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Difficult removal of subdermal contraceptive implants: a multidisciplinary approach involving a peripheral nerve expert☆,☆☆

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Abstract

Objectives: We aim to describe our experiences and identify patients who may benefit from referral to a peripheral nerve surgeon for removal of contraceptive subdermal implants in which neurovascular injury may occur, and describe a treatment pathway for optimal care.
Study design: We reviewed the charts of 22 patients who were referred to the Division of Family Planning for difficult removal of etonogestrel contraceptive implants between January 1, 2014, and April, 1 2016. Of these, five were referred to a peripheral nerve surgeon due to pain or location of the implant. We evaluated and described these cases and, from our findings, developed recommendations for care in a multidisciplinary team approach.
Results: Two patients reported pain, including one with four previous failed removal attempts. In the two patients with pain, the implants were adherent to a sensory nerve. In another, the implant was within the biceps muscle and difficult to locate. In all cases, ultrasound imaging, general anesthesia and a wide exposure allowed for safe removal and good outcomes. Our multidisciplinary care approach has elucidated important referral and technical considerations that improve patient care and safety.
Conclusion: When necessary, multidisciplinary care with a Family Planning expert and possibly a peripheral nerve surgeon may be beneficial in safely removing etonogestrel contraceptive implants that would be difficult or risky to remove in an ambulatory setting.

Keywords: Etonogestrel contraceptive implant; Nerve injury; Multidisciplinary care; Implanon; Difficult implant removal

1. Introduction

The use of long-acting, reversible subdermal contraceptive implants increased by 50% between 2009 and 2012 [1]. The only etonogestrel contraceptive implant available in the United States is Nexplanon® (Merck Inc., Whitehouse Station, NJ, USA), which replaced its predecessor Implanon® (Merck Inc.). Both are single-rod implants that are 4 cm long and placed subdermally along the medial upper arm [2,3]. The implant is inserted using a simple applicator in an ambulatory clinic, and practitioners usually perform removal in an office setting as well. Practitioners in the United States and abroad are required to complete insertion and removal training to prevent complications, but very rarely, serious adverse events have occurred such as migration or embolization of implants. The manufacturer estimates that intravascular placement has occurred in just over one patient per million Nexplanon® implants sold [4]. While serious adverse events related to insertion and removal are exceedingly rare [5–7], prior reports have described cases that required specialized surgical expertise to remove all varieties of implants from the upper extremity while minimizing additional risks to the patient [8–18]. It is not always easy to identify someone qualified to treat these types of cases, but Family Planning specialists who may be found at some academic medical centers should be the first point of referral to triage such patients.

Depending on the Family Planning specialist's findings, select cases may benefit from partnership with physicians with additional upper extremity surgical proficiency. A peripheral nerve surgeon has training, knowledge and interest in the

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Table 1
Cases 1–5: patient demographics, pertinent history and physical examination data, surgical findings and outcomes

	Patient 1[a] (Fig. 1)	Patient 2 (Fig. 2)	Patient 3 (Fig. 3)	Patient 4 (Fig. 4)	Patient 5 (Fig. 5)
Age (years)	36	19	48	23	25
BMI (kg/m^2)	18.3	31.2	20.5	21.9	19.8
Time from placement (years)	4	3	4	4	3
Reason for removal	Neuropathic pain	Migration of implant	Expired implant	Expired implant	Expired implant
Prior removal attempts	4	1	0	0	1
Reason for referral to peripheral nerve surgeon	Neuropathic pain and failed removal	Device subfascial on imaging	Device within biceps muscle	Device subfascial on imaging	Failed removal and subsequent pain
Pain	Yes	No	No	No	Yes
Strength	Diminished	Normal	Normal	Normal	Normal
Sensation	Normal	Normal	Normal	Normal	Abnormal
Exam	3 transverse scars over implant site	Healing transverse scar over implant site	–	–	2 healing incisions at implant site
Implant palpable	No	No	No	No	Yes
Implant location	Deep to bicipital fascia; adherent to brachial neurovascular bundle	Deep to bicipital fascia; adherent to sensory nerve branch	Within bicep muscle; parallel to muscle fibers	Adjacent to ulnar nerve and brachial artery	Deep to triceps fascia; adherent to sensory nerve
Outcome	Implant removed; pain resolved	Implant removed; no issues	Implant removed; no issues	Implant removed; no issues	Implant removed; pain resolved

