CASE REPORT

Migration of a Nexplanon contraceptive implant to the pulmonary artery

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SUMMARY

This is a case report of a 17-year-old woman who experienced distant intravascular migration of a radio-opaque Nexplanon contraceptive implant. She presented with an impalpable implant and this was located using CT in the left lower lobe pulmonary artery. Significant migration of a contraceptive implant is an uncommon risk. Using radio-opaque contraceptive implants such as Nexplanon increases the ability to locate them if migration occurs.

BACKGROUND

Nexplanon is a highly effective, long-acting reversible contraceptive implant. It is a single rod that contains Etonogestrel (ENG), a synthetic progestogen that is inserted subdermally to provide contraceptive cover for up to 3 years.

It is the only contraceptive implant currently licensed in the UK and has been available in the UK since 2010. Nexplanon has replaced the previous implant Implanon and has the added benefit of being radio-opaque. Migration has also been known to occur with Implanon; however, this is not discussed as it is no longer in clinical use.

Intravascular migration of the contraceptive implant is a known, although rare, complication of the implant insertion. There have been eight reported cases of intravascular migration within the UK, Ireland and France.^{1 2} The risk of intravascular insertions is estimated at 1.3 per million Nexplanon implants sold worldwide.^{3 4}

CASE PRESENTATION

A 17-year-old woman using the radio-opaque contraceptive implant Nexplanon requested removal due to problematic bleeding patterns. The implant had been inserted by her general practitioner (GP) into the inner aspect of the left upper arm, and palpated by the patient and the GP immediately after the insertion. At the time removal was requested, the implant was not palpable in the left arm and was not visible on the single X-ray of the arm requested by her GP. She was therefore referred to tertiary services for location of the subdermal implant. At the time of presentation to our service, she continued to have an irregular menstrual cycle. She was otherwise well with a medical history of well-controlled asthma. She was not using any contraception in addition to the impalpable implant and was therefore advised

to use condoms consistently until the implant was located. She was advised against starting alternative hormonal contraception as this may interfere with ENG serum levels.

INVESTIGATIONS

A urine pregnancy test was negative. On examination an insertion scar was seen on her left upper arm; however, there was no implant palpable in either upper arm. An ultrasound scan of both upper arms did not demonstrate a subdermal implant. Further X-ray imaging of both upper arms was obtained with multiple views, which did not demonstrate an implant in situ. The case was discussed with the manufacturer and the patient had serum levels of ENG sent via courier transport of the sample to the Netherlands for analysis. ENG was detected in the blood sample.

A chest X-ray showed a 4 cm long linear radio-opaque shadow in the lower left lung field (figure 1). Following this a CT thorax was performed. The CT report states 'a 4 cm long linear radio-opaque object lies within the left lower lobe of the pulmonary artery branch; its appearance is in keeping with the missing contraceptive implant. The lungs are clear otherwise' (figure 2A–C).

A contrast enhanced CT pulmonary angiogram demonstrated that the implant was located very far down the pulmonary artery with no contrast reaching beyond the implant. This therefore demonstrated that the implant had occluded the pulmonary vessel. There was no evidence of necrosis, infection or other pulmonary pathology distal to the occlusion.

TREATMENT

The patient was referred to a thoracic surgeon and an interventional radiologist to discuss the possibility of removing the implant. The device had been implanted 2 years prior to its identification in the pulmonary artery, and although initially palpated by the patient, shortly after insertion it could no longer be felt. It is therefore believed that migration via the venous system of the arm occurred after insertion and caused the implant to traverse the right heart chambers and become lodged in a branch of the pulmonary artery supplying the left lower lobe.

The contrast enhanced CT pulmonary angiogram demonstrated the implant had occluded the pulmonary vessel, and it was therefore likely to have become embedded and incorporated into the

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Figure 1 Lateral chest X-ray demonstrating linear opacity in the left lower lobe (arrow).

arterial wall. Removal options were either via an interventional radiological technique or via open surgery. Both of these procedures carried a high degree of risk of arterial damage, bleeding and the possibility of a lobectomy.

OUTCOME AND FOLLOW-UP

Given the high degree of risk with both removal options, it was agreed to leave the implant in situ. We have not arranged a routine follow-up; however, she is advised to return if she experiences any further problems. We have advised alternative contraception once the implant reaches the end of its licensed duration at 3 years.

