

Intracardiac Migration Following Percutaneous Computed Tomography-Guided Fiducial Marker Implantation for Pulmonary Metastasis: A Rare Complication

Abstract

A 41-year-old female with rectal cancer and lung metastasis underwent percutaneous transthoracic placement of fiducial marker. Postprocedure scan showed the migration of one of the fiducial markers to the left ventricle. Intracardiac fiducial marker migration is a rare complication but can happen, especially with centrally located lesions. Physicians and patients should be aware of this risk.

Keywords: *Fiducial marker, lung metastasis, migration, percutaneous transthoracic*

Introduction

Stereotactic body radiation therapy (SBRT) is a technique that utilizes precise targeting of tumor irradiation to minimize the exposure of adjacent normal tissue.^[1] SBRT is used to treat a variety of primary and metastatic tumors of the lung, liver, pancreas, kidney, spine, and prostate.^[2] Fiducial markers enable lesion tracking, but complications from insertion may occur.^[3]

Fiducial markers act as an internal radiological landmark and move with a constant relationship to the targeted tumor during therapy for the precise delivery of radiation.

Percutaneous implantation of fiducial markers can be achieved with a relatively low rate of major complications. Complications from fiducial marker insertion have been reported, including pneumothorax in 33%–68% of patients as well as bleeding.^[4,5] Fiducial markers may also migrate into the pleural space, the airway, or into the vascular structures.^[3,6-8] Intracardiac migration is an extremely rare complication. Here, we report a case of left ventricular migration of the fiducial following percutaneous implantation of the marker in a centrally located lung lesion.

Case Report

A 41-year-old female patient with rectal cancer and lung metastasis underwent

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percutaneous transthoracic placement of fiducial markers in the left upper lobe lesion under computed tomography (CT) guidance. Four gold markers and one platinum coil were placed in the lung within the vicinity of the metastatic nodule in the left upper lobe. Minor perilesional bleeding was noted. Four days later, the patient underwent another percutaneous transthoracic placement of fiducial markers in bilateral metastatic lung lesions. The preprocedure scan showed mild left-sided pneumothorax, stable position of the previously inserted fiducials in the left upper lobe metastatic nodule. Three additional markers were placed in the right middle lobe metastatic lesion [Figure 1] with moderate right-sided pneumothorax. Furthermore, three markers were placed at the left lower lobe metastatic nodule and two at the right lower lobe metastatic pulmonary nodule [Figure 2]. Postprocedure scan showed the migration of one of the fiducials to the left ventricle by embolization through a pulmonary vein [Figure 3]. Follow-up CT scan at 4 months showed stable migrated fiducial in the left ventricle. The migrated fiducial markers remained stable in position at 3-year follow-up CT scan [Figure 4], when the patient expired due to the progression of the pulmonary and osseous metastasis.

Discussion

Fiducial marker migration to the heart is a rare complication that can happen,

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Figure 1: Computed tomography image showing centrally located metastatic pulmonary nodule was planned for fiducial marker placement

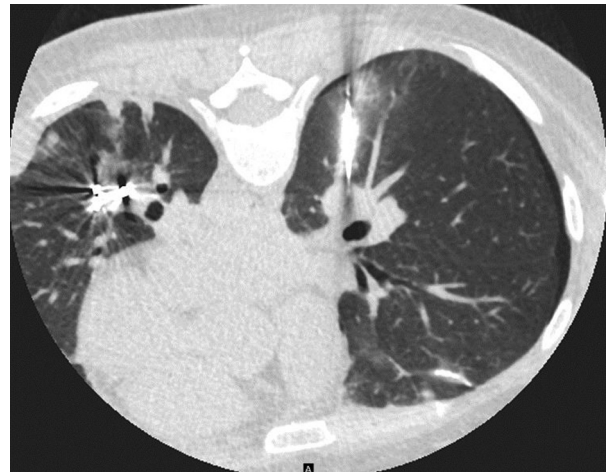


Figure 2: Unenhanced computed tomography image in the prone position during fiducial marker implantation



Figure 3: Unenhanced computed tomography image in coronal reformat obtained immediately after the procedure shows the displacement of the marker (arrow)

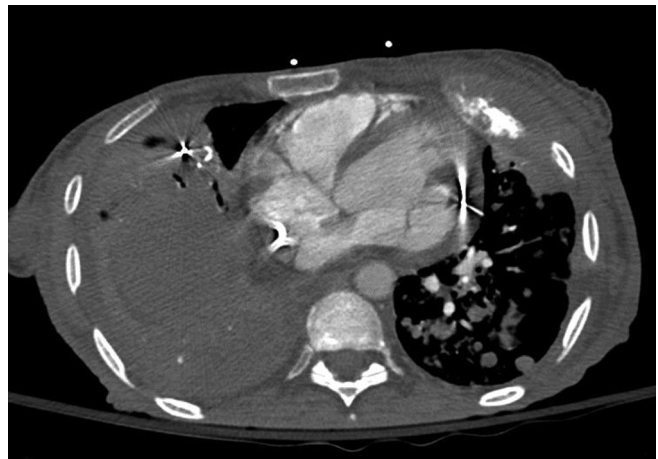


Figure 4: Enhanced computed tomography image of the chest obtained at a 3-year follow-up shows the marker stabilized in the left ventricle (arrow) as well as new metastatic pulmonary nodules

especially with centrally located lung lesions. Cousin *et al.* reported a case of intracardiac displacement of the fiducial marker into the left atrium 1 month after the procedure, which further migrated into the left ventricle on follow-up CT.^[7] Hennessey *et al.* reported a case of coil migration through hepatic vein to the inferior vena cava and lodged at the cavoatrial junction during fiducial marker placement for hepatic metastasis. The coil was successfully retrieved and the patient remained asymptomatic.^[8] Farkas *et al.* reported another case of intracoronary fiducial migration resulting in acute coronary syndrome and was treated conservatively.^[9] In our case, the fiducial was embedded and endothelialized in the ventricular wall and did not require any further intervention.

Interventional radiologists, radiation oncologists, and patients should be aware of this risk. Migration carries the risk of stroke, acute coronary syndrome, or distal embolization in other organs. In case of intracardiac migration, close observation and imaging follow-up to ensure the stability of the fiducial is highly recommended.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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