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Case Report

Aspiration technique for percutaneous endovascular retrieval of contraceptive device embolized to the pulmonary vasculature ☆,☆☆

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ABSTRACT

Contraceptive implant migration into the pulmonary circulation is an uncommon, but potentially serious complication. We describe an "aspiration" technique for percutaneous retrieval of a contraceptive implant from a subsegmental pulmonary artery, using a Penumbra Neuron MAX 088 guiding catheter and a Merit Medical VacLok Vacuum Pressure Syringe, as an alternative to the previously described snare technique. Our patient had an uneventful recovery and was discharged home on the same day.

Introduction

The contraceptive implant (Implanon NXT) is a soft plastic device measuring approximately 40 × 2 mm (Fig. 1), which slowly releases progestogen. It is not biodegradable. The implant is inserted (injected) under the skin of the inner non-dominant upper arm. Significant migrations (more than 2 cm) are uncommon, and primarily occur caudally to the insertion site [1,2]. Intravascular placement is estimated to occur at a rate of 1.3/million insertions [3]. Embolization into the pulmonary arterial circulation is an uncommon complication. However, previous reports demonstrate that it has increased in frequency [4,5]. The position of the foreign body within the cardiovascular system depends on the route of entry and – if migratory – on gravity, as well as position of the patient at the time of the incident. The final position depends on the length, stiffness of the material, and vascular flow pattern [6].

Case report

A 46-year-old Caucasian woman, smoker, normal BMI, experienced asymptomatic migration of a subdermal contraceptive implant into a subsegmental branch of her right lower lobe

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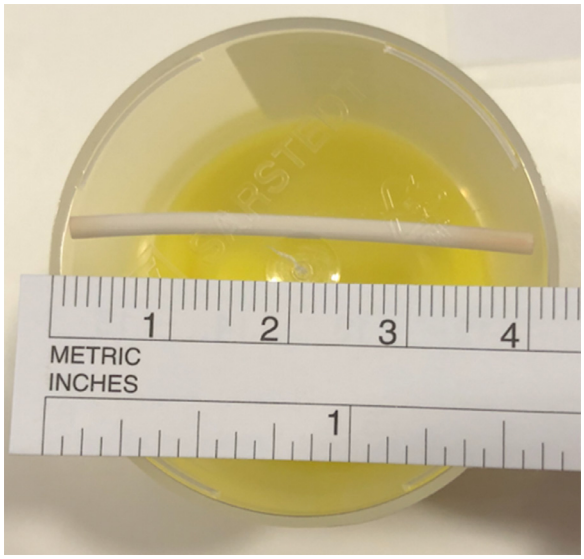

Fig. 1 – Contraceptive implant retrieved from a branch of the right lower pulmonary artery.

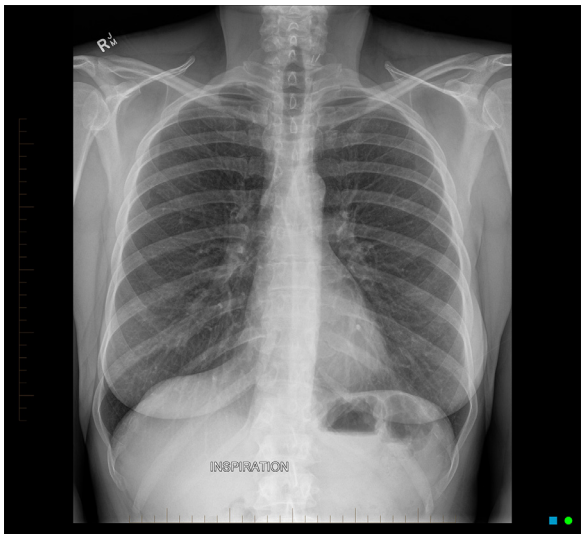

Fig. 2 – Chest radiograph, posterior-anterior projection, reported as normal.

pulmonary artery. The patient had no significant comorbidities. Upon request to have the device removed, it could not be palpated at the site of insertion. Upper arm ultrasonography and chest radiography (Figs. 2 and 3) were unsuccessful in locating the device. Unenhanced chest computed tomography and computed tomography pulmonary angiography (CTPA) confirmed the device lodged within a subsegmental branch of the right lower lobe pulmonary artery (Fig. 4). No lung changes were present to suggest infarction. Similarly, no pulmonary thromboembolism was identified. In retrospect, upon review of previous computed tomography of the chest, the device was found to be in the pulmonary vasculature for at least 21 months.

