Persistent Intraocular Residue with the Use of Dexycu® in Cataract Extraction: A Case Series

ABSTRACT

Purpose:
The objective of this article is to report 8 cases of persistent IOL residue associated with the use of Dexycu® in the context of cataract surgery and then to subsequently describe each patients clinical course.

Observations and Presentation:
Between 2020-2021, persistent residue was noted in 8 eyes of 7 patients who received Dexycu® implants after cataract surgery. The residue was identified an average of 1.63 months after surgery (range 0.20-4.23). A subsequent procedure removed the residue from the intraocular lens; the average time to the follow-up procedure after surgery was 4.71 months (range 1.90-11.20).

Conclusions and Importance:
The Bausch and Lomb intraocular lenses seem to be predisposed to a Dexycu® persistent opacification, however correlation does not equate with causation. This article documents cases of persistent IOL residue with the use of Dexycu® and the MX60 lenses and its toric varieties. Further evaluation is necessary to elucidate the mechanism and risk factors for this occurrence.

Keywords: Cataract Surgery; Dexycu; Residue Polish; Tano Diamond Brush

1. INTRODUCTION

Almost 28 million cataract surgeries are performed worldwide each year [1]. Efforts to improve the patient experience and surgical outcomes by targeting postoperative inflammation have yielded several methods that do not require use of postoperative eye drops. Dexycu® (Icon Bioscience Inc., Newark, CA) is a novel posterior chamber dexamethasone drug delivery suspension that has been shown to effectively control postoperative inflammation in patients for up to 21 days after cataract surgery [2]. A single vial of Dexycu® suspension is equivalent to 51.7 mg of dexamethasone suspended in a Verisome® acetyl triethyl citrate spherule (Eyepoint Pharmaceuticals, Inc. Watertown, MA) [2].

Dexycu® was approved by the FDA in 2018. Possible adverse reactions listed by the FDA include increased intraocular pressure, corneal edema, and iritis [3]. Since the approval of Dexycu®, other complications have been reported such as iris atrophy [4]. However, intraocular lens (IOL) residue associated with the use of Dexycu® is not well studied. The objective of this article is to present a series of 8 patients who had phacoemulsification with intraocular lens implantation and subsequently developed persistent IOL residue associated with the use of Dexycu®.

2. METHODOLOGY

Patient 1: 61 year old female with a relevant past medical history of Type 2 diabetes mellitus (A1C: 6.0), essential hypertension, meibomian gland dysfunction / dry eye syndrome, poor tear film OU (TBUT: 3 seconds), and 2+ nuclear senile cataracts OU. This patient underwent right eye phacoemulsification with intraocular lens implantation (MX60E, Bausch + Lomb, Laval, Canada) and notably on post-op day 1 had a deep anterior chamber with 2+ cell. At a follow-up exam, 1.63 months later, there was residue noted on the inferior anterior surface of the right intraocular lens.

Residue Recognition Clinical Examination:

Visual Acuity (Snellen - Linear)

	Right	Left
Dist sc	20/30 slow	20/30 +
Dist ph sc	20/25 +-	20/25

Pupils

	Dark	Light	Shape	APD
Right	3	2	Round	None
Left	3	2	Round	None

Tonometry (Applanation, 9:46 AM)

	Right	Left
Pressure	12	9

Visual Fields (Counting fingers)

Left	Right
Full	Full

Extraocular Movement

Right	Left
Full	Full

Slit Lamp Exam

	Right	Left
Lids/Lashes	MGD	MGD
Conjunctiva/Sclera	White and quiet	1+ injection
Cornea	Trace PEE	Trace PEE
Anterior Chamber	Deep and quiet	Deep and quiet
Iris	Round and reactive	inferior iris atrophy with barely visible small dexycu
Lens	PCIOL with remnant Dexycu residue inferiorly	Posterior chamber intraocular lens
Vitreous	Normal	Normal

After 2.93 months from the original operation, the patient consented and received a re-operation to try to remove the residue.

The following procedure was used:

Two paracentesis incisions were made with a 1 mm diamond blade. Lidocaine MPF was injected into the anterior chamber followed by DiscoVisc ® (Alcon Inc., Geneva, Switzerland). The 23g

Tano diamond brush (Synergetics Inc., O'Fallon, MO, US) was then used to gently polish the residue from the anterior surface of the intraocular lens. Once it was free, bimanual irrigation/aspiration was used to remove the viscoelastic and residue from the anterior chamber. Vigamox was injected into the anterior chamber at the end of the case. The wounds were inspected and were found to be watertight after hydration. Topical Betadine, Brimonidine, and antibiotic drops were placed on the corneal surface.

