Bilateral Submandibular Gland Excision
With Parotid Duct Ligation
for Treatment of Sialorrhea in Children

Long-term Results

Yoram Stern, MD; Rafael Feinmesser, MD; Michael Collins, BSc; Sally R. Shott, MD; Robin T. Cotton, MD

Background: Multiple procedures have been advocated for the surgical control of chronic sialorrhea in children. However, some of them are associated with significant complications or only short-term success.

Objectives: To evaluate the safety of bilateral submandibular gland excision (SGE) with parotid duct ligation (PDL) and to assess its long-term complications and efficacy in the treatment of chronic sialorrhea in children.

Design: Case series. Telephone interview of patients’ families.

Setting: Tertiary care children’s hospital.

Patients: Ninety-three patients with chronic sialorrhea who underwent bilateral SGE with PDL from 1988 to 1997.

Main Outcome Measures: Operative and postoperative complications, length of postoperative hospitalization, postoperative drooling, care requirements, xerostomia, dental caries, and overall satisfaction.

Results: The mean postoperative stay was 2.4 days. There were 3 postoperative complications. Seventy-two families were interviewed (follow-up time, 1-10 years): 62 (87%) reported no further drooling or significant improvement; 7 reported the occurrence of dry mouth; and 2 reported an increase in dental caries.

Conclusion: Bilateral SGE with PDL is a safe and consistently efficient procedure for the treatment of chronic sialorrhea in children.


SIALORRHEA, or drooling, may be a persistent feature in children with conditions affecting the neurologic or muscular systems.1 Chronic sialorrhea may cause significant social isolation, embarrassment, and discomfort. It also increases and complicates patient care, imposing significant problems for the patients and their family members or caregivers. Many approaches have been used to diminish the amount of drooling, including behavior modification, medical regimens, and surgical intervention. Surgical correction of chronic sialorrhea in children has proved to be the best solution. Several procedures have been advocated. However, some of the procedures may be associated with significant complications or only a short-term solution.2

Bilateral submandibular gland excision (SGE) with parotid duct ligation (PDL) has been the treatment of choice for chronic sialorrhea in children at our hospital since 1984. The objectives of the present study were to evaluate the safety of bilateral SGE with PDL and to assess its long-term complications and efficacy in the treatment of chronic sialorrhea in children.

RESULTS

The medical records of all children who underwent bilateral SGE with PDL (N=93) were available for review. There were no operative complications. Postoperative complications occurred in 3 patients: 1 had a wound hematoma in the immediate postoperative period that required evacuation in the operating room; 1 had significant bilateral swelling of the parotid glands that resolved spontaneously; and 1 had unilateral infection of the parotid gland that resolved after a course of intravenous antibiotics.

The average length of postoperative hospitalization was 2.4 days (range, 1-5 days). The families or caregivers of 72 children (77%) were interviewed. The aver-
PATIENTS AND METHODS

SURGICAL PROCEDURE

Antibiotic therapy was preoperatively administered to cover intraoral flora and was continued for 7 days after surgery. The procedure was performed with the patients under general anesthesia. Bilateral submandibular incisions were used. The submandibular glands were identified and excised with preservation of the surrounding neural structures, including the marginal mandibular branch of the facial nerve and the hypoglossal and lingual nerves. A mouth gag was inserted, and each parotid opening was identified in the buccal mucosa. Then the duct was cannulated with a probe, and an elliptical incision was made around the duct papilla. The duct was dissected for approximately 1 cm, and the suture was ligated and then resected. The buccal mucosa was closed with interrupted absorbable sutures.

Intravenous hydration was begun after surgery, and the patients were encouraged to take fluids by mouth as soon as they were able. They were not discharged until all drains had been removed and their oral intake was adequate.

