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editorial-office@sciformat.ca

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EXERCISE-INDUCED LARYNGEAL OBSTRUCTION AND ASTHMA IN ATHLETES: A NARRATIVE REVIEW OF DIAGNOSTIC PITFALLS, COMORBIDITIES, PSYCHOLOGICAL IMPACT, AND MANAGEMENT

Weronika Cionżńska (Corresponding Author, Email: weronikacionzynska@gmail.com)
Stefan Żeromski Specialist Hospital in Cracow; os. Na Skarpie 66, 31-913 Cracow, Poland
ORCID ID: 0009-0007-1464-4957

Krzysztof Machnik
Stefan Żeromski Specialist Hospital in Cracow; os. Na Skarpie 66, 31-913 Cracow, Poland
ORCID ID: 0009-0000-3345-8593

Bartosz Gawel
Stefan Żeromski Specialist Hospital in Cracow; os. Na Skarpie 66, 31-913 Cracow, Poland
ORCID ID: 0009-0008-7135-7679

Beata Tekieli
Stefan Żeromski Specialist Hospital in Cracow; os. Na Skarpie 66, 31-913 Cracow, Poland
ORCID ID: 0009-0008-4427-6654

Anna Justkowska-Gebauer
Stefan Żeromski Specialist Hospital in Cracow; os. Na Skarpie 66, 31-913 Cracow, Poland
ORCID ID: 0009-0001-3106-5697

Wojciech Krzysztof Cyran
Stefan Żeromski Specialist Hospital in Cracow; os. Na Skarpie 66, 31-913 Cracow, Poland
ORCID ID: 0009-0001-8992-3199

Tatsiana Matsiusheuskaya
Stefan Żeromski Specialist Hospital in Cracow; os. Na Skarpie 66, 31-913 Cracow, Poland
ORCID ID: 0009-0007-2984-5356

Michał Górecki
Stefan Żeromski Specialist Hospital in Cracow; os. Na Skarpie 66, 31-913 Cracow, Poland
ORCID ID: 0009-0006-0557-868X

Maksymilian Olesiński
Independent Public Health Care Institution of the Ministry of the Interior and Administration in Krakow,
Kraków, Poland
ORCID ID: 0009-0004-7179-1476

Ewelina Chudyba
Edward Szczeklik Specialist Hospital in Tarnow, ul. Szpitalna 13, 33-100 Tarnow, Poland
ORCID ID: 0009-0004-7320-4773

ABSTRACT

Background: Exertional dyspnea in athletes is most commonly attributed to exercise-induced bronchoconstriction (EIB), leading to frequent diagnostic errors and the overuse of inhaled medications. However, increasing evidence indicates that exercise-induced laryngeal obstruction (EILO) is a frequent and significant cause of these symptoms that is often overlooked in sports medicine.

Aim: This study aims to provide a comprehensive review of the diagnostic challenges associated with EILO, specifically focusing on its differentiation from EIB, the impact of comorbidities, the psychological burden on athletes, and modern therapeutic strategies.

Material and methods: A narrative literature review was conducted using PubMed, Scopus, and Google Scholar databases, covering the period from 2016 to 2026. The analysis included original research articles, systematic reviews, and current consensus statements from international sports medicine and laryngology societies.

Results: EILO involves the paradoxical collapse of laryngeal structures during inspiration. It is clinically differentiated from asthma by the presence of inspiratory stridor, an immediate resolution of symptoms upon the cessation of exercise, and a lack of response to bronchodilators. The review highlights that over half of EILO patients suffer from coexisting laryngopharyngeal reflux, and untreated upper respiratory allergies further lower the laryngeal trigger threshold. Furthermore, the sudden onset of dyspnea frequently triggers a "panic-breathlessness cycle," which exacerbates laryngeal spasms and reduces the athlete's quality of life. The continuous laryngoscopy during exercise (CLE) test remains the diagnostic gold standard. Proper recognition allows for the avoidance of unnecessary pharmacotherapy in favor of targeted non-pharmacological treatments, primarily specialized respiratory physiotherapy.

