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PALATAL REHABILITATION AFTER CLEFT PALATE SURGERY

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Rehabilitation of the patient after cleft palate repair presents a significant challenge to the cleft palate team. Up to 75% of patients with repaired cleft palates will have velopharyngeal insufficiency defined as an inability to separate the oropharynx from the nasopharynx. Dysfunction occurs in palatal, posterior pharyngeal wall and lateral pharyngeal wall musculature. Affected children compensate for the loss of velopharyngeal port closure by positioning the tongue posteriorly in the oropharynx. This results in a loss of tongue-to-alveolar contact causing omission of alveolar consonant production. These children also have hypernasal speech and cannot form fricatives.

Six muscles function to close the velopharyngeal port. The palatopharyngeus, palatoglossus, levator veli palatini, tensor veli palatini, and musculus uvulae make up the muscular palate. The sixth muscle, the superior constrictor, constitutes the lateral and posterior pharyngeal walls and Passavant's ridge (found in 20% of the normal population). All muscles are innervated by the pharyngeal plexus (Cranial Nerve X) with the exception of the tensor veli palatini (Cranial Nerve V) and the levator veli palatini (Cranial Nerve VII). In the cleft palate patient incomplete fusion occurs at the palatal aponeurosis preventing the union of the muscular mass required for secondary palatal formation and function.

The goals of cleft palate repair are to ensure an acceptable aesthetic result, allow satisfactory facial growth, and, most importantly, to allow for as near-normal speech

production as possible. Diagnosis relies primarily on the ear of a well-trained speech pathologist. Cine radiography and nasal endoscopy have supplanted acoustic and nasal emission techniques as the primary adjunctive assessment measures. Lateral, basal, frontal and Towne view videofluoroscopy with supplemental barium injected into the nasal ports provide dynamic assessment of velopharyngeal function. The Towne view is the most useful of the four projections. Nasal endoscopy allows the physician to directly visualize velopharyngeal function in the dynamic state. The seventy-degree Hopkins rod is the gold standard for visualization but is poorly tolerated in children less than 10 years old. Flexible fiberoptic nasoendoscopy can be successfully used in children as young as 4 years of age.

Treatment options for the immobile postoperative palate include palatal training, palatal appliances, posterior pharyngeal wall augmentation, and further surgical correction. Cole has classified palatal training measures into indirect, semidirect and direct. Indirect methods include speech therapy with articulation training, and biofeedback from acoustic and endoscopic data. Semidirect methods employ non-speech exercises such as sucking, swallowing and gagging. Effects only last as long as therapy continues and only a poor carry-over to speech can be expected. Direct measures use stimulation of the palatal musculature itself. Techniques using inflatable velopharyngeal prostheses, tactile stimulation, and electrical stimulation of individual muscles have limited success rates long- term.

Palatal appliances are indicated in patients unable to undergo anesthesia for surgical repair, with badly scarred postoperative palates, in patients refusing surgery, and with persistent palatal fistulae. Posnick reports using the palatal prosthesis to predict surgical outcomes prior to secondary repairs of the soft palate. Marsh and Wray found an equal success rate in children treated with palatal prostheses or surgery if compliance was maintained. Surgery, with a 9% complication rate, remained the method of choice since 35% of patients studied were non-compliant with palatal prostheses.

Pharyngeal augmentation can be used in patients with mild velopharyngeal insufficiency with an anteroposterior velopharyngeal gap of less than five centimeters, provided lateral pharyngeal wall mobility is adequate. No injectable material has won FDA approval although Remacle reported favorable results using collagen in a group of five patients.

Surgical options include pushback palatoplasty, pharyngoplasty, and palatopharyngoplasty. Pushback palatoplasty is useful in patients with short palates and good lateral pharyngeal wall mobility. Good levator veli palatini function makes pharyngoplasty a viable option in selected patients. Palatopharyngoplasty (velopharyngeal flap) provides a passive obturator for the velopharyngeal port but also requires mobility in the lateral pharyngeal walls. Surgical complications include bleeding, infection, airway obstruction, decreased lateral pharyngeal wall motion, and persistent velopharyngeal insufficiency.

In summary, velopharyngeal insufficiency is quite common after cleft palate repair. Early diagnosis is facilitated by videofluoroscopy and nasal endoscopy. Indirect and semidirect measures have proven of little value in rehabilitating these challenging patients, making surgery the treatment of choice in the majority of affected children. At Texas Children's Hospital the cleft palate team is utilizing digital palatal facilitation

with pressure being applied to the posterior muscular palate, compressing this flaccid structure posterosuperiorly until contact is made to the posterior pharyngeal wall. Favorable preliminary results have prompted a prospective study to evaluate the efficacy of this previously undescribed treatment option.

Case Presentation

A 5 1/2-year-old white male child was diagnosed at birth with Pierre-Robin Sequence (micrognathia, cleft palate, and glossoptosis), a ventricular septal defect, and feeding difficulties. At two months of age he underwent tracheotomy and gastric feeding tube placement. He was referred to the Texas Children's Plastic Surgery Service at nine months of age and was managed by the cleft palate team. Physical examination revealed a cleft involving only the secondary palate with a normal primary palate and alveolar ridge. At eleven months of age the patient underwent a pushback palatoplasty. After successful decannulation at 3 1/2 years of age he had his first videofluoroscopic exam by speech pathology revealing very poor soft palate mobility. Conventional speech therapy and palatal stimulation were started once daily in an attempt to obviate the need for a velopharyngeal flap. As evidenced by a repeat videofluoroscopic exam, the patient improved. The palatal stimulation was increased to 5 to 7 times daily. On repeat videofluoroscopy the palate showed marked improvement with aggressive palatal stimulation. A pharyngoplasty was done at five years of age to bring the posterior pharyngeal wall into approximation with the mobile but short palate. He continues to do well with regular follow-up.

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