The patient tolerated the procedure well and was taken to the postoperative care unit in good condition. The patient will be discharged home with instructions for the use of topical antibiotics and anti-inflammatory drops, and the use of a metal shield at bedtime.

Post-Procedure Clinical Examination at 1 Week:

Visual Acuity (Snellen - Linear)

	Right	Left
Dist sc	20/25 -	20/25 +-

Tonometry (Applanation, 11:21 AM)

	Right	Left
Pressure	10	12

Tonometry #2 (Tonopen, 11:23 AM)

	Right	Left
Pressure	14	14

Pupils

	Dark	Light	Shape	APD
Right	4	2	Round	None
Left	4	2	Round	None

Visual Fields (Counting fingers)

Left	Right
Full	

Extraocular Movement

Right	Left
Full	Full

Slit Lamp Exam

	Right	Left
Lids/Lashes	MGD	MGD
Conjunctiva/Sclera	White and quiet	White and quiet
Cornea	Clear	Clear
Anterior Chamber	Deep and quiet	Deep and quiet
Iris	Round and reactive	inferior iris atrophy with barely visible small dexycu
Lens	PCIOL	PCIOL
Vitreous	Normal	Normal

Patient 2: 65 year old male with a relevant past medical history of severe stage primary open angle glaucoma and combined forms of age-related cataract in both eyes. This patient underwent left eye phacoemulsification with intraocular lens implantation (MX60UT, Bausch + Lomb, Laval, Canada), ab-interno iTrack catheter and viscoelastic canaloplasty, along with Hydrus microstent insertion. At a follow-up exam, 4.23 months later, there was diffuse posterior capsular opacification bilaterally and the patient reported he felt like he was "looking through frosted glass."

Residue Recognition Clinical Examination:

Visual Acuity (Snellen - Linear)

	Right	Left
Dist cc	20/50 +2	20/50 -2
Dist ph cc	20/30 +2	20/40 +1

Correction: Glasses

Tonometry (Tonopen, 3:53 PM)

	Right	Left
Pressure	10	13

Pupils

	Dark	Light	Shape	React	APD
Right	3	2.5	Round	Brisk	None
Left	3	2.5	Round	Brisk	None

Visual Fields (Counting fingers)

Left	Right
	Full

Extraocular Movement

Right	Left
Full	Abnormal

Left visual field experiences double vision.

External Exam

	Right	Left
External	Normal	Normal

Slit Lamp Exam

	Right	Left
Lids/Lashes	Normal	Normal
Conjunctiva/Sclera	White and quiet	White and quiet
Cornea	Clear	Clear
Anterior Chamber	Deep and quiet, supero/temp tube	Sup/temp tube, Deep and quiet
Iris	dilated	dilated
Lens	Posterior chamber intraocular lens, PCO	TORIC IOL, 1+ diffuse PCO
Vitreous	1+ pigmented cells	vitreous debris, prominent vitreous strands

Fundus Exam

	Right	Left
Disc	Peripapillary atrophy, Tilted disc	Peripapillary atrophy, Tilted disc
C/D Ratio	0.5	0.75
Macula	Normal	ERM
Vessels	Normal	Normal
Periphery	peripheral cobblestone degeneration	peripheral cobblestone degeneration.

The patient has not undergone a re-operation to date, but is continuing to be monitored.

Patient 3: 76 year old male with a relevant past medical history of intermediate stage primary angle closure of the left eye, anatomical narrow angle borderline glaucoma of right eye, and combined forms of age-related cataracts in both eyes. This patient underwent phacoemulsification with intraocular lens implantation (MX60E, Bausch + Lomb, Laval, Canada), goniosynechiolysis, and goniotomy in the left eye and a week later phacoemulsification with intraocular lens implantation (AMO Tecnis ZCB00, Johnson & Johnson, New Brunswick, NJ) in the right eye. At a follow-up exam, 0.2 months later, there was residue noted on the anterior surface of the left intraocular lens and the right inferior iris.

Residue Recognition Clinical Examination:

Visual Acuity (Snellen - Linear)

	Right	Left
Dist sc	20/20	20/40

Neuro/Psych

Oriented x3: Yes
Mood/Affect: Normal

Tonometry (iCare, 11:26 AM)

	Right	Left
Pressure	13	10

External Exam

	Right	Left
External	Normal	Normal

Slit Lamp Exam

	Right	Left
Lids/Lashes	Normal	Normal
Conjunctiva/Sclera	White and quiet	White and quiet
Cornea	1+ PEK	1+ PEK
Anterior Chamber	residual Dexycu on inferior iris, rare cell	Deep and quiet
Iris	Round and reactive	Residual Dexycu on IOL
Lens	PCIOL	PCIOL

After 5.27 months from the original operation, the patient consented and received a re-operation to try to remove the residue.