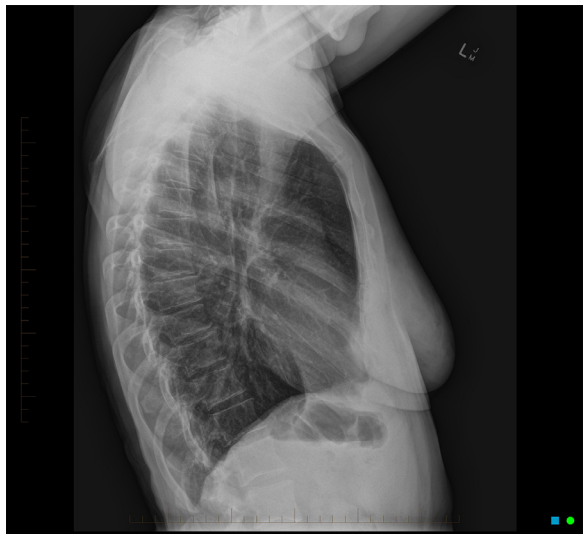

Fig. 3 – Chest radiograph, lateral projection, reported as normal.

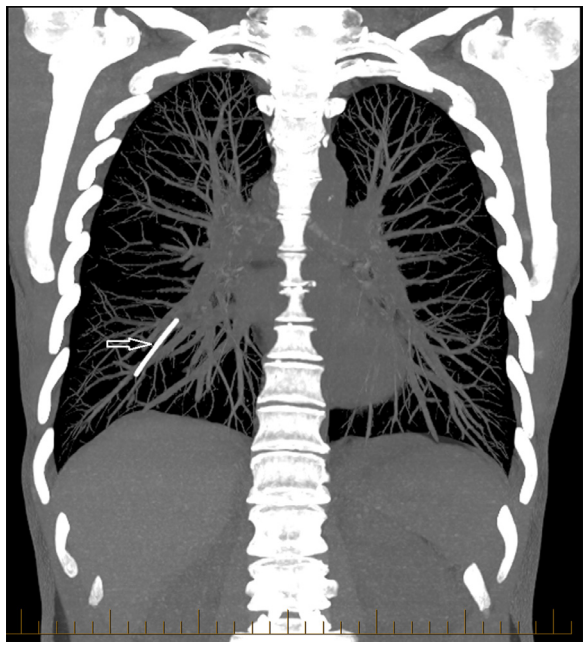

Fig. 4 – Contraceptive device in the subsegmental right lower pulmonary artery.

The retrieval procedure was performed under general anesthesia. Control chest radiograph demonstrated the radiopaque contraceptive device in the right lower zone. Ultrasound guided right common femoral vein puncture was performed, followed by insertion of an 8 French angiographic sheath. An angiographic 5 French pigtail catheter was introduced over a Bentson wire into the pulmonary trunk. The distal curve of the catheter was maintained with meticulous technique to avoid exposing the wire distally. Pulmonary angiogram was performed, confirming standard anatomy and

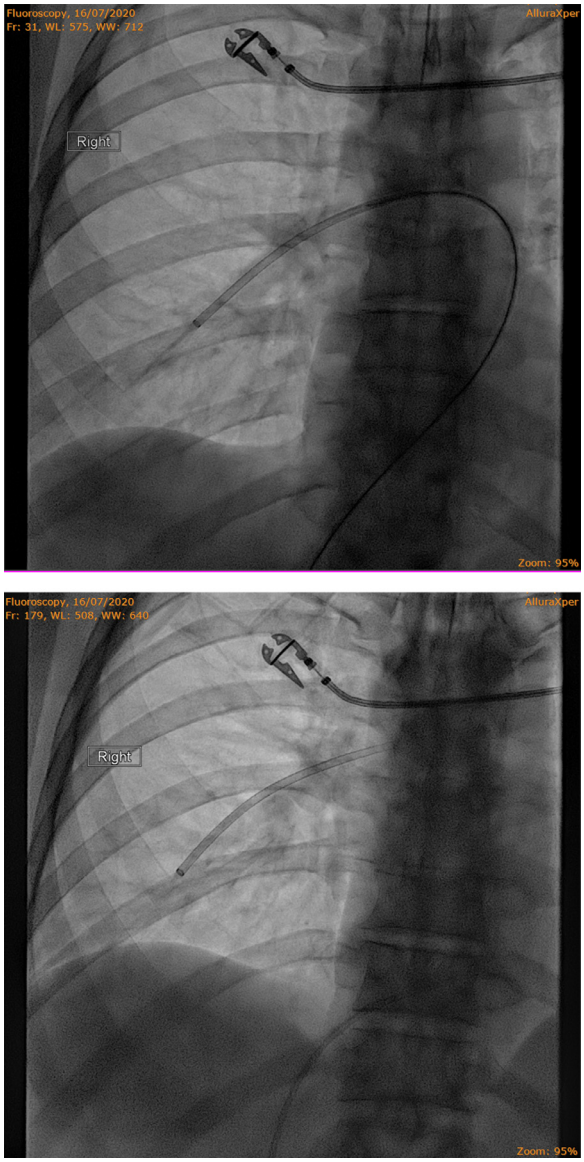

Fig. 5 – Neuron Max 088 catheter over the contraceptive device (Top and Bottom).

