

Aryepiglottoplasty for Severe Laryngomalacia

¹Akanksha Saxena, ²Madhumita Kumar, ³Bini Faizal

ABSTRACT

Laryngomalacia is the most common cause of stridor in children below the age of 1 year. In majority of the cases it can be managed conservatively, but in severe cases intervention becomes necessary.

Objectives: To evaluate the outcome of aryepiglottoplasty (Cold steel method) in cases of severe laryngomalacia.

Methods: Retrospective. Review of medical records of 8 cases treated in Department of ENT, Amrita Institute of Medical Sciences from 2006 to 2011.

Results: Seven out of eight children had a favorable outcome.

Conclusion: Aryepiglottoplasty (Cold steel method) is an efficient, simple and low cost method for treating severe cases of laryngomalacia.

Keywords: Laryngomalacia, Pediatric stridor, Aryepiglottoplasty, Failure to thrive, Tracheostomy.

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INTRODUCTION

Laryngomalacia often presents with inspiratory stridor in infants. High velocity air flow through a narrowed airway gives rise to the characteristic sound. Stridor worsens when the child is agitated, crying, feeding or lying in supine position and is relieved on sleeping in prone position. Symptoms manifest as early as the first month of life and may persist up to 12 to 24 months of age.^{1,2} Active intervention is suggested only if the stridor is severe, or if child has failure to thrive due to regurgitation, intolerance to feeds or recurrent vomiting.^{2,3} Gastroesophageal reflux which is often undiagnosed may worsen the condition.^{4,5}

METHODS

This study is a retrospective analysis of medical records of 8 children who underwent aryepiglottoplasty during

the years 2006 to 2011, in Department of ENT, Amrita Institute of Medical Sciences, Kochi. All children were referred cases with severe stridor and failure to thrive. They were evaluated clinically and then subjected to awake flexible nasopharyngolaryngoscopy (Karl Storz 11101SK2, 2.5 mm), which revealed moderate to severe degree of laryngomalacia.⁵ Figure 1 shows one such finding.

These children underwent aryepiglottoplasty by cold steel method under general anesthesia. This procedure has been described by Venkatarthikeyan, Thakar and Lodha in 2005.⁶ After induction, a preliminary rigid bronchoscopy was done in all cases to rule out co-existing abnormalities of the tracheobronchial tree. Next the larynx was suspended and both the aryepiglottic folds were infiltrated with 2% Lidocaine + 1:200,000 Adrenaline solution. Microscissors were used to cut the aryepiglottic folds at their mid-point. (Fig. 2). Hemostasis was achieved by pressure application with an adrenalin soaked neurosurgical patty. Patients were extubated on table and postoperatively they were given adrenaline and budesonide nebulization every 2 hours for 24 hours. IV Dexamethasone 0.1-0.2 mg/kg body weight was given 8th hourly for 2 days, to reduce postoperative airway edema. Feeds were restarted on the 2nd postoperative day via nasogastric tube. If child tolerated nasogastric feeds, oral feeds were started on the 3rd postoperative day. Anti-reflux medications - (Omeprazole 1mg/kg body weight once daily and Domperidone 0.25 mg/kg body weight TDS) were given for 6 weeks postoperatively.

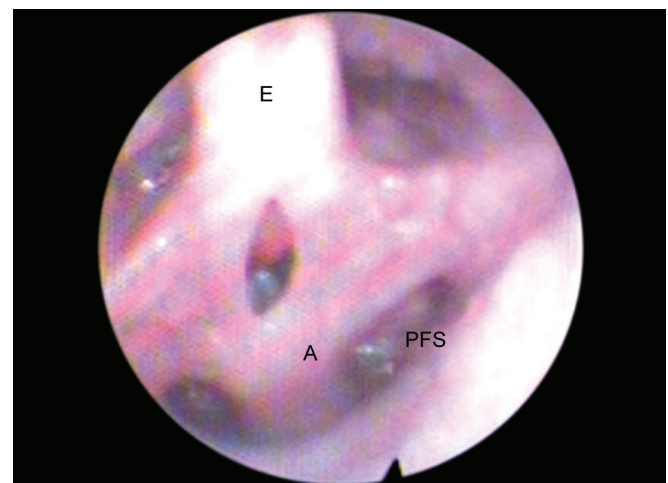


Fig. 1: Preoperative view of larynx during flexible nasopharyngolaryngoscopy. Slit-like supraglottic airway is seen. (E: Epiglottis; A: Arytenoids; PFS: Pyriform sinus)