Conclusions: EILO is a frequent, often overlooked cause of exertional dyspnea in athletes. Accurate differentiation from EIB through identification of inspiratory stridor, rapid symptom resolution, and bronchodilator non-response is essential. Proper management requires CLE-based diagnosis, targeted respiratory physiotherapy, and concurrent treatment of comorbidities, while addressing psychological factors significantly improves athletes' quality of life.

KEYWORDS

Exercise-induced Laryngeal Obstruction, Exercise-induced Asthma, Sports Medicine, Laryngopharyngeal Reflux, Quality of Life.

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1. Introduction

Exertional dyspnea in athletes does not always reflect poor conditioning. It often points to a treatable condition that has gone unrecognized for years. When faced with a dyspneic athlete, most clinicians default to exercise-induced bronchoconstriction (EIB) – exercise-induced asthma. The pattern is so entrenched that inhaled corticosteroids and short-acting beta-2 agonists are usually prescribed before alternative diagnoses are seriously considered (Clemm et al., 2022).

Yet a substantial share of athletes treated for "exercise-induced asthma" do not actually have it. Increasing evidence points to exercise-induced laryngeal obstruction (EILO) – a transient, reversible narrowing of the larynx at peak ventilatory demand – as a major and under-recognized cause of the same symptoms (Halvorsen et al., 2017; Røksund et al., 2017). The two conditions are easy to confuse: both occur during intense exertion, both worsen in cold or dry air, and both produce alarming dyspnea in otherwise healthy people. They are not, however, the same problem, and they do not respond to the same treatment.

EILO is a problem of the upper airway. The vocal folds, or the supraglottic structures above them, collapse medially during inspiration when the larynx is briefly stretched by high negative pressures (Walsted et al., 2021). The clinical hallmark is high-pitched inspiratory stridor that peaks at maximum effort and disappears within seconds of stopping. EIB, in contrast, is a problem of the lower airway and produces expiratory wheezing with slow, often pharmacologically assisted recovery (Mæstad et al., 2024).

Persistent misdiagnosis carries real costs. Athletes spend years inhaling medications that cannot reach the actual site of obstruction, accumulate side effects without benefit, and live with the frustration of "treatment-resistant" asthma that never improves (Rogde et al., 2023). The psychological toll of repeatedly failing to breathe during competition becomes its own complication.

This review summarizes how to recognize EILO at the bedside, distinguish it from EIB, account for coexisting reflux and rhinitis, and select an appropriate, predominantly non-pharmacological treatment path.

2. Material and Methods

A narrative review of the literature was performed using PubMed, Scopus, and Google Scholar for English- and Polish-language publications from 2016 to 2026. Search terms combined "exercise-induced laryngeal obstruction," "EILO," "vocal cord dysfunction," "exercise-induced asthma," "EIB," "athletes," "differential diagnosis," and "continuous laryngoscopy during exercise" (CLE), with additional queries on "GERD," "laryngopharyngeal reflux," "psychological impact," and "quality of life" to capture relevant comorbidities and patient-centered outcomes.

Inclusion was limited to original research, peer-reviewed reviews, meta-analyses, and consensus statements from international sports medicine and laryngology societies. Case reports were included only when they illustrated specific patterns of misdiagnosis or psychological complications. Conference abstracts without available full texts, unpublished material, and non-peer-reviewed sources were excluded. Selection proceeded in two stages: title-and-abstract screening, followed by full-text evaluation of articles directly relevant to pathophysiology, clinical presentation, differential diagnosis, and management of EILO versus EIB.

3. Why Diagnostic Errors Happen

Both conditions present in the same way at the trackside: an athlete suddenly cannot finish the session, struggling to draw air. The pathophysiology, however, is entirely different, and so is the treatment.

During normal exercise the vocal folds open widely to maximize airflow. In EILO the opposite occurs – the glottic or supraglottic structures (vocal folds, arytenoids, or epiglottis) collapse medially during inspiration at the moment the larynx is most stretched by negative pressure (Røksund et al., 2017). The mechanism is mechanical, not inflammatory.

