

Functional Appliance Therapy to Control Drooling: A Case of A Child With Mental Retardation

Sharat Chandra Pani* / Amitha M. Hegde**

A 12 year old male child with mental retardation was referred to the department of Pedodontics and Preventive Children Dentistry, AB Shetty Memorial Institute of Dental Sciences, Mangalore, with a complaint of severe drooling. Mouth closure exercises and speech therapy had failed to control the problem. The patient was given a functional appliance and a significant reduction in the severity of the drooling and reduction in the foul odor was found. Despite its limitations functional appliance therapy could serve as a useful alternative to the use of drugs or surgery in the control of drooling.

Key words: drooling, functional appliance, mental retardation

J Clin Pediatr Dent 31(4):284-286, 2007

INTRODUCTION

Saliva is essential to the maintenance of normal oral function. On an average an individual secretes 1500ml of saliva *per* day almost all of which is swallowed. Drooling is basically the escape of excess saliva from the mouth. Drooling is seen commonly in normal infants, it usually subsides by 15-18 months of age as a consequence of physiological maturity of oro-facial motor function. Although drooling may, in some rare cases, persist in a normal child, its presence beyond the age of 4 years must be considered abnormal. Drooling of saliva is a finding seen in a wide range of conditions such as, cerebral palsy, mental retardation, motor neuron damage, cerebro-vascular accidents, Parkinsonism, congenital suprabulbar palsy or resection of the oropharynx. Drooling of saliva has been shown to cause both psychological problems such as isolation of the child and problems such as irritation or maceration of the skin, increased perioral infection, a foul smelling odor and dehydration due to fluid and nutrient loss.² While investigators believe that some individuals may have both an increased salivation and decreased or ineffective swallowing², most studies and reviews of literature show that drooling is mainly due to a swallowing defect caused by poor neuromuscular coordination.³

Swallowing is controlled by a central program generator, located in the medulla oblongata of the brain. It is regulated by the

voluntary act of propelling what is in the mouth to the back of the pharynx, and involves carefully timed responses of the respiratory as well as gastrointestinal system. The swallowing reflex normally prevents drooling. In the typical 24 hour cycle of an adult 590 swallowing actions occur. The average adult resting salivary flow rate ranges from 0.02-2.75 ml/min.⁹ Hence, if not swallowed, large amounts of saliva dribble out of the mouth. Therefore any appliance to control drooling would have to modify the swallowing pattern of the patient.

Functional appliance therapy to promote swallowing has been used successfully in the management of drooling of saliva in patients with cerebral palsy. In the 1970s Castillo-Morales developed an appliance with an acrylic button on the palate which was used to control drooling in children with cerebral palsy.¹² The goal of the appliance, termed as the 'stimulating palatal plate', was to reduce the forward movement of the tongue by encouraging a backward upward movement of the tongue.² A modification of the appliance which used a bead rather than a button has yielded interesting and encouraging results.¹³ These appliances aim to improve the neuromuscular coordination of the patient. Since drooling in children with mental retardation is also caused by a lack of neuromuscular coordination² it can be assumed that a similar appliance would be equally effective in these patients.

CASE REPORT

A 12 year old male with mental retardation attending a special school, was referred, by his teacher to the Department of Pedodontics and Preventive Children Dentistry, with a complaint of severe drooling. The drooling and the foul odor accompanying it were preventing other children from mingling with the child. Mouth closure exercises and speech therapy had failed to control the problem. Both the parents and the teacher reported that the child could swallow, if told to do so, but normally did not notice the saliva dribbling out of his mouth.

The patient was observed to have severe drooling with the saliva spilling on to his clothing. A persistent foul odor was observed due to the saliva on the clothing. There was no sign of any

From the department of Pedodontics and Preventive Children Dentistry, A.B. Shetty Memorial Institute of Dental Sciences.

*Sharat Chandra Pani, Post graduate student

**Amitha M. Hegde, Professor and Head of the Department

Send all correspondence to: Dr. Amitha M. Hegde, Professor and Head of the Department, Department of Pedodontics and Preventive Children Dentistry, A.B. Shetty Memorial Institute of Dental Sciences, Derlakatte, Mangalore -575018, Karnataka, India.

Fax no: 0824-2204572.

