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ORIGINAL ARTICLE

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Laryngomalacia surgery: a series from a tertiary pediatric hospital

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Abstract

Laryngomalacia is the condition responsible for 75% of the cases of stridor in children aged up to 30 months, in which there is supraglottic collapse during inhalation. Inspiratory stridor is a characteristic telltale. As many as 20% of the patients are severely affected and require surgery. Supraglottoplasty is the procedure of choice and the presence of comorbidities is the most relevant prognostic factor for surgery success.

Objective: To describe a series in a tertiary pediatric hospital, its success rates, and surgery prognostic factors.

Method: This retrospective cohort study enrolled 20 patients submitted to supraglottoplasty between July 2007 and May 2011.

Results: Thirteen (65%) patients were males; mean age at the time of the procedure was 6.32 months. Endoscopic examination showed that 12 subjects had combined forms of laryngomalacia, 40% had associated pharyngomalacia, and three also had tracheomalacia. Thirteen subjects had isolated laryngomalacia and seven had gastroesophageal reflux disease. Fifteen (75%) patients underwent aryepiglottic fold resection. After the procedure, eleven patients were asymptomatic and two required tracheostomy. Presence of comorbidities was the strongest predictor of unfavorable postoperative outcome (p = 0.034).

Conclusion: Supraglottoplasty is a safe therapeutical procedure for select patients with laryngomalacia.

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INTRODUCTION

Laryngomalacia is a condition in which supraglottic tissues collapse in a cycle during inhalation to produce mild, moderate, or severe respiratory obstruction. It is the most common cause of stridor in children and accounts for 60% to 75% of the cases in children aged 30 months or less[1]. The real incidence rate of laryngomalacia is unknown and severe cases are predominantly diagnosed at tertiary pediatric hospitals[2]. The pathophysiology of this condition is still uncertain. Initially, laryngomalacia was thought to occur as a consequence of the inability of immature cartilages to offer a stiff framework for the larynx, but this explanation has been refuted by histopathology tests in which cartilage alterations were not observed in laryngomalacia patients[3]. Today, the most widely accepted theory suggests that laryngomalacia is the outcome of disordered laryngeal neuromuscular tone[4,5]. This idea is supported by biopsy studies that revealed histopathological alterations in laryngeal nerve tissue of children with severe laryngomalacia[6].

The characteristic clinical finding is inspiratory stridor occurring between the second and sixth week of life of the subject, which tends to resolve spontaneously before the individual reaches the age of two[1]. As many as 20% of the patients, depending on the level of care complexity given at the facility the patient is hospitalized, have severe laryngomalacia characterized by upper airway obstruction, acute life-threatening events, low weight gain, and slow growth. These patients are the best candidates for surgical treatment[7].

Supraglottoplasty was originally described in 1922[8], and became the procedure of choice to treat laryngomalacia. For a long time, tracheostomy was the only treatment available to avoid fatal events, but it has been increasingly less offered to patients. Many approaches have been described, and success rates range between 38.1% and 100%[9]. Apparently, the most relevant factor in the failure of surgical treatment is the presence of comorbidities, a finding observed in about 45% of the patients (neurological disease, cardiopathy, genetic syndrome or anomaly)[10,11]. Additionally, some 30% of the pediatric patients may have synchronous airway injuries[2-14] and 85% to 96% of these patients may have laryngeal edema or pharyngolaryngeal reflux[15].

Current procedures are based on individualized care and the anatomic and functional alterations observed in each patient. Thus, when the issue is shortened aryepiglottic folds, resection with microscissors[2], laser[16], or microdebrider[17] is recommended. If there is associated redundant arytenoid mucosa or cuneiform cartilages, supraglottoplasty - a more generic term that encompasses the resection of the aryepiglottic folds, excess mucosa, and the lateral surface of the epiglottis[18] - is recommended. If the determining factor for the observed obstruction is epiglottis inhalation, partial epiglottectomy or glossoepiglottopexy[19] is recommended.

This paper aimed to describe a patient series seen at a Brazilian tertiary pediatric hospital, surgery success rates, and analysis of prognostic factors.

METHOD

This is a prospective cross-sectional study on a historical cohort based on patient chart reviews. Patients with severe laryngomalacia submitted to endoscopic surgery between July 2007 and May 2011 at a tertiary pediatric ENT service in Brazil were enrolled in the study. Twenty patients were included. This study was approved by the Research Ethics Committee and given permit 3682/11.

The following clinical variables were observed in the diagnosis of laryngomalacia: onset of stridor, factors connected to improvements and decays in subject overall condition, perinatal history, presence of other congenital anomalies, difficult breastfeeding, weight gain, cyanosis episodes, and presence of apnea and other events requiring hospitalization for respiratory obstruction.

Patients suspected for laryngomalacia underwent nasal bronchoscopy in a surgical center on a Machida® 3.2 mm endoscope. Subjects were offered inhalation anesthesia and spontaneous ventilation support, and had their airways monitored to the level of the secondary bronchi. Patient examinations were recorded on a DVD. Laryngomalacia was classified into five types, according to the scheme proposed by Holinger[20]: type I (prolapse of enlarged cuneiform cartilages), type II (omega-shaped epiglottis that folds on itself during inhalation), type III (anterior and medial collapse of the arytenoids during inhalation) and type V (shortened aryepiglottic folds); patients may have more than one type of alteration. Rigid bronchoscopes were not used in the assessment of the patients included in this study.

The criteria for severe laryngomalacia with surgical indication were as follows: a) clinical evidence of severe respiratory obstruction such as cyanotic episodes with or without supracostal and intercostal retractions and/or pectus excavatum and/or b) swallowing disorders accompanied by low weight gain and deficient stature gain.

Patient charts were reviewed for history of diseases and particular emphasis was given to comorbidities such as GERD, neurological disease, and cardiopathy as per the protocol defined before data collection. (Annex 1).

GERD was considered present in patients with clinical signs of reflux (vomiting, low weight gain, abdominal discomfort), as in most cases the children got to our service after being referred by other physicians with