



UPDATE IN RADIOLOGY

Esophageal cancer: Anatomic particularities, staging, and imaging techniques[☆]



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Abstract Cancer of the esophagus is a tumor with aggressive behavior that is usually diagnosed in advanced stages. The absence of serosa allows it to spread quickly to neighboring mediastinal structures, and an extensive lymphatic drainage network facilitates tumor spread even in early stages. The current TNM classification, harmonized with the classification for gastric cancer, provides new definitions for the anatomic classification, adds non-anatomic characteristics of the tumor, and includes tumors of the gastroesophageal junction. Combining endoscopic ultrasound, computed tomography, positron emission tomography, and magnetic resonance imaging provides greater accuracy in determining the initial clinical stage, and these imaging techniques play an essential role in the selection, planning, and evaluation of treatment. In this article, we review some particularities that explain the behavior of this tumor and we describe the current TNM staging system; furthermore, we discuss the different imaging tests available for its evaluation and include a diagnostic algorithm.

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PALABRAS CLAVE

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 invasiva

Cáncer de esófago: particularidades anatómicas, estadificación y técnicas de imagen

Resumen El cáncer de esófago es un tumor de comportamiento agresivo, que suele diagnosticarse en etapas avanzadas. La ausencia de serosa permite su rápida propagación a estructuras vecinas del mediastino, y una extensa red de drenaje linfático facilita la diseminación tumoral incluso en estadios precoces. La actual clasificación TNM, armonizada con la del cáncer gástrico, proporciona nuevas definiciones en la clasificación anatómica, añade características no anatómicas del tumor e incluye los tumores de la unión esofagogástrica. La mayor precisión en la determinación del estadio clínico inicial se obtiene con la combinación de ecoendoscopia, TC, PET-TC y RM, que desempeñan un papel esencial en la elección, la planificación y la evaluación del tratamiento. En este artículo repasamos algunas particularidades que explican el comportamiento de este tumor, revisamos la estadificación TNM actual y presentamos las distintas pruebas de imagen de que disponemos en la actualidad para su evaluación, incluyendo un algoritmo de diagnóstico.

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Introduction

Esophageal cancer is the eighth most common type of cancer worldwide and it ranks third among those of gastrointestinal origin. According to recent data by the Sociedad Española de Oncología Médica (Spanish Society of Medical Oncology) based on the 2012 GLOBOCAN project review the incidence in Spain amounts to 2090 cases, with an estimated five-year prevalence of 2238, and even though it represents 1% of all cancers, it accounts for 1.7% of all deaths for this cause. Unlike other tumors, it is expected that the incidence of esophageal cancer will continue to rise in the next few years.¹⁻³

90% of the cases are epidermoid carcinomas or adenocarcinomas. Squamous cell cancer, associated with alcohol and tobacco consumption, is overall the most common worldwide, especially in Eastern countries, and its incidence is decreasing in Western countries. Today adenocarcinomas are the most common type of cancer in Western countries, due to a significant increase of its incidence during the last few years with respect to gastroesophageal reflux disease and obesity. While the former one is distributed similarly in different segments of the esophagus, the latter one fixes on the distal esophagus in three fourths of the cases.^{4,5} Other types of tumor such as lymphomas, fusiform cell carcinomas, neuroendocrine tumors and gastrointestinal stroma tumors (GIST), are extremely uncommon.⁶

Esophageal cancer is a tumor of aggressive behavior that is usually diagnosed in advanced stages, which is explained to a certain extent by some anatomical and lymphatic-drainage peculiarities of this organ. Despite recent breakthroughs in its diagnosis and treatment, prognosis continues to be poor and it represents the sixth cause of death worldwide, with a survival of less than 20% at 5 years.

Breakthroughs in multidisciplinary therapeutic approach during the last few years have allowed us to improve the median survival in these patients. In addition to surgery, today there are treatment options such as endoscopic resection or the use of neoadjuvant chemoradiotherapy followed

by surgery or definitive chemoradiotherapy. Furthermore, chemotherapeutic treatments are being developed in the light of new receptors, such as HER-2 (*human epidermal growth factor receptor 2*) that appears to be overexpressed in esophageal adenocarcinoma, and growth factor inhibitors such as VEGF (*vascular endothelial growth factor*) and EGFR (*epidermal growth factor receptor*), which could extend the survival of patients with disseminated disease in the future.

Imaging modalities play an essential role in these patients' integral assessment, both in the initial evaluation – determining resectability and in the most appropriate treatment and in the response assessment and follow-up.⁷

In this paper we review the anatomical and lymphatic-drainage peculiarities of the esophagus that explain the aggressive behavior of this tumor, we review the actual classification and its contributions to esophageal cancer staging, and we present the utility and limitations of each imaging modalities used in the initial assessment and during these patients' therapeutic process.

Anatomic peculiarities in esophageal cancer

The esophagus is a muscular tube that connects the pharynx with the stomach, whose wall is made up of four layers: the mucosa, the submucosa, the muscular and the adventitia layers. The esophagus does not have serosa, a characteristic that facilitates the rapid dissemination of cancer to neighboring structures in the neck and mediastinum.^{8,9}

Although there is an endoscopic division based on the distance from the upper edge of the tumor to the incisors, we usually use a clinical division that divides the esophagus into cervical, upper, mid and lower thoracic regions, with well-defined relations and well-defined anatomic limits¹⁰⁻¹² (Fig. 1):

- *Cervical esophagus*. Limits: from the cricopharyngeal muscle to the sternal notch. Anatomical relations: carotid arteries, thyroid gland, trachea and vertebral bodies.
- *Upper thoracic esophagus*. Limits: from the sternal notch to the aortic arch. Anatomical relations: the same ones.

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