The following procedure was used:

A 1-mm clear corneal paracentesis incision was created inferiorly through which lidocaine with epinephrine was injected into the anterior chamber. Viscoelastic (DiscoVisc®, Alcon Inc., Geneva, Switzerland) was used to stabilize the anterior chamber. Two additional 1 mm clear corneal paracentesis incisions were made superiorly. A Tano scrubber (Synergetics Inc., O'Fallon, MO, US) was used to gently scrape residue off the intraocular lens implant and polish the lens. Bimannual irrigation/aspiration was used to extract the viscoelastic from the anterior chamber. The corneal wound edges were hydrated with balanced salt solution on a cannula. Then, 0.1 ml of Vigamox was injected into the anterior chamber. The wounds were inspected and were found to be watertight. Topical Betadine, Alphagan P, and antibiotic drops were placed on the corneal surface.

The patient tolerated the procedure well and was taken to the postoperative care unit in good condition. The patient will be discharged home with instructions for the use of topical antibiotics and anti-inflammatory drops, and the use of a metal shield at bedtime.

Post-Procedure Clinical Examination at 1 Week:

Visual Acuity (Snellen - Linear)

	Right	Left
Dist sc	20/20	20/20

Tonometry (Applanation, 2:51 PM)

	Right	Left
Pressure		14

Slit Lamp Exam

	Right	Left
Conjunctiva/Sclera		White and quiet
Cornea		Clear
Anterior Chamber		Deep and quiet
Iris		normal
Lens		PC IOL, clear s/p removal of IOL deposits

Patient 4: 79 year old female with a relevant past medical history of essential hypertension, severe stage primary open angle glaucoma, blepharitis/meibomian gland dysfunction, and combined forms of age-related cataract of both eyes. Previous ocular surgeries included bilateral trabeculectomy with mitomycin c. This patient underwent left eye phacoemulsification with intraocular lens insertion (Toric MX60UET200, Bausch + Lomb, Laval, Canada). Two weeks later the patient underwent right eye phacoemulsification with intraocular lens insertion (Toric MX60UET350, Bausch + Lomb, Laval, Canada). At a follow-up exam, 3.9 months later, there was residue noted on the anterior surface of the right intraocular lens.

Residue Recognition Clinical Examination:

Visual Acuity (Snellen - Linear)

	Right	Left
Dist cc	20/20 -3	20/30 -

Correction: Glasses

Tonometry (Applanation, 2:23 PM)

	Right	Left
Pressure	8	6

Pupils

	APD
Right	None
Left	None

Visual Fields

Left	Right
Full	Full

Extraocular Movement

Right	Left
Full	Full

Slit Lamp Exam

	Right	Left
Lids/Lashes	Normal	Normal
Conjunctiva/Sclera	White and quiet, elevated bleb	White and quiet, elevated bleb
Cornea	meibomium debris	meibomium debris
Anterior Chamber	Deep and quiet	Deep and quiet
Iris	Round and reactive	Round and reactive
Lens	PCIOL, Dexycu residue	PCIOL
Vitreous	syneresis	syneresis

Fundus Exam

	Right	Left
Disc	normal, pale	normal, pale
C/D Ratio	0.9	0.9
Macula	Normal	Normal
Vessels	Normal	Normal
Periphery	Normal	Normal

After 4.37 months from the original operation, the patient consented and received a re-operation to try to remove the residue.

The following procedure was used:

Two 1-mm clear corneal paracentesis incisions were created through which lidocaine with epinephrine was injected into the anterior chamber. Viscoelastic (DiscoVisc ®, Alcon Inc., Geneva, Switzerland) was used to stabilize the anterior chamber. A Tano diamond dusted scraper (Synergetics Inc., O'Fallon, MO, US) was used to polish away the Dexycu® residue. The corneal wound edges were hydrated with balanced salt solution on a cannula and the bimanual irrigation/aspiration handpiece was used to extract the remaining viscoelastic. Then, 0.1 ml of Vigamox was injected into the anterior chamber. The wounds were checked and found to be water tight.

The patient tolerated the procedure well and was taken to the postoperative care unit in good condition. The patient will be discharged home with instructions for the use of topical antibiotics and anti-inflammatory drops, and the use of a metal shield at bedtime.

