Elongated Pharyngeal Flap in Extensive Clefts of the Hard and Soft Palate

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In some cases of extensive palatal defects surgical closure may be regarded as unfeasible, and the condition treated with an obturator prosthesis. In such a case the cleft can be closed in one operation by means of a pharyngeal flap elongated through a pharyngotomy according to Bengt Johanson (1966). Eleven patients who had used obturators were operated on between 1957 and 1978. The mean age of the patients was 39 years. All patients were cleft lip and palate or cleft palate cases; two unilateral, five bilateral, and four with an isolated cleft palate. In most of these patients a temporary tracheostomy was performed after which the pharynx was opened through a neck incision. A flap was created which reached the alveolar ridge. For oral closure, mucoperiosteal flaps were used.

Anterior palatal fistulas developed in two cases; one closed spontaneously and the other remained as a 3-mm fistula behind the alveolar ridge. Three patients had postoperative transient dysphagia. Phoniatric evaluation showed that two patients had better speech after operation than before with an obturator. Gross speech improvement at this late age should not be expected and is not the primary goal of the procedure. The aim of surgical closure with an elongated pharyngeal flap is to replace the obturator.

The superiorly based pharyngeal flap is routinely used in the treatment of velopharyngeal insufficiency. Combined with a palatal push-back procedure, most residual clefts can be closed. In some cases of extensive palatal defects surgical closure has been regarded as being unfeasible, and the condition is treated with an obturator prosthesis. However, using an obturator is distressing, so the patient usually raises the question of surgical closure. A pharyngeal flap, elongated by means of a pharyngotomy as described by Bengt Johanson (1966) offers a simple one-stage alternative to more complex multistaged procedures to supply tissue for palatal closure.

This study presents the surgical and phoniatric results from 11 obturated cleft palate cases operated on with an elongated pharyngeal flap.

MATERIAL AND METHODS

Eleven patients, having a mean age of 39 years (range 18 to 58 years) were operated on between 1957 and 1978. Six patients were males and five were females. The cases included two unilateral, five bilateral, and four isolated cleft palates. In only two cases had an attempt been made to close the palate. Each patient wore a palatal obturator prior to the present operation.

Operation

The first nine patients had a temporary tracheostomy performed; the last two cases had only oral intubation. The operation started with a pharyngotomy on the right side of the neck at the level of the middle and upper part of the
The thyrohyoideus muscle was incised, and the larynx was separated from the anterior aspect of the pharynx. The pharynx was opened longitudinally, and a 3-cm wide flap was raised from the posterior wall of the pharynx at the level of the cricoid cartilage and the sixth cervical vertebra. The inferior pharyngeal constrictor muscle was included in the flap, and care was taken not to intrude into the esophagus. The flap was raised 3 to 4 cm cranially and a stay stitch was fastened in the tip of the flap, which was brought up to the oral cavity. The donor site was closed with surgical gut, after which the pharyngotomy was closed in separate layers.

The operation was continued through the mouth. The flap was now extended cranially and laterally as far as possible. The elongated pharyngeal flap had a length of approximately 10 cm and was sufficiently long to cover the alveolar ridge. The superior pharyngeal constrictor muscle was included in the base of the flap. The viability is always good as shown by bleeding from the tip of the flap. Palatal mucoperiosteal flaps were elevated from the soft palate using the Wardill-Kilner technique. The elongated pharyngeal flap was adapted to the nasal defect and the mucoperiosteal flaps were moved backward and medially to cover the oral aspect of the cleft (Fig. 1). The lateral defects of the palate were packed with xeroform gauze. The patient was kept on parenteral feeding for the first few days and in cases with tracheostomy, decanulation was performed on the third through fifth postoperative day.

RESULTS

Surgical Results

In 2 patients an anterior fistula developed; one closed spontaneously and the other remained as a 3-mm fistula behind the alveolar ridge. None of the patients required a second operation. In all patients the pharyngeal flap and the soft palate remained intact and permitted disposal of the palatal prosthesis. Three patients had postoperative dysphagia, two of which subsided spontaneously. In the third patient esophagoscopy showed a spastic contracture but no anatomical stricture in the upper part of the esophagus, and the condition was treated successfully with dilatation (Figs. 2 to 4).

FIGURE 1 Diagram of defect and procedure of the elongated pharyngeal flap. A. Extended superiorly based pharyngeal flap marked on posterior pharyngeal wall. Flap reaches the sixth vertebral body. B. Flap raised and sutured to palate. Lateral mucoperiosteal flaps are outlined.
Phoniatric Assessment and Results

Ten of the 11 patients were available for phoniatric examination. Speech assessment was based on postoperative tape recordings (Revox A 77) of a standard passage read in a soundproof room. The evaluation was performed by a clinically experienced listener (RS). Because most of the patients had been operated on in the 1950s and 1960s, a preoperative recording was available in only one case. In the remaining nine cases, judgments of preoperative speech were based on hospital records from the speech clinic.

Following the elongated pharyngeal flap operation, speech was judged to be socially acceptable in eight of the ten patients. In all ten patients, deviations from normal speech were noted with respect to nasality, articulation, or both. Four patients demonstrated normal articulation combined with slight degrees of hypernasality or hyponasality. On clinical examination, these cases presented satisfactory mobility of the soft palate and pharyngeal walls. Severe hypernasality, observed in the two patients whose speech was judged socially unacceptable, tended to be as-
associated with an asymmetrically positioned pharyngeal flap, resulting in a wide defect of palatopharyngeal closure.

The articulation disorders, when present, consisted of glottal compensation, pharyngeal production of sibilants, and sigmatism.

