CASE REPORT

Implantable contraceptive devices: *primum non nocere*

Thomas W H Bragg, Rajive M Jose, John W Bland, Richard N Matthews, Shekhar Srivastava

Introduction

Long-term implantable contraceptive devices have been available for a number of years.[1] They are particularly suited to patients who are sensitive to the relatively high levels of oestrogen associated with other forms of contraception and those who have had difficulty with other contraceptive methods.[1] With an average annual pregnancy rate over 5 years of less than 0.1%, such systems are extensively employed worldwide.[2–4]

The first such system was Norplant®, offering women the versatility of a reversible, 5-year, low-dose, progestogen-only contraceptive.[5] The six levonorgestrel-impregnated silastic tubules were inserted subcutaneously in the lower medial aspect of the patient's upper arm. Each capsule was 2.4 mm in diameter and 34 mm in length and contained 36 mg of the progestogen.

Distribution of Norplant was discontinued in October 1999 as a commercial decision, influenced by the rising tide of litigation mainly associated with injuries incurred during removal. It has been superseded by Implanon®.[6] The newer preparation differs by containing 68 mg etonogestrel in a single flexible rod and lasts up to 3 years. In common with Norplant this device is inserted 7 cm proximal to the medial epicondyle, on the medial aspect of the upper arm.[6] Any Norplant systems still in place should have been removed by the end of 2004,[7] although some women with Norplants *in situ* are still coming into the UK from abroad (J Bland, personal observation). We report the present case with suggestions for safer sites for implantation.

Case report

A 38-year-old, right-handed saleswoman was referred to a plastic surgery department from her general practitioner (GP) after she underwent unsuccessful exploration of her left medial arm for removal of Norplant implants inserted 8 years previously. She initially underwent exploration at her GP's surgery. He was unable to remove the implants and referred the patient to a family planning centre. She had had a difficult removal of previous implants at the same site. Exploration and removal was performed under local anaesthesia without a tourniquet by a doctor. Only four rods were palpable subcutaneously and were deep. The patient was advised that the four rods would be removed but if the others could not be found she would require scanning. All six rods were found but extensive blunt dissection was needed to remove them. The local area was scarred due to previous attempts at removal of implants at this site, thus further complicating the procedure. The patient experienced electric shock-like symptoms during the procedure, but did not mention this at the time, and subsequently developed numbness of the ring and little fingers. She was referred to the plastic surgery team 2 days later, when decreased sensation and obvious clawing of the ring and little fingers were noted. She also had absence of power in the interossei muscles, as well as the adductor pollicis muscle. It was decided to explore the wound over the left medial arm under general anaesthesia. There was extensive ulnar nerve contusion but the nerve was in continuity. The patient was discharged with an anti-claw splint and physiotherapy follow-up. At outpatient review the wound had healed with ulnar nerve function recovering slowly.

Discussion

Patients considering contraception in the form of implants are often concerned by such factors as ease of insertion and a concealed scar. The ideal site would also allow for ease of removal and contain enough subdermal fat to avoid skin blistering, but not so much as to permit migration. Insertion sites such as the abdomen, buttocks and upper leg are more likely to result in complex removals due to implant migration in the subcutaneous planes, risking damage to important neurovascular structures.[8] Accordingly, the manufacturers were advised that the lower medial aspect of the upper arm fulfilled these characteristics, with a more predictable depth of subcutaneous fat and a low rate of migration (Medical Information Manager, Organon Laboratories Ltd, personal communication).

The attractiveness of this site for implantation of contraceptive devices is due to its easy accessibility and a cosmetically concealed scar. However, as shown by this case report, it is an area of questionable safety. As can be seen in Figure 1, insertion at this site may jeopardise a number of neurovascular structures.[8,9] A simple analysis of the anatomy of this region alerts one to the close proximity of important structures. The neurovascular bundle starts deep in the proximal upper arm (Figure 1a), becoming progressively more superficial distally. In this area (Figure 1b) there are two important structures in the subcutaneous plane, namely the ulnar nerve and the medial cutaneous nerve of the forearm. The medial cutaneous nerve of the forearm lies alongside the basilic vein in the groove between the biceps and the triceps. Under the fascia between the muscles lies the brachial artery. It is important to consider that dissection deep to the deep fascia should never be necessary since subcutaneously implanted devices rarely migrate beneath it. This analysis leads us to caution clinicians in the use of the medial arm at any site distal to the midpoint of the humerus.

