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Localization techniques

Ultrasound Sonography (USS)

From an earlier study (Lantz et al. 1997) it is known that a correctly inserted single-rod implant can be located by ultrasound, X-ray or CT-scan. Because ultrasound equipment is widely available and the examination the method of choice to localize non-palpable implants.

Nexplanon can be localized by ultrasound using transducers commonly available in the gynecologist's office. Best results, however, are obtained with high frequency linear array transducers (Kaptein and Ganpat, 2002). Because of the specific expertise of radiologists in localization techniques and their access to high frequency transducers, cooperation between gynecologist and radiologist is indicated when nonpalpable implants need to be visualized. Since identifying Nexplanon might be difficult to the untrained eye, we produced this website as a guide to help physicians locate and subsequently remove non-palpable implants. If you require additional information or support, please contact the local MSD affiliate in your country.

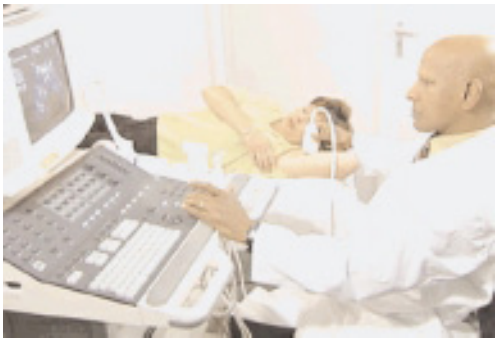

Figure 1
Locating an Nexplanon rod with Philips HDI 5000 ultrasound equipment.

Ultrasound equipment

Because Nexplanon has a cross-sectional diameter of only 2 mm, high resolution is important for ultrasound visualization. As can be seen in figures 4 to 13, Nexplanon can be visualized with all US transducers, high, intermediate and low frequency.However, the best results are obtained with high frequency transducers including a high frequency linear array transducer (12-5 MHz) and a very high frequency linear array transducer (15-7 MHz). When using a low or intermediate frequency transducer, application of a silicone patch or a large amount of gel enhances visibility of the implant.

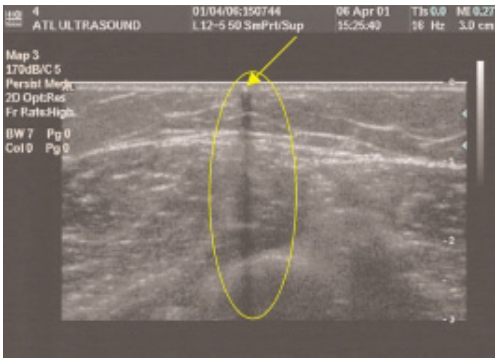

Figure 2a
Acoustic shadow of Nexplanon using SonoCT Compound technique. Please note that the acoustic shadows indicate the exact position of the implant, which is visible as an echogenic spot.

The HDI ultrasound systems of Philips Medical Systems, in particular the HDI 5000, are well suited for the identification of corpora aliena like the implant (Fig. 1). Philips Medical Systems incorporates the so-called Sono Compound Technique (SonoCT) in its ultrasound systems. This technique produces one compound image of nine different images from nine different angles, compared with a single line of sight with conventional ultrasound. As can be seen in figures 2A and 2B, the SonoCT produces a distinctive acoustic shadow. Many details of the implant and the surrounding tissue can be visualized.The different beams may also be helpful in the exact positioning of the actual implant, but they are not essential.

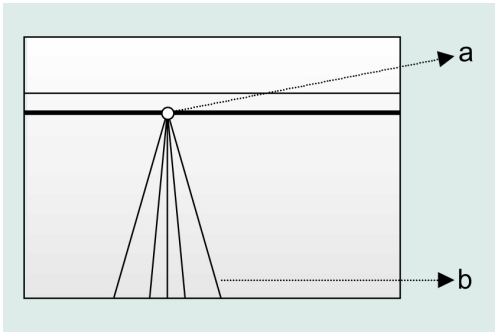

Figure 2b
Schematic representation of figure 2a indicating the position of the acoustic shadow (b) opposite the echogenic spot (a).

