Surgical Intervention for Exercise-Induced Laryngeal Obstruction

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KEYWORDS

• Exercise • Laryngeal obstruction • Surgery • Laryngoplasty • Laryngomalacia

KEY POINTS

- The larynx quickly adapts to increased airflow during activity by inspiratory abduction of the aryepiglottic folds and vocal folds, which increases laryngeal aperture and decreases airflow resistance.
- Respiratory distress during strenuous exercise may be due to malfunction of this adaptive mechanism causing airflow obstruction in the larynx in patients with exercise-induced laryngeal obstruction (EILO).
- Laryngeal obstruction caused by inward rotation of aryepiglottic folds (supraglottic) shows similar findings as laryngomalacia in infants.
- Supraglottic laryngeal obstruction can be treated successfully with operative techniques that are also used in infants with laryngomalacia.
- Key elements in surgical treatment of EILO are presented including selection criteria for surgery, procedural details, outcomes, and risk factors.

Video content accompanies this article at http://www.immunology.theclinics.com.

INTRODUCTION

During exercise, ventilation increases substantially. High airflow presumably causes notable negative pressures at narrow portions of the airways, including the larynx.

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The larynx quickly adapts to the ventilatory demands of exercise through abduction of the glottic as well as supraglottic structures. Exercise-induced laryngeal obstruction (EILO) is a condition in which the larynx fails to remain fully patent during exercise because of dysfunction at a glottic or supraglottic level, and is characterized by typical symptoms of respiratory distress, dyspnea, stridor, and wheezing.[1]

Smith and colleagues described the condition in which EILO appeared largely isolated to the supraglottic structures. At the time of publication, the authors named their finding exercise-induced laryngomalacia (now known as EILO-supraglottic type), because they observed exertional laryngeal motions that appeared similar to those seen in infants with congenital laryngomalacia (CLM).[2,3] CLM, which is anatomically characterized by supraglottic laryngeal collapse, is the most common cause of stridor in infants and children, and similar conditions can occur throughout later childhood and adulthood.[4–6] Following initial reports of the condition, larger series were published, indicating that EILO-supraglottic type may be more common than previously recognized.[7] Patients with CLM that persists into childhood and adulthood may experience symptoms at rest[8,9] or during exercise alone.[5] There are reports indicating that CLM may increase the risk for EILO later in life, although a definite relationship between CLM and EILO has not yet been verified.[10]

Experience from the surgical treatment of CLM in infants has now been applied with clinical success in both children and youths with laryngomalacia, including some with EILO-supraglottic type.[2] Initial published case reports have been followed by larger series of patients treated surgically for EILO-supraglottic type.[11–13]

This article summarizes the surgical experience of the treatment of EILO-supraglottic type. It will describe the proposed indications for surgery, technical surgical considerations, outcomes, and complications. In areas not clearly guided by literature, surgical experience of the authors will be included.

LITERATURE REVIEW

Systematic searches in Medline databases, available through PubMed, have revealed descriptions of surgical treatment to a total of 64 EILO patients through the end of 2016 (**Table 1**). In recent years, the number of reports of successful treatment of supraglottic laryngeal collapse has increased substantially. Children and adults are included in these reports.

Table 1
Previous reports of surgically treated exercise-induced laryngeal obstruction

Authors, Year	Number	Examination
Smith et al,[2] 1995	1	Exercise and laryngoscopy
Bent et al,[14] 1996	2	Exercise and laryngoscopy
Björnsdóttir et al,[15] 2000	2	Exercise and laryngoscopy
Chemery et al,[20] 2002	1	Exercise simultaneous laryngoscopy
Mandell et al,[16] 2003	1	Laryngoscopy and spirometry
Richter et al,[6] 2008	3	Exercise laryngoscopy
Maat et al,[7] 2011	23	Exercise simultaneous laryngoscopy
Norlander et al,[12] 2015	14	Exercise simultaneous laryngoscopy
Mehlum et al,[13] 2016	17	Exercise simultaneous laryngoscopy
Total number	64	