PATIENTS

Ninety-three children with chronic sialorrhea underwent bilateral SGE with PDL from January 1988 to December 1997 at the Children’s Hospital, Cincinnati, Ohio. The parents or caregivers of the patients were contacted by telephone and questioned about the results of the surgical procedure. Inquiries were made into the preoperative and postoperative levels of sialorrhea, care requirements, thick secretions, dry mouth, overall satisfaction with the procedure, and any complications that may have occurred and were not documented in the patient’s chart. The parents or caregivers were also questioned about the number of dental caries and lower respiratory tract infections before and after the surgery. Postoperative drooling was assessed as to whether it was the same as, or better or worse than, the preoperative state, based on the family’s or primary caregiver’s description. The patients’ improvement was measured according to the number of shirts or bibs that needed to be changed each day before and after the surgery. Patients were characterized as having no improvement of drooling if the rate was the same as the preoperative level, or worse. If no overall improvement was noted after surgery, the family or caregiver was questioned regarding any initial improvement and the interval of time before relapse occurred. The patients’ charts were retrospectively reviewed to determine operative and postoperative complications and length of postoperative hospitalization.

Average time of follow-up was 4.2 years (range, 1-10 years). Significant improvement in drooling was reported in 47 patients (65%), and no further drooling was noted after surgery in 15 patients (21%). All the families or primary caregivers reported that the overall care requirements and quality of life of the children were improved. There was no long-term postoperative improvement in drooling in 10 children (14%); however, 2 of the 10 had fewer lower respiratory tract infections after the surgery. Six of the 10 children had 1 to 2 months of improvement after surgery, but then the drooling recurred. Postoperative dry mouth occurred in 7 children, and there was an increase in dental caries in 2 children.

Various methods have been advocated for the management of drooling in the pediatric patient. Depending on the severity of the drooling and the patient’s cognitive level, the initial treatment could be nonsurgical, eg, behavioral programs, biofeedback techniques, physiotherapy, and prosthetic devices. Medical therapy for drooling that is not controllable by these methods may be initiated using antihistaminic and anticholinergic agents. However, the long-term use of these agents may be associated with significant adverse effects.

Surgery is recommended primarily for patients who have profuse and consistent drooling or significant cognitive impairment, making nonsurgical therapy impractical. It is also recommended for those children who continue to have significant sialorrhea despite appropriate nonsurgical therapy. Several procedures for surgical control of drooling in children, including destruction of the parasympathetic control fibers, salivary gland excision, ductal ligation, ductal rerouting, and various combination procedures, have been reported in the literature. However, there is significant disagreement regarding their safety and long-term efficacy.

Parasympathetic denervation is initially successful, but drooling may return, and because of the ophthalmic risks, this procedure is contraindicated in a patient with compromised hearing. Submandibular duct rerouting has very good results; however, the increase in salivary flow to the oropharynx may cause salivary contamination of the lower respiratory tract. This procedure has few complications, although ranulas may occur. Parotid duct ligation is commonly performed to control sialorrhea. In contrast, submandibular duct ligation has not been routinely performed. Ligation of the submandibular duct may increase the likelihood of calculus formation compared with ligation of the parotid duct because of the higher alkalinity and viscosity of submandibular saliva, the higher concentration of calcium and phosphate salts, the longer duct system, and the statistics that is associated with the orifice being superior to the gland. Klem and Mair recently reported on their experience with 4-duct ligation in 5 patients. The procedure was able to control aspiration pneumonia in these patients. No major complications were noted; however, the period of follow-up was relatively short. Larger series and longer follow-up periods will be needed to determine the role of this procedure in the management of chronic sialorrhea.

At our hospital, the preferred treatment for children with drooling is bilateral SGE with PDL. Removal of the submandibular glands eliminates resting salivary flow in the majority of children, while ligation of the
parotid ducts eliminates the major source of food-stimulated salivary production. In our experience, the morbidity associated with this procedure was not significant, and the hospital stay was relatively short. Significant postoperative swelling of the parotid glands was quite rare in our series, possibly because of the use of preoperative and perioperative antibiotic treatment in our patients. Some authors have suggested that xerostomia, with its associated increase in dental caries, is a major complication of the surgical procedures to control drooling. However, in our experience, this was not a significant problem. Most likely, an adequate amount of saliva continues to be produced from the minor salivary glands, which prevents xerostomia and dental caries in most of the patients.

As with other authors, we found that bilateral SGE with PDL was a safe and effective technique. Our study demonstrates that this procedure is beneficial in the majority of patients and should be considered an option in cases in which surgical management of drooling is appropriate.

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Corresponding author: Yoram Stern, MD, Department of Pediatric Otolaryngology, Schneider Children’s Medical Center of Israel, 14 Kaplan St, Petah Tiqva 49202, Israel (e-mail: sterngoldberg@bezeqint.net).