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## Case Report

# Endovascular retrieval of contraceptive implant embolized to pulmonary artery

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## ABSTRACT

Embolization of subdermally implanted contraceptive devices is a rare but potentially serious event. Timely removal of the embolized foreign body should be considered to prevent possible hemodynamic, respiratory, or hormonal complications. We present a case of a 22-year-old woman with a contraceptive implant embolized to her right lower lobar pulmonary artery, which was successfully managed by endovascular retrieval.

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## Introduction

Subdermal contraceptive implants such as Implanon and Nexplanon (Merck & Co. Inc, Whitehouse Station, NJ) are a commonly utilized contraceptive method. Both devices are 4-cm long plastic rods that deliver etonogestrel (progestin specific to these devices) which suppresses ovulation for an average of 2–3 years [1]. Providers are instructed to insert the device via an applicator while tenting the soft tissue of the medial arm. The device is deployed into the subcutaneous tissue, and the placement is confirmed with palpation at the insertion site [1]. Implant removal is done in outpatient setting

via a minor incision of the overlying tissue. Complications related to contraceptive implants are uncommon and include local infection, hematoma, and scarring [2].

Device embolization is a very rare but serious event that is thought to occur when a device is inadvertently placed intravascularly into a superficial upper extremity vein, most frequently the basilic vein [2]. Intravascular placement is estimated to occur at a rate of 1.3-per-million Nexplanon insertions [3]. Embolization events may be clinically silent and are typically discovered at the time of attempted device removal when the device is not palpable at the original insertion site. A more extensive search ensues with radiography of the upper extremity and chest. Once embolization is confirmed,

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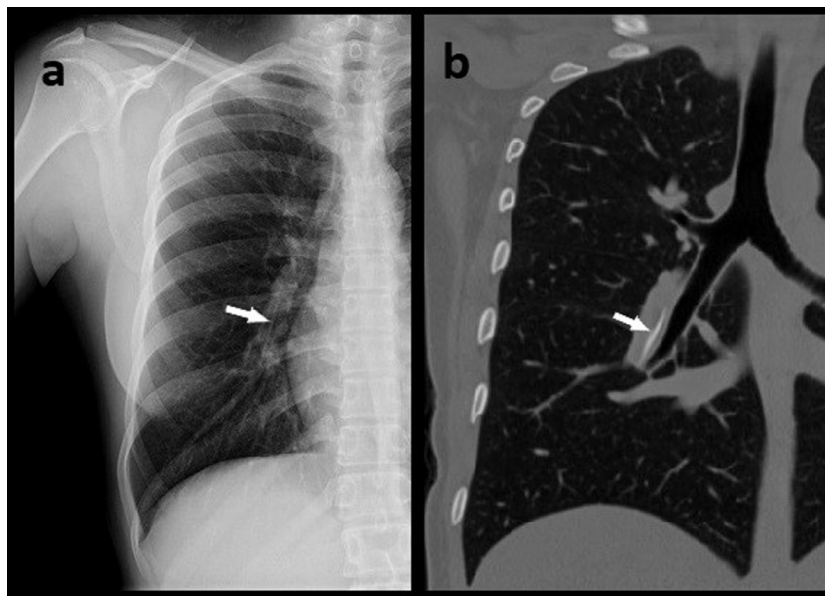
Compliance with ethical standards: All procedures performed in studies involving human participants were in accordance with the ethical standards of the institutional and/or national research committee and with the 1964 Helsinki declaration and its later amendments or comparable ethical standards. Informed consent was obtained from all individual participants included in the study. Consent for publication was obtained for every individual person's data included in the study.

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**Fig. 1 – Localization of foreign body. (a) Chest radiograph demonstrating a linear opacity (arrow) consistent with an embolized Implanon contraceptive device in the right lower lobar pulmonary artery. (b) Coronal chest CT confirming the presence of a linear foreign body (arrow) within the right lower lobar pulmonary artery.**

expedited removal is recommended and can be performed endovascularly by interventional radiology [2–4] or surgically by cardiothoracic surgery [5,6]. We report our experience of device retrieval using an endovascular approach.

