



## Labioglossopexy and epiglottopexy

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### KEYWORDS

Labioglossopexy;  
 Lip-tongue adhesion;  
 Pierre Robin  
 sequence;  
 Epiglottopexy;  
 Laryngomalacia

Suspension techniques may be useful in correcting certain forms of pediatric airway obstruction. Pierre Robin sequence and laryngomalacia are two such disorders, characterized by collapse of the tongue and prolapse of the epiglottis, respectively. This article describes in detail the approaches to suspension of the tongue (labioglossopexy) and the epiglottis (epiglottopexy).

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Labioglossopexy (lip-tongue adhesion) and epiglottopexy are suspension surgical techniques used to relieve airway obstruction in children. Labioglossopexy is most commonly indicated in cases of Pierre Robin sequence in which securing the tongue anteriorly temporarily relieves retrodisplacement of the tongue while growth of the hypoplastic jaw progresses. In epiglottopexy, an adhesion is created between the epiglottis and the ventral surface of the tongue to elevate a retroflexed epiglottis. This finding is most common in patients with laryngomalacia and pharyngeal hypotonia. Other suspension techniques, such as those approximating the tongue base (Repose; InFLUENT Medical LLC, Concord, NH) or the hyoid bone to the anterior mandible, are used more commonly in the adult population.

### Labioglossopexy

Labioglossopexy was first described by Shukovsky in 1911 but was popularized in 1946 by Beverley Douglas.<sup>1</sup> This technique requires the removal of a triangular segment of mucosa from the ventral surface of the tongue, floor of the mouth, alveolus, and lip (Figure 1A). The raw surface of the ventral tongue is then sewn to the exposed areas of the floor of mouth, alveolus, and lower lip (Figure 1B and C). A tension suture is placed from the dorsal tongue through the lower lip and down to the chin (Figure 1D).

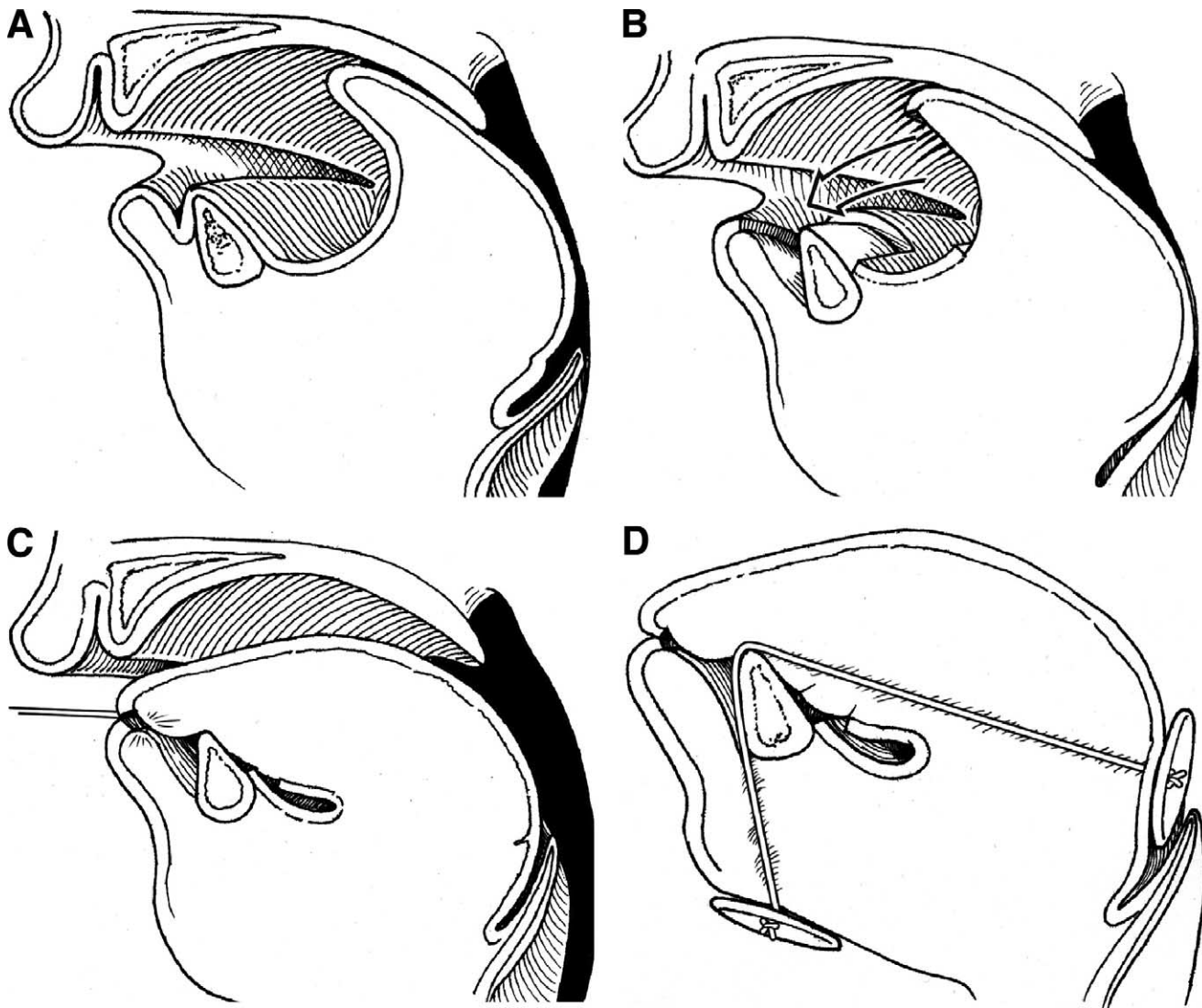
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However, many investigators have found a high rate of dehiscence with mucosal adhesion alone. In a study by Kirschner et al,<sup>2</sup> the dehiscence rate with mucosal adhesion alone was 41.6%. In 1960, Routledge<sup>3</sup> reported a modification of the Douglas technique that incorporated muscle of the anterior ventral tongue and lower lip while sparing the mucosa of the floor of mouth. He also placed a deep suture from the tongue musculature to the orbicularis muscle of the lower lip. Using this technique, success rates ranging from 70% to 83% have subsequently been reported.<sup>2,4,5</sup> The technique has since been further modified by using interdigitating flaps from the ventral tongue to the lip,<sup>6</sup> changing the incision,<sup>7</sup> and placing tension sutures in the tongue.<sup>8,9</sup> Other investigators<sup>1,10</sup> have advocated release of the genioglossus muscle because this muscle is short in Robin sequence as a result of mandibular hypoplasia. The base of tongue can also be anchored to the mandible<sup>11</sup> or hyoid.<sup>12</sup> Argamaso<sup>1</sup> further modified the Routledge technique with a 2-point attachment for stabilization of the tongue. In his series of 24 patients, he reported only 1 instance of partial dehiscence of the anterior tongue adhesion.

