Case Report

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Successful role of adjuvant radiotherapy in a rare case of tracheal inflammatory myofibroblastic tumor: a case report

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Abstract

Background: Inflammatory myofibroblastic tumor (IMT) is a rare benign cancer that can express a more aggressive phenotype related to the genetic mutation of the anaplastic lymphoma kinase receptor (ALK). Involvement of trachea is extremely rare and due to the clinical and radiologic nonspecificity, the definitive diagnosis is based on the histologic evaluation of tissue specimens. Total surgical excision is curative and chemotherapy or radiotherapy has been employed in the treatment of unresectable tumors or as adjuvant therapies.

Case presentation: The case described here is being reported because of the rare tracheal location and the atypical treatment approach used for an ALK-positive IMT. A 7-week pregnant woman voluntary interrupted pregnancy and underwent total surgical excision that resulted to have close margins. Although ALK-positive expression indicated the use of ALK inhibitors, she refused any type of adjuvant therapy that could affect ovarian function. Thus, 3D conformational external beam radiotherapy was performed with a daily dose of 180 cGy, 5 times per week, up to 45 Gy at the level of trachea. A total of 62 months of follow-up showed and no signs of disease recurrence or late radiation therapy-related toxicity.

Conclusions: This report describes an extremely rare case of a tracheal IMT, underlying the key role of radiotherapy as adjuvant treatment able to definitively cure IMT, limiting systemic chemotherapy-related toxicity.

Keywords

Inflammatory myofibroblastic tumor, trachea, radiotherapy, ALK

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Introduction

Inflammatory myofibroblastic tumor (IMT) is a very rare cancer made up of cells called myofibroblastic spindle cells whose etiology is poorly understood. IMT usually affects pediatric patients although it may arise in patients of any age.[1–3] Although considered benign, IMT can manifest an aggressive clinical course with local recurrence, distant metastasis, and sarcomatous degeneration.[1–3] This phenotype has been related to the chromosomal rearrangement involving the anaplastic lymphoma kinase receptor (ALK) gene that, determining the constitutive receptor activation, shown in 50% of IMTs, promotes the expression of a more aggressive phenotype.[4] IMT can occur in almost any part of the body, but preferentially affects the lung parenchyma, representing 0.04%–0.7% of all lung tumors while rarely affecting the airways. Clinical presentation is generally unspecific and signs and symptoms depend on the site of the tumor, with some patients being asymptomatic; others may have nonspecific respiratory symptoms, fever, or pain. Complete surgical resection is the best treatment modality for IMT; however, chemotherapy or radiotherapy can be performed in unresectable tumors or when the surgical margins are positive or close,

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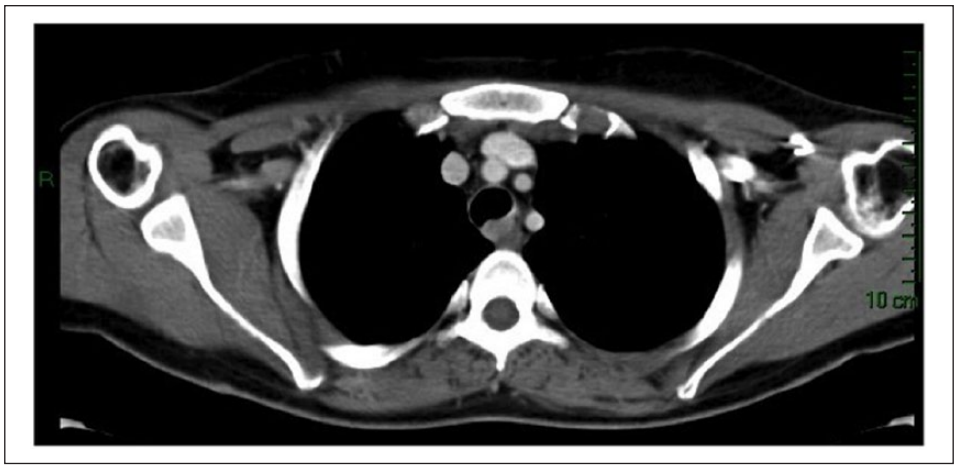

