

Pharyngoplasty with suture of mucosal flap complementary coverage for treating pharyngeal stenosis

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Abstract

Exploring a new method of pharyngoplasty surgery, which uses CO2 laser to dislocate the mucosa and then covers the wound with mucosal flap complementary sutures, successfully preventing postoperative pharyngeal stenosis.

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Disclosure statement:

There is no financial conflict of interest to disclose.

Ethical Statement

The investigation has been approved by the Institutional Research Ethics Committee of EENT Hospital, and that the investigators have obtained written informed consent from participant and guardians.

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Author contribution

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Key clinical message

A 9-year-old boy suffered pharyngeal stenosis secondary to caustic ingestion, presenting with dyspnea and slurred speech. Pharyngoplasty with mucosal dislocation incision and complementary suture was performed on the patient. Over the course of six months of follow-up, the patient's symptom of dyspnea completely disappeared and his phonation was improved.

Introduction :

Pharyngeal stenosis can be congenital or acquired. At present, congenital pharyngeal stenosis has been reported more frequently^[1], while acquired pharyngeal stenosis, especially those caused by corrosive injury, has been reported less frequently, especially in children. In this article, we will introduce a novel surgical procedure for the treatment of pharyngeal stenosis caused by caustic ingestion, which may function in preventing adhesions and stenosis recurrence, and a case report of child who unfortunately suffered from this disease will be presented.

Case History:

The patient is a 9-year-old boy. 6 years ago, he swallowed detergent, a strong alkaline substance by accident. Although he expectorated the substance immediately, he appeared lip edema and burning of the mouth. Immediately sent to the hospital, gastroscopy showed esophageal injury. Antibiotics and glucocorticoid were given intravenously. Because the patient could not ingest food orally, the nasogastric tube was inserted to guarantee nutritional support. After 7 days of treatment, the patient showed no symptoms such as hoarseness, dysphagia, or dyspnea, and was discharged after the nasogastric tube was removed. Pharyngeal stenosis was not found on examination at this time. One month after the injury, the patient developed respiratory symptoms such as dyspnea and cough. Tracheoscopy revealed significant pharyngeal stenosis, but surgery was not performed due to the patient's young age and the symptoms were not obvious.

Before admission this time, the symptoms worsened progressively of dyspnea, wheezing, slurred speech without obvious causes, while hoarseness, dysphagia and other symptoms didn't occur. At admission, fibrolaryngoscopy showed a defect of the upper epiglottis, adhesion of the epiglottic stump to the posterior pharyngeal wall, and a small hole remaining on the right side. Aryepiglottic folds, false and true vocal folds were smooth (Fig 1).

Methods

After discussion, our department decided to perform adhesion incision and pharyngoplasty with CO2 laser. After the laryngeal surface anesthesia with fiber bronchoscope, the patient was intubated awake with the light stick. After general anesthesia, the patient was placed in a head back and supine position. Under the microscope, a moist cotton pledget was placed around the anesthesia cannula with a diameter of about 6mm to protect the anesthesia tube balloon. Before incision, the anesthesiologist was informed to change the anesthetic gas to mixed gas. CO2 laser (2W, continuous mode) (DEKA SmartXide²C60 M103F1) was used to melt the mucosa on the right side of the epiglottic lingual surface through the small hole, and we lifted the superior mucosal flap for later use. Then we created the two-layer mucosal flaps by dislocation incision of the inferior adhesive mucosa and turned the mucosal flap from the pharyngeal cavity surface towards the lingual surface. To shape the right epiglottic mucosa, a 6-0 vicryl was used to suture the mucosal flap and the incisal margin of the lingual surface mucosa of the epiglottis together. Then the excess mucosa was removed. Sutured the mucosal flap on the lateral pharyngeal wall to the peripheral edge of the mucosa to shape the hypopharynx (Fig 2). The same went for the left side.

Results

Tracheotomy and nasogastric tube insertion were not performed during the treatment. The patient was able to eat orally without choking the first day after surgery, and the symptom of dyspnea was significantly improved. Laryngoscopy showed no recurrence of pharyngeal stenosis 3 weeks after operation (Fig 3). At follow-up six months after the surgery, his parents reported that breathing problems had disappeared and slurred speech had improved.