Email: amipedo@yahoo.co.in



Figure 1: Marking the midline of the tongue with a hematoxylin pencil

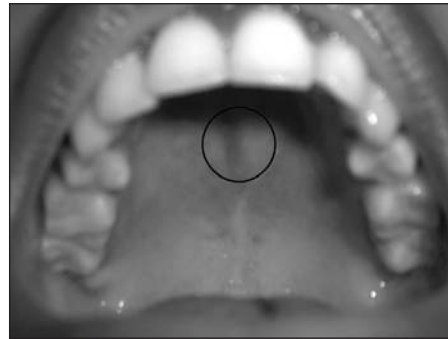


Figure 2: Pattern of swallow as transferred to the roof of the palate

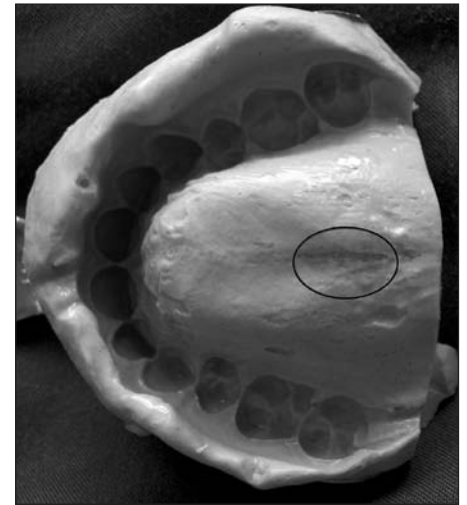


Figure 3: The marking on the palate as recorded on the alginate impression

perioral infection or ulceration as a result of the drooling. The patient had an infantile swallowing pattern with tongue thrusting habit. However there was no lateral deviation of the tongue. The unstimulated salivary flow rate was estimated and found to be 0.32ml/min, thus ruling out any possibility of hypersalivation. Thus a modified stimulating palatal plate appliance was planned for the patient.

Determining the swallowing pattern:

Children with neuromuscular disorders may show deviation from the normal pattern of swallowing;¹³, therefore the pattern of swallow was determined in the child. The dorsum of the tongue was marked using a hematoxylin pencil (fig.1); the patient was then asked to swallow, thus transferring the swallowing pattern to the palate (fig. 2). An alginate impression of the upper arch was made and a cast, along with the marking of the swallowing pattern was obtained using dental stone. (figs 3, 4)

Appliance construction:

Adams clasps were fitted on the first permanent molars and a passive short labial bow was placed extending from canine to canine, to aid in retention of the appliance. A custom made acrylic bead was mounted on a roller fabricated using a 0.9mm stainless steel wire and positioned in the posterior part of the palate along the marked swallowing pattern. The appliance was waxed up and fabricated using a thermally cured acrylic resin. (Fig. 5)

Insertion of the appliance and patient instructions:

The appliance was inserted in the presence of the parent and teacher. The child was instructed to try and roll the bead with his tongue while swallowing (Fig 6). The parents and the teacher were instructed to ensure that the child was under their supervision while wearing the appliance. This was done in order to prevent the child from accidentally swallowing any component of the appliance. The appliance was to be removed while eating, and at night before going to bed. The parents were also instructed to examine the appliance each morning, and to discontinue the use of the appliance and report to the authors if there was any sign of damage.

At the end of two weeks, both the parents and the teacher reported that there was a significant reduction in the severity of the drooling. There was little or no soiling of the clothes resulting in a reduction in the foul odor. Thus the patient was advised to continue the appliance for a longer period of time.

DISCUSSION

A wide range of treatment alternatives have been used to control drooling in patients with mental and physical disabilities. These may range from methods such as bio-feedback, bio-functional therapy, speech and physiotherapy, to more drastic measures such

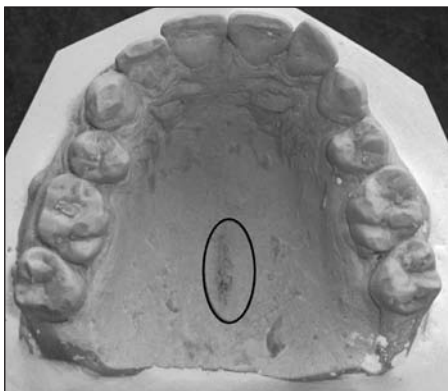


Figure 4: The record as seen on the poured cast

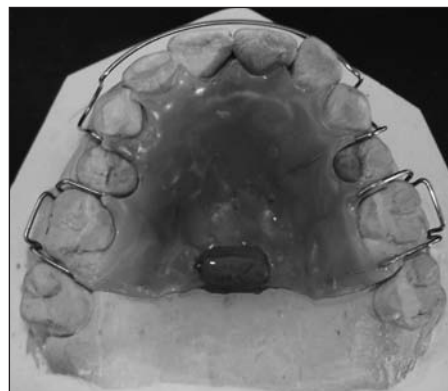


Figure 5: The acrylized appliance-note the position of the bead corresponds to the recorded pattern of swallow



