CASE REPORT

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Tracheal localization of inflammatory myofibroblastic tumor in adults: A case report

Trahealna lokalizacija inflamatornog miofibroblastnog tumora kod odraslih

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Abstract

Introduction. Inflammatory myofibroblastic tumor (IMT) is a rare neoplasm. This disease, of unknown etiology, runs an unpredictable course. Its definitive diagnosis calls for a detailed histopathological analysis including immunohistochemistry. Microscopically, IMT is composed of myofibroblastic spindle and inflammatory cells in different proportions. It presents infrequently in adults with nonspecific symptomatology. The presence of IMT is described in every anatomical region but the tracheal one is especially uncommon. **Case report.** A 41-year-old female patient checked into our institution due to exacerbation of asthma-like symptoms such as shortness of breath, cough and exertion intolerance. She was originally treated as the asthmatic patient with the bronchodilator therapy with no success. Chest x-ray done during one of the outpatient follow-up appointments pointed to a suspected change in the tracheal distal part. After her admission to our institution, the following diagnostic procedures were performed: spirometry, chest computed tomography (CT) scan, chest magnetic resonance imaging (MRI) and bronchoscopy and the change in tracheal distal third was confirmed. Right-sided thoracotomy with mobilization of lung, tracheal resection and termino-terminal (T-T) anastomosis was undertaken. Subsequent histopathological analysis of surgically removed afflicted tracheal part of them trachea including immunohistochemistry enabled us to definitively of diagnose IMT. Four years after surgical resection, the patient showed no recidivism of illness. **Conclusion.** Definitive IMT diagnosis requires the detailed diagnostic tests, most importantly, an adequate histopathological analysis including immunohistochemistry**.** Complete surgical resection is the treatment of choice in case of IMT. Further monitoring of patients is necessary due to a risk of recurrence.

Key words:
diagnosis; immunohistochemistry; inflammation; surgical procedures, operative; thoracotomy; tracheal neoplasms.

Apstrakt

Uvod. Inflamatorni miofibroblastni tumor (IMT) je retka neoplazma. Bolest je nepredvidivog toka i nejasne etiologije i za njenu definitivnu dijagnozu je potrebna detaljna patohistološka analiza uz primenu imunohistohemije. Mikroskopski, IMT čine miofibroblastne vretenaste i inflamatorne ćelije u različitom odnosu. Ređe se viđa kod starijih osoba i nespecifične je simptomatologije. Opisano je prisustvo IMT-a na svim anatomskim lokalizacijama, a trahealna lokalizacija je veoma retka. **Prikaz bolesnika.** Bolesnica stara 41. godinu javila se u našu ustanovu zbog progresije simptoma sličnih astmi u vidu otežanog disanja, kašlja i brzog zamaranja. Ranije je lečena bronhodilatatornom terapijom bez uspeha. Na kontrolnim ambulantnim pregledima radiografijom grudnog koša uočena je suspektna promena u distalnom delu traheje. Nakon prijema u našu ustanovu učinjene su dijagnostičke metode – spirometrija, kompjuterizovana tomografija (CT) grudnog koša, nuklearna magnetna rezonanca (NMR) i i bronhoskopija. Navedene dijagnostičke pretrage su potvrdile postojanje promene u distalnoj trećini traheje. Učinjena je desna torakotomija sa mobilizacijom pluća i resekcijom traheje i termino-terminalnom (T-T) anastomozom. Patohistološkom analizom operativnog materijala, uz primenu imunohistohemije, postavljena je dijagnoza IMT-a. Bolesnica je četiri godine nakon operacije bile bez recidiva bolesti. **Zaključak.** Za postavljanje dijagnoze IMT-a potrebne su detaljne dijagnostičke pretrage, posebno adekvatna patohistološkom analiza sa imunohistohemijom. Metod izbora u lečenju IMT-a je kompletna hirurška resekcija. U cilju detekcije mogućih recidiva neophodne su dalje kontrole.