### Preoperative evaluation

A multidisciplinary team approach consisting of a pediatric otolaryngologist, craniofacial surgeon, speech pathologist, feeding therapist, pulmonologist, and anesthesiologist is essential for proper evaluation of airway obstruction in syndromic patients or those with Pierre Robin sequence. The work-up for airway obstruction should begin with a thorough history, with particular attention to airway obstruction, feeding difficulties (>30 minutes to finish a bot-



**Figure 1** (A-D) Traditional labioglossopexy. This technique creates a mucosal lip-tongue adhesion assisted by a tension suture. The adhesion may be unreliable, and the button stays on the tension suture may be uncomfortable and cause tissue necrosis.

tle), and failure to thrive. Office examination should focus on mandibular length, position of the tongue, other sources of pharyngeal obstruction, and other anomalies of the head and neck.

The physical examination should include flexible fiberoptic laryngoscopy, and direct laryngoscopy and bronchoscopy to assess accurately the tongue base and determine additional sites of obstruction. In addition, patients should be monitored overnight with pulse oximetry or evaluated by formal polysomnography to quantify the severity of obstruction. Those patients with obstruction of significance typically have oxygen desaturations to less than 80% or saturations less than 90% for more than 5% of the monitored time.<sup>13</sup> Children with feeding difficulties but only minimal obstruction (without desaturations) can usually be treated with feedings through a nasogastric tube. Conservative measures such as prone positioning or placement of a nasopharyngeal airway should be attempted in patients with a moderate degree of obstruction before proceeding with surgical intervention. However, individuals with severe obstruction or frequent desaturation generally require the establishment of a reliable airway with surgical procedures.

Labioglossopexy has been advocated when conservative measures fail to relieve obstruction or the infant fails to thrive, and the surgeon or caregiver wishes to avoid tracheostomy or early surgical distraction of the mandible. During endoscopic evaluation, the tongue can be pulled forward to see if the obstructive symptoms are adequately alleviated. Sher et al<sup>14,15</sup> classified the types of obstruction based on flexible fiberoptic laryngoscopy and found that obstruction caused by tongue retrodisplacement responded best to glossopepy, while other types of obstruction were best treated with tracheostomy.

### Surgical technique

Before surgery, preparation is made for intubation by flexible fiberoptic bronchoscopy or Bullard laryngoscopy in the event the larynx cannot be visualized using a standard anesthesia laryngoscope. After being taken to the operating room, the patient is anesthetized via mask and subsequently intubated by one of these techniques with an age-appropriate tube. Nasal intubation can be performed; however, our experience has been that an oral endotracheal tube does not

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