ULTRASOUND - ASSISTED REMOVAL OF IMPALPABLE CONTRACEPTIVE IMPLANTS AT THE KORLE BU TEACHING HOSPITAL

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Abstract

Objective: To describe our experience of using ultrasonography to locate and remove impalpable implants in a low-resource environment.

Methodology: We report a series of non-palpable subdermal contraceptive implants with unsuccessful removal attempts at other facilities, who were referred to the Reproductive Health Unit, KorleBu Teaching Hospital, between 2015-2018. A high-resolution linear-array probe ultrasound was done to localize the implants. Removal was performed under local anaesthesia, involving a longitudinal incision within the ultrasound-guided skin markings and blunt dissection to locate and retrieve the implant.

Results: Fifteen patients with non-palpable subdermal contraceptive implants were referred after failed attempts by midwives or gynaecologists over the period. Implants included Implanon (9) and Jadelle (6), with durations of use ranging from 8 months to 5 years. Most implants were successfully located using high-resolution linear-array ultrasound probe, and removed under local anaesthesia. Implants were abnormally positioned in 5 cases, with depths ranging between 5 mm and 7 mm. In 14 cases, removal was successful through skin marker guidance or direct ultrasound guidance. One case required general anaesthesia and plastic surgeon's assistance. No significant complications were reported.

Conclusion: In Ghana, the increasing incidence of impalpable contraceptive implants necessitates the use of interventional radiological methods for removal. Our case series demonstrates that ultrasound-guided removal of non-palpable implants is effective and can be performed with minimal complications in low-resource settings. We recommend training providers, including midwives, in ultrasound-guided implant removal techniques and advocating for early referral to specialized centers to ensure timely and successful removal.

Key words: *contraceptive, cost-effective, difficult, implant, low-resource, non-palpable, removal, successful ultrasound scans*

Introduction

Subdermal contraceptive implants have been widely used in Ghana since the 1980s, offering high effectiveness and acceptability.[1] Studies have shown that implants like Implanon, Norplant, and Jadelle are highly effective contraceptive methods with no significant differences in effectiveness or continuation rates.[2,15]

While subdermal contraceptive implants are typically inserted subdermally in the upper arm and are designed to be easily palpable for straightforward removal. However, an increasing number of cases involve impalpable or deeply placed implants, presenting significant challenges for healthcare providers.[3] Impalpable implants can result from factors such as incorrect insertion, migration, tissue encapsulation, or significant weight gain.[3] Failed removal attempts by midwives or general practitioners may cause patient discomfort, delayed care, and potential legal issues.[3]

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To address these challenges, specialized referral clinics have been established for difficult removals.[4] Interventional radiological methods, such as high-frequency point-of-care ultrasonography, have proven effective in localizing non-palpable implants, enabling successful in-office removals in up to 96% of cases, including subfascial placements.[5] Standardized protocols now guide clinicians through safe and efficient removal procedures.[6] However, the specialized equipment required for these procedures can be costly, making reimbursement considerations essential in resource-limited settings.[5]

This study focuses on the assessment and removal of impalpable subdermal contraceptive implants using ultrasound guidance at Korle Bu Teaching Hospital. The objective is to describe the profiles of affected patients, procedural techniques, and outcomes to highlight the importance of ultrasound in managing these challenging cases.

Materials and Methods

Study design

This was a retrospective cohort study conducted by reviewing the charts of patients referred for the assessment and removal of non-palpable subdermal contraceptive implants.

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Study Site

The study took place at the Family Planning & Reproductive Health Unit of Korle Bu Teaching Hospital, Ghana, between January 2015 and August 2018.

Selection Criteria

Patients were eligible for inclusion if they met the following criteria: (1) documented insertion of a subdermal contraceptive implant (Implanon or Jadelle) based on medical records, (2) non-palpable implant on physical examination, and or (3) a history of failed removal attempt by trained midwives or obstetrician-gynaecologists.

Data Capture and Analysis

Patient demographics, implant characteristics, ultrasound findings, procedural details, and outcomes were collected and analyzed. Descriptive statistics were used to summarize the data.