Discussion

Caustic ingestion of household cleaner by children aged 2-6 years accounted for 80% of cases of caustic injury. The severity of the injury depends on a number of factors, such as the property (acid or base), state and quantity of the substance. Acids produce coagulation necrosis, causing cicatrices, while alkalis produce liquefaction necrosis, immediately leading to severe penetrating damage. As to physical form, the rapid flow of liquid substances not only damages the mouth and pharynx, but also causes digestive tract burns^[2, 3]. Due to the protective effect of the epiglottis, the vocal cords are generally not damaged, which explains why hoarseness is uncommon in these patients.

Pharyngeal stenosis is a complication caused by ingestion of harmful substances, total laryngectomy, chemoradiation, or malignant tumors. The cases of pharyngeal stenosis surgery caused by caustic ingestion are few. Berlucchi M^[4] and Velasco KJS^[5] chose the same way of removing the stenosis directly and applying mitomycin C to prevent the stenosis. We sought improvement upon this foundation.

How to prevent fibrosis and recurrence postoperatively is always a challenge to surgeon. Whether using a cold instrument or CO2 laser, simple excision of the tissue increases the risk of postoperative recurrence and scar formation. Many researchers have worked on this problem. Placement of laryngeal stent and graft of intervening tissue has been proven to improve phonation^[6, 7]. Yilmaz T^[8] first proposed the concept of butterfly mucosal flap. The sutured flaps covered raw surfaces, thus diminishing the risk of reformation of web postoperatively. Subjective and objective voice indicators and ventilation were significantly improved with this technique. In opinion of the author, besides smearing chemical drugs like mitomycin and steroids, these methods are all about diminishing the contact of surgical wounds to prevent recurrence. This technique is based on the same principle.

In the surgical treatment of glottic web, the removal of excess mucosa is controversial. Schweinfurth^[9] recommended removal of excess mucosa directly, while Yilmaz T^[8] suggested that the mucosal flap was insufficient to cover all the exposed mucosal surface and thus should be preserved. However, this problem is absent in the hypopharyngeal stenosis area in consequence of the larger mucosal area. But there is a fact that the flap shrinks during the development process. It should be noted that the flap should not be too small and the tension should not be too high during the process of making the mucosal flap and suturing.

At the beginning of the operation, the anesthesiologist should stop supplying pure oxygen and instead supply mixed air to prevent the airway from burning due to the laser. Tracheotomy and insertion of nasogastric tube after pharyngoplasty are often difficult to avoid. In this case, the patient's parents were very resistant to tracheotomy and nasal feeding. Finally, the patient did not suffer these means, and achieved satisfactory therapy effect.

It is the first case in which CO2 ablation and mucosal flap suture have been applied conjunctively to the treatment of pharyngeal stenosis caused by caustic ingestion. This new attempt yielded satisfactory results. Upholding the principle of covering the bare mucosal wound, the method could be applied to similar diseases, such as pharyngeal web, but it still needs more study and clinical practice.

Conclusion :

Pharyngoplasty with mucosal dislocation incision and complementary suture is an effective technique to resect stenosis and prevent the recurrence. More case studies are needed to practice and validate the effectiveness of this technology in treating pharyngeal adhesions and stenosis.

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Figure legends:

Fig 1. Preoperative laryngoscopy (a) Epiglottis stump adhered to the posterior pharyngeal wall. (b) Normal laryngeal structure

Fig 2. Intraoperative view (a) Preoperative view. (b) Remove superior mucosal flap. Arrow shows the direction of mucosal inversion. (c) Turn the mucosal flap of pharyngeal cavity surface (asterisk) to the lingual surface. (d) Suture the mucosal flap. Triangle indicates excess mucosa. (e) Remove excise excess mucosa. The incisal edge of lateral pharyngeal wall (arrow) is still bare, remained to be sutured. (f) Postoperative view showed good shape of the epiglottis.

Fig 3. Endoscopy performed 21 days after surgery.