The vast majority of implants are palpable. In such cases the implant is removed by injecting local anaesthetic below it, making an appropriate incision and then grasping it with blunt forceps and pulling it out of the incision in a 'U' or 'pop-out' technique.[10,11] Older implants may be encased in fibrous tissue, which may be parted by blunt dissection or by an upturned knife, avoiding cutting into the rod itself.[12]

J Fam Plann Reprod Health Care 2006; **32**(3): 190–192
(Accepted 1 May 2006)

Department of Plastic and Reconstructive Surgery, George Eliot Hospital, Nuneaton, UK
Thomas W H Bragg, MRCS (Eng), *Senior House Officer in Plastic Surgery*
Rajive M Jose, MB BS, MRCS, *Specialist Registrar*
Richard N Matthews, MB BS, FRCS (Plast), *Consultant*
Shekhar Srivastava, MB BS, FRCS (Plast), *Consultant*

Family Planning Services, North Warwickshire Primary Care Trust, George Eliot Hospital, Nuneaton, UK
John W Bland, MB BS, FFFP, *Lead Clinician*

Correspondence to: Mr Thomas W H Bragg, Department of Plastic and Reconstructive Surgery, George Eliot Hospital, College Street, Nuneaton, Warwickshire CV10 7DJ, UK.
E-mail: twhbragg@hotmail.com

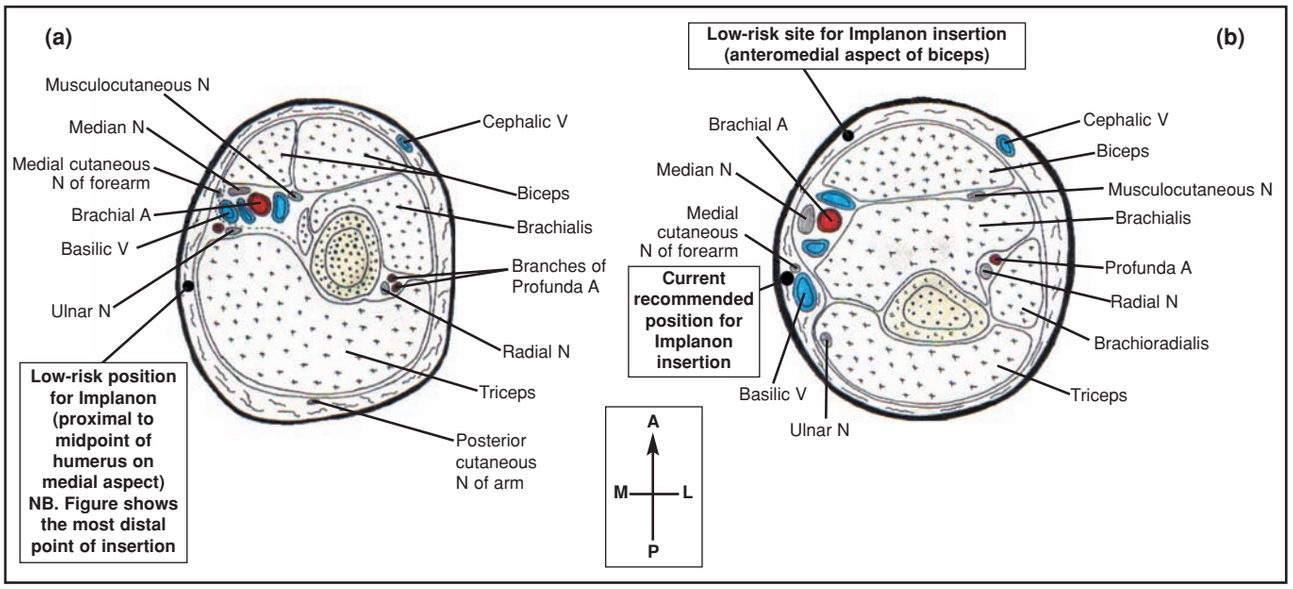

Figure 1 *Anatomy of the upper arm showing important structures in this region. (a) Cross-sectional anatomy of the arm at the level of the mid-humerus. (b) Cross-sectional anatomy of the arm at the level 7 cm proximal to the medial epicondyle, showing the current recommended position for Implanon insertion and the present authors' alternative 'low-risk' position. A, artery; N, nerve; V, vein, Orientation: A, anterior; L, lateral; M, medial; P, posterior. Figure by Thomas W H Bragg, reproduced with permission*

If the device is not palpable subcutaneously then imaging techniques should be used to locate it prior to exploration.[13] It should be noted that Implanon is not radio-opaque and that it is not detectable by computed tomography scanning. The current literature suggests a number of conventional and some novel imaging techniques. The manufacturers advocate the use of either ultrasound (7 MHz) or a compression mammography technique that has been reported for location of Norplant.[13,14] The use of a very high frequency ultrasound transducer (13.5 MHz) for the location of Implanon has been reported.[15] If the device is deep in the muscle or soft tissue it may be difficult to identify by ultrasound since the diameter of the rod is close to the resolution of the ultrasound probe. High-resolution fluoroscopy with associated digital subtraction has been used to achieve satisfactory imaging of Norplant and of complex local anatomy.[15] Current consensus in the UK advocates magnetic resonance imaging (MRI) that allows for high-resolution three-dimensional imaging of intricate anatomy.[16] The authors accept that this modality may be limited to second-line use because of cost and restricted access to facilities. The implant produces a low signal or signal void on MRI and is seen as a dark area.[17] The introduction of radiopaque markers into each end of the Implanon device would simplify the imaging process for the location of lost implants considerably.

