Review Article

Stridor in the Infant and Pediatric Population

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Abstract

Stridor remains a common symptom that prompts a thorough investigation in the infant and pediatric population. Defined as a high-pitched sound emitting from the upper airway, the noise may be indicative of something more worrisome. The astute clinician should be inclined to find the root cause of stridor to provide adequate treatment. We review the most common entities related to infant and pediatric stridor and current treatment and management strategies.

Keywords: stridor, infant, pediatric

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Introduction

Pediatric patients in both the inpatient and outpatient setting may present with symptoms commonly grouped into noisy breathing. Clinicians should do their best to ascertain the timing, circumstances, and related symptoms to the patient's noisy breathing. Stridor, or the high-pitched sound emitted from the upper airway can many times be indicative of something readily treatable, such as laryngomalacia, or in some occasions something that may require immediate attention. First and foremost, stridor must be separated from a commonly misused term known as stertor. Stertor although arising from the upper airway itself usually pertains to sounds emitted from the nasal cavity and nasopharynx. Common causes of stertor include adenoid hypertrophy, allergic rhinitis, and common upper respiratory tract infections. Stridor on the other hand must be further dissected into which respiratory phase the sound is occurring in. Inspiratory, expiratory, or biphasic can clue physicians to the underlying points of concern. Inspiratory stridor is typically indicative of the supraglottis as the source, in cases such as laryngomalacia. Expiratory stridor can be indicative of an anomaly below the level of the vocal cords such as subglottic stenosis, while biphasic stridor is heard commonly in abnormalities affecting the vocal cords, or glottis.

Work-up

Timing of stridor can also guide clinicians to a suitable differential. Any additional associated symptoms including signs of respiratory distress should be documented as well. Retractions throughout the neck and chest can be indicative of labored breathing, while signs of infection may present with fever, elevated white blood cell counts, and nasal symptoms. History, as in any clinical scenario should be reviewed closely. Family acknowledgement of choking or signs of foreign body ingestion should be taken seriously and addressed thoroughly. The most important finding in an airway foreign body diagnosis is history alone.

Upper airway assessment

One of the most vital aspects of upper airway evaluation available to Otolaryngologists is the flexible laryngoscopy. Even in infants, this tool can be invaluable. Patients require no sedation and can commonly continually be fed prior to evaluation. A small 2.7 mm flexible endoscope passed through the naris while the child is awake will allow the clinician to evaluate fully the nasopharynx, hypopharynx, and larynx. Laryngomalacia can be fully assessed as can vocal cord nodules, polyps, masses or vocal cord paralysis. Within a matter of minutes, we are able to collect vital information regarding the patient's upper airway. Laryngoscopy provides information on the dynamic function of the airway.[1] Very few patients will not benefit from flexible laryngoscopy and these patients must be identified immediately. Any patient with impending airway compromise evident by a child in a tripod position or severe labored breathing should undergo evaluation in a controlled environment such as the operating suite.

Laryngomalacia

Laryngomalacia remains the most common cause of stridor in the infant age group. A recent study out of Hong Kong also listed it as the most common finding after patients underwent a formal airway evaluation in the operating room.[2] Typically described as immaturity of the larynx, the supraglottic structures collapse upon inspiration leading to inspiratory phase stridor. Symptoms can initiate a few days after birth and can be persistent for up to roughly 12 months of age. Key laryngoscopic findings include an omega-shaped epiglottis and redundant arytenoids with shortened aryepiglottic folds. These anatomical findings promote easier collapse when there is negative pressure in the airway. Gastroesophageal reflux has been commonly associated with laryngomalacia and anti-reflux treatment is commonly employed.[3] Treatment options include close observation for patients with minimal symptoms to tracheostomy

in severe cases. Patients who are fit for surgical supraglottoplasty my find significant improvement and avoid tracheostomy all together. Treatment of shortened aryepiglottic folds is one of the most commonly employed supraglottoplasty techniques.[4]

Subglottic Stenosis

Subglottic stenosis can be both congenital and acquired. The incidence of acquired subglottic stenosis has decreased over the past few years secondary to improved neonatal care. Circumferential narrowing causes a decrease in laminar flow through the airway leading patients to present with both expiratory and sometimes biphasic stridor. Rigid bronchoscopy remains the gold standard for evaluation and use of the Cotton-Meyer grading system is commonly employed.[5] Newer treatment modalities have been employed including balloon laryngoplasty. More common in the Western world, balloon laryngoplasty has found significant barriers in developing nations.[6]

Vocal Cord Paralysis

The second most common cause of stridor in the infant population is vocal cord paralysis. Most causes of vocal cord paralysis in the infant age group is secondary to iatrogentic injury to the recurrent laryngeal nerve or idiopathic. Most times, patients who present with stridor have bilateral vocal cord paresis, while unilateral paresis can present with a soft cry in infants. Those with significant airway compromise are typically recommended to undergo a tracheostomy, with hopes that time may lead to recovery of some vocal cod function.