Procedures

History and Examination

An experienced provider evaluated all patients at the outset. A detailed history was taken to confirm that the implant was actually inserted, the type of implant, the duration of the patient's use of the implant, and the reasons for its removal (Table 1). A physical examination of the implant insertion site was performed once more to establish that the implant was in fact "impalpable." When properly inserted, the proximal end of the rod should be approximately 1 cm away from the scar at the insertion site. An ultrasound examination was then scheduled and performed by a skilled reproductive health specialist.

Implant Identification

A high-resolution linear array ultrasound probe (7–10 MHz, Philips Clearvue 350) was used to localise the implant. The scan was performed with the patients in the operational position (supine, shoulder abducted to 90° in external rotation, elbow in 90° flexion, and the patient's hand behind her head). This is the same operative position that is required for removal.

A systematic ultrasound-guided search was conducted in the transverse plane (perpendicular to the humeral length surrounding the insertion scar) and then rotated to the longitudinal plane. The implant was identified in the transverse plane by the rod's characteristic posterior acoustic shadowing, which appeared as a thin, dark wedge reaching deep to the rod. The implant was demonstrated as a bright echogenic 'dot' at the peak of the acoustic shadow (Figure 1). The probe was guided proximally and distally along the trace of the echogenic dot and shadow to confirm that the identified structure fits the implant's expected dimensions. Once detected, the ultrasound probe was rotated through approximately 90º to be in a parallel line with the implant. The bright reflection of the implant could then be appreciated (Figure 1).

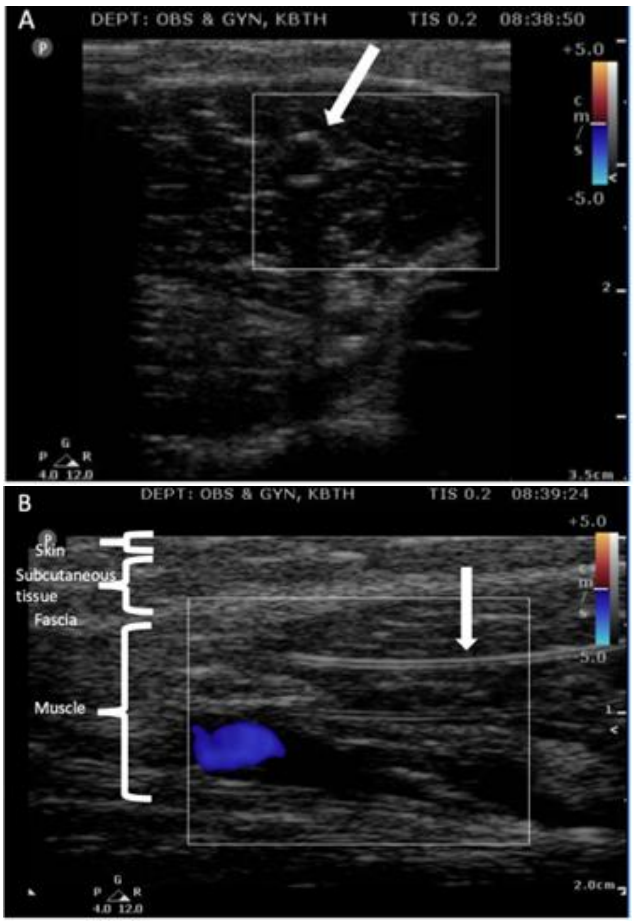

Figure 1: An ultrasound image of contraceptive implant in upper arm

A- Transverse plane with the echogenic dot of the contraceptive implant seen with a posterior acoustic shadow

B- Probe rotated through approximately 90º to be in a parallel line with the implant.