DISCUSSION

The long-term implications to the patient were considered. There is no evidence that a correctly sited contraception implant increases the risk of venous thromboembolism.^{5 6} However, due to the intravascular location of the implant, the potential risk of the implant causing thrombotic emboli was considered, and

after discussion with the haematology team it was felt that anti-coagulation was not warranted. As the implant has reached its current location intact, it is unlikely that it would now undergo breakage or fracturing as it is likely to become embedded in the vessel wall. If fracturing were to occur, information provided from the manufacturer states that in vitro broken implants only demonstrate a very slightly higher rate of release of ENG than non-broken counterparts, but this is not enough to be significant.⁷

It is known that Nexplanon works to fully inhibit ovulation in the first 2 years and ovulation rarely occurs in the third year of use.^{8 9} Literature available to date suggests that a serum ENG level of 90 pg/mL is required to achieve suppression of ovulation.¹⁰ The serum ENG levels at the end of the third year declines to 156 pg/mL, compared with 196 pg/mL at the end of year 1. It is therefore likely that it would continue to be effective beyond 3 years,¹¹ although use beyond this time frame has not been sufficiently studied. It would be expected that the serum concentrations would progressively fall until they were undetectable; however, it is not currently known how long this would take, and it is likely that there will be a delay in return of fertility beyond the end of the licence period. The implant in its current location can continue to be relied on to provide contraceptive cover, at least, until the end of its 3-year licence. Following this, alternative contraceptive cover will need to be arranged if the patient so wishes. However, if a spontaneous or in vitro fertilisation pregnancy were to occur, current evidence suggests that Nexplanon is not teratogenic, and there is no evidence that pregnancy with the implant in situ would be detrimental to the woman, fetus or pregnancy outcome.^{12 13} It is unknown what effect, if any, the implant would have on the outcomes of possible future fertility treatment.

Nexplanon is licensed for use for women aged between 18 and 40. However, it is acknowledged within the National Institute for Health and Care Excellence clinical guidance that it is in widespread use outside of this age range. These guidelines recommend that the use of Nexplanon need not be restricted to women aged 18–40 as evidence can be extrapolated to an older or younger population.¹⁴ Therefore, it is unlikely that the patient's age of 17 at the time of insertion played a role in the outcome, and its use in this age group should not be restricted based on this case.

Migration has been known to occur with the previous generation implant, Implanon. Nexplanon has an updated inserter to reduce the risk of deep insertion and is radio-opaque to help locate migrated implants.¹⁵ Regarding Jadelle and Norplant, the two-rod and six-rod implants, no published cases of distant migration have been identified.

Intravascular migration of the Nexplanon contraceptive implant is a rare complication of insertion. In this case, the device was inserted into the inner aspect of the non-dominant upper arm as per manufacturer's guidance.¹⁶ The insertion scar was visible at approximately 8 cm above the medial epicondyle of the humerus, avoiding the bicipital groove which is the common site for the neurovascular bundle. The implant was initially palpated by both the patient and practitioner at the time of insertion, but shortly after this it could no longer be felt by the patient. It is, therefore, believed that migration via the venous system of the arm occurred. The implant was identified 2 years after its insertion in the pulmonary artery of the left lower lobe. It is thought that the implant traversed from the basilic vein to the superior vena cava, through the right heart chambers to become lodged in a branch of the pulmonary artery supplying the left lower lobe.

Figure 2 Unenhanced chest CT scan. (A) Axial image demonstrating dense opacity (arrow) on the left lower lobe below the level of lower lobe pulmonary artery. (B) Axial image at the lower level demonstrating similar dense opacity (arrow). (C) Reformatted oblique coronal image demonstrating linear dense opacity (arrow) within a branch of the lower lobe pulmonary artery.

It is now advised by the Faculty of Sexual and Reproductive Health Clinical Effectiveness Unit that the risk of migration is discussed when seeking informed consent and that implants be inserted over the biceps muscle anterolateral to the bicipital groove to avoid the blood vessels and nerves contained within the subcutaneous tissue.¹⁷ It is important for healthcare professionals to be vigilant during the insertion procedure by visualising the needle just below the skin along its whole length to reduce the risk of deep insertion. It is recommended the device is palpated by both the healthcare professional and patient immediately after insertion, and that advice is given to the woman to return in the event the device can no longer be felt at a later date.

Learning points

- ▶ Intravascular migration of the contraceptive implant is a rare complication.
- ▶ It is advised to discuss the risk of migration when seeking informed consent.
- ▶ The recommended insertion location is over the biceps muscle, anterolateral to the bicipital groove, to avoid the blood vessels and nerves contained within the subcutaneous tissue.
- ▶ The device should be palpated by both the healthcare professional and the patient immediately after insertion.
- ▶ Advise women to return in the event the device can no longer be felt at a later date.

Contributors KJ identified the patient for case report write-up and acquired the necessary patient information. RB-E carried out the literature search, drafted the manuscript and obtained consent for publication from the patient. KJ proof-read and amended the manuscript and approved the final draft of the manuscript for submission. MB reported the original radiological images, prepared the images for inclusion and wrote the legends for the images.

Competing interests KJ received honoraria for delivering lectures and sponsored for attending various symposia by MSD. RB-E and MB have no competing interests to declare.

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