Ključne reči:
dijagnoza; imunohistohemija; zapaljenje; hirurgija, operativne procedure; torakotomija; traheja, neoplazme.

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Introduction

Inflammatory myofibroblastic tumor (IMT) is an infrequent mesenchymal tumor of unclear etiology and more frequent occurrence among children and young adults in the first two decades of life [1, 2]. The most common incidence is in the lungs as peripheral nodes, while its manifestation in the trachea is extremely rare. According to the World Health Organization (WHO), IMT is a lesion composed of myofibroblastic spindle cell population accompanied by an inflammatory infiltrate of plasma cells, lymphocytes, and eosinophils [2] and its diagnosis depends on relevant histopathological analysis. Before its definitive diagnosis, a detailed histopathological analysis, which includes an immunohistochemistry, is necessary [3, 4]. Even though it was previously considered a benign ailment, the latest research indicates its recurrence potential or malignant nature, depending on the proliferative index (Ki-67) [5]. The surgical resection is the method of choice in its treatment with the excellent chance of patient survival [1]. We reported a 41-year-old female patient with IMT of the trachea.

Case report

A 41-year-old female patient was admitted to our institution due to the exacerbation of asthma-like symptoms. In the months prior to admission, she experienced difficulties of breathing, cough without sputum and exertion intolerance. The worsening of those symptoms over time and their appearance even at rest were noted. She was originally treated with bronchodilator therapy with no effects. During one of the outpatient follow-up visits, the chest x-ray showed a change in the distal left wall of the trachea (Figure 1) and she was referred to our hospital.

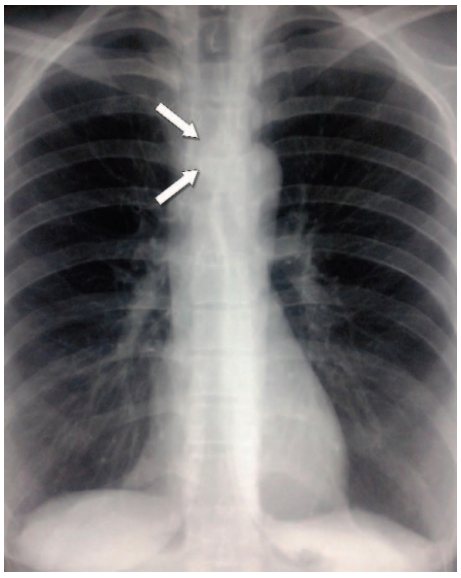

Fig. 1 – Chest X-ray showing a lesion on the left distal wall of the trachea (arrows).

Upon admission, the pulmonary function test parameters informed of the severe obstructive ventilatory defect of the upper respiratory tract forced expiratory volume (FEV1) – 32%, forced vital capacity (FVC) – 84%, Tiffenean (Tiff) – 29%.

The laboratory analysis values fell within their respective reference intervals. The computed tomography (CT) of the thorax exposed semicircular thickening of the size 32 x 15 mm at the level of the distal third of trachea, above bifurcation, that significantly reduced the tracheal lumen (Figure 2).

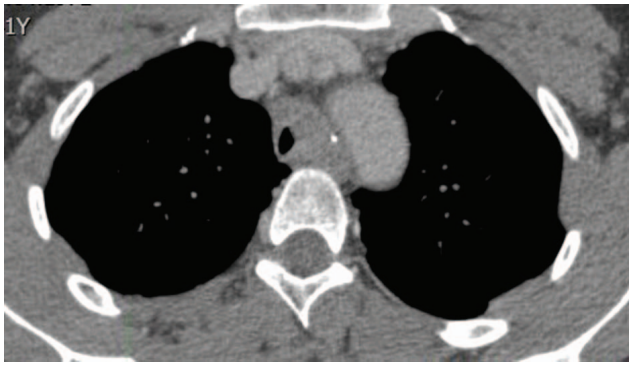

Fig. 2 – Computed tomography showing a mass on the left tracheal wall with intraluminal propagation.

