

# The challenges of location and removal of Implanon® contraceptive implants

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## Background

The single-rod, subdermal, implant system, Implanon® (Organon), has justifiable popularity amongst many women as a long-acting hormonal contraceptive delivery system with a number of positive attributes.<sup>1</sup> For many, the appeal of the long-action, high efficacy and convenience greatly outweigh the inconvenience of a minor surgical insertion procedure and the possibility of nuisance value or troublesome breakthrough bleeding.<sup>1</sup>

One of the main disadvantages, which rarely impacts on the decision to start the method, is that the device requires a surgical procedure for removal. Fortunately, this is usually simple, minor, quick, safe and undertaken with the injection of only a small volume of local anaesthetic. Occasionally, removal may be difficult, or even extremely difficult,<sup>2-4</sup> and there are a number of possible reasons for this (Table 1).

## Implant positioning and insertion

Removal is rarely difficult if the implant has been correctly positioned superficially in the subdermal layer of the skin of the inner aspect of the non-dominant upper arm, and can be easily palpated. Attention to detail on positioning of the device at insertion is critical,<sup>4-7</sup> and no health professional should embark on an insertion procedure without completing an approved training programme,<sup>4</sup> such as the Faculty of Family Planning and Reproductive Health Care Letter of Competence in Subdermal Contraceptive Implant Techniques. The procedure looks easy when performed by an expert, but errors at insertion are the basis of almost all difficult removals.

The manufacturer recommends insertion over the groove between the biceps and triceps muscles of the non-dominant arm, about 7 cm above the medial epicondyle of the humerus. However, many experienced family planners insert the device somewhat more anteriorly along the medial surface of the biceps, or posteriorly over the medial surface of the triceps, away from major vessels and nerves.<sup>7-10</sup> Hundreds of thousands of Implanon implants have been inserted worldwide, with only a few hundred (i.e. <0.2%) resulting in difficult, deep removals.<sup>2</sup> However, it is my belief that this number is sufficient to justify the minor change in insertion site which ensures that the implant is inserted away from the sulcus between the biceps and triceps, where the main neurovascular bundle of the upper arm lies. I recommend about 1 cm anterior to the sulcus on the medial border of the biceps.

## Multiple implant systems

Many family planning and other health professionals in Britain are experts with contraceptive implants through

their experience with the six-capsule, subdermal system, Norplant® (Hoechst Marion Roussel), where the difficulties of insertion and removal were substantially greater because of the multiple implants involved.<sup>11</sup> The single-rod implant is an order of magnitude more straightforward, but errors continue to be made. In experienced hands, difficult removals of Norplant were only encountered in around 1% of cases. The largest of these studies was the Phase IV post-marketing surveillance study funded by the World Health Organization, Family Health International and the Population Council.<sup>12</sup> Of a total of 7827 Norplant removals, 79 were graded as 'difficult' (10.1 per 1000 removals) and 59% of those difficult removals were reported from only two of the 18 clinics surveyed, suggesting that local factors and training may play a role in the difficulties experienced. In a comparative study, complications were reported with Implanon removals in only 0.2% of cases compared with 4.8% in the Norplant group.<sup>2</sup> In a further study, where Norplant was compared with the two-rod levonorgestrel implant system, Jadelle® (Schering), removal complications were recorded in 6.9% of Jadelle subjects and 14.8% of Norplant subjects.<sup>13</sup> Norplant capsules are recognised to be more fragile than the Implanon or Jadelle rods, and this contributes to many of the difficult Norplant removals.

## Techniques for implant removal

Reasons for possible difficulty in Implanon removal are listed in Table 1, and most of these are encountered by the inexperienced or untrained operator who has no backup, who is geographically isolated or who has little insight into his or her own inexperience. Deep insertions where the implants are impalpable offer the greatest challenge to the expert<sup>3,4,7,11,14,15</sup> and, like all difficult situations in medicine, they require development of a sensible strategy for management.

