

Removal of impalpable contraceptive implants

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Abstract

A paired-rod, subdermal, implant system (Jadelle[®]) is one of the popular methods of long term reversible contraceptive methods in Sri Lanka. The longer duration of action, low failure rate and comfort of the implant greatly outweigh the inconvenience of a minor surgical insertion and removal procedure. Even though the insertion is usually

simple, minor, quick and safe, the removal sometimes is difficult and may require surgical intervention under anaesthesia.

This article describes the background information on impalpable implants and the technique of their removal.

Key words: subdermal, contraceptives, impalpable implants

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Introduction

The contraceptive demand and uptake are influenced by clinical effectiveness of the method, women's experience and community attitudes toward any contraceptive method. Myths and misconceptions of contraceptive methods greatly affect the contraceptive uptake^{1,2,3}. We have experienced several referrals from the primary care institutions following failed attempts in removal.

The authors have removed about 150 sub dermal, implant systems (Jadelle[®]) in the last four years. Among

them, about ten women required Computerized Tomography (CT) scan preoperatively and had to undergo surgery under general anesthesia for removal and in one woman, we couldn't trace one rod despite having surgery twice.

When difficulties are experienced during its removal, it will perceive as side effects of the method. When a client visits family planning clinic for the removal of an implant, clinicians should make sure a safe and efficient method is adopted for its removal, which prevents the wrong impression among public that hinders the uptake of this contraceptive method.


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A good technique of implant insertion is essential for the easy removal. If sub dermal placement is not ensured by not tenting the skin at the time of insertion, it can be deeply placed and become impalpable^{5,6}. If the correct sub dermal insertion is made the rod will not normally migrate more than 2 cm⁷.

A faulty insertion technique would lead to impalpable implants. Main reason for the difficulty in removal of sub dermal contraceptive implants is due to the incorrect procedure of insertion by an inexperienced or untrained operator^{7,11,12}. This will result in superficial sub dermal insertion in an unusual position, deep sub dermal insertion, deep sub fascial or intramuscular insertion, insertion among brachial vessels and nerves and deep-angled insertion. Removal of implant is also difficult due to migration of implant, formation of fibrous capsule around implant and previous unsuccessful attempts at removal and subsequent scarring. Removal is also technically challenging when there is excessive weight gain following insertion^{8,9}.

Technique of contraceptive implants removal

Implants are removed by a simple, minor, quick and safe surgical technique following infiltration of local anaesthetic agent by a medical officer who has had the basic training in the procedure⁴. First, the distal end of the implant is palpated with fingers and a 25G needle is inserted under the implant, approximately $\frac{3}{4}$ cm from the distal end to bring the needle to the other side as shown in Figure 1. One ml of 2% lidocaine is infiltrated below the tip. An incision is then made through the dermis with a no. 15 scalpel blade at a 45° angle so that it goes just under the implant (Figure 2).

The implant is visible through the incision when it is pushed gently from the proximal end. The implant slides out easily when it is held with a curved mosquito forceps and use a scalpel to release the fascia (Figure 3).

Finally, the incision wound is closed with a suture or a Steri Strip™ and a bandage is applied on the top. This is a simple easy and quicker way to remove the implant.

When a woman presents with an impalpable implant, an attempt for removal should not be made without precisely locating the implant¹⁰.

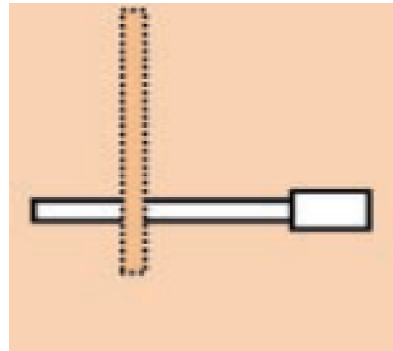


Figure 1. A needle is inserted under the implant approximately $\frac{3}{4}$ cm from the end to bring the needle to the other side.

