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Removal of a Nonpalpable Etonogestrel Implant With Preprocedure Ultrasonography and Modified Vasectomy Clamp

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BACKGROUND: Deep etonogestrel contraceptive implant placements still occur despite design modifications to the implant inserter. We present a method for outpatient removal of a nonpalpable etonogestrel implant using preprocedure ultrasonography for implant localization followed by removal with a modified vasectomy clamp, a modification of the “U” technique for six-capsule levonorgestrel implant removal.

TECHNIQUE: In women with a nonpalpable etonogestrel implant containing barium sulfate, we obtain a radiographic examination to confirm the implant’s presence in the upper extremity. Using an 18-MHz linear ultrasound transducer, we identify and mark the implant location on the patient’s arm, noting the depth. We remove the implant with local anesthesia in the office using a modified vasectomy clamp through a 5-mm or less skin incision directly over the implant.

EXPERIENCE: All three patients referred to our office with nonpalpable etonogestrel implants had successful removal using this technique.

CONCLUSION: Nonpalpable contraceptive implants can be removed in the office using a modified vasectomy clamp after localization with high-frequency ultrasonography. Given the relative infrequency of nonpalpable

implant removals, regional expert sites with health care providers experienced in difficult removals should be created for patient referrals.

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Deep placement of Implanon (etonogestrel implant) occurred in approximately one in 1,000 patients, leading to development of techniques for localization and removal of nonpalpable implants.^{1,2} Nexplanon (etonogestrel implant with barium sulfate) features two modifications of the original contraceptive implant: inclusion of barium sulfate in the implant to aid in radiologic localization and a new applicator to facilitate placement and potentially avoid deep insertions. Despite the new applicator design, several reports of deeply located etonogestrel implants with barium sulfate have been published.^{3–5} These reports describe techniques for implant removal in the interventional radiology suite with fluoroscopy or in the operating room. We present a technique to remove a nonpalpable etonogestrel implant in the outpatient setting using ultrasonography for implant localization and a modified vasectomy clamp for removal. This technique is based on a modification of the “U” technique developed more than two decades ago for removal of the six-capsule levonorgestrel implant.⁶

TECHNIQUE

Once a clinician determines that an etonogestrel implant with barium sulfate is nonpalpable, a radiographic examination is used to confirm the presence of the implant (Fig. 1). To localize the implant, we obtain an ultrasound examination of the upper extremity with the patient in the same position that she would be in for office removal (supine with her arm flexed at the elbow with the hand next to her head). We go with the patient

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Financial Disclosure

Dr. Creinin serves on Advisory Boards for Merck & Co., Inc., Teva, and Actavis and is a consultant for Danco, Bayer, and Polkadoc. The Department of Obstetrics and Gynecology, University of California, Davis, receives research funding for contraceptive clinical trials from Merck & Co., Inc. and Medicines360. The other author did not report any potential conflicts of interest.

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Fig. 1. Radiographic examination of left upper extremity demonstrating the presence of the implant (arrow).

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to the radiology suite for the examination. A high-frequency ultrasound transducer such as a 15-MHz or 18-MHz transducer will demonstrate the posterior acoustic shadow from the implant in transverse view

Fig. 2. Ultrasonogram of the left upper extremity demonstrating posterior acoustic shadow with the implant in transverse view, visible between the arrows.

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Fig. 3. Ultrasonogram of the left upper extremity demonstrating longitudinal view of the implant. Arrows indicate the ends of the implant.

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(Fig. 2). When the transducer is turned 90°, the full implant is shown in longitudinal view (Fig. 3). During the ultrasound study, the depth of the implant from the skin surface and nearby vital structures is also noted to determine if the implant is accessible. We mark the patient's skin to identify the ends of the implant.

We then bring the patient to the outpatient clinic for the removal procedure. Her upper arm is prepped with Betadine and 2–3 cc of lidocaine 1% with 1:100,000 epinephrine is injected at the skin and subcutaneous tissue below the site of the planned incision. We use a no. 11 blade disposable scalpel to make a 5-mm incision parallel to and directly over the implant, starting approximately 2 mm from the marked end. We use a straight hemostatic clamp to

Fig. 4. The modified vasectomy clamp.

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Video 1. Removal of deeply inserted etonogestrel implant with modified vasectomy clamp. After making a skin incision over the implant, the straight hemostat clamp is used to divide the subcutaneous tissue until the level of the implant, as determined by the preprocedure ultrasound study. The modified vasectomy clamp grasps around the implant and brings it to the skin surface. A scalpel is used to clear any overlying fibrotic tissue to free the implant for removal. Video author: Melissa J. Chen, MD, MPH. Videographer: Courtney Overstreet. Participants: Mitchell D. Creinin, MD, and Melissa J. Chen, MD, MPH. Video courtesy of Melissa J. Chen, MD, MPH. Used with permission.

divide the subcutaneous tissue directly downward until the approximate depth of the implant as noted during the ultrasound study. A modified vasectomy clamp (Fig. 4) is then used to palpate and grasp around the implant. The implant is brought to the skin surface and the surrounding fibrous sheath is incised along the capsule toward the distal end to free the implant for removal (Video 1, available online at <http://links.lww.com/AOG/A700>). A hemostat or second modified vasectomy clamp can be used to grasp the end of the implant for removal. We close the skin incision with a Steri-Strip and apply a pressure dressing.

