

# Teflon-induced granuloma: a source of false positive positron emission tomography and computerized tomography interpretation

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## Abstract

Patients diagnosed with malignancy often undergo combined positron emission tomography (PET) and computerized tomography (CT) to investigate possible metastases. This report presents a case in which, in the investigation of suspected pulmonary malignancy, combined PET and CT images suggested a malignant lesion at the level of the vocal fold. Biopsy of the lesion, however, confirmed the clinical diagnosis of a Teflon granuloma. The case highlights the potential for a false positive report during scanning of patients who have had vocal fold injection.

**Key Words:** Polytetrafluoroethylene Tomography; False Positive Reactions; Laryngeal Neoplasms

## Introduction

Positron emission tomography (PET) and computerized tomography (CT) are investigative tools in the diagnosis, staging and management of neoplasia.<sup>1,2</sup> Their combined use allows a more precise localization of lesions and more accurate interpretation of the visualized lesion, reducing the chance of false positive interpretation of non-neoplastic disease.<sup>3</sup>

Vocal fold medialization is a well established treatment modality for laryngeal nerve injuries. This involves surgical implantation of material such as fat, silastics and polytetrafluoroethylene (Teflon). This short report details a case in which a vocal fold lesion, investigated by combined PET and CT, was proposed to be a primary neoplasm responsible for metastasis to the lung. However, subsequent clinical and histological investigation showed it to be a Teflon granuloma.

## Case report

A 67-year-old man presented with a two-month history of dry cough. His medical history was notable for diabetes and hypertension and in 1985 he had undergone a repair of his thoracic aorta for inflammatory vascular disease. Post-operatively, he had suffered from dysphonia secondary to left recurrent laryngeal nerve injury (in addition to left phrenic nerve injury) and underwent an unknown procedure on his larynx, with limited effect. From the history, this was probably a Teflon injection to achieve vocal cord medialization. His voice remained unchanged for 18 years to date. He also had a 30-pack-year smoking history, although he had given up smoking in 1985.

Chest radiography and CT scanning of his chest revealed a single, spiculated 2-cm lesion in the upper lobe of the left lung and a raised hemidiaphragm. Needle

aspiration cytology suggested a non-small cell lung cancer. Fibre-optic bronchoscopy, bone scan and abdominal ultrasound were all negative and an abdominal CT showed no evidence of metastasis. A PET scan showed an area of intense <sup>18</sup>F-fluorodeoxyglucose (FDG) uptake in the left upper lobe and a second isodense area below the epiglottis at the level of the left vocal fold (Figure 1). Corresponding CT images of the neck demonstrated a discrete nodular lesion in the left hemilarynx (Figure 2). These findings were reported as indicative of two malignant lesions, raising the possibility of a primary lesion in the larynx and metastasis involving the left upper lobe.

At this stage an otolaryngology opinion was obtained. On outpatient flexible nasendoscopy there was no movement of the left hemilarynx, and a marked swelling of the superior surface of the cord was noted. A microlaryngoscopy under general anaesthesia revealed a smooth swelling of the superior cord extending into the ventricle, with no evidence of a mucosal lesion. Biopsies were taken of the mucosa over the swelling and of the deeper tissue. There was no clinical evidence of any laryngeal neoplasm. Histological examination confirmed a Teflon granuloma in the deep tissue and fibrosis with no evidence of dysplasia or malignancy in the overlying epithelium.

The patient subsequently underwent a lobar resection for his pulmonary malignancy.

## Discussion

During his cardiothoracic procedure in 1985, this patient suffered damage to both the left recurrent laryngeal nerve, producing left vocal fold paralysis, and the phrenic nerve, resulting in the raised hemidiaphragm. These are well documented complications.<sup>4</sup> The patient had undergone a