location of the implant in the right lower segmental pulmonary artery. The angiographic catheter was further advanced into the lower segmental pulmonary artery. The pigtail catheter was exchanged for a Neuron Max 088 guiding catheter, over an Amplatz wire, which was carefully advanced and parked immediately proximal to the implant. The guiding catheter was, then, slowly advanced over the contraceptive device and wedged within the pulmonary artery (Fig. 5). Immediate aspiration using a VacLok Vacuum Pressure Syringe (60 mL) was applied. After a few seconds without blood flow, the entire device was aspirated into the syringe, followed by vigorous blood flow (first pass). Completion pulmonary angiogram demonstrated intact and patent pulmonary arteries, without filling defects. The patient had an uneventful recovery and was discharged home on the same day.

Discussion

Our case demonstrates a minimally invasive aspiration technique of a rare but serious complication associated with subdermal contraceptives. When implants are not palpable on routine physical examination or at the time of removal attempt, imaging studies should be immediately done to localize a potentially migrated device.

Patients may be asymptomatic or present with symptoms of chest pain and/or dyspnea. Cardiopulmonary complications after implant migration to the pulmonary arterial system may be serious and include infection, vascular thrombosis, pneumothorax, pleural irritation, vascular perforation, or impaired fertility until the active ingredient is depleted [7–9].

To our knowledge, there have been 12 reported cases of contraceptive implants embolizing to the pulmonary vascular system, a few of which previously retrieved by endovascular techniques, mostly using a snare [10]. Other removal techniques include video-assisted thoracoscopic surgery and thoracotomy [11].

Percutaneous retrieval of intravascular foreign body obviates the need of surgical procedures, which are associated with increased morbidity and mortality. Dotter, in 1964, first described nonsurgical retrieval of catheter emboli to the heart and great vessels by various means, the simplest of which being the loop snare catheter [12].

Uflacker et al described the "*passover*" technique, used for retrieval of small catheter fragments in the peripheral pulmonary artery, which consists of the introduction of a straight guidewire into an embolized catheter fragment through a large-bore angiographic catheter. The latter is, then, carefully advanced until it passes over the foreign body and the whole system is withdrawn. However, passing a guidewire through a fragment is certainly not always feasible making this technique to be of value in only a limited number of cases [13].

Previous report by O'Brien et al suggested that the contraceptive device incites endothelialization/fibrosis within the wall of the pulmonary artery, knowing that the rod is designed to engender such reaction [14].

Our technique raises a couple of questions and also possibilities: (1) the advancement of the Neuron Max 088 guiding catheter over the contraceptive device can break possible fibrotic strands or debris surrounding the rod, releasing it and making aspiration feasible; (2) although the outer diameter of the catheter (8 French) provides considerable seal for suction, one could use a coaxial system, with a distal access catheter (such as Microvention Terumo Sofia Plus) within the guiding catheter, for retrieval of foreign bodies located more distally in the pulmonary or peripheral vasculature. Our patient's (CTPA) did not demonstrate areas of lung infarct, implying the presence of blood flow distal to the contraceptive device. We would expect at least a degree of fibrosis or endothelialization, after 21 months since the device was first identified in the pulmonary arterial circulation.

We suggest our described aspiration technique is simple to perform. Also, it may reduce the potential risks associated with endovascular removal of contraceptive device, including foreign body fracture with further distal embolization,

folding upon itself, as well as previously described cardiac and pulmonary valve injury during other retrieval manoeuvres. As with any endovascular procedure, particularly involving the pulmonary vasculature, there are risks involved, such as vessel rupture, thromboembolic events, lung infarction, pneumothorax, infection, and cardiac arrhythmias.

Finally, we consider our aspiration technique safe and potentially associated with a higher chance of complete contraceptive device retrieval.

Ethical approval

For this type of study formal consent is not required.

Patient consent

Informed consent was obtained from all individual participants included in the study.

Our institution does not require Institutional Review Board (IRB) approval or exemption for case reports.

Supplementary materials

Supplementary material associated with this article can be found, in the online version, at doi:10.1016/j.radcr.2020.12.049.

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