There exists a great variability in terms of experience, resources and training of individuals in the family planning service and in general practice to tackle such technically demanding problems, making it important that 'low-risk' insertion sites should be used.[9] Devices forced out of applicators by inexperienced clinicians can sometimes result in deep insertion alongside important structures.[8] As increasing numbers of removal-related injuries became evident so the family planning services have become more vigilant to the risks.[12] Clinicians are now encouraged to attend specialist courses in accepted practices of insertion and removal of devices. Whilst these courses are recommended they are as yet not compulsory.[3,8] In cases of complex removal, the present authors advocate early referral to a local plastic surgical unit where much experience exists in this anatomical field coupled with microsurgical facilities should complex dissection or nerve repair be required.

The authors would like to raise awareness of these complications and reduce potential risk by advocating the use of alternative sites for the insertion of such devices. The upper arm still offers clinicians a wide selection of implantation options. The neurovascular bundle gets progressively deeper as one moves proximally and laterally. For patients who still favour a medial implantation, a site proximal to the midpoint of the humerus would be better. This would offer patients a well-concealed site away from any important structures.

Another appropriate site for insertion may be on the anteromedial aspect of the arm over the biceps muscle (Figure 1b). Sarma and Hatcher[9] suggested the medial side of the biceps muscle, yet the present authors feel that this approach may still put the median nerve and brachial artery at risk. The anteromedial site has the advantage of not immediately endangering any structures, with a keloid risk no greater than over the medial aspect. This site has the added advantage that an arm tourniquet can be used should exploration be necessary. Unfortunately some patients may not find this site acceptable due to its only semi-concealed position. Other patients may be happy with devices implanted in more exposed but safe positions such as posteriorly over triceps, anteriorly over biceps or in the deltoid area. We would, however, caution clinicians against using the deltoid area due to the incidence of fat atrophy and keloid noted at this exposed site (A L H Moss, personal communication).

We strongly advocate that the common clinical practice be modified from insertion distally on the inner arm to a position proximal to the midpoint of the humerus on the medial aspect.

Statements on funding and competing interests
Funding. None identified.
Competing interests. None identified.

References

1 Shulman LP, Nelson AL, Darney PD. Recent developments in hormone delivery systems. *Am J Obstet Gynecol* 2004; **190** (Suppl. 4): S39–S48.

2 Harrison-Woolrych M, Hill R. Unintended pregnancies with the etonogestrel implant (Implanon): a case series from post marketing experience in Australia. *Contraception* 2005; **71**: 306–308.
3 Agrawal A, Robinson C. An assessment of the first 3 years' use of Implanon in Luton. *J Fam Plann Reprod Health Care* 2005; **31**: 310–312.
4 Funk S, Miller MM, Mishell DR Jr, Archer DF, Poindexter A, Schmidt J, *et al*; The Implanon US Study Group. Safety and efficacy of Implanon, a single-rod implantable contraceptive containing etonogestrel. *Contraception* 2005; **71**: 319–326.
5 Hatcher RA, Schnare S. Ask the experts: progestogen-only contraceptives. *Contracept Technol Update* 1993; **14**: 114–115.
6 Organon Laboratories Ltd. Summary of Product Characteristics; Implanon Implant. RA0450 UK S5 (Ref 6.0).
7 *British National Formulary*, Vol. 50. Parenteral progestogen-only contraceptives; Implanon (Section 7.3.2.2; p. 414). September 2005. http://bnf.org [Accessed 7 February 2006].
8 Bensouda-Grimaldi L, Jonville-Bera AP, Beau-Salinas F, Llabres S, Autret-Leca E. Insertion problems, removal problems, and contraception failures with Implanon. *Gynecol Obstet Fertil* 2005; **33**: 986–990.
9 Sarma, SP, Hatcher RP. Neurovascular injury during removal of levonorgestrel implants. *Am J Obstet Gynecol* 1995; **172**: 120–121.
10 Praptohardjo U, Wibowo S. The 'U' technique: a new method for Norplant implants removal. *Contraception* 1993; **48**: 526–536.
11 Mascarenhas L. Insertion and removal of Implanon: practical considerations. *Eur J Contracept Reprod Health Care* 2000; **5** (Suppl. 2): 29–34.
12 Walling M. How to remove impalpable Implanon® implants. *J Fam Plann Reprod Health Care* 2005; **31**: 320–321.
13 Piessens SG, Palmer DC, Sampson AJ. Ultrasound localisation of non-palpable Implanon. *Aust N Z J Obstet Gynaecol* 2005; **45**: 112–116.
14 Letterie GS, Garnaas M. Localization of "lost" Norplant capsules using compression film screen mammography. *Obstet Gynecol* 1995; **85**(5 Pt 2, Suppl.): 886–887.
15 Evans R, Holman R, Lindsay E. Migration of Implanon®: two case reports. *J Fam Plann Reprod Health Care* 2005; **31**: 71–72.
16 Silverstein MI, Lewis CA, Sheline ME, Sarma SP. Fluoroscopically guided Norplant removal. *J Vasc Interv Radiol* 2001; **12**: 253–255.
17 Merki-Feld GS. Nonpalpable ultrasonographically not detectable Implanon rods can be localised by MRI. *Contraception* 2001; **63**: 325–328.
18 Stillwell S, Shepperd P, Searle S. The impalpable Implanon®: a case report. *J Fam Plann Reprod Health Care* 2003; **29**(3): 156–157.