## Case report

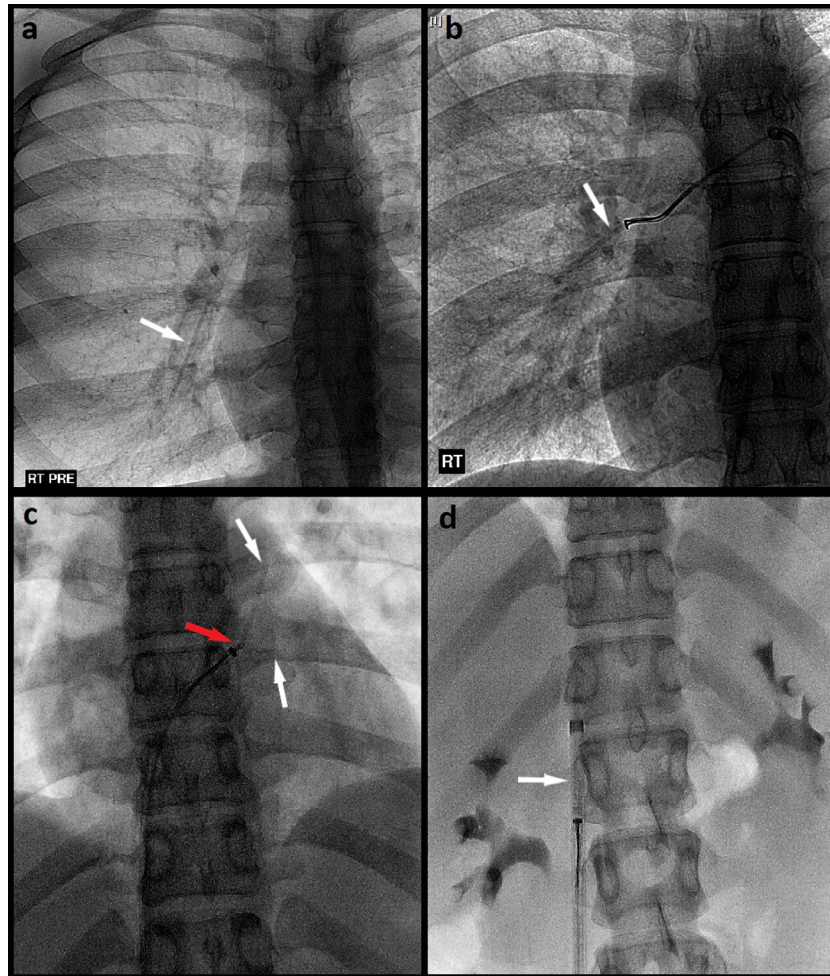
A 22-year-old woman, who had an Implanon device inserted in Mexico a year ago, presented to a gynecologist to request its removal due to hormonal side effects, including progressive headache, mood changes, breast tenderness, and vaginal spotting. The device, which was initially placed in her right arm, could not be palpated on exam. The patient reported that she could never feel the device at the insertion site since its placement. Radiography of the right arm was performed, which did not demonstrate the device in situ. A blood sample obtained for serum etonogestrel level returned elevated at 268.44 pg/ml, confirming that the device was still in her body. A chest radiograph was then obtained, revealing the presence of a linear density within the right pulmonary vasculature (Fig. 1). Follow-up chest computed tomography (CT) verified that the device had embolized to the right lower lobe pulmonary artery, which remained patent. Interventional radiology was consulted for an endovascular foreign body retrieval attempt.

The retrieval procedure was performed under moderate sedation via right common femoral vein access. A triaxial system was utilized, consisting of a 12-F base sheath placed at the level of intrahepatic inferior vena cava (IVC), an 8-F curved sheath advanced to the proximal right pulmonary artery, and

a 4-F angled diagnostic catheter in the right lower lobar artery. A 10-mm loop snare was used through the 4-F catheter to grasp the proximal portion of the implant (Fig. 2). The device was successfully engaged with the snare but could not be pulled into the 8-F sheath given that it had folded on itself at the snare point (Fig. 3). Due to concern for a possible device fracture with more aggressive pulling, the snared device and inner sheath were gently withdrawn under fluoroscopy through the right heart into the IVC. The system could then be easily pulled into the 12-F sheath for complete retrieval. After the device was removed from the patient, its integrity was verified on the back table. The patient tolerated the procedure well without immediate complications and was discharged home 3 hours later. She was followed up by her gynecologist 40 days postprocedure and reported complete resolution of her hormonal symptoms.

