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Research Article

MANAGEMENT OF SIALORRHOEA IN NEUROLOGICALLY IMPAIRED CHILDREN

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A R T I C L E I N F O

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A B S T R A C T

The aim is to review on management of sialorrhoea in neurologically impaired children. Sialorrhea (drooling) is the unintentional loss of saliva and other oral contents from the mouth. The overflowing of saliva from the mouth, is mainly due to neurological disorder and, less frequently, to hypersalivation. Treatment options include behavioral modification therapy, oral or topical anticholinergic medications, surgical excision of salivary glands or duct relocation, and chemodenervation with botulinum toxin.Drooling is prevalent among children with cerebral palsy (CP) and has a negative impact on their social and physical wellbeing. In this review, an analysis of outcome measures commonly used for assessing response to treatment and studies on various therapeutic options available will be presented. Since no treatment option has proven to be ideal, an optimum approach needs to be tailored to the needs of the child. This article provides an overview of the different treatment approaches and significant research findings.

INTRODUCTION

Sialorrhea (drooling) is the unintentional loss of saliva and other oral contents from the mouth [(1)].This condition is normal in infants, but usually stops by 15 to 18 months of age.Sialorrhea after four years of age generally is considered to be pathologic.Physical and psychosocial complications of sialorrhea range from mild and inconvenient symptoms to severe problems that can have a significant negative impact on quality of life [(2)]. The overall prevalence of significant chronic drooling in childhood is put at up to 0.6%.The commonest population group with severe and persisting difficulty is children with quadriplegic cerebral palsy where the prevalence rate is as high as 30-53% [(3)]. Reported treatment options have included behavioral modification therapy, oral or topical anticholinergic medications, surgical excision of salivary glands or duct relocation, and chemodenervation with botulinum toxin[(1)]. Despite of many treatment options, definitive conclusions are difficult to draw because of different outcome measures used in the various studies. In this review, a study of recent reports on the various therapeutic options available will be presented.

Pathophysiology

Etiology

Sialorrhea usually is caused by neuromuscular dysfunction, hypersecretion, sensory dysfunction, or anatomic (motor) dysfunction. The most common cause is neuromuscular dysfunction.

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From this research, the knowledge and practice and attitude of oral hygiene habits followed by patients are studied. Oral health knowledge is considered to be an essential prerequisite

In children, mental retardation and cerebral palsy are commonly implicated. The factors that contribute to drooling in children with CP include an inefficient coordination of the oral phase of swallowing and poor lip closure[(1)]. Other factors that might contribute to drooling include muscle hypotonia, macroglossia, dental malocclusion, abnormal posture, and impaired nasal airway patency[(4)].

Assessment

Assessment of the severity of drooling and its impact on quality of life for the patient and their carers help to establish a prognosis and to decide the therapeutic regimen (5). Both objective and subjective methods need to be utilized in assessing therapeutic intervention (1).

Objective methods are used to measure the amount of saliva. Commonly utilized objective methods are weight of drool using dental bibs, weighing dental rolls placed in different areas of the mouth, positioning absorbent cotton rolls at the salivary gland duct orifice, and the drool quantification method (5). The commonly utilized subjective tools include the drooling severity and frequency rating scale, Teacher Drooling Scale (TDS), Drooling Quotient (DQ). (6-9). Table 1 shows severity of drooling and frequency rating scale.

Frequency
1=Never drools
2=Occasionally drools (not every day)
3=Frequently drools (part of every day)
4=Constantly drools
SEVERITY
1= Dry (never drools)
2=Mild (only lips wet)
3=Moderate (wet on lips and chin)
4=Severe (drool extends to clothes)
5=Profuse (hands, tray, and objects wet)

Behavioural treatment

Various behavioural techniques have been described for the treatment of drooling. Despite their appeal because of their non-invasive nature, there is a paucity of clinical research documenting their efficacy (1). The techniques include various oral appliances to modify and improve oral motor function and aid lip closure (10), oral motor stimulation techniques for enhancement of sensorimotor function(11), biofeedback and automatic cueing techniques.