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Before starting the ultrasound examination

If you did not carry out the insertion yourself, it is important to determine where the implant was (approximately) inserted. Key information can be obtained from the patient user card and by asking the patient the following questions:

1. How and in which direction was the implant inserted?
2. Was/is a scar visible at the insertion site?

Standard advice is that the implant should be inserted at the inner side of the non-dominant upper arm, in the groove between the biceps and triceps. It should be placed about 6-8 cm above the elbow crease directly under the skin in the subdermal tissue.

Identification of Nexplanon

Nexplanon can be identified and located by its **acoustic shadow (see figures 2a and 2b)**. The ultrasound image of the implant is very distinctive and is unlikely to be overlooked in the surrounding tissue.

The acoustic shadow will enable you to identify the exact position of the implant itself, which will be visible as a small but clear echogenic spot **(see figures 2a and 2b)**.

Guidelines for the ultrasound examination

1. Start the ultrasound examination at a 90° angle to the presumed longitudinal direction of the implant.
2. Focus superficially, since it is unlikely that the implant is inserted deeper than 3 cm after an incorrect insertion procedure.
3. When the acoustic shadow of the implant has been identified, look for the actual implant.
4. Turn the transducer 90° to attain a longitudinal view of the implant.
5. Finally, indicate the exact position of the implant on the skin.

Note: An example of an ultrasound examination where the transducer is turned 90°to obtain a longitudinal view of the implant, is shown in video clip 1.

Correctly inserted implant

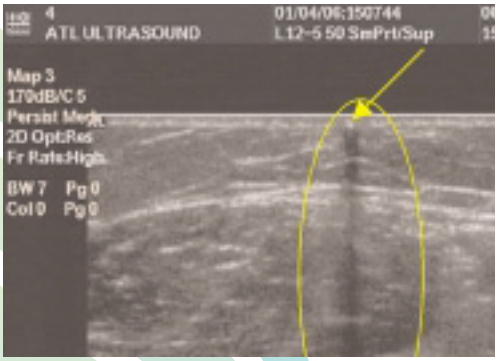

Figure 3
Transversal ultrasound image without SonoCT of a correctly inserted implant using a 12-5 MHz transducer. Please note the superficial position of the implant, indicated by the arrow and the clear acoustic shadow indicated by the circle.

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Incorrectly inserted implants

Intramuscular insertion

The ultrasound images numbered 4 to 13 show an implant inserted in the musculus biceps. With this series of images of the same patient we would like to show that Nexplanon can be localized with low, intermediate and high frequency transducers. As can be seen in figures 4 to 13 the best results are obtained with the high frequency transducers.

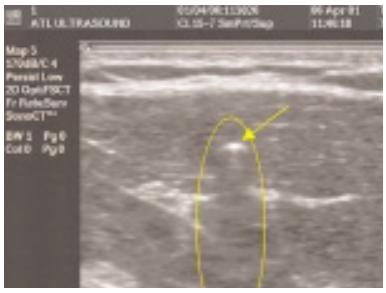

Figure 4
Transversal ultrasound image of an implant inserted in the m. biceps, using a 15-7 MHz transducer. Please note that the arrow indicates the actual implant and the circle indicates the acoustic shadow.

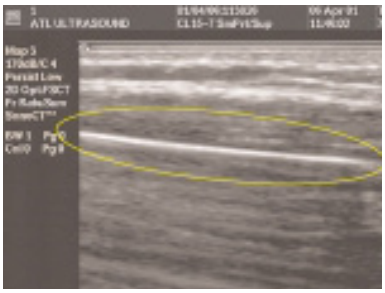

Figure 5
Longitudinal ultrasound image of the full length of an implant inserted in the m. biceps, using a 15-7 MHz transducer. The circle indicates the actual implant.

Figure 6
Transversal ultrasound image of an implant inserted in the m. biceps, using a 12-5 MHz transducer. The arrow indicates the actual implant and the circle indicates the acoustic shadow.

Figure 7
Longitudinal ultrasound image of the full length of an implant inserted in the m. biceps, using a 12-5 MHz transducer.The circle indicates the actual implant.

Figure 8
Transversal ultrasound image of an implant inserted in the m. biceps, using an 8-4 MHz vaginal transducer. The arrow indicates the actual implant and the circle indicates the acoustic shadow.

