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Treatment of submucous cleft palate by pharyngeal flap as a primary procedure

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KEYWORDS
Submucous cleft;
Velopharyngeal incompetence;
Hypernasality;
Pharyngeal flap

Summary

Objective: (a) Palatal repair is the standard surgical method for correction of velopharyngeal incompetence due to submucous cleft, but some patients may need further narrowing of velopharynx by pharyngeal flap. (b) The purpose of this study is to evaluate the efficacy of a pharyngeal flap as a single surgical procedure in the treatment of symptomatic cases.
Methods: Nine cases of symptomatic submucous cleft palate were subjected to treatment by pharyngeal flap only as a primary and single procedure after failure of speech therapy. Preoperative flexible nasopharyngoscopy was carried out for all children to determine the width of the velopharyngeal gap; the results were recorded on videotape and reviewed in the operating theatre for determination of the width of the pharyngeal flap. Postoperative follow-up by flexible nasopharyngoscopy and parent's questionnaire were used to assess the success rate.
Results: Follow-up flexible nasopharyngoscopy showed complete closure of the lateral ports in eight cases (89%) while one case (11%) showed incompetence. Hypernasality was improved in all cases witnessed by parent's questionnaire and this improvement was satisfactory in seven cases (78%) but not satisfactory in two cases (22%). One of the last two cases reached to satisfactory level after speech therapy, while the other case showed no further improvement.
Conclusions: Speech therapy alone cannot correct hypernasality in presence of anatomical defect. Pharyngeal flap is a useful procedure monitored by flexible nasopharyngoscopy. When pharyngeal flap is used, the need for adjunctive procedure is absent.

1. Introduction

The term submucous cleft palate is used to describe the condition which consists of a bifid uvula, translucent zona pellucida caused by deficient muscular

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structure in the midline of the soft palate and notched posterior border of the hard palate [1,2]. However this definition was denied before by Crikelair et al. in 1970, as all cases of overt cleft palate should leave zone that can truly be called a submucous defect after palatoplasty, if the hard palate is involved because only mucous membrane is closed over this area of the defect [3].

The incidence of this deformity has been reported to be 0.02—0.08%. In the larger of these series, the incidence of velopharyngeal insufficiency among patients identified to have submucous cleft palate was 1—9 [4]. Submucous cleft may occur sporadically or it may be present in association with other craniofacial abnormalities [3].

The structural presentation of submucous cleft palate indicates that the levator palati muscles have been shifted from their normal transverse orientation to a longitudinal position. The muscles, presumably important for normal speech, insert aberrantly on the bony free edge of the hard palate instead of forming a complete muscular sling leading to inability of the posterior margin of the soft palate to fully contact the pharyngeal wall [5].

About 50% of cases with submucous cleft palate will have speech disorders but this study was conducted in tertiary referral cleft clinics; thus the actual frequency of symptomatic patients may be lower [6].

The degree of velopharyngeal insufficiency that can exist is based on the anterior displacement of the muscles. However submucous clefts may be overlooked in neonates because they may be asymptomatic. Early manifestations include nasal reflux of liquids or food. Later, as speech develops, hypernasal speech or nasal emission may result [7].

Controversy exists regarding whether the incidence of otitis media with effusion is increased in children with submucous clefts. Studies have revealed an improvement in effusions following repair of a submucous cleft. However, more recent studies have revealed no improved resolution of the effusion after surgery [3,6].

Techniques for closure of submucous clefts are the same as those used for closure of overt cleft which are usually palatal push back or Furlow Z-plasty. Alternatively, the surgeon can use a pharyngeal flap technique or a pharyngoplasty. Pharyngeal flaps are usually superiorly based pedicle flaps of mucosa and underlying constrictor muscle. The overall goal is to create lateral ports that can easily close. Use of a pharyngeal flap is best when a sagittal closure pattern exists (i.e., when the greatest contribution to velopharyngeal closure is lateral wall movement). A sagittal closure pattern most commonly occurs with a cleft palate.

The aim of this study is to evaluate the efficiency of a pharyngeal flap as a single and primary surgical method for treatment of velopharyngeal insufficiency caused by submucous cleft without the need for reconstruction of palatal muscles, which when used primarily, may need secondary pharyngeal flap.