Where the implant is barely palpable, it is helpful to carefully mark the position of the implant on the overlying skin with indelible pen before any attempt is made at removal. When the implant is impalpable, it is mandatory to locate the device with an imaging technique such as ultrasound, magnetic resonance imaging or soft tissue X-rays.<sup>4,16-19</sup> The most widely recommended modality nowadays is ultrasound, but this requires expert knowledge and careful technique.<sup>4</sup> Key issues are to use a high-frequency, linear array probe with light pressure on the skin, and to identify the implant by the appearance of

**Table 1** Factors influencing the difficulty of removal of subdermal contraceptive implants

Incorrect implant insertion
Superficial subdermal insertion in an unusual position
Deep subdermal insertion – just palpable or impalpable
Deep subfascial or intramuscular insertion
Insertion among brachial vessels and nerves
Deep-angled insertion
Inexperienced or untrained operator
Implant impalpable due to failure of insertion or previous removal
Migration of implant
Fibrous capsule around implant
Operator inexperienced or untrained in implant removal
Previous unsuccessful attempts at removal and subsequent scarring

*J Fam Plann Reprod Health Care* 2006; **32**(3): 151–152

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acoustic shadowing deep to the implant and by the appearance of the implant itself as a bright dot or line.<sup>4,17,19</sup> The exact positioning should be marked on the skin and the depth, in subcutaneous fat or muscle, recorded.

Occasionally, ultrasound imaging fails to locate an impalpable implant. In most of these cases there has probably been a failure of initial insertion of the implant,<sup>4,20</sup> and this can be confirmed by measurement of serum levels of etonogestrel by arrangement with the manufacturer, Organon. Spontaneous expulsion of a device after correct insertion must be close to impossible, but rare anecdotal cases of manipulation and extrusion of the device by the patient soon after insertion have been recorded.<sup>21</sup> Such manipulation of the correctly inserted device (some patients report 'playing' with the easily palpable superficial device) may be the explanation for some cases of device migration,<sup>9,22</sup> although implants inserted deeply into the biceps muscle may migrate as a consequence of muscle action. A very recent and careful study of the extent of individual implant migration<sup>9</sup> found that 55% of implants had shown some migration (mostly caudally: towards the insertion site). Only 1% migrated more than 2 cm, and there was no migration into the deeper subcutaneous layers.

Attempted removal of impalpable implants should only be undertaken by practitioners experienced in such removals, and many countries now have a system of nominated expert referral centres. These removals can sometimes be remarkably difficult and may be followed by troublesome haematomas or local infection or, rarely, nerve damage.<sup>5,7,8</sup> There may be uncommon cases where access to an expert in Implanon removal is unfeasible (e.g. in remote geographical areas) and in these situations detailed telephone consultation with an expert is advisable. Contact with a local expert can be done, in most countries, through Organon.

Surgical removal of an impalpable, but ultrasound-localised, implant usually requires a 1.5–2.0 cm skin incision with progressive, gentle blunt dissection until the implant can be palpated and then visually identified.<sup>4</sup> This can usually be accomplished using local analgesia, but potentially difficult cases may be performed under general anaesthesia according to the preference of the individual surgeon. Occasionally, fibrous tissue around the implant may complicate the dissection.<sup>6</sup> Other techniques have also been described, including the use of modified vasectomy forceps with guidance from real-time ultrasound,<sup>3</sup> although I personally prefer to visually identify the deep implant before removal. Clearly, special care needs to be taken when a deeply inserted implant is close to the brachial and ulnar neurovascular bundle.<sup>5,7,8</sup>

Issues of risk management and possible remediation are also raised when an incorrect insertion results in a difficult removal. It is my opinion that the practitioner undertaking a difficult removal should provide a report to the appropriate senior medical officer in the unit where the original insertion was carried out, even though the insertion may have been done 3 years previously.

### Conclusions

Over the past few years, this Journal has published an increasing number of articles and case reports highlighting the potential problems that may arise during subdermal contraceptive implant removal, including the single-rod implant, Implanon. It is clear that all family planning providers must be thoroughly familiar with the potential pitfalls of implant insertion and removal, with the techniques for implant detection, and with the requirement that these procedures must not be undertaken

without appropriate training. Health professionals who only undertake insertions – and not removals – must nevertheless thoroughly understand the principles of removal and the complications that may occur after deep insertion. Consideration should be given to referral of all women with impalpable implants to a specialist unit with specific experience in these difficult procedures when removal is required.

### Statements on funding and competing interests

**Funding.** The author has received occasional consultancy and lecture fees and expenses from Organon.

**Competing interests.** None identified.

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### Editor's Note

Interested readers should note that four of the articles/case reports cited by the author in this Commentary article appear in this issue of the Journal.