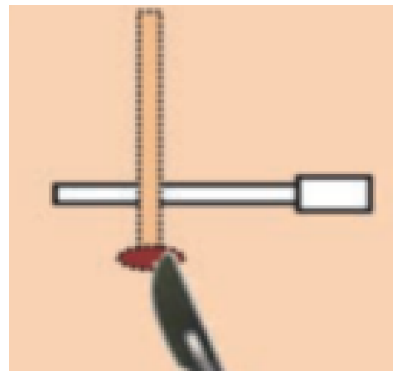


Figure 2. An incision on the dermis with a scalpel blade at a 45° angle so that it goes just underneath the implant.

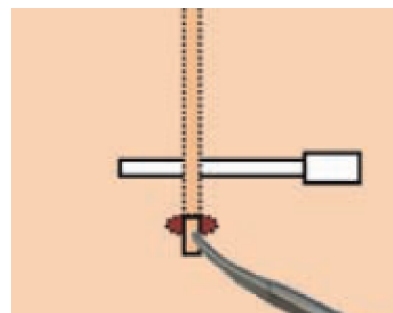


Figure 3. The implant is held with a curved mosquito forceps and a scalpel is used to release the fascia.

Overview of anatomy of mid arm [Figure 4]

Sound knowledge and understanding of the structural configuration of the medial aspect of the upper arm are somewhat essential to avoid damage to the many structures in this region at the time of insertion as well as during the removal of implants.

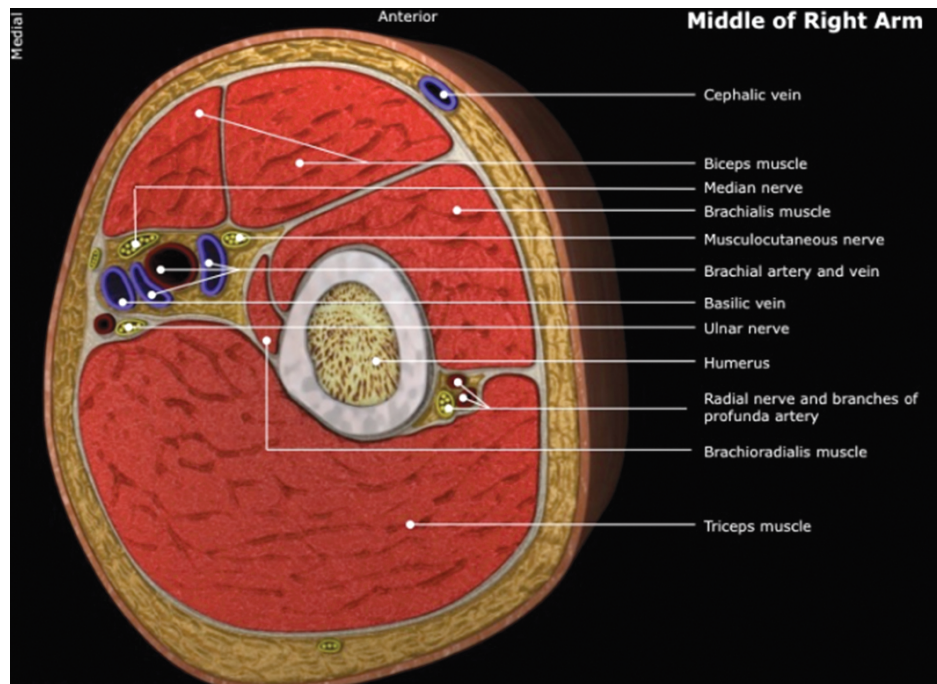


Figure 4. Cross section at the mid right arm (Source: Sobotta, *General Anatomy and Musculoskeletal System*).

The neurovascular bundle (brachial artery and vein, basilic vein, ulnar nerve, median nerve) is in the groove between the biceps and the triceps muscles. Therefore, when dissecting directly over this groove, utmost care should be taken to avoid its damage.