2. Methods

This study was conducted on nine cases with submucous cleft palate. Their ages ranged between 5 and 10 years. Five were males and four were females. All cases were collected from the ENT outpatient clinics of Kasr Elaini and Abou Rich children hospital in the period from May 2004 to April 2006, of these cases six were referred from Phoniatric clinics.

All cases were complained of hypernasal speech and on examination; they showed the three criteria of submucous cleft palate which means bifid uvula, bluish zona pellucida of the soft palate (Fig. 1) and notched posterior border of the hard palate.

Speech therapy was tried to correct the hypernasality for all cases before coming to the ENT clinic with no success.

All cases were subjected to the followings:
Preoperative evaluation:

- Full ENT examination.
- Flexible nasopharyngoscopy (Fig. 2A and B): the nose is decongested and anesthetized with a mixture of 4% lidocaine and 0.05% oxymetazoline hydrochloride. The nasopharyngoscope is passed through the nostril, superior to the inferior turbinate, to the choana. Passage of the scope along the floor of the nose does not position the fiberscope

Fig. 1 Bluish zona pellucida in the midline of the soft palate.

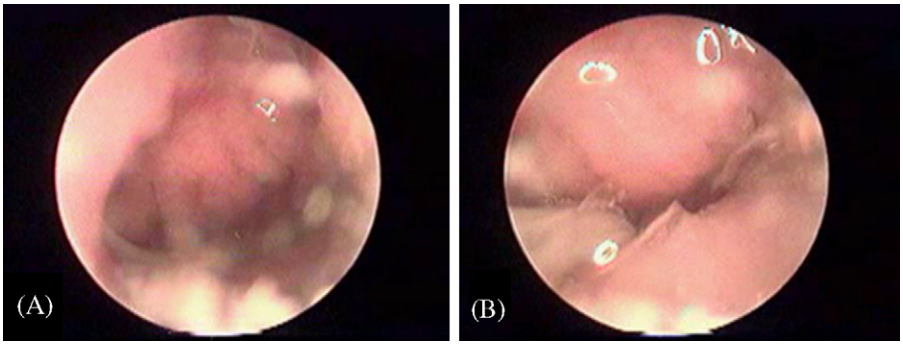

Fig. 2 (A) The velopharynx when open during breathing while (B) the velopharynx when close during articulation of the words Coca Cola for the same patient.

high enough to allow for visualization of the entire velopharyngeal sphincter. With the fiberscope in place, the patient is asked to repeat a series of words loaded with phonemes that require increased oral airflow ''Coca Cola'' in order to observe the velar closure pattern and the width of the velopharyngeal gap.
- General medical examination to exclude any other congenital anomalies.

Operative technique:

- Elevation of a superiorly based posterior pharyngeal wall flap (superior constrictor muscle and its overlying mucosa) was carried out; the width of the flap was decided by reviewing a videotape record of preoperative flexible nasopharyngoscopy.
- Splitting all layers of the soft palate horizontally was performed between the posterior border of hard palate and the posterior border of the soft palate.
- The pharyngeal flap was passed through the palatal split and sewn into position.

Postoperative follow-up:

- The patients were discharged after 2 days and they were given oral antibiotic and semisolid foods for 10 days.
- Two weeks after the operation: all patients were seen to assess healing of the wounds.
- Three months after the operation: flexible nasopharyngoscopy was carried out for all cases to assess the stability of the flap.
- One year after the operation, all patients were seen to determine the success by two methods:

The first is flexible nasopharyngoscopy for direct visualization of the stability of the pharyngeal flap and degree of closure of the two lateral ports during articulation of phonemes with high oral pressure (Coca Cola) and if these lateral ports are sufficient for breathing or not.

The second method is parent's questionnaire, which was used to determine the degree of improvement of hypernasality and they were asked to answer three questions:

- Did the speech improve or not?
- If improved; was the improvement satisfactory or not?
- If there was snoring after the operation, and if it was associated with apnea?

3. Results

As regards the results of flexible nasopharyngoscopy, all pharyngeal flaps were stable in place without tethering of the soft palate bridging the central part (zona pellucida) which was deficient in muscles. The two lateral ports were sufficient for breathing without vibration of any redundant tissues in all cases.

During articulation of the words Coca Cola, eight cases (89%) showed complete closure of the lateral ports without gaping or bubbles while one case (11%) showed incompetence with few bubbles passed from oropharynx to nasopharynx.