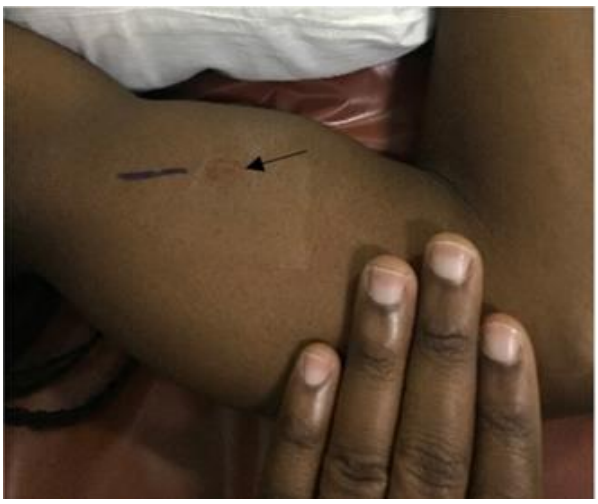

Figure 2: Ultrasound directed skin marking of contraceptive implant with black permanent marker before removal.

--➔ Scar from original insertion point

⟶ Arrow indicates scars from previous failed attempts also seen on the arm.

The skin area was marked with a permanent marker pen once the implant's anatomical site was determined (Figure 2). While marking, the operator made certain that the implant's shadow remained in the centre of the US screen. This outlined mark denoted the whole length of the implant in order to facilitate removal. The scanning probe was gently pressed against the arm, while preventing compression, in order to reduce skin-implant depth measuring errors. Following the ultrasound guided marking, an implant removal procedure was organised in the day surgical unit.

Implant Removal

The steps involved careful cleaning of the skin and draping of the arm using aseptic procedures during the implant removal. The provider injected 2 ml of a 1 percent Lidocaine local anaesthetic preparation beneath, rather than above, the evaluated depth of the marked implant rod. This prevented the skin-implant depth from increasing. Within the ultrasound skin markings, a longitudinal incision (1.5 to 2 cm) was created, followed by blunt dissection until the implant was first palpated through the incision by the provider's finger. The dissection was continued bluntly until the implant was visually spotted and retrieved with small curved artery forceps. Subcutaneous absorbable sutures and subcuticular suturing were used to close the wounds. During this series, the average removal time was about 10 minutes. Following that, patients were given wound care instructions, counselled on contraception while the implant was removed, and discharged home the same day with advice to use barrier methods (which were given them) until they were decided on other long-term methods. Three days after discharge, follow-up visits were scheduled, and advice was given to attend the community clinic for future follow-up.

All 15 individuals in our cohort had their subdermal contraceptive implant successfully removed. With the exception of one case that required sedation and the assistance of plastic surgeons, all removals were completed on the first attempt, with no significant complications following the procedure or at the follow-up visit.

Results

A total of 15 patients with non-palpable subdermal contraceptive implants were referred to the Family Planning & Reproductive Health Unit at Korle Bu Teaching Hospital for ultrasound-guided removal. The implants included Implanon (9 cases) and Jadelle (6 cases), with durations of use ranging from 8 months to 5 years (Table 1). All patients had previously undergone unsuccessful removal attempts by trained midwives or obstetrician-gynaecologists from various healthcare facilities in Ghana.

Ultrasound successfully located the implants in all 15 cases. The depth of the implants ranged from 5 mm to 7 mm beneath the skin surface. The implants were classified as normally positioned in 10 cases and abnormally positioned in 5 cases. Despite these challenges, all implants were successfully removed. Fourteen removals were completed on the first attempt using skin marker guidance, with some cases facilitated by direct ultrasound visualization. One case (Client I) required sedation and assistance from plastic surgeons due to the deeper placement (7 mm).

Majority of skin-marking guided impalpable implants were removed under local anaesthesia, with only one case requiring sedation and assistance from plastic surgeons before removal could be achieved. At the point of removal, some cases were facilitated by direct visualisation with ultrasound guidance.

The procedure was performed under local anesthesia in all but one case, and no significant complications occurred during or after the procedures. Patients were discharged the same day and attended follow-up visits, where no adverse outcomes were noted.