Figure 6: The appliance was inserted into the patient's mouth and the patient was asked to try and roll the b

as drugs and radiotherapy to reduce the salivary flow and surgical methods that involve the excision or re-routing of the salivary gland ducts or their nerve supply.² It has already been mentioned that patients with drooling rarely, if ever, have hypersalivation. Therefore any treatment, such as drugs, radiation and surgery, are bound to result in a reduction in the salivary flow. Studies have shown that children who have been treated with drugs or surgery have a greater incidence of dental caries as well as a higher risk for development of dental caries in the future. Drugs that reduce the flow of saliva offer little selectivity, in terms of action solely on the required site, and act on all end organs controlled by the muscarinic system.² In addition effects like toxic psychoses, resulting from the use of drugs such as scopolamine must also be considered.

In view of these side effects, functional appliance therapy offers a relatively safe and conservative treatment modality in the management of drooling. Authors have pointed out that disadvantages such as the child becoming acclimatized to the appliance can easily be overcome by changing the position of the bead.¹³ Most of our knowledge on such appliances is based only on reports of the success and drawbacks of this appliance. Further research with a large sample is needed to determine the effectiveness of this appliance.

Despite its drawbacks functional appliance therapy has been used successfully in the management of drooling in patients with cerebral palsy and it is the opinion of the authors that with judicious case selection such appliances may be effectively used for the management of drooling in any patient with a lack of neuromuscular coordination.

REFERENCES

1. Davies A, Blakely AGH, Kidd C. Human Physiology Churchill-Livingstone, London; 815-820, 2001
2. Hussien I, Kershaw AE, Thamassebi JF, Fayle SA. The management of drooling in children and patients with mental and physical disabilities: a literature review. *Int J. Pediatr Dent*; 8: 3-11, 1998
3. Blasco PA, Allaire JFL and participants of the Consortium on Drooling: Drooling in the developmentally disabled: management practices and recommendations. *Developmental Med Child Neurol*; 34:849-862. 1992
4. Crysdale WS. Management options for a patient with drooling *Arch Otolaryngol*; 105:535-537. 1979.
5. Guerin RL. Surgical management of drooling. *Arch Otolaryngol*; 108:535-537. 1979
6. Thamassebi JF, Curzon MEJ. The cause of drooling in children with cerebral palsy hypersalivation or swallowing defect. *Int J. Pediatr Dent*; 13:106- 111 2003
7. A, Langevin M, Muller S, Guillemont S. Swallowing disturbances associated with drooling in cerebral palsied children. *Developmental Med Child Neurol*; 35:298-304, 1993
8. Ganong WG. Review of medical physiology 21st ed. McGraw-Hill- Asia, Singapore. pp232, 2005
9. Jenkins GN. The physiology and biochemistry of the mouth. 4th ed. Blackwell scientific publications Oxford. pp 284-359. 1978
10. Levine RS. Saliva: the nature of saliva. *Dent Update 1989: special supplement*; 3-6
11. Reddihough D, Johnson H, Ferguson E. The role of a saliva control clinic in the management of drooling. *J. Paediatr Gen-Health*; 28:395-397, 1992
12. Limbrock GJ, Hoyer H, Scheying H. Drooling. Chewing and swallowing dysfunctions in children with cerebral palsy: treatment according to Castillo--Morales. *J Dent Child*; 57:445-451, 1990
13. Inga J, Reddy AK, Richardson S, Sanders B. Appliance for chronic drooling in cerebral palsy patients. *Pediatr Dent*; 23: 241-242, 2003
14. McDonald RE, Avery DR, Dean JA; *Dentistry for the Child and Adolescent 8th ed Mosby, St. Louis. pp 212-213, 2004*
15. Subtelny JD, Subtelny J. Abnormal deglutition facts and fallacies. In Stewart RE, Barber TK, Troutman KC, Wei SH (ed) *Pediatric Dentistry: Scientific foundations and clinical practice. CV Mosby Company St.Louis. pp 374-398, 1982*
16. Hallet KB, Lucas J, Johnson T, Reddiborough OS, Hall RK.. Dental health of children with cerebral palsy following sialoductoplasty. (Abstract). *Pediatr Dent*; 17:137, 1995
17. Arnup K, Crossner C. Caries prevalence after submandibular gland reposition in children with neuromuscular disorders. *Pediatr Dent*; 12:98-101, 1990
18. Sennhauser FR, Schwarz HP. Toxic psychoses from the use of transdermal scopolamine in a child. *Lancet 1986; ii:1033.*