"30 Love"

Lar Diass

So, all I have to do is keep a list of the fatties in my practice and there's eight QOF (Quality and Outcomes Framework) points to be had. That's easy. I can do that off the top of my head. To start with, there's Mr Tubbs who broke the chair in the waiting room – we're still waiting to hear from our lawyers as to who's liable. Then there's young Thomas who just turned sixteen and came to see me with computer game thumb, and yesterday Ms Delight who thought that being overweight made you infertile but is now on her way to the antenatal booking clinic. Shouldn't be difficult to get the rest of the register completed; although when my larger patients waddle up to me in the supermarket and I've no recollection of what they came to see me about, I can certainly remember whether their flanks rub up against both sides of the checkout aisle or not. Plus, like all staff, ours are always gossiping about how much weight so and so has put on.

I guess we are going to have to do it properly if we're not going to be slammed by the QOF reviewers. Apparently, some practices are providing patients with a private room where they can record their weight and blood pressure and input it onto the computer themselves. Saves time for the GP and the nurse, makes a patient feel empowered, and so on, but can you trust them to do this honestly? Can you hell! Come on, be realistic. You ask how much someone drinks and they underestimate it; ask them if they smoke and through stained teeth they reply "only socially"; ask them about their weight and they claim to barely eat anything at all.

My solution is to put the weighing scales at the reception desk for patients to stand on when they arrive. This way they can be doing something useful whilst they're waiting for the reception staff to book them in. It will keep them occupied and may mean fewer complaints about being kept waiting, which in turn will score more points by making us all look good in the patient survey. It will also keep them standing upright so they won't be able to lean menacingly over the counter, spewing half-chewed crisps onto the message book, as they moan about not being able to lose weight. If I can figure out a way of connecting the scales to the computer then I won't even have to enter the data. In fact, since waist measurement has been reborn as an indicator of future health problems, perhaps during our surgery remodelling we could make the doorframe width the maximum safe waist width. This way, when waist circumference joins the band of merry QOF targets, we'd be ahead of the game with an effortless way of identifying our 'wide-loads'.

Ms Delight's situation is a real conundrum and highlights how, surely, we should be spending time educating our patients, rather than compiling meaningless registers. She doesn't think she needs contraception because she's heard that being overweight makes you infertile. More to the point she tells me: "Needing contraception would be a fine thing but it's not likely when I look like this doctor, is it?". True, being overweight can reduce a woman's chance of falling pregnant because of a lack of ovulation, and a lack of physical appeal. She doesn't feel attractive, and doesn't think men find her attractive. To compensate for this she 'puts out', and men, well, men are men. Result, she's become a two-for-one deal, like the offer she's so fond of at the supermarket that she blames for putting her in this situation – it's never the individual's fault is it? – as she's now joined the obesity and antenatal registers, but is still no wiser about her health.

But how will patients react when they learn about the obesity register, and that they are on it? "There's a list. I'm on it? What do they do with it? You mean it's on that NHS network. Oh God, that means anyone will be able to see it." In our dreams this realisation should be the trigger for them to seriously try and lose weight, protect their heart, and their image, and reduce their risk of diabetes, and so on. In reality it will probably mean more consultations trying to explain the register and listening again to their feeble excuses about why it's not their fault that they're overweight, and inevitably more complaints. But there's a bursting at the seams, silver stretched lycra lining to every big fat cuddly cloud. They're on the register for a reason: they're obese, which means they're not likely to be able to catch me as I walk briskly away, are they?

J Fam Plann Reprod Health Care 2006; **32**(3): 192

Greater Fulsome, UK
Lar Diass, MRCGP, *General Practitioner*