Discussion

Principal Findings

We reported a series of 15 cases of non-palpable contraceptive implants successfully removed using ultrasound guidance in Ghana. The use of ultrasound guidance in the removal of non-palpable subdermal contraceptive implants was found to be a safe and effective method. All 15 patients in the study had their implants successfully removed with no significant complications, except for one case that required sedation and assistance from plastic surgeons. With this particular case, the implant had migrated into the axilla. This case series highlights the potential benefits of using ultrasound guidance in low-resource environments where trained midwives or obstetrician specialists may not be available to perform the procedure and also where

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MRI services may be expensive and not be widely available.

Results

Similar findings have been reported in other studies conducted in high-income countries such as the United Kingdom[7] and the United States[8] which also demonstrated the effectiveness of ultrasound guidance in locating and removing impalpable implants. In addition, reports from Nigeria and the Unitd States of America also reported successful removal of subdermal contraceptive implants using ultrasound guidance.[8,9] Ultrasound guidance has been shown to improve the success rate of implant removal, particularly in cases where the implant is difficult to locate or has migrated from its original insertion site.[7] This is in contrast to blind removal techniques, which may result in incomplete removal or traumatic injury to surrounding tissue.

Clinical Implications

The use of ultrasound guidance can help to minimize complications such as bleeding or infection, as the procedure can be performed with greater accuracy and precision.[8] There were no such complications among any of our clients. However, the use of ultrasonography requires specialist radiologists and a high-frequency linear probe to ensure proper location of the implant.[10,11] It is also important to note that failure to detect an implant by ultrasound may be due to several factors, including a low frequency ultrasound probe, obesity, or limited experience of the sonographer in dealing with a subdermal implant scan.[10,11,17] Our work used a high-resolution linear array ultrasound scan by an experienced specialist.

It is worth noting that inadequate training and lack of experience in implant insertion have been linked with poor implant placement and impalpable implants.[16] Proper training and continuing education for healthcare professionals who insert implants can help to reduce the occurrence of impalpable implants.[12] In addition, it is crucial to conduct routine follow-up visits after insertion to assess the implant's position, palpability, and any adverse effects.

Policy Implications

The introduction of Nexplanon into Ghana in 2015 was a significant step towards improving access to long-acting reversible contraceptives (LARCs) for women. The Ghana Health Service - Family Health Division, and other partners, provided training and orientation for service providers to ensure safe and effective implant insertions.[13] However, the discontinuation of Implanon Classic production in favour of Implanon-NXT manufacture, which led to the introduction of Nexplanon, has not entirely eliminated the use of other subdermal implants such as Jadelle and Sinoimplant II, and Implanon, which are still used by some women.[14] As a result, removing impalpable subdermal implants may continue to be a challenge in the future. This highlights the importance of ensuring that service providers are adequately trained and skilled in the insertion and removal techniques of all types of subdermal implants, not just Nexplanon. It is essential to have a comprehensive and ongoing training program for all providers to ensure that they are up to date with the latest techniques and procedures for inserting and removing subdermal implants. Furthermore, increasing awareness among women about the potential complications associated with subdermal implants, including impalpable implants, is crucial. Women should be informed about the importance of regular self-examination and seeking medical attention if they cannot feel the implant. This will ensure timely intervention and prevent the development of complications such as migration, fibrous adhesion, and nerve or blood vessel damage.

Research Implications

This work retrospectively reports a case series to document the effectiveness of ultrasound scan as a useful intervention in managing non-palpable implant removals. A more rigorously designed prospective study including randomized control trials are needed to critically evaluate this intervention and compare with others.

Strengths and Limitations

This case series highlights the potential benefits of using the technology of ultrasound guidance in low-resource environments where the numbers of trained midwives or gynecologists are grossly inadequate, to perform the procedure and also where MRI services may be expensive, unaffordable and not be widely available. A major weakness in this work is the inherent limitations of case series that lack prospective recruitment and randomization to eliminate selection bias among others.

Conclusion

Impalpable subdermal contraceptive implants pose a significant challenge in their removal, especially in low-resource settings. Ultrasonography can be an effective and low-cost tool for locating and removing impalpable implants. Proper training and continued education of contraceptive service providers in implant insertion techniques can help to reduce the incidence of impalpable implants. Further studies are needed to evaluate the effectiveness and safety of this method in larger populations.

Author Contribution

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