EIB sits below the glottis. Heavy ventilation dries the bronchial mucosa, raises its osmolarity, and triggers mast-cell degranulation; histamine and prostaglandins follow, producing smooth-muscle contraction and mucosal edema (Smoliga et al., 2016). The substrate is inflammatory.

This distinction matters because identical environmental triggers can provoke both conditions. Cold dry air affects cross-country skiers and outdoor amateurs alike, irritating both the laryngeal and bronchial mucosa (Irewall et al., 2021). Chlorine and trichloramine vapor hover over swimming pools and reach swimmers' airways directly, contributing to so-called swimmer's asthma and predisposing the larynx to spasm (Sayad & Das, 2026; Lomax, 2016). Hyperventilation in any setting produces shear stress at the mucosal surface. When the trigger is shared but only the bronchi are checked, asthma becomes the default – and often the wrong – diagnosis (Smoliga et al., 2016).

4. Clinical Recognition: Red Flags at the Bedside

A correct diagnosis usually begins long before a laryngoscope is inserted. Three clinical features, taken together, point firmly toward EILO and away from EIB.

Inspiratory stridor versus expiratory wheezing. Wheezing is the sound of air pushed through narrowed bronchi during exhalation (Hall et al., 2016). Stridor is the sound of air drawn through a collapsing larynx during inhalation (Liyanagedara et al., 2017). Attentive listening at the moment of dyspnea, including video review when possible, usually clarifies the difference.

Time to recovery. EILO ends almost the moment the athlete stops. Symptoms typically resolve within 30 to 60 seconds (Olin et al., 2014). EIB peaks 5 to 15 minutes after exertion ends and may require a bronchodilator or longer for full resolution.

Failure of bronchodilator therapy. This is the most clinically useful sign. An athlete who has used salbutamol before training for years without meaningful improvement should not be relabelled as having "severe asthma" indefinitely. The absence of bronchodilator response should redirect the workup toward laryngeal causes (Śpiewak & Śpiewak, 2024; Jansrud Hammer et al., 2022).

5. Diagnostic Gold Standard: Continuous Laryngoscopy During Exercise (CLE)

Resting laryngoscopy and resting spirometry are typically normal in EILO, which routinely leads to premature exclusion of laryngeal causes (Thomander et al., 2023). Establishing the diagnosis requires direct visualization of the larynx while the athlete is symptomatic – that is, during exercise.

In a CLE test, a thin flexible laryngoscope is passed nasally and secured with headgear so the camera remains above the larynx during exertion. The athlete then undergoes a sport-relevant incremental exercise protocol on a treadmill or cycle ergometer until symptoms reproduce or maximal effort is reached (Røksund et al., 2017). The collapse can then be observed in real time and recorded. CLE is well tolerated by both adults and adolescents and rarely interferes with the ability to reach maximum effort (Thomander et al., 2023).

Severity is scored from 0 to 3 separately at the glottic and supraglottic levels using the CLE scoring system (Halvorsen et al., 2017). Recent efforts to apply machine-learning algorithms to CLE recordings aim to reduce inter-rater variability in scoring (Mæstad et al., 2024), but direct visual confirmation at peak effort remains the only definitive way to differentiate EILO from EIB, monitor therapy outcomes, and qualify the most severe cases for surgery (Irewall et al., 2023).

6. Treatment: Non-Pharmacological First

Because EILO is a problem of upper-airway biomechanics, first-line therapy is not pharmacological. Therapeutic priorities differ fundamentally from those of asthma.

Respiratory re-education and speech-language therapy (SLT). The conservative gold standard is targeted training by a speech-language pathologist or a respiratory physiotherapist experienced with EILO (Shaffer et al., 2018). Athletes are taught diaphragmatic breathing and rescue techniques such as pursed-lip breathing, which generate positive end-expiratory pressure and help stabilize the larynx during the high-flow inspiratory phase that triggers collapse.

