



## Review

Non-Malignant Central Airway Obstruction<sup>☆</sup>

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## ARTICLE INFO

## Article history:

Received 20 June 2013

Accepted 28 December 2013

Available online 2 July 2014

## Keywords:

Non-malignant airway obstruction

Tracheobronchial stenosis

Granulation tissue

Tracheostomy

Diagnostic and therapeutic bronchoscopy

Intubation

## Palabras clave:

Patología obstructiva no maligna

Estenosis traqueobronquial

Tejido de granulación

Traqueostomía

Broncoscopia diagnóstica y terapéutica

Intubación

## ABSTRACT

The most common causes of non-malignant central airway obstruction are post-intubation and post-tracheostomy tracheal stenosis, followed by the presence of foreign bodies, benign endobronchial tumors and tracheobronchomalacia. Other causes, such as infectious processes or systemic diseases, are less frequent. Despite the existence of numerous classification systems, a consensus has not been reached on the use of any one of them in particular. A better understanding of the pathophysiology of this entity has allowed us to improve diagnosis and treatment. For the correct diagnosis of nonspecific clinical symptoms, pulmonary function tests, radiological studies and, more importantly, bronchoscopy must be performed. Treatment must be multidisciplinary and tailored to each patient, and will require surgery or endoscopic intervention using thermoablative and mechanical techniques.

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## Patología obstructiva no maligna de la vía aérea central

## RESUMEN

Las causas más frecuentes de patología obstructiva no maligna de la vía aérea central son las estenosis postintubación y postraqueotomía, seguidas por los cuerpos extraños y la traqueobroncomalacia. Otras causas, como las secundarias a procesos infecciosos y enfermedades sistémicas, son menos frecuentes. A pesar de la existencia de numerosas clasificaciones, todavía no se ha alcanzado consenso sobre la utilización de alguna de ellas en concreto. Un mejor conocimiento de su fisiopatología nos ha permitido aumentar el diagnóstico y mejorar su tratamiento; su presentación clínica inespecífica exige la realización de diversos estudios funcionales, radiológicos y fundamentalmente endoscópicos para su correcto diagnóstico. El tratamiento debe ser multidisciplinario e individualizado, requiriendo tratamiento quirúrgico o endoscópico mediante diferentes técnicas termoablativas y mecánicas.

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## Introduction

Obstruction of the central airway, trachea and primary bronchi is a common problem in medical and surgical settings. The incidence of this disorder seems to be rising due to the epidemic of lung cancer; however, the growing number of benign obstructive pathologies also contributes to this trend, primarily due to the use of artificial airways.<sup>1</sup> Multidisciplinary management and progress

in the use of different radiological and endoscopic tools have led to an improvement in the diagnosis and treatment of these conditions.

The aim of this review is to examine the causes of benign central airway obstruction considered most important by the authors, including intubation, tracheotomy, tracheobronchomalacia (TBM), infectious processes (tuberculosis) and systemic diseases (sarcoidosis, amyloidosis, Wegener's granulomatosis, relapsing polychondritis, tracheobronchopathy osteochondroplastica), and finally, idiopathic tracheal stenosis and post-lung transplantation bronchial stenosis.

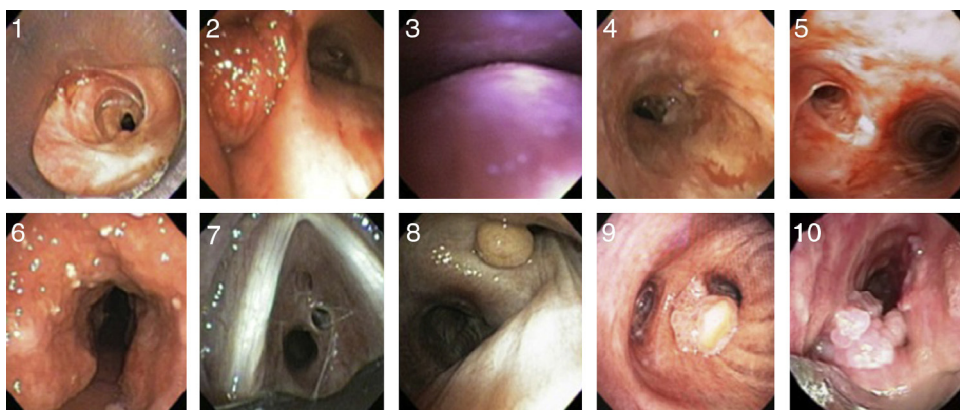
## Etiology and Classification

There are many causes of central airway obstruction (Table 1), the most common being associated with orotracheal intubation

<sup>☆</sup> Please cite this article as: Barros Casas D, Fernandez S, Folch E, Flandes Aldeyturriaga J, Majid A. Patología obstructiva no maligna de la vía aérea central. Arch Bronconeumol. 2014;50:345–354.