Post-Procedure Clinical Examination at 6 Weeks:

Visual Acuity (Snellen - Linear)

	Right	Left
Dist cc	20/25	20/30 +2

Correction: Glasses
Used Saline OU for moisture

Tonometry (Applanation, 4:38 PM)

	Right	Left
Pressure	12	12

Visual Fields

Left	Right
Full	

Inconsistent answers

External Exam

	Right	Left
External	Normal	Normal

Slit Lamp Exam

	Right	Left
Lids/Lashes	Normal	Normal
Conjunctiva/Sclera	White and quiet, elevated bleb	White and quiet, elevated bleb
Cornea	Clear	Clear
Anterior Chamber	Deep and quiet	Deep and quiet
Iris	Round and reactive, dilated	Round and reactive
Lens	pciol	PCIOL
Vitreous	syneresis	syneresis

Fundus Exam

	Right	Left
Disc	thin rims, pale	thin rims, pale
C/D Ratio	0.9	0.9

Patient 5: 53 year old male with a relevant past medical history of chronic left eye uveitis, essential hypertension, type 2 diabetes mellitus, posterior synechiae in the right eye, and nuclear senile cataract in both eyes. This patient underwent phacoemulsification with intraocular lens implantation (MX60E, Bausch + Lomb, Laval, Canada) along with posterior synechialysis in the right eye. Two weeks later the patient had phacoemulsification with intraocular lens implantation (MX60E, Bausch + Lomb, Laval, Canada) of the left eye. At a follow-up exam, 0.2 months post-op, there was residue noted in the right eye at the inferior portion of the anterior chamber.

Right Eye Residue Recognition Clinical Examination:

Visual Acuity (Snellen - Linear)

	Right	Left
Dist sc	20/30	20/25

Tonometry (Tonopen, 7:45 AM)

	Right	Left
Pressure	13	

Neuro/Psych

Oriented x3: Yes
Mood/Affect: Normal

Slit Lamp and Fundus Exam

External Exam

	Right	Left
External	Normal	Normal

Slit Lamp Exam

	Right	Left
Lids/Lashes	Normal	Normal
Conjunctiva/Sclera	White and quiet	White and quiet
Cornea	trace swelling by CCI	Clear
Anterior Chamber	deep quiet, residual Dexycu inferiorly	Deep and quiet
Iris	round but slightly irregular	Round and reactive
Lens	PCIOL, pigment dusting on optic	2+ Nuclear sclerosis

At a follow-up exam, 0.77 months post-op there was residue noted at the anterior surface of the left intraocular lens.

Left Eye Residue Recognition Clinical Examination:

Visual Acuity (Snellen - Linear)

	Right	Left
Dist sc	20/20	20/25

Tonometry (iCare, 4:27 PM)

	Right	Left
Pressure	8	9

Pupils

	Dark	Light	APD
Right	3	2	None
Left	3	2	None

Visual Fields (Counting fingers)

Left	Right
Full	Full

Extraocular Movement

Right	Left
Full	Full

Slit Lamp Exam

	Right	Left
Lids/Lashes	Normal	Normal
Conjunctiva/Sclera	White and quiet	White and quiet
Cornea	Clear	1-2+ edema paracentral at around 8:00
Anterior Chamber	deep quiet, trace cells	Deep, quiet, Dexycu dissolving (in the middle of pupil centrally)
Iris	round but slightly irregular	Round and reactive
Lens	PCIOL, pigment dusting on optic	PC IOL, severe persistent Dexycu residue on optic surface
Vitreous	Normal	Normal

Fundus Exam

	Right	Left
Disc	Normal	Normal
C/D Ratio	0.4	0.4
Macula	Normal	Normal
Vessels	Normal	Normal
Periphery	Normal	Normal

After 1.9 months from the original operation, the patient consented and received a re-operation to try to remove the residue.

The following procedure was used:

A 1 mm clear corneal paracentesis incision was created through which lidocaine with epinephrine was injected into the anterior chamber. Another paracentesis was made superiorly. Viscoelastic (DiscoVisc®, Alcon Inc., Geneva, Switzerland) was used to stabilize the anterior chamber. As viscoelastic was injected the residue overlying the lens began to peel away. A retina ILM forceps was then used to peel off the residue. A Tano retina polisher (Synergetics Inc., O'Fallon, MO, US) was used to remove remaining residue. The lens was inspected and noted to be clean without any scratches or defects. The remaining viscoelastic was aspirated with bimanual I&A. The corneal wound edges were hydrated with balanced salt solution on a cannula and the irrigation/aspiration handpiece was used to extract the remaining viscoelastic. The wounds were inspected and were found to be watertight. 0.1 ml of Moxifloxacin was injected. ReSure corneal glue was placed over the incisions. Topical Betadine, Brimonidine, and antibiotic drops were placed on the corneal surface.

The patient tolerated the procedure well and was taken to