Subsequently, the chest magnetic resonance imaging (MRI) revealed that on a distance of approximately 16 mm from the tracheal carina, laid a tumor that filled the lumen almost in its entirety (free lumen is approximately 8 x 4 mm in magnitude) and its dimensions were 11 x 19 x 33 mm (Figure 3).

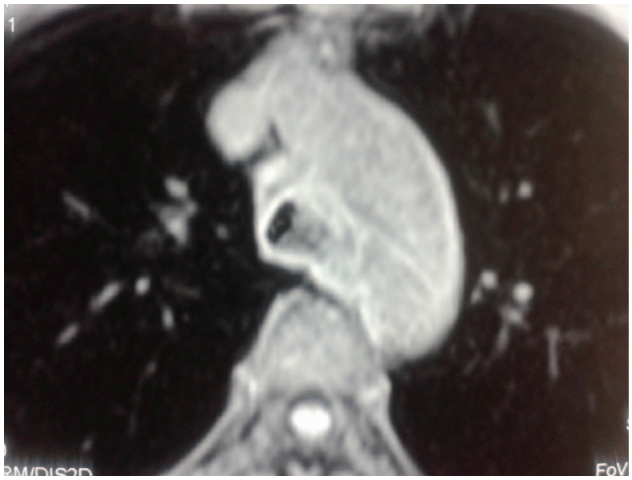

Fig. 3 – Magnetic resonance imaging scan demonstrating a tumor of the left lateral tracheal wall, with lumen reduction.

Repeated bronchoscopy disclosed the tumorous lesion on the XIII tracheal ring that blocked two thirds of tracheal lumen (Figure 4). The histopathological findings revealed chronic inflammation and squamous metaplasia of respiratory epithelia of trachea only.

After completed the preoperative procedure, right-sided thoracotomy was performed with mobilization of lung and resection of trachea in the length of approximately 3 cm and termino-terminal (T-T) anastomosis.

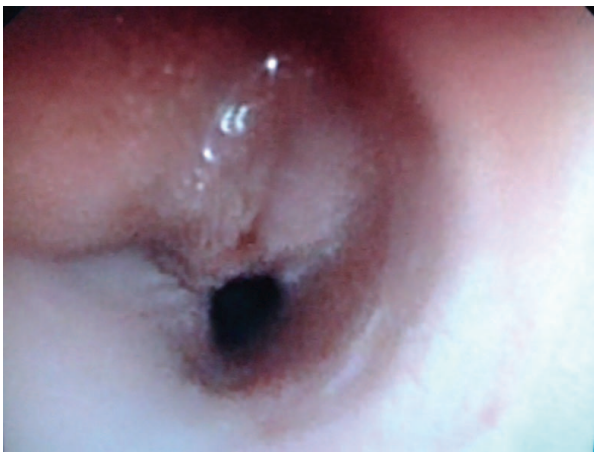

Fig. 4 – Bronchoscopy showing a stenosis of the trachea as a result of a tumor mass at the level of the XIII tracheal ring.

Microscopically, the nonencapsulated inflammatory myofibroblastic tumor contained a mixture of spindle cells arrayed in the fascicles or arranged in a storiform pattern.

These cells with the oval nuclei and inconspicuous nucleoli had abundant lightly eosinophilic cytoplasm. Mitoses and cytologic atypia were not found. Admixed with the spindle proliferation, there was an inflammatory infiltrate containing a numerous lymphocytes and a prominent number of plasma cells associated with lymphoid follicles. Histiocytes were also obtained including some Touton type giant cells (Figures 5a and 5b). Immunohistochemically, all of tumor cells expressed vimentin (Figure 5c) and some of them smooth-muscle-actin (SMA) (Figure 5d). The anaplastic lymphoma kinase (ALK) expression was detected in some tumor cells (Figure 5e). Cytokeratin-AE1/AE3 was not expressed, excluding the spindle cell type of lung carcinoma, and, in like manner, S-100 protein, excluding neuroectodermal tumor. Ki67 was not found in any of the examined tumor cells.