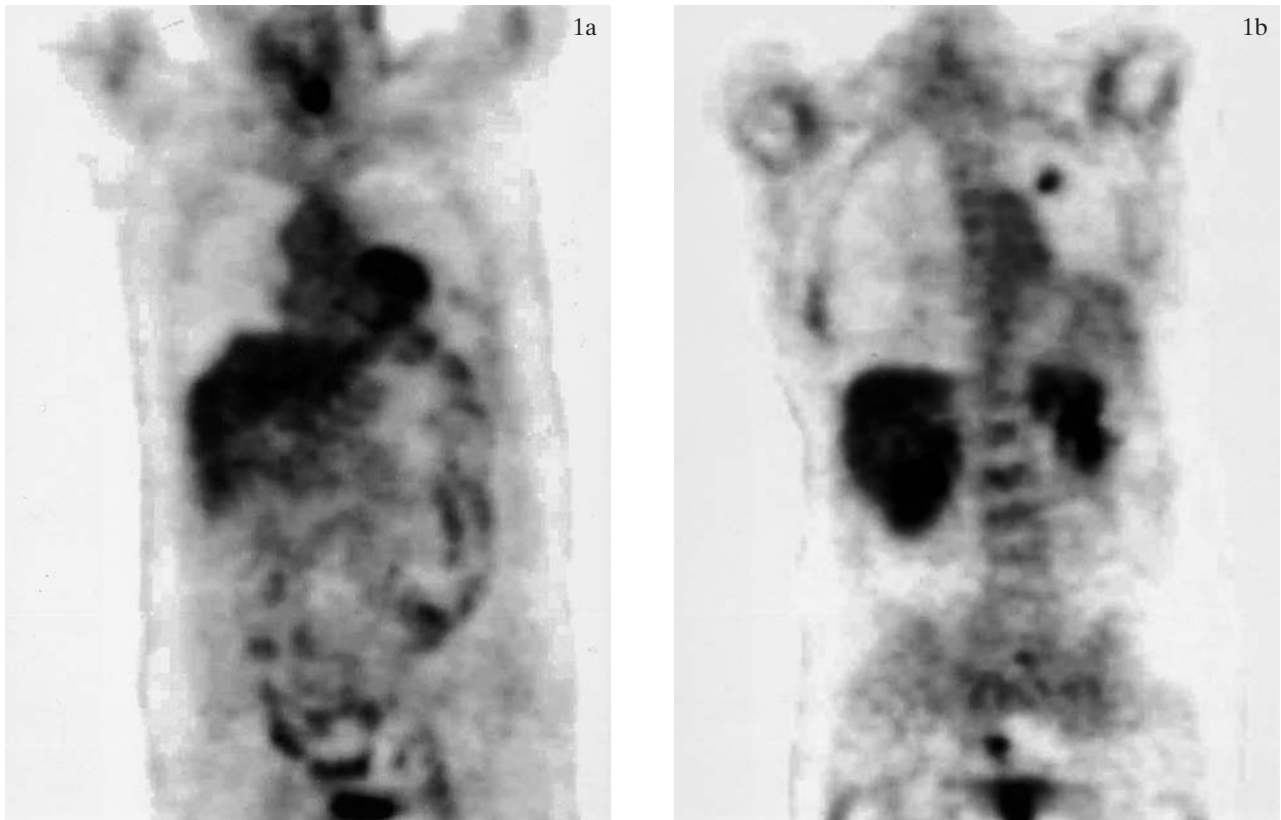


FIG.1

Coronal views acquired with PET demonstrating high uptake both in (a) the left larynx and (b) the left lung.

vocal fold medialization in order to improve phonation and reduce further complications, such as aspiration pneumonia. In the past, this had been achieved by the implantation of material, including the direct injection of Teflon, into the fold. In recent times, use of Teflon has reduced due to complications such as overinjection, improper injection and the formation of granulomas.<sup>5,6</sup>

- **Case report of patient suspected of bronchial malignancy, who during scanning was found to have a vocal fold abnormality**
- **The vocal fold anomaly was found to be due to a granuloma from a previous Teflon injection**
- **The case highlights the potential for false positive reports during scanning of patients with vocal fold injections**

The injection of Teflon induces an acute inflammatory response dominated by neutrophils, which are quickly replaced by an immune-based cellular reaction characterized by aggregations of lymphocytes and macrophages. This progresses to a chronic inflammatory process with the formation of discrete clusters of cytokine-recruited macrophages, called granulomas. As Teflon is non-viable, polymorphs are unable to destroy it and it remains as a constant inflammatory stimulus, with particles surrounded by activated macrophages, multinucleated macrophages (Langhans giant cells) and dense collagenous material.<sup>3</sup> This granulomatous reaction has

been observed to arise three to six months post-injection.<sup>7</sup>

Positron emission tomography relies on FDG uptake by abnormal tissue. Studies have demonstrated that, in vitro, lymphocyte and macrophage aggregations and, in vivo, pulmonary tuberculomas or sarcoid granulomas can accumulate FDP in similar quantities to malignant tissue.<sup>8,9</sup> Yeretsian *et al.* (2003) presented a case report hypothesizing the false positive PET interpretation of a vocal fold lesion. Based on radiological and fibre-optic laryngoscopy, they concluded that the lesion was a 'Teflonoma' caused by the previous injection of Teflon.<sup>10</sup> This short report describes a similar case but also presents histological analysis confirming the lesion to be a Teflon-induced granuloma.



FIG. 2

CT of the larynx demonstrating a mass in the left vocal fold/hemilarynx.

### Conclusion

Combined PET and CT studies are valuable in the investigation, staging and monitoring of head and neck neoplasms. As with all imaging studies, there is the potential for false positive and false negative results. Teflon has been shown to be capable of FDG uptake similar to that of malignant tissue and is a potential source of false positive interpretation of lesions. This case demonstrates a histologically proven Teflon granuloma, the appearances of which on PET and CT study gave rise to a false positive result. Otolaryngologists and radiologists need to be aware of this potential source of error.

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