Inspiratory muscle training (IMT). Resistive inspiratory devices strengthen the diaphragm and external intercostals. Better inspiratory mechanics reduce the peaks of negative pressure that pull the laryngeal structures inward, improving both symptoms and CLE scores (Sandnes et al., 2019).

Surgery. When supraglottic collapse is severe, CLE-confirmed, and unresponsive to conservative therapy, laser supraglottoplasty – selective resection of redundant aryepiglottic tissue – is considered. In carefully selected patients it allows return to full training without stridor (Siewers et al., 2019).

7. Coexisting Conditions: Reflux and Allergies

EILO seldom occurs in isolation. Two comorbidities recur frequently enough that they should be screened for in every case.

Laryngopharyngeal reflux (LPR). Sports requiring sustained core compression – rowing, cycling, weightlifting – repeatedly raise intra-abdominal pressure and promote microaspiration of acidic gastric content and pepsin into the pharynx and larynx (Ludlow et al., 2023; Eapen et al., 2024). Chronic inflammation and mucosal hyperreactivity follow, lowering the threshold at which the larynx collapses under inspiratory negative pressure. Up to 57% of patients with endoscopically confirmed EILO also have reflux disease, which independently worsens dyspneic episodes (Haines et al., 2024).

Allergic rhinitis and altered breathing patterns. A blocked nose forces premature mouth breathing during exertion, which delivers unwarmed, unhumidified, and allergen-laden air directly onto the laryngeal mucosa. The mucosa responds defensively, lowering the threshold for spasm. When asthma and allergic rhinitis coexist – and they often do – sports physicians should treat both upper and lower airway components in parallel rather than focusing on bronchi alone (Eapen et al., 2024).

8. Psychological Dimension and Quality of Life

The sensation of suddenly being unable to breathe, accompanied by audible stridor in front of teammates, coaches, and competitors, is qualitatively different from the gradual onset of asthma. EILO carries a heavier psychological burden, and the burden itself becomes part of the pathology (Fujiki et al., 2024; Fujiki & Thibeault, 2023).

The panic–breathlessness cycle. Abrupt laryngeal closure at peak effort can trigger acute anxiety. Anxiety raises tension in cervical and laryngeal muscles, which worsens the obstruction and deepens the panic. Documented cases describe paradoxical vocal-fold movement provoked directly by panic episodes during competition (Leng et al., 2023).

Social and career consequences. Stridor is audible, which makes EILO unusually visible – especially in young athletes who become self-conscious about how their breathing sounds in training and races. Persistent dyspnea despite "asthma" treatment lowers quality of life and contributes to early career exit (Fujiki et al., 2024; Leng et al., 2023). In clinical experience, a substantial share of the relief patients feel after diagnosis comes simply from being told that the condition has a name, is treatable, and is not life-threatening. Explanation alone interrupts the panic component (Leng et al., 2023).

9. Conclusions

1. EILO is a frequent but under-recognized cause of exertional dyspnea in athletes and is regularly misdiagnosed as exercise-induced asthma.
2. Three clinical features should redirect the workup toward the larynx: inspiratory stridor, rapid resolution within 30 to 60 seconds of stopping exercise, and absent response to inhaled bronchodilators.
3. Resting laryngoscopy and spirometry are typically normal in EILO. Continuous laryngoscopy during exercise (CLE) remains the only test that confirms the diagnosis and grades severity reliably.
4. Treatment is primarily non-pharmacological – speech-language therapy and inspiratory muscle training. Surgical supraglottoplasty is reserved for severe, conservative-resistant supraglottic collapse.
5. Coexisting laryngopharyngeal reflux and allergic rhinitis should be sought and treated; both lower the threshold for laryngeal collapse and predict therapeutic failure when missed.
6. The psychological component is not incidental. The panic–breathlessness cycle worsens individual episodes and contributes to long-term loss of quality of life and premature retirement. Honest, early patient education is itself an intervention.

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