The postoperative course proceeded with no complications. The patient was released from the hospital on the 10th postoperative day. From there on, she has been undergoing the regular follow-up visits and four years after the procedure, the patient shows no recidivism of the illness.

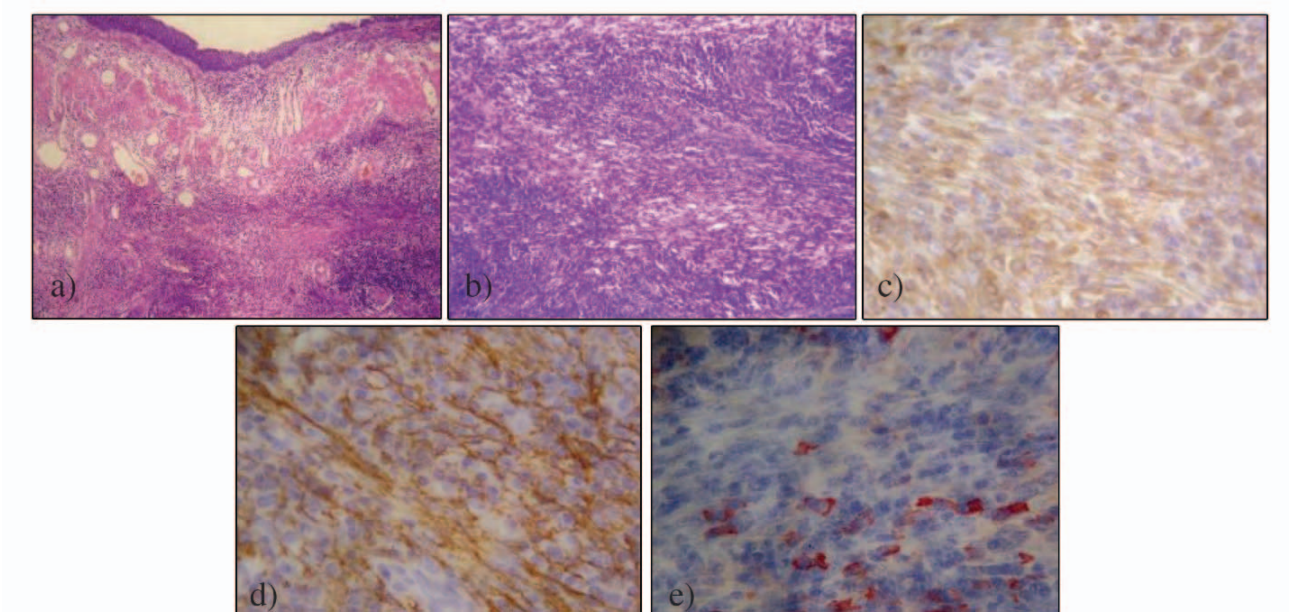

Fig. 5 – a) Nonencapsulated proliferative cells are present in deeper layers of the tracheal wall. Respiratory epithelia is with squamous metaplasia [hematoxylin and eosin (HE) stain (×10)]; b) Mixture of small spindle cells with prominent, hyperchromatic nuclei and histiocytes with clear nuclei intermingled with lymphocytes and plasma cells (HE, ×20); c) Small spindle cells express, Vimentin (×40); d) A majority of cells express smooth-muscle-actin (SMA, ×40); e) The anaplastic lymphoma kinase (ALK-P) expression in some cell is specific for the myofibroblastic lung tumor (ALK-P, ×40).

Discussion

IMT is a rare mesenchymal tumor most commonly located in the lungs making only 0.04% of all lung tumors [1], while its presence in the trachea is exceptionally uncommon [6, 7].

Etiology of this tumor is uncertain. Explanations provided for the IMT development are the following: an inflammatory reaction as a result of a trauma, an autoimmune reaction or an infection. However, in the majority of reported IMT cases, no trauma or infection was detected prior to the diagnosis [8, 9]. As of late, IMT is widely recognized as a mesenchymal tumor with a low malignant potential in view of its observed characteristics: local recidivism and invasion, metastasis, malignant transformation and certain genetic transformation such as chromosome translocation ALK genes in reported cases [5, 10].