Figure 1. Chest CT image of the mass lesion that was obliterating tracheal lumen.

as adjuvant treatment.[1–3] In this context, the use of ALK inhibitors, such as crizotinib, is successfully used in ALK-positive patients with IMT with unresectable tumor, as adjuvant treatment or as an alternative to traditional chemotherapy.[4] Despite the efficacy of chemotherapy treatments, the systemic toxicity of the drugs used represents an important limitation, particularly in relation to the young age of the patients and the need to preserve reproductive function.

Herein we describe a case of IMT of the trachea that as indicated by Gaissert et al.[2] and Fabre et al.[3] is very rare. The case reported here describes the clinical history of a pregnant woman with tracheal ALK-positive IMT who voluntarily interrupted her pregnancy and was subjected to adjuvant radiation therapy to preserve reproductive function.

Case description

A 26-year-old woman, 7 weeks pregnant, was admitted to the emergency department for an acute respiratory distress syndrome. Clinically, she presented severe stridor while laboratory data and arterial blood gas analysis did not reveal abnormalities; systemic corticosteroids and bronchodilators had no significant effect on her dyspnea. She was a nonsmoker, did not refer any allergy but was being treated with fluticasone propionate/salmeterol (50/250μg) twice daily for asthma, with no noticeable effect in terms of symptom relief. Thorax computed tomography (CT) showed a mass causing stenosis of the airway and the presence of pneumomediastinum (Figure 1). Rigid bronchoscopy confirmed the presence of a vascularized, smooth-surfaced, lobulated mass lesion that was obliterating tracheal lumen; endoscopic resection was performed, resolving the dyspneic symptomatology. The pathologic report was spindle cell tumor with inflammatory infiltrate, consistent with IMT; surgical margins were positive. Immunohistochemistry showed that tumor cells were positive for smooth muscle actin (SMA), desmin, keratin, cytokeratin, and anaplastic lymphoma kinase (ALK), and negative for S-100, CD117, CD23, and c-kit (data not shown). Pregnancy was voluntarily interrupted after being informed of the risks of surgery and thoracotomy with segmental tracheal resection and lymphadenectomy performed. The pathologic report showed that surgical margins were less than 1 mm from tumor and adjuvant 3D conformational external beam radiotherapy (3D-EBRT) with a daily dose of 180 cGy, 5 times per week, up to 45 Gy at the level of trachea, was performed (Figure 2). The patient did not refer any acute toxicity and after a follow-up of 62 months no signs of disease recurrence or late toxicity have been described.

Conclusions

IMTs are rare tumors with an unknown etiology and that rarely affect the trachea.[1–3] The case reported here provides important information on the potential role of estrogen in the onset and progression of the IMT. Ours complements other reports that suggest how pregnancy can facilitate the growth of IMT[5,6]; this seems to be in line with the role of estrogen in promoting the onset and progression of lung cancer.[7]

Since clinical and radiologic findings are nonspecific in the diagnosis of IMT, the definitive diagnosis is based on histopathologic examination of the excised material. In our case, the presence of actin (SMA), desmin, keratin, cytokeratin, and ALK and the absence of S-100, CD117, CD23, and c-kit associated with the presence of inflammatory cells were also helpful in differential diagnosis. Furthermore, ALK positivity indicated a more aggressive phenotype,[4] obliging the choice of an effective therapeutic strategy.