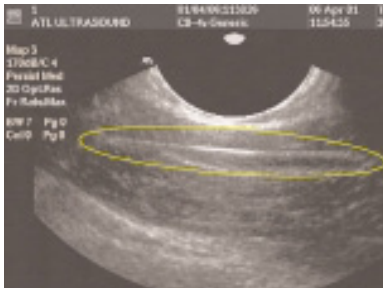

Figure 9
Longitudinal ultrasound image of the full length of an implant inserted in the m. biceps, using an 8-4 MHz vaginal transducer.The circle indicates the position of the actual implant.

Figure 10
Transversal ultrasound image of an implant inserted in the m. biceps, using a 7-4 MHz transducer.The arrow indicates the actual implant and the circle indicates the acoustic shadow.

Figure 11
Longitudinal ultrasound image of the full length of an implant inserted in the m. biceps, using a 7-4 MHz transducer.The circle indicates the position of the actual implant.

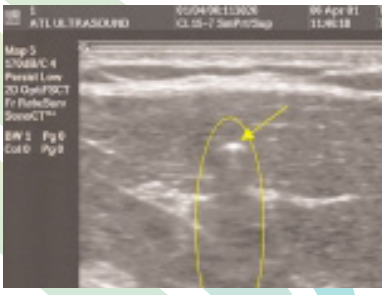

Figure 12
Transversal ultrasound image of an implant inserted in the m. biceps, using a 5-2 MHz transducer.The arrow indicates the actual implant and the circle indicates its acoustic shadow.

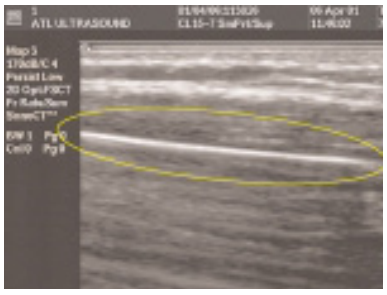

Figure 13
Longitudinal ultrasound image of the full length of an implant inserted in the m. biceps, using a 5-2 MHz transducer.The circle indicates the position of the actual implant.

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Injection technique

The ultrasound images of figures 14 and 15 show an implant that was difficult to palpate. It was found that the proximal tip was localized deeper than the distal tip, moreover the implant was slightly curled indicating the use of an incorrect “injection” technique. Since the implant was curled it was not possible to obtain a proper longitudinal view of the implant.

Figure 14
TTransversal ultrasound image of the distal tip of an implant inserted with the “injection” technique, using a 15-7 MHz transducer.The arrow indicates the actual implant and the circle indicates its acoustic shadow.

Figure 15
Transversal ultrasound image of the proximal tip of an implant inserted with the “injection” technique, using a 15-7 MHz transducer.The arrow indicates the actual implant and the circle indicates its acoustic shadow.

Note: Video clip 2 shows the position of the proximal and distal tip of the implant, indicating the “injection” technique.

Subfascial insertion

The ultrasound images of figures 16 to 18 show an implant that was inserted erroneously on top of the upper arm instead of the inner side.The layer of connective tissue is much thinner at this place and combined with an incorrectly performed insertion technique this resulted in an implant inserted just underneath the fascia brachii of the musculus biceps, which made it impossible to palpate.

Figure 16
Transversal ultrasound image of an implant inserted just underneath the fascia brachii of the musculus biceps using a 12-5 MHz transducer.The arrow indicates the actual implant and the circle indicates the acoustic shadow.

Figure 17
Transversal detailed ultrasound image of the subfascial position of an implant using a 15-7 MHz transducer. The arrow indicates the actual implant and the circle indicates the acoustic shadow.

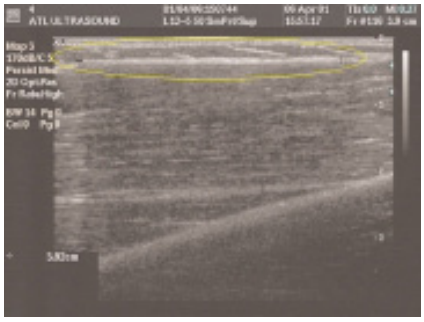

Figure 18
Longitudinal ultrasound image of the full length of an implant inserted just underneath the fascia brachii of the musculus biceps using a 12-5 MHz transducer.

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