Localization of deep implant with palpation

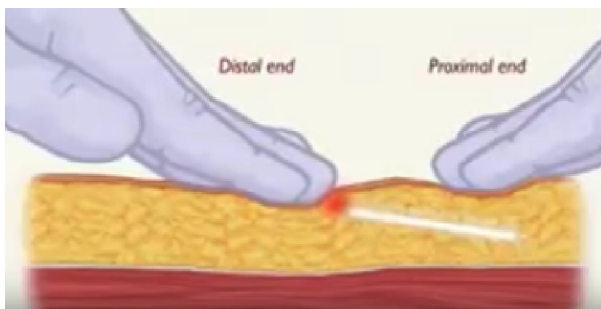


Figure 5. Palpation technique of implant.

Initially palpate the implant by pressing near the proximal end to locate the tip of the distal end near the scar. Palpable implant even though deeply located, does not require ultrasound localization. The position of the two ends of the implant should be marked and then the center between the two points for the incision site should be marked as shown in Figure 6.



Figure 6. Marking over the implant.

Use of imaging techniques on impalpable implants

High-frequency linear array ultrasound is the imaging technique and the method of choice for locating the non-palpable or deep implants. Use of 10 to 18 mega Hertz frequency ultrasound with a linear transducer with cover gives better resolution. Another option is to use a transvaginal probe which has an intermediate

frequency range from 5 to 13 mega Hertz ultrasound localization. Thus, the transducer available with the highest frequency in the machine should be selected to localize the implant.

Ultrasound technique

Initially the examiner will look with an increased depth to identify the acoustic shadow. Then the depth should be switched to the shallowest possibility around one to two centimeters indicated by the depth indicators on the screen. The image will be optimized by adjusting the overall gain and individual gain to get better attenuation through the tissue. This will increase the contrast and allow visualizing the implant and acoustic shadow more distinctly. It is also necessary to scan for the implant in the transverse plane of the arm with the probe. Perpendicular to the implant in this plane look for the implant acoustic shadow (Figure 7) which is seen underneath the implant and the actual implant is located as an echogenic white spot found at the top of the acoustic shadow¹³.

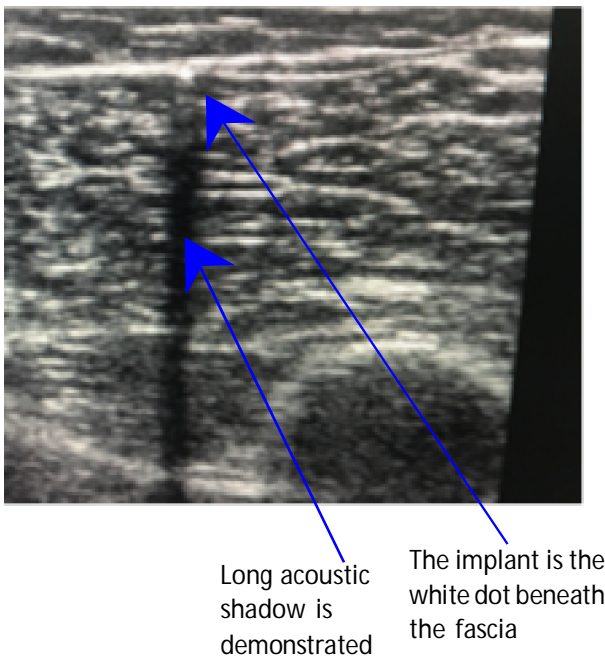


Figure 7. **Ultrasound image**

(Transverse ultrasound through the upper arm demonstrates typical appearance of device seen in cross section with echogenic focus (arrow) and posterior acoustic shadowing)

Using the ultrasonography, the ends of the implant will be identified by following the echogenic spot towards each end until it disappears. Locations of both ends will be marked on the skin when the implant disappears from the screen. A surgical marker or a pen can be used to make a mark of the ends of the implant located with an ultrasound guide.

The Colour Doppler can be used to evaluate the nearby vessels. When it demonstrates blood vessels or other vital structures less than one centimeter to the implant, consulting with a Vascular or Neurologic Surgeon or a Surgeon experienced in complex surgery becomes essential to perform a collaborative procedure.

A non-palpable implant can be identified by the high-frequency ultrasound in the biceps muscle when an elbow is actively flexed. It causes proximal movement of the implant relative to the ultrasound transducer, suggesting localization within the muscle. This maneuver may assist in verifying intramuscular placement prior to surgical excision¹⁴.