¹Resident (DNB), ²Professor and Head, ³Professor

¹⁻³Department of ENT, Amrita Institute of Medical Sciences Kochi, Kerala, India

Corresponding Author: Madhumita Kumar, Professor and Head, Department of ENT, Amrita Institute of Medical Sciences, Kochi, Kerala, India, Phone: 04842801234, e-mail: madhumitak@aims.amrita.edu

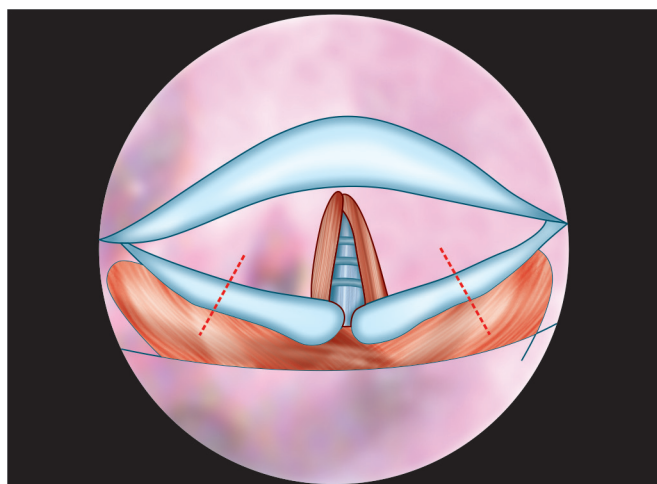


Fig. 2: Technique of aryepiglottoplasty. The aryepiglottic folds are divided at midpoint. Supraglottis is seen to open up due to natural recoil of epiglottis

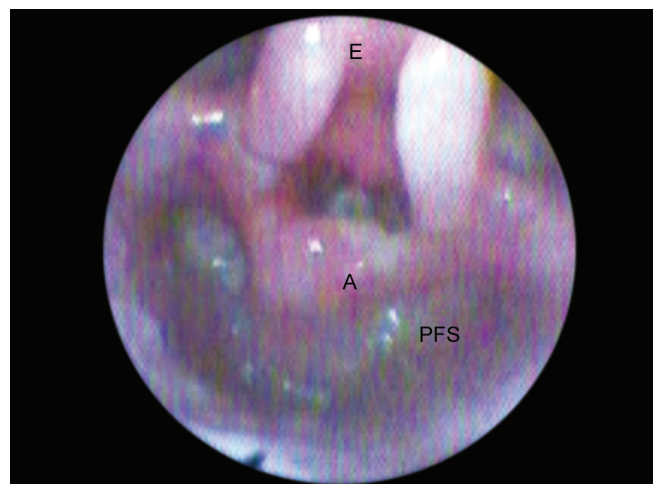


Fig. 3: Postoperative view of larynx during flexible nasopharyngolaryngoscopy. Supraglottic airway has opened up. (E: Epiglottis; A: Arytenoids; PFS: Pyriform sinus)

Flexible nasopharyngolaryngoscopy was repeated in select children to assess the airway 6 weeks after surgery (Fig. 3). Children were observed for relief in stridor, ease of feeding and weight gain at 3 months postprocedure/weight doubling time was noted.

RESULTS

Eight children were assessed in this study, 5 males and 3 females. They all had stridor as the presenting symptom. Six children also had feeding difficulty and failure to thrive. Four children had cardiovascular anomalies; cyanosis was noted in these children. Two were preterm babies.

Moderate to severe laryngomalacia was diagnosed by flexible nasopharyngolaryngoscopy assessment. Mean age at presentation was 3.12 months (SD 3.75832). Mean birth weight was 3.15 kg (SD 0.47) (Table 1).

Seven out of eight children showed significant improvement postoperatively. They were able to tolerate oral feeds on 3rd postoperative day. One child (diagnosed case of Pierre sequence), did not show improvement after aryepiglottoplasty. She underwent revision supraglottoplasty. However, there was little improvement after the revision surgery and she was therefore tracheotomized.

Mean weight gain of the children at 3 months after the procedure was 2.90 kg (SD of 1.185).