Total surgical excision is curative for the treatment of IMT while adjuvant treatment after surgery has been reported to be useful in recurrence or incomplete resection[3] and in ALK-positive patients.[6] Curative surgical treatment was applied to our case and although no residual tumor within surgical margins was described after microscopic examination, close margins suggested performing adjuvant therapy. Although the positivity for ALK expression

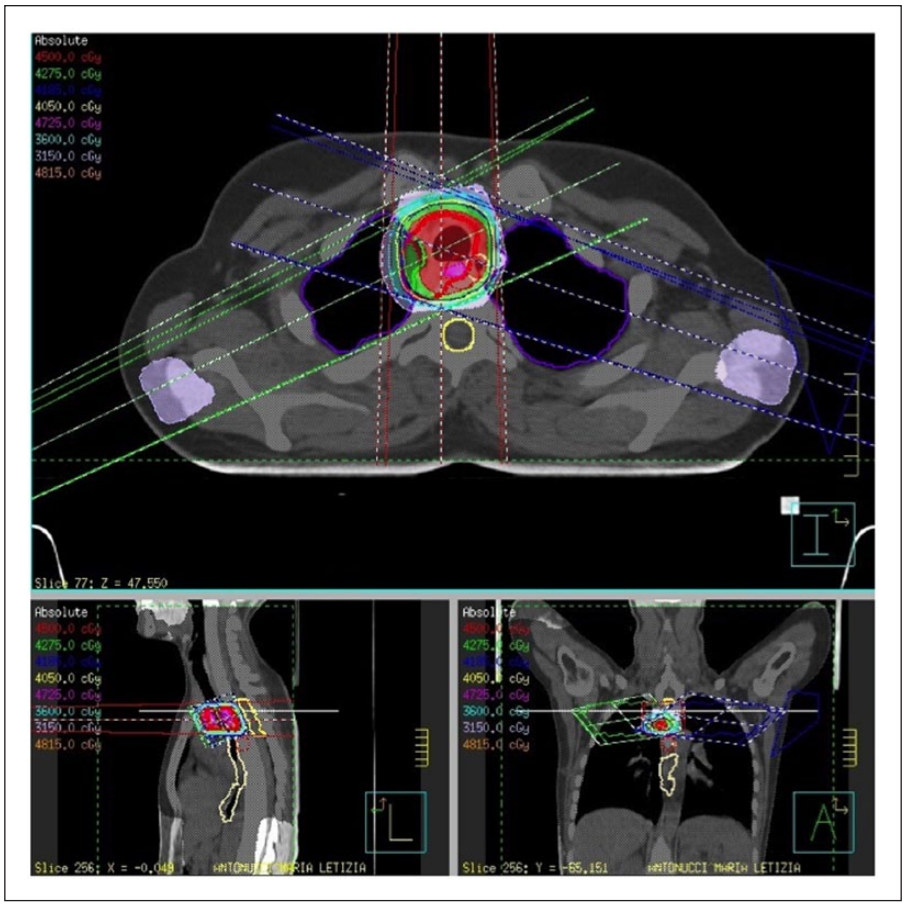

Figure 2. Distribution shows the percent of the total dose to the clinical tumor volume (CTV, trachea + surgery bed). Treatment was performed by using 3D conformational external beam radiotherapy (3D-EBRT) with 3 fields: 1 anterior and 2 oblique. Dose to target was 45 Gy, 180 cGy/fraction x25 times (5 fractions/week, 5 times per week).

suggested the use of ALK inhibitors as adjuvant therapy, this therapy, as well as conventional chemotherapy, may impair ovarian function.[8] We needed to avoid this toxicity especially in a woman who had interrupted a pregnancy due to possible complications on the fetus related to the surgical procedure. Thus, radiotherapy was successfully performed with no acute or chronic consequences for the patient.

In conclusion, our experience confirms that since IMT may be confused with many different benign and malignant tumors clinically and radiologically, definitive diagnosis is possible with histopathologic examination after excision. Adjuvant therapy is strongly recommended in all patients at high risk of relapse and radiotherapy should also be considered in ALK-positive tumors, especially when it is necessary to preserve ovarian function.

Declaration of conflicting interest

The authors declare that there is no conflict of interest.

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