## Discussion

This case demonstrates minimally invasive management of a rare but serious complication associated with subdermal contraceptives. If the implant is not palpable on exam during routine physical exam or at the time of removal attempt, imaging studies should be pursued to localize a potentially migrated device. Initial workup should include an ultrasound and radiograph of the arm to include the axilla [2,4]. Nexplanon contains barium sulfate making it more radio-opaque and easier to locate on imaging studies than Implanon, whose use has been discontinued in the United States [1]. If these methods do not reveal the implant's location, chest radiograph or



**Fig. 2 – Retrieval of foreign body. (a) The contraceptive device seen within the right lower lobar pulmonary artery (arrow). (b) A 10-mm loop snare engaging the embolized device. (c) The snared device is being pulled back through the right ventricle outflow tract (arrowhead represents snare grasp point, white arrows indicate Implanon ends). (d) Complete retraction of the folded implant (arrow) through a 12-F sheath. (For interpretation of the references to colour in this figure legend, the reader is referred to the web version of this article).**

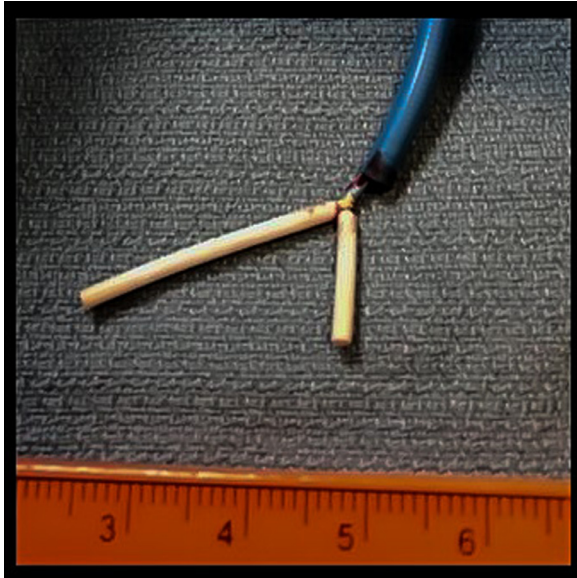
CT should be considered to assess for central embolization [2–5,7,8].

Patient presentation in reported cases ranged from asymptomatic to reports of chest pain and dyspnea [2–6]. Varying presentation might be related to acuity and location of embolization, and degree of tissue damage caused by the intravascular foreign body. Nexplanon/Implanon is designed to induce a local fibrotic response to facilitate fixation within the subdermal tissue [5]. This should be considered when planning removal, as devices embedded for a prolonged duration may have developed marked endothelialization and fibrosis within the vessel, potentially complicating endovascular retrieval [5]. Once embolization is confirmed, retrieval should be attempted in a facilitated manner to prevent a theoretical risk of pulmonary artery occlusion, perforation, lung infarction, or hemodynamic compromise. Asymptomatic patients may opt for no intervention, however no studies to date have looked at the long-term outcomes of this approach or the timeframe to return of fertility [8].

To our knowledge, there have been 9 reported cases of contraceptive implants embolizing to the pulmonary vasculature, 3 of which were successfully removed using endovascular techniques [2–6]. Other removal options include video-assisted thoracoscopic and open thoracotomy approaches [6]. While the experience is limited, endovascular removal should be considered first given its less invasive nature compared to surgical options.

Given our general unfamiliarity with the device, we were concerned about potentially fracturing it with aggressive retrieval maneuvers. In our experience, this device was pliable enough to be easily pulled back into a 12-F sheath by being folded upon itself without breaking. The few endovascular case reports have also described successful sheathing of the devices without fracture [2,4].

This case outlines an infrequent but potentially severe complication associated with intradermally implanted contraceptives. Successful endovascular retrieval is possible and should be attempted prior to more invasive techniques.



**Fig. 3 – Retrieved Implanon device secured on a loop snare.**

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