An Anti-drooling Operation in Cerebral Palsy

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SUMMARY

Persistent drooling in cases of cerebral palsy can be successfully controlled by a combination of bilateral parotid duct translocation and bilateral submandibular gland excision. Ten children are described who underwent this operation with satisfactory results. Apart from mild transient postoperative swelling of the cheek, there have been no postoperative complications.

The importance of bilateral submandibular gland excision is stressed and the operative details are described. These include elevating a flap of buccal mucosa distally from the orifice of the parotid duct and then burying this strip beneath the buccal mucosa posteriorly to emerge in the pharynx just above the tonsillar fossa. The edges are then sutured to the mucosa of the pharynx. In time the parotid secretions pass into the pharynx via the newly created tube of mucous membrane.

The technique is simple and the end result is satisfactory.


The distress and social stigma of continual drooling is so disturbing even to the moderately retarded child that many consider it their worst affliction. The chin rashes and sodden shirts that offend strangers and irritate the family, and the inability to carry out normal daily routines such as writing or reading have led many patients to seek surgical correction of their drooling rather than operative procedures for orthopaedic and other disabilities.

SUBJECTS AND METHODS

Patients

During the past 18 months, 10 children with cerebral palsy were referred to the Johannesburg General Hospital for consideration for surgical correction of drooling. All were older than 5 years and there were 5 boys and 5 girls. The main complaints from their attendants were persistent drooling (some children were using up to 8 towels a day), persistent chin rashes, and smudging of their writing and drawing.

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Methods

With the patient under general anaesthesia, the larynx intubated and the pharynx packed, the first procedure is bilateral submandibular gland excision. The sides are operated on sequentially with a glove change and a clean set of instruments for the second side. We and our pathologist believe that the excised submandibular glands are hypertrophied and enlarged. Since there are no available data on the average weight and size of submandibular glands in normal children of this age, the impression is purely clinical at this stage. The glandular enlargement tends to push the facial vein to one side which affords easy access without the necessity to ligate and transect it. Since patients develop facial swelling after the operation, we tried to avoid sectioning the facial veins where possible in an attempt to minimize this.

On completion of the bilateral submandibular gland excision, attention is directed to the mouth. Fig. 1 illustrates the essential surgical anatomy, viz. the orifice of Stensen’s duct, the pterygomandibular ligament and the tonsillar fossa. A probe is passed into Stensen’s duct and a cuff of mucosa is undermined so that the duct, with the peri ductal pedicle, is exposed (Fig. 2). A flap of buccal mucosa is elevated distally from the area around the opening of Stensen’s duct towards the mucosa of the lower lip (Fig. 3). The flap of mucosa is elevated to a width of approximately 1 cm and to a distance of within 1 cm of the lip (Fig. 4). When this elevation is completed, a tunnel is made in the submucosal plane, superficial to the pterygomandibular ligament into the tonsillar fossa (Fig. 5). A tonsil clamp is used to widen the submucosal tunnel into the tonsillar fossa and will be used to deliver the tubed flap.
Fig. 2. Exposure of the duct with the periductal pedicle.

Fig. 3. A flap of buccal mucosa is elevated distally towards the mucosa of the lower lip.

Fig. 4. The flap is elevated to a width of 1 cm to within 1 cm of the lip.

Fig. 5. A tunnel is made in the submucosal plane.

Stensen's duct is mobilized for 1 cm and is ready for the translocation (Fig. 6). The mobilized duct and extension flap are then turned posteriorly for 1 cm and passed into the submucosal tunnel; the flap is delivered into the tonsillar fossa and sutured to the anterior pillar with a few very fine chromic catgut sutures (Fig. 7). A water-tight closure of the donor site is achieved. The mucosal flap spontaneously forms a tube, producing an extension to Stensen's duct and directing saliva into the pharynx.

Fig. 6. Mobilization of Stensen's duct.

RESULTS

Although this is a small series, excellent results were achieved in all 10 cases. Marked facial swelling developed in all patients, becoming maximal at 48 hours. Most swellings resolved in 3 - 4 days but mild persistent swel-
Duct turned posteriorly 1 cm into tunnel
Watertight closure
Flap turned and sutured to pillar

Fig. 7. The flap is sutured to the anterior pillar.

ling in 1 case lasted for a week. Another patient developed a small cystic swelling of the cheek in the region of the duct 5 months after operation. This was non-tender and resolved on massage. Apart from these, there have been no complications.

We have emphasized the need for careful attention to dental hygiene in this group during the postoperative period and in the long term, and as yet no dental problems have occurred.

**DISCUSSION**

Wilkie was the first to describe the pathophysiology of drooling and the principles of surgical correction. After observations on cine radiographs taken to observe palatal motion, he noted the significance of tongue function in the control of salivation. He concluded that swallowing is divided into oral and pharyngeal actions. During the oral phase, the co-ordinated tongue, together with the cheek and lip muscles, forms the food into a bolus and then forms a cup which seals against the hard palate and pushes the bolus posteriorly, depositing it in the pharynx. This initiates the second pharyngeal phase of swallowing which is automatic.

In the child with cerebral palsy, the oral structures position food and liquids inefficiently and the unco-ordinated tongue hits against the palate, forcing oral contents in all directions, with only a portion reaching the pharynx. Therefore, drooling is less of a problem of lip continence than of semi-automatic function of the entire oral musculature. It is assumed that the pharyngeal phase is relatively normal if the child has had no respiratory or nutritional difficulties. This contention is supported by the observation that drooling in cerebral palsied patients is almost always associated with poor speech.

In the management of the drooling patient, training techniques started in infancy are often of value, but most would agree that little is to be gained from this approach after the age of 3 or 4 years. Parasympatholytic drugs have limited value. Radiotherapy, while effective in atrophying salivary tissue, is only to be condemned. Parotid duct ligation is simple, but subsequent fistula formation and parotitis are common sequelae. All four major ducts must be controlled for treatment to be effective. Surgical denervation of the salivary glands has been advocated. Extirpation of the tympanic plexus is a simple otological procedure which destroys the stimulatory nerves to the parotid ducts. Denervating the submandibular gland requires sectioning of the chorda tympani. Unfortunately, most glandular tissue eventually escapes denervation and drooling ultimately recurs, although some authors have reported satisfactory results with transtympanic neurectomy. However, the risk of destroying the sense of taste by sectioning the chorda tympani seems unjustifiably cruel, since this may be the only pleasurable sensation enjoyed by some of the severely retarded patients.

The submandibular and parotid glands produce 90-95% of the 1 000-1 500 ml of saliva produced daily. The rest comes from the sublingual glands and from the oral mucosa itself. Experience has shown that saliva must be controlled from all four major glands for effective relief of drooling. The submandibular glands can be safely, quickly and easily removed with no known consequences. Removal of the parotid glands is difficult, complicated and hazardous to the 7th nerve. Wilkie postulated that re-routing the parotid ducts to the pharynx would bypass the oral phase of swallowing and would permit automatic pharyngeal swallowing and prevent drooling. The procedure of bilateral submandibular gland resection and extension and translocation of both parotid ducts to the pharynx is performed as one operation. It is our experience with the combined operation in 10 patients that the technique is simple and the end result is satisfactory.

**REFERENCES**