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**Figure 1.** Images of different types of non-malignant obstructive airway disease. (1) Post-intubation stenosis. (2) Granulation stenosis secondary to silicone stent. (3) Tracheobronchomalacia. (4) Stenosis secondary to Wegener's granulomatosis. (5) Stenosis secondary to tuberculosis. (6) Tracheobronchopathia osteochondroplastica. (7) Idiopathic stenosis. (8) Hamartoma. (9) Solitary papilloma. (10) Papillomatosis.

and tracheotomy. Tracheomalacia is another important cause currently gaining recognition. Other less common causes are chronic inflammatory diseases (amyloidosis, sarcoidosis and relapsing polychondritis), infectious diseases (tuberculosis and rhinoscleroma) and collagen vascular diseases (granulomatosis with polyangitis or Wegener's granulomatosis and lupus). Lung transplant patients can present symptomatic stenosis or malacia at the site of the anastomosis. Finally, if no other cause is identified, the condition may be termed idiopathic tracheal stenosis.<sup>2,3</sup> There are other causes of obstruction that will not be addressed in this review, such as extrinsic compression due to cervical lymphadenopathies or masses, obstruction due to benign endoluminal tumors (Fig. 1, images 8–10), radiation and inhalation lesions, and the aspiration of foreign material.

Recently, Freitag et al.<sup>4</sup> published a classification system aiming to divide stenosis into structural and dynamic types, with additional categorization by degree of stenosis and site. Unfortunately, this classification is complex and has not been universally accepted (Fig. 2).

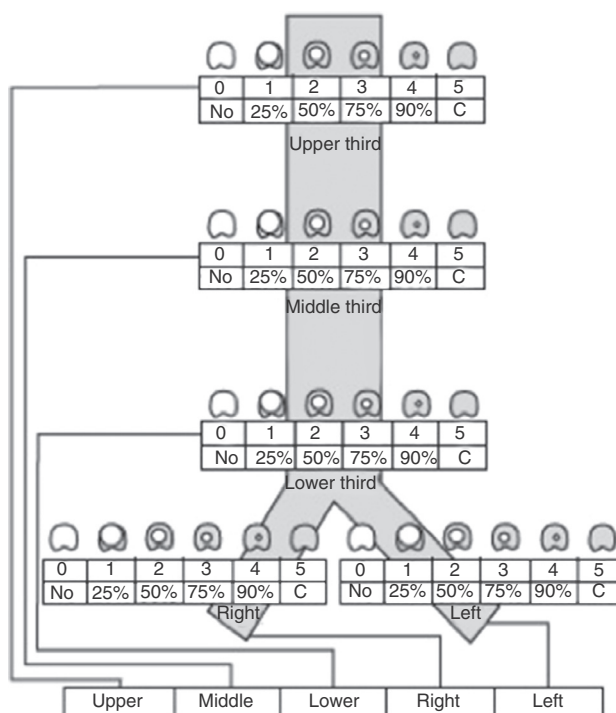
In the opinion of the authors, the most important differentiation to be made is between simple and complex stenoses, since this determines the success or failure of the endoscopic intervention. A complex stenosis is defined here as stenosis with one or more of the following characteristics: long (>10 mm), tortuous, with contractions or cartilaginous damage associated with malacia. All these factors add to the difficulty of endoscopic intervention and make surgery the therapeutic method of choice.

**Table 1**  
Conditions Associated With Non-malignant Airway Obstruction.

<i>Lymphadenopathies</i>
Infectious
<i>Inflammatory diseases</i>
Sarcoidosis
Wegener's granulomatosis
<i>Vascular</i>
Rings
Anatomical variations
<i>Granulation tissue</i>
Endotracheal tubes
Tracheostomy tubes
Airway stents
Foreign material
Surgical anastomosis
Wegener's granulomatosis
<i>Pseudotumor</i>
Hamartomas
Amyloid
Papillomatosis
<i>Hyperdynamic</i>
Tracheobronchomalacia
Excessive pars membranosa collapse
<i>Idiopathic</i>
Tuberculosis
Sarcoidosis
<i>Other</i>
Goiter
Mucous plug
Vocal cords
Epiglottitis
Blood clot

**Clinical Presentation**

Varying degrees of dyspnea and cough, stridor and wheezing make up the clinical spectrum of this disorder. Clinical



**Figure 2.** Stenosis classification system, according to site, grade and type of stenosis, proposed by Freitag et al.<sup>4</sup>

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