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Title

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Permalink

<https://escholarship.org/uc/item/3dv0b1h5>

Journal

Retinal Cases & Brief Reports, 17(1)

ISSN

1935-1089

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Publication Date

2023

DOI

10.1097/icb.0000000000001116

Peer reviewed

1 Small Gauge Techniques for Removing a Fluocinolone Acetonide Implant

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10 Funding: Supported by an unrestricted grant from Research to Prevent Blindness (RPB)

11 Disclosures: No relevant financial disclosures

12 Presentations:

13 Work presented in this paper was presented in part at ASRS Annual Meeting, Vancouver 2018

14 and Vit Buckle Society Annual Meeting, Miami 2018

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23 **Key Words:**

24 Fluocinolone Implant, Explantation, foreign body, Illuvien, Vitrectomy, Vitreous

25 Explanting Fluocinolone Implant

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27 **Brief Summary Statement:**

28 This article describes surgical techniques that may be used for removal of a non-dissolvable,

29 long-acting fluocinolone acetonide implant without causing damage to the vitrectomy system.

30 The implant can be safely vitrectomized or removed en bloc using commonly available surgical

31 instruments.

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44 **Abstract**45 **PURPOSE:** Long-acting injectable fluocinolone releasing implants are used in clinical practice.46 We set out to describe possible explantation techniques and to determine whether these implants
47 can be safely removed from a standard sclerotomy or eliminated using a vitrectomy system.48 **METHODS:** A vitreoretinal surgery system was designed using a porcine eye model. A
49 fluocinolone implant was injected into the vitreous cavity. Pars plana vitrectomy was performed
50 and the vitreous cavity was infused with balanced salt solution. The injected implants were
51 removed from 23-Gauge (G) and 25-Gauge (G) vitrectomy cannulas with 27-G forceps. The
52 implants were examined under the microscope for induced defects. The implants were reinserted
53 into the eye model and eliminated using a 23-G and 25-G vitrector system.54 **RESULTS:** The implant was removed from both the 23-G and 25-G vitrectomy cannulas
55 without causing structural damage to the implant. During implant extraction through the 25-G
56 sclerotomy, the cannula was dislodged from the incision along with the implant. The most
57 technically challenging portion involved aligning the implant coaxially to allow for removal en
58 bloc through the sclerotomy site. Implants could be completely eliminated using both the 23-G
59 and 25-G vitrector using a low cut rate.60 **Conclusion:** The fluocinolone implant was removed safely via standard 23-G or 25-G
61 vitrectomy systems. It is unknown whether intraocular manipulation will affect pharmacokinetics
62 of drug delivery if the implant is not explanted.

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66 Introduction

67 Long acting intraocular corticosteroid implants are used in the treatment of a number of ocular

68 conditions, including diabetic macular edema and uveitic macular edema.¹⁻³ A number of new

69 devices offer extended dosing of the medication with a single in-office application. The 0.2

70 µg/day fluocinolone acetonide intravitreal implant ([FAHFAc](#), Iluvien, Alimera Sciences) is

71 currently approved for long term, sustained release of drug over the course of 36 months.⁴ The

72 most commonly encountered side effects are directly related to use of corticosteroids including

73 elevated intraocular pressure and formation of cataracts. Even with extremely selective criteria

74 of candidates for this treatment, situations may arise where removal of the implant is indicated

75 and must be addressed surgically. This can include migration of the implant directly into the

76 anterior chamber or intraocular pressure related adverse events.^{5,6} To our knowledge, a consensus

77 approach to explantation of the non-dissolving, extended use implant has not been delineated.

78 Multiple approaches to removal of foreign material are conventionally taken, including direct

79 removal with forceps and elimination using a vitrectomy instrument. We set out to describe

80 explantation techniques for the [FAHFAc](#) using commonly available vitrectomy instruments.

81 These include direct removal via small gauge sclerotomy wounds with forceps or via elimination

82 with the vitreous cutter.

83 Surgical Technique

84 A vitreoretinal surgery system (Dutch Ophthalmic Research Corporation Eva with TDC cutter)

85 was designed using a porcine eye model and conventional vitrectomy equipment for both 23-

86 Gauge (G) and 25-Gauge (G) surgery. We performed a conventional pars plana vitrectomy of
87 the vitreous cavity with a balanced salt solution infusion. An FAH-FAc implant was injected
88 into the vitreous cavity through the standard 25-G needle injector. The implant was then
89 identified under the surgical microscope within the vitreous cavity. The implant was aligned
90 coaxially using 27-G forceps, then removed en bloc through the 23-G cannula without removal
91 of the cannula (Figure 1). The implant was then reinserted and removed through a 25-G cannula
92 using 27-G forceps (DORC asymmetrical forceps) (Figure 2). During removal from the 25-G
93 port, the cannula was dislodged from the globe along with the implant due to size limitations of
94 the implant within the 25-G cannula. The implant was then examined under the microscope for
95 induced defects after removal (Figure 3). No significant structural damage to the body of the
96 implant and no loss of fragments within the vitreous cavity were noted.

97 Additional implants were injected into the globe using the standard injection technique. These
98 implants were completely eliminated using both the 23-G and 25-G standard vitrectomy cutter
99 under low-cut rate settings (650mmHg vacuum, 1000 cuts per minute, under the core vitrectomy
100 pump settings) (See Video, Supplemental Digital Content 1, which demonstrates removal of an
101 implant using the 25-G vitrectomy system).

102 **Discussion**

103 Several well-established techniques exist for removal of foreign material from the vitreous cavity
104 during traumatic etiologies. This includes use of magnets, aspiration, and basket devices with
105 occasional creation of larger sized scleral incisions.^{7,8} Long acting injectable implants are an
106 emerging technology that also introduces the risk of iatrogenic need for explantation. The
107 methods described are based on standard vitrectomy techniques and the most technically
108 challenging portion of the removal was aligning the implant coaxially to allow for removal en

109 bloc through the sclerotomy site. The implants were removed without any implant fragments
110 being freed into the vitreous cavity or putting the patient at risk of ongoing exposure to
111 medication. To the best of our knowledge, this is the first report describing removal of the ~~FAH~~
112 FAc implant using conventional vitrectomy instruments. This is an inexpensive, effective, and
113 efficient technique to assist in rare occasions when explantation is indicated for an emerging long
114 acting drug delivery system.

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181 **Figure 1:** Alignment of the implant coaxially, 27-G forceps through 23-G cannula

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183 **Figure 2:** Implant removed with 27-G forceps through 25-G cannula, cannula dislodged from

184 sclerotomy

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186 **Figure 3:** Implant under microscope after removal through the 23-G cannula and manipulation

187 with 27-G forceps

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189 **Supplemental Digital Content 1.** Video demonstrating alignment of the implant and removal of

190 the implant using a 25-G vitrectomy system. mp4

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