Table 1: Patient clinical and surgical details

Sl. No.	Age (mo)	Sex	Stridor	Cyanosis	Feeding difficulty	Failure to thrive	Re-current LRTI	Pre term	Other anomalies	Primary surgery	Revision surgery	Birth weight (kg)	Weight at surgery (kg) (X)	Weight at 3 months follow-up (kg) (Y)	Weight gain (kg) (y-X)	Total follow-up (month)
1	1	F	Yes	No	Yes	Yes	No	No	No	Aryepiglottoplasty	No	2.9	2.8	4.2	1.4	24
2	1	M	Yes	No	No	No	No	No	No	Aryepiglottoplasty	No	3.6	3.5	N/A	—	0
3	4	F	Yes	No	Yes	Yes	No	No	No	Aryepiglottoplasty	No	N/A	2.4	N/A	—	1
4	2	M	Yes	Yes	Yes	Yes	Yes	Yes	Down's syndrome	Aryepiglottoplasty	No	2.8	2.37	4.2	1.83	6
5	3	F	Yes	Yes	Yes	Yes	Yes	Yes	Pierre's sequence	Aryepiglottoplasty	Supraglottoplasty	2.6	2.57	5.1	2.6	26
6	1	M	Yes	No	Yes	Yes	No	No	No	Aryepiglottoplasty	No	3.2	2.9	7	4.1	14
7	1	M	Yes	Yes	Yes	Yes	No	No	Pectus excavatum	Aryepiglottoplasty	No	N/A	3.68	8	4.32	12
8	12	M	Yes	Yes	No	No	No	No	VSD	Aryepiglottoplasty Aryepiglottoplasty	No	3.8	10.8	14	3.2	12

DISCUSSION

Laryngomalacia results from excess redundant mucosa and soft tissue in the supraglottic larynx. In a majority of the cases, conservative management is sufficient.^{4,5} Children should be followed up frequently. Parents should be counselled regarding the course of the condition and warning signs, as most children outgrow the condition by their first birthday.¹

In children who cannot cope with the work of breathing, get exhausted during feeding and have failure to thrive, it becomes important to intervene. Flexible nasopharyngolaryngoscopy is an excellent dynamic study to visualize the larynx. It may be done safely in the OPD or bedside setting with relevant emergency measures in place.^{1,7,8} When done in an awake infant, it gives an accurate picture of the areas of larynx that prolapse most and restrict the airway. It should always be supplemented with a direct laryngo-tracheobronchoscopy under GA to rule out any other co-existing cause of obstruction of the airway.^{1,2,7}

The earliest mention in literature of laryngeal tissue resection for treatment of severe laryngomalacia was found in an article by Fraga,⁹ referencing the work by Hasslinger in 1928. Methods described in literature include supraglottoplasty for posterior and lateral tissue prolapse which may be performed with micro-scissors or CO₂ laser, epiglottopexy and epiglottectomy for epiglottis that prolapses posteriorly and covers the glottic inlet.^{1,3,7,8}

Aryepiglottoplasty is a variation of supraglottoplasty that involves incising the short aryepiglottic folds close to the base of epiglottis, without excision of any supraglottic tissue. This allows the epiglottis to unfold by the virtue of its natural elasticity and improve the supraglottic airway.

Cold steel (use of micro-scissors) method for supraglottoplasty has been performed and evaluated by Polonovski et al¹⁰ and Thomson⁵ with success rates of 79% (in 39 patients) and 81% (in 62 patients) respectively. Carbon dioxide laser for the same purpose has been studied by Senders et al¹¹ and Lee et al¹² with success rates of 74% (in 23 patients) and 83% (in 138 patients) respectively. Complications of its use are reportedly supraglottic stenosis and interarytenoid adhesions.¹³ In our study, we found the use of micro-scissors for aryepiglottoplasty to be efficient, simple and low cost method, with high success rates. We have used weight gain as an objective indicator of the successful outcome of this procedure.

Along with treatment of laryngomalacia, it is very important that any coexistent medical illness should be treated. Children with congenital heart diseases, neurologic disease, syndromes and any comorbidity should be identified.⁸ Treating these children is a challenge and requires

support from experienced ICU and pediatrics teams. Gastroesophageal reflux, which is common but under-diagnosed in children, should be adequately treated, as it is responsible for inflammation of the laryngeal mucosa and can worsen stridor in children.^{4,5,8}

CONCLUSION

Laryngomalacia is a relatively common self-limiting condition. Few indicated cases would need surgical management to relieve the persistent airway obstruction and failure to thrive. We have successfully used the minimal procedure of aryepiglottoplasty in such cases, with satisfactory results.

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