[a] Distal compression of the median and ulnar nerve at the level of the wrist was noted on exam of the patient, and a carpal tunnel and Guyon's canal release were completed at the time of device removal. This may have been entirely unrelated to the device.

treatment of traumatic and compressive disorders of the peripheral nerves. Usually, they have completed a residency in plastic or orthopedic surgery with subsequent subspecialty fellowship in hand and upper extremity surgery. They are uniquely qualified to remove implants that are directly adjacent to neurovascular structures or deep within the musculature.

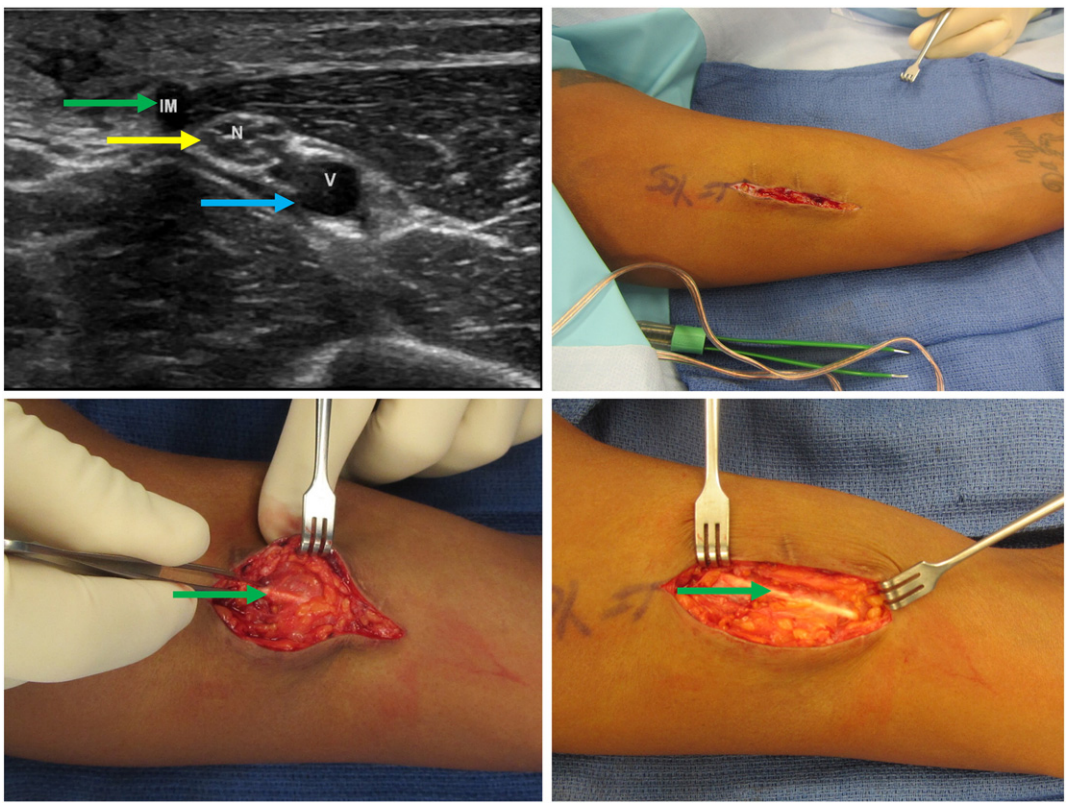

Fig. 1. Patient 1: 36 years old (BMI 18.3), multiple extraction attempts and significant pain. Clockwise from top left: (a) Ultrasound image with proximity to neurovascular structures; note nerve fascicles directly abutting the implant in cross section. (b) Initial incision; note transverse scars (black arrows) from prior extraction attempts. (c) Wide exposure of the implant with significant scarring. (d) Removal of the implant. Green arrow marks the implant, yellow marks nerve, and blue marks blood vessel (printed with permission ©2016 nervesurgery.wustl.edu).