When the implant is adherent to a sensory nerve, patient reports pain. If the implant is within the biceps muscle, it is difficult to locate and remove. In such cases, ultrasound imaging, general anesthesia and a wide exposure allowed for safe removal. Neuro-surgical input is important in difficult cases specially to prevent neurovascular injury¹⁵.

Ultrasonography is useful to identify the correct site for incision. The depth of the implant from the surface of the skin at this central optimal incision site needs to be measured and documented and a mark be placed on the skin at this site. It is important to keep in mind that this ultrasonically identified depth may be significantly shallower than the actual implant location.

Implants that are deeply palpable can be removed with the guidance of ultrasound while locating its site and depth ensuring the aseptic measures. Once the local anesthesia is infiltrated, a 5-mm or less skin incision is made directly over the implant and through the incision the implant can be removed using a modified vasectomy clamp¹⁴.

If an implant remains undetectable despite ultra sound imaging, consider CT or magnetic resonance imaging (MRI) for those with a non-radiopaque implant. If the

non-palpable implant containing barium sulfate, radiography examination (X-ray) is done to locate the implant. The arms should be examined for insertion site scars if the ultrasound fails to locate the implants.

Removal technique

After the infiltration of local anesthesia, a longitudinal incision of three to five-millimeter in length, is made directly above the middle of the implant. The incision will be about one-third of the way up from the distal end of the implants where they are closer together and in between the two implants. If only one of the implants is palpable, make the incision above the palpable one. Then the curved mosquito forceps with its tip, always directed under the skin, to dissect the tissue rather than pointing deeper to the depth of the implant¹⁵ and other hand would palpate the implant and guide the dissection.

If the implant is deeper, the incision may need to be extended to one centimeter long. A non-palpable implant relies on dissection technique and subsequent visualization of the implant as it is often covered and surrounded by fibrotic tissue. The operator might visualize the implant through the incision or feel the implant with the forceps or palpate through the incision. Further, reassuring the client and infiltrating additional local anaesthetic agents would be required if she experiences pain and discomfort during the dissection. After reaching the implant through dissection, use ringed forceps to grasp the implant and any surrounding fibrotic tissue perpendicularly and bring it to the level of the incision. The ringed portion of the ringed forceps fits snugly around the width of the implant. Palpation with the other hand is useful to guide the implant into the forceps. It is advised to avoid grasping the implant with straight forceps as it might get crushed and may lead to fracture of the implant during removal. The surrounding tissue of the implants will sometimes contain both implants.

If other implant is not very close by, it should be reached through the same incision site by bluntly dissecting off the fibrous tissue formed around the implant. Dissection may be done with gauze or by scraping the tissue with the blunt side of a scalpel blade along the length of the implant to uncover it. Once exposed, the implant will be pulled out from where it is exposed preferably with ringed forceps. Length of the removed

implant should be promptly measured and confirm the whole rod has been removed. Single rod implant is 4 centimeters long and the length of an implant of 2 rod system ranges between 4.2 and 4.4 centimeters.

The incision is closed by bringing the edges of the incision together with a sterile skin closure or a suture depending on the size of the incision. A pressure bandage dressing is applied to minimize bleeding and bruising.

Conclusion

A proper training programme for the insertion and removal techniques are very important in effective and safe delivery of contraceptive implants (Jadelle[®]). In Sri Lanka contraceptive provision is done mostly by family planning clinics in the hospital and also by Medical Officers of Health (MOH). Therefore, the Family Health Bureau (FHB) can take innovative steps in conducting certificate courses in good practice of insertion and removal of implants. If the contraceptive implants removal become difficult, it is a good practice to refer such a woman to a place where it can be carried out safely. It is important to locate with an ultrasound scan before attempting a removal of the implant. High-frequency linear array ultrasound is the imaging technique and the method of choice for locating non-palpable or deeply seated implants.

Authors' contributions

MT was the principal author and conceived the topic for this manuscript and both MT and KEK have done the review. All authors have critically revised and approved the final version of the manuscript.

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