EXPERIENCE

One author (M.D.C.) previously used the “U” technique to remove multiple six-capsule levonorgestrel

implants. We have used the modified “U” technique to successfully remove three etonogestrel implants.

In the first case, a 26-year-old woman (body mass index [BMI, calculated as weight (kg)/[height (m)]² 27) requested removal of an etonogestrel implant with barium sulfate as a result of abnormal uterine bleeding and weight gain. The implant was nonpalpable, so her health care provider ordered a left arm radiographic examination to confirm the presence of the implant and referred her to our clinic. Ultrasonography in the area of the implant placement scar, initially with the 15-MHz transducer then more clearly with the 18-MHz transducer, identified the implant 1.0 cm deep to the skin surface at the level of the biceps fascia. In the office, we removed the implant successfully using the procedure described.

In the second case, a 28-year-old woman (BMI 19) requested removal of an etonogestrel implant with barium sulfate as a result of abnormal bleeding and the desire to become pregnant. Her health care provider ordered a left arm radiographic examination, which confirmed the implant’s presence before referral to our clinic. Ultrasonography with the 18-MHz transducer demonstrated the implant approximately 0.8 cm deep to the skin surface within the upper biceps muscle. We performed dissection with a hemostat and scalpel through the biceps fascia overlying the implant. The patient tolerated the procedure well, although she did report paresthesia in the ulnar distribution of her forearm at the end of the removal; the complaints resolved later that evening.

In the third case, a 25-year-old woman (BMI 19) was referred for removal of an etonogestrel implant without barium sulfate from her left arm after multiple prior unsuccessful attempts in the office. She had undergone three ultrasound studies before referral to our clinic, two of which demonstrated the implant’s presence. We visualized the implant using an 18-MHz transducer in the ultrasound suite, approximately 0.3 cm deep to the skin surface beneath the biceps fascia. We used the modified vasectomy clamp to grasp the implant after dissection of the overlying biceps fascia with the hemostat and scalpel. The patient tolerated the procedure well.

DISCUSSION

With the addition of barium sulfate, the etonogestrel implant can now be localized radiographically to confirm its presence in the arm. However, ultrasonography is still necessary to identify the exact location for removal. High-frequency ultrasound

Scan this image to view Video 1 on your smartphone.

transducers (10 MHz and greater) demonstrate the posterior shadowing of the implant but actual visualization of the implant can be limited.⁷ We have found an 18-MHz transducer for implant localization is most helpful, and we are able to visualize both the posterior acoustic shadow and the implant itself with this high frequency transducer. The 18-MHz transducer is typically used in musculoskeletal ultrasonography to visualize superficial structures and is not generally used in obstetric and gynecologic offices.

Prior reports of nonpalpable etonogestrel implant removals describe procedures in an interventional radiology suite with fluoroscopy,³ the operating room,^{4,5} or radiology department with continuous ultrasound guidance.⁸ We are able to safely remove nonpalpable etonogestrel implants in the outpatient clinic after ultrasonographic localization of the implant and nearby vasculature. If the ultrasound study demonstrated blood vessels or other vital structures overlying the implant, we would consult a surgeon with experience in upper limb dissection to perform a collaborative procedure as has been described previously with levonorgestrel implants.⁹

The modified vasectomy clamp used in our technique is the same clamp used with the “U” technique previously described for removal of the six-capsule levonorgestrel implant.⁶ The ringed portion of the clamp (2.2 mm in diameter) fits around the width of the etonogestrel implant (2.0 mm in diameter), allowing for a snug grasp of the implant to the skin surface. This instrument, in combination with accurate preprocedure localization of the implant, facilitates removal of deeply located implants in the outpatient setting. In our experience, we have used a hemostat to grasp the implant once it is brought to the skin surface. Unlike the modified vasectomy clamp, however, the hemostat crushes the implant and may

lead to fracture of the implant during removal. In future cases, we would consider using a second modified vasectomy clamp instead of a hemostat.

Despite the new design modifications of the etonogestrel implant with barium sulfate, deep insertions still occur. Clinicians who encounter a patient with a nonpalpable implant should discuss a backup contraceptive method, confirm the implant’s presence on radiographic study, and then refer to a health care provider experienced in difficult implant removals. Regional expert sites have been established in the United Kingdom,⁴ and the same process should be considered in the United States.

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