Fig. 3A shows the lateral ports when open during breathing while Fig. 3B shows the lateral ports when close during articulation of the words Coca Cola for the same patient.

Parent's questionnaire demonstrated improvement of hypernasality in all cases but this improvement was satisfactory in seven cases (78%) and not satisfactory in two cases (22%). One of the last two cases reached to satisfactory level after speech therapy elevating the satisfactory results to eight cases (89%), while the other case showed no further improvement.

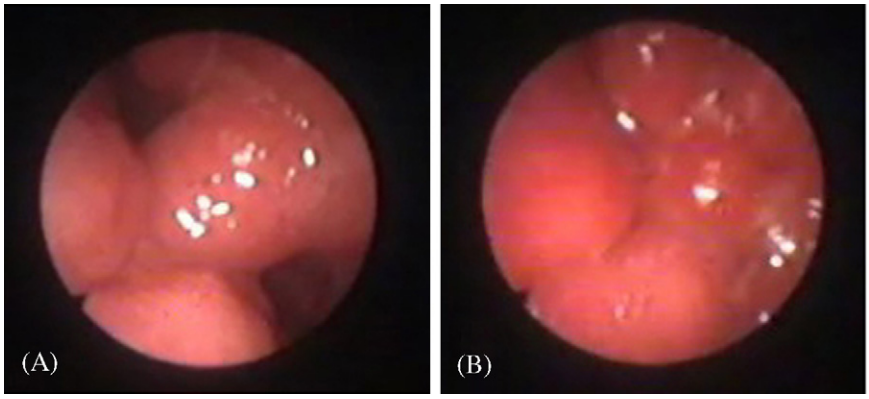

Fig. 3 (A) Open lateral ports during breathing while (B) closed lateral ports during articulation seen by flexible nasopharyngoscopy for one of the studied cases.

The case that showed no satisfactory improvement is the same case that presented by persistent incompetence of the lateral ports by flexible nasopharyngoscopy.

No cases developed upper airway obstruction or hyponasality after the operation.

4. Discussion

In submucous cleft, there is a deficient area of muscles in the central part of the soft palate; this area is covered by mucosa only which may be insufficient for tight closure of the velopharynx during articulation of phonemes with high oral pressure. Some authors used palatoplasty to reconstruct the musculature and covering the central defect through using either Furlow or push back techniques [4,8,9]. Palatoplasty may carry a high incidence of failure with residual hypernasality; this is due to the abnormal thin palatal muscles and then velpharyngeal closure is mainly by lateral pharyngeal wall motion; in this case a pharyngeal flap could be used as a secondary procedure to close the residual gap. However Seagle et al. reported a high success rate of 83% for cases of submucous cleft treated by Furlow Z-plasty but they commented that a high rate of success can be obtained for cases with velopharyngeal gaps of 8 mm or less, and less likelihood of success when the gap exceeded 8 mm [10].

Our study showed a high incidence of success (89%) after closure of the gap with pharyngeal flap and no cases developed hyponasality or airway compromise which is usually the disadvantage of a wide flap. The new in our study is the review of preoperative flexible nesopharyngoscopy recorded on a videotape in the operating theatre to decide the width of the flap which should be matched with width of the velopharyngeal gap. By this method, a narrow flap could be avoided which may lead to residual hypernasality (i.e. failure), and a wide flap could also be avoided as it may result in hyponasality and airway obstruction.

Husein et al. reported a success rate of 80% for cases of submucous cleft treated by pharyngeal flap but they reported a postflap hyponasality in 10% of cases and postoperative airway problems in 1 out of 38 cases [11]. Park et al. reported a success rate for hypernasality of more than 90% after pharyngeal flap — matched with our results — and about 44% after pushback palatoplasty that may need secondary pharyngeal flap to correct the residual velopharyngeal incompetence [12].

Finally, we conclude that surgical treatment of submucous cleft is indicated only when velophayngeal incompetence has been demonstrated and pharyngeal flap is a useful procedure monitored by flexible nasopharyngoscopy. Using palatoplasty as a primary procedure may need secondary pharyngeal flap to close the residual gap against the lateral pharyngeal walls. When pharyngeal flap is used, the need for adjunctive procedure is absent. However speech therapy alone cannot correct hypernasality in presence of anatomical defect.

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