Oral motor stimulation programs include measures to improve oral-facial tone, increase sensory awareness and develop voluntary control of movement [(12)]. Biofeedback and automatic cueing techniques have successfully treated patients with mild neurologic dysfunction and drooling. In the authors' opinion, behavioural techniques may have a role as adjunctive therapy with other treatment modalities; however, this requires further investigation before definitive recommendations can be made (1).

Pharmacological therapy

Salivation is mediated through the autonomic nervous system, primarily by way of the cholinergic system muscarinic receptor sites. Blockage of these receptors inhibits nervous stimulation to the salivary glands. Anticholinergic drugs used to decrease drooling, have widespread effects on all end-organs that are governed by muscarinic stimulation.

Anticholinergic medicines

- Hyoscine patches
- Glycopyrrolate
- Trihexyphenidyl-benzhexol hydrochloride
- Benztropine
- Ipratropium bromide

Transdermal scopolamine has been used with some success and has minimal side effects with short term use (13). Recently, glycopyrrolate a quaternary ammonium compound structurally related toatropine, has been found to be very effective in the treatment of drooling (14,15). The drug is long-acting, does not cross the blood-brain barrier and has minimal side effects, it is five to six times more potent than atropine in its anti sialogogue effect (15).

Common-autonomic-system-mediated side effects include blurred vision, constipation, urinary retention. Central-nervoussystem-mediated side effects include sedation, irritability, headache and increase in frequency of seizures. Anticholinergics are contra indicated in individuals with glaucoma, myasthenia gravis and a history of urinary retention (12). However, unpleasant side effects preclude their long term use.

Botulinum toxin

Botulinum toxin (BoNT), a potent exotoxin produced by Clostridium botulinum, the same organism responsible for tetanus, is another medication that may be effective in the treatment of drooling. It blocks the release of acetylcholine at the cholinergic neurosecretory junction of the target organs including the salivary glands (1). However, it was only in the past few years that botulinum toxin type -A (BTx- A) has been used for this purpose. Studies have shown that injection of botulinum toxin to parotid and submandibular glands, successfully subsided the symptoms of drooling (15,16).

Radiation therapy

Radiation to the salivary glands is a reasonable treatment option in elderly patients who are not candidates for surgery and cannot tolerate medical therapy (17). Radiotherapy (RT) to the salivary glands in doses of 10 - 20 Gy in a single fraction or two fractions was used to treat drooling (18-20). The most frequent adverse events reported were xerostomia and loss of taste. Xerostomia is believed to be due to the delivery of Radiation therapy to the parotid glands, such adverse events can hopefully be avoided by delivering the radiationtherapy to the submandibular glands instead of the parotid glands (1). Due to long-term hazards of growth retardation and risk of malignancy radiation therapy has been criticized and abandoned from use for the pediatric population (21).

Surgical therapy

Surgical options in the treatment of sialorrhea include surgery on the salivary glands and ducts, and surgery to denervate the glands (2). The therapies include Submandibular duct relocation, Submandibular gland excision, Parotid duct relocation, Parotid duct ligation, Transtympanic neurectomy.The most definitive treatment of sialorrhea is surgery to excise the major salivary glands or to ligate or reroute the major salivary ducts. This procedure typically involves a combination parotid duct ligation or rerouting with either submandibular gland excision or duct rerouting (22,23). The most definitive surgical procedure, which includes bilateral parotid duct ligation and sub-mandibular gland excision, is highly successful, with nearly total elimination of sialorrhea, a low incidence of facial weakness, and significant patient and caretaker satisfaction (24). This procedure is a most invasive treatment option and is carried out based on the severity of the sialorrhoea.

CONCLUSION

The assessment and management of chronic drooling in children is best coordinated by a specialist multidisciplinary team liaising with local services. There are a considerable number of options for treatment depending on the age of the child and the severity of the problem. Therapy-based and conservative options should be considered first, Unless there are specific contraindications, it is best to then try medical treatment before progressing to surgical procedures(12). There are no clinical trials comparing different treatment options (e.g pharmacotherapy vs surgery or pharmacotherapy vs behavioral treatment), making treatment guidelines more difficult. Future long-term studies with a large, homogeneous patient population should provide

guidelines for the best treatment approach for this problem (1).

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