Subglottic Hemangioma

A less commonly encountered entity, but present nonetheless is that of subglottic hemangiomas. Patient's typically present with expiratory stridor and at times recurrent croup. A bronchoscopic evaluation is necessary for diagnosis. Patients may also display signs of a V_3 cutaneous (beard distribution) hemangioma as well. Typically, propranolol has now been utilized as first-line treatment of these patients.[7]

Other causes of stridor

Other causes of infant and pediatric stridor can include tracheal anomalies, laryngeal clefts, vascular and lymphatic malformations, laryngeal papillomas, craniofacial abnormalities, and even head and neck tumours.[8 - 9] Rare tracheal tumors (Figure 1) must also be ruled out especially if there is evidence of an airway masse visualized in the airway.[10] Figure 2 depicts a lateral X-ray of a patient that presented to Thammasat University Hospital with a tracheal schwannoma. Typically conservative surgical management remains the treatment of choice for benign obstructive airway lesions. Another rare lesion that can lead to stridor and symptoms of coughing secondary to aspiration includes laryngeal clefts. These lesions, may be subtle evidenced by larger than normal gaps between the arytenoids. Patient's with small gaps may undergo use injection of fillers or endoscopic suturing techniques.

Figure 1 Endoscopic finding of a tracheal mass later diagnosed as a schwannoma

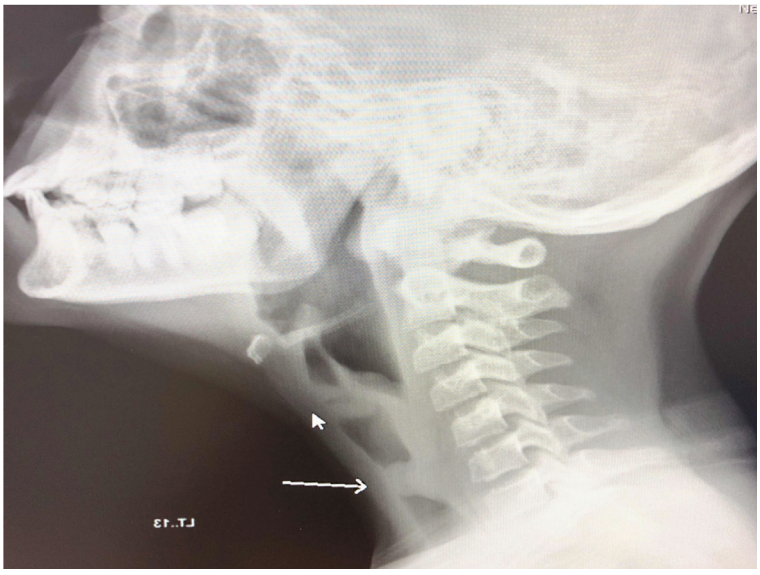

Figure 2 Lateral neck X-ray revealing subglottic mass

Conclusion

Stridor in the neonate and pediatric age group can present with a wide array of causes. A careful and thorough history and physical examination is important to accurate diagnosis. Persistent symptoms or associated respiratory decline should result in prompt notification of Otolaryngologic colleagues for endoscopic visualization. Various medical and surgical methods have evolved for the safe treatment of these patients.

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บทคัดย่อ

ภาวะทางเดินหายใจส่วนบนอุดกั้นในทารกและเด็ก

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การมีเสียงสูงขณะหายใจ (stridor) เป็นภาวะที่พบได้บ่อยในวัยทารกและวัยเด็กซึ่งต้องการการตรวจเพิ่มเติม โดยภาวะนี้คือการที่มีเสียงหายใจเป็นเสียงสูงซึ่งเกิดจากการมีพยาธิสภาพที่บริเวณทางเดินหายใจส่วนบน แพทย์ผู้รักษาควรที่จะตรวจเพิ่มเติมเพื่อหาสาเหตุและให้การรักษาที่เหมาะสม การศึกษานี้ทำการทบทวนสาเหตุที่พบได้บ่อยของการเกิดภาวะผิดปรกตินี้ในเด็กและการรักษาในปัจจุบัน

คำสำคัญ: เด็ก, ทารก, ภาวะทางเดินหายใจส่วนบนอุดกั้น