit, and the present protocol enables spontaneous cessation without frustration, and is thus highly preferable to behavioral protocols requiring grids to be filled out with alternating suns and clouds – with feelings of guilt liable to arise in case of failure. For the 5% of children who go on sucking their thumbs despite wearing the device, sucking is not a “habit” but a “need”; this symptom may not always be serious, but it is always significant. A psychologist or child-psychiatrist should be systematically consulted in these rare cases, to have a differential diagnosis between delayed affective development and a more severe issue of psychological origin.

Conflicts of interest

The author is President of Orthopolis SAS, which holds the patent for Froggy Mouth.

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