IMT of respiratory organs is the most frequently related to an ambiguous symptomatology involving difficulties with breathing, cough and fatigue [11]. Dyspnea as the most com-

mon tracheal IMT clinical symptom is manifested early in the course of illness because of the tracheal obstruction [10].

However, forming the correct diagnosis is usually delayed when symptoms are as vague and common and having in mind the low illness incidence [3].

IMT of trachea is generally located in the distal third of trachea [12].

Identifying an IMT preoperatively is hindered because of its cellular pleomorphism feature even after an adequate bronchoscopy [11, 13]. Its diagnosis is ordinarily being confirmed after the surgical resection [13]. The above argument also demand an immunohistochemistry analysis [3, 4].

Upon the morphological pattern and immunohistochemistry results, we diagnosed IMT. Until the WHO 2004 lung tumor classification, inflammatory myofibroblastic tumor of the lung was categorized as an "inflammatory pseudo tumor" [14]. Characteristic morphology of nonencapsulated tumor is a mixture of spindle cells in fascicular and storiform pattern and collagen, accompanied with lymphocytes, plasma cells and histiocytes. Using the vimentin expression, we confirmed mesenchimal proliferation and using the focal SMA expression we confirmed the myofibroblastic origin of tumor. Absence of S-100 proliferation excluded the neuroectodermal origin of tumor and the absence of Cytokeratin-AE1/AE3 expression allowed exclusion of spindle cell carcinoma, although according to the literature their presence could be observed in some IMTs. Its focal reactivity is potentially explained by the alveolar entrapment. We did not find the Ki67 expression and that could be a good prognostic sign that we were not supposed to expect the local tumor recurrence after the tumor was removed completely. We were guided by the IMT diagnosis recommendation both of the 2004 and the more recent 2015 WHO classification of lung tumors [14, 15]. In the described tumor, ALK was expressed in some cells. Cessna et al. [16] in 2002 found that 40% of IMTs expressed ALK in some of tumor cells.

Since IMT could immitate other lesions such as lymphroproliterative diseases, certain expert opinions call for a histopathological confirmation before the surgical resection that could shed light on whether less invasive procedure like the endoscopic removal can be implemented. Nonetheless, it is widely accepted that in the case of tracheal IMT with the transmural propagation or recidivism, the complete surgical resection of the afflicted part of the trachea is recommended [3, 4, 7, 11, 12].

Due to the small number of reported cases of tracheal IMT, till 2013 (there were only 11 recorded cases of tracheal IMT in adults), we cannot say anything definitive about its recidivism rate [8]. This is the first reported case of tracheal IMT in adults in our hospital.

Radiotherapy is being used in the patients when surgery is not applicable, or they are inoperable with limited results [3, 4, 12].

In the course of the IMT treatment, beside the surgical resection as the method of choice, corticosteroids are prescribed as well. The results of their use vary, from the ineffective to complete illness remission [2, 17, 18]. The adoption of chemotherapy in the IMT treatment did not produce satisfactory results [19].

After the complete IMT removal, the prognosis is usually excellent, and with several recidivism cases being reported, subsequent regular follow-ups of patients are recommended [7, 12].

Conclusion

Inflammatory myofibroblastic tumor is rarely thought of, considering its vague clinical course and nonspecific radiographic findings. It cannot be ignored especially in the pediatric population. Surgical resection is the method of choice in the treatment of inflammatory myofibroblastic tumor. When tumor is resected in its entirety, this method yields an excellent rate of patient survival. The histopathological examination and diagnosis supported by immunohistochemistry are necessary to determine the histological type of tumor and its biological behavior. Other treatment techniques (chemotherapy, radiotherapy, corticosteroids) are less frequently used and with the lower success rates. Further monitoring of patients is necessary in order to detect recidivism.

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