Comparison of postoperative tape recordings with information in preoperative speech reports indicated that speech was unaltered in seven patients and improved in two patients. Each of these two patients had a pharyngeal flap positioned in the midline and satisfactory mobility of the soft palate and pharyngeal walls. In the tenth patient, hypernasality was perceived to be worse after the operation. This patient had had a prior palatoplasty attempted and demonstrated a decreased mobility of the soft palate and pharyngeal walls after the pharyngeal flap operation, but the flap

FIGURE 3 Forty-eight-year-old woman with total cleft of palate. A. Preoperative view of extensive defect. B. Extended pharyngeal flap 6 years after operation. Speech improved in comparison to that achieved with obturator.

FIGURE 4 Eighteen-year-old man with left repaired cleft lip and open palate. A. Preoperative view. B. Palate 25 years after closure with an extended pharyngeal flap. Central part of the hard palate is soft and irregular but has no fistula.
was also asymmetrically positioned and the operation complicated by an anterior fistula. As expected following adult surgery, there was no evidence of change in articulatory behavior.

Radiography and Electromyography

Lateral radiographs show the flap extending from the posterior pharyngeal wall to the posterior palate at the level of the hard palate. The pharyngeal valve closes as the flap contracts (Fig. 5). By fiberoptic nasendoscopy the lateral pharyngeal walls are seen to move medially and close the lateral ports in most patients. In one case it was possible to obtain an electromyographic (EMG) recording from the part of the elongated pharyngeal flap that crosses the epipharynx. When the palate was actively closing, action potentials were recorded from the flap indicating muscular contraction.

DISCUSSION

The widespread use of the regular pharyngeal flap has resulted in a decrease in the use of obturators in the management of palatal clefts. However, two indications for prostheses remain; wide clefts of the soft and hard palate with insufficient local tissue for surgical repair and surgical failures.

A palatal prosthesis is in most cases a successful speech aid. The patient, however, experiences local irritation and discomfort from the bulkiness of the obturator. Because it is a foreign object, the obturator has to be attended to daily, but it still causes difficulties in oral hygiene. Furthermore, a prosthesis may have to be changed at intervals either because of ill-fit or material fatigue. The need for dental fixation may also harm the teeth and cause their premature loss, compounding difficulties in the retention of the palatal prosthesis. Therefore, the use of natural structures is always preferred, and a prosthesis is reserved as a last resort when surgical closure is judged to be hopeless.

Extensive clefts of the hard and soft palate are difficult to close using local tissues. The velum alone may be closed with a regular pharyngeal flap, and the residual cleft in the anterior palate may be left for secondary closure. This may be accomplished in certain cases by means of local or tongue flaps, but in most cases distant tissues (e.g., tubed pedicle flaps) have to be used to obtain sufficient tissue (Padgett, 1936; Longacre and Gilby, 1954; Gillies, 1957). However, these methods are difficult and plagued with failures, and an alternative solution to close extensive palate defects is needed. One answer is the superiorly based elongated pharyngeal flap which provides material for the entire nasal lining (Fig. 6).

The pharynx is usually wide in patients who have worn a palatal prosthesis, and the pharyn-

![FIGURE 5 Lateral radiographs of pharynx. A. At rest showing a thick elongated pharyngeal flap (arrows). B. Phonating /s/, soft palate is elevated and flap contracted.](image-url)
geal constrictor muscles become hypertrophied as they are stimulated to move the pharyngeal wall towards the prosthesis. The elongated pharyngeal flap is therefore thick and well vascularized. The perfusion at the end of this long flap is satisfactory despite the unfavorable length-to-width ratio. Furthermore, the pharyngeal flap is an arterial flap because of the longitudinal arrangements of the vessels in the posterior pharyngeal wall, and the survival length is related to the length of these vessels. The inclusion of a thick and broad muscle in the pedicle may also account for the contractile quality as shown by EMG and radiographs.

By means of the pharyngotomy, the length of the flap can be extended down through the entire length of the posterior pharyngeal wall. This usually results in a 10-cm long flap. The width is commonly 2.5 to 3 cm. It is of utmost importance not to cross the borderline to the esophagus, since this may cause a stricture of the esophagus. Swallowing difficulties were noted during the repair phase in two of the 11 patients, and another patient had persistent dysphagia owing to a spastic contraction in the upper part of esophagus which was successfully treated by dilatation. The reason for spastic stenosis may be a transient dysfunction of the swallowing mechanism caused by the transection of the pharyngeal constrictor muscles.

In all cases the oral defects were covered with lateral mucoperiosteal flaps of Wardill-Kilner. When the palatal shelves were narrow, the flaps could be augmented by adding nasal mucosa from the margin of the palate to the medial sides of the oral flaps.

Of ten patients available for preoperative phoniatric evaluation, nine had some velopharyngeal inadequacy and closure problems with obturation, but their speech was considered socially acceptable. Improvement of speech after surgical repair was only noted in two patients. In one patient, the development of an anterior fistula resulted in impairment of speech, but this 53-year-old man still expressed an overwhelmingly positive opinion of the operation. A similar finding has been noted in 13 patients who had used obturators before palatal reconstruction using a regular pharyngeal flap. In this group several of the patients with no improvement, or even slightly worse speech, indicated that speaking was easier and that they were pleased with
the results (Engström et al., 1970). Gross speech improvement at late age (mean 39 years) should not be expected; the reason for surgical closure with an elongated pharyngeal flap should not be to improve speech but to dispense with the obturator.

In summary, a method has been described where obturator-treated palatal defects can be closed by means of a pharyngeal flap elongated through a lateral pharyngotomy. Eleven patients treated in this way were able to dispose of the palatal prosthesis. This technique may prove valuable in cases where traditional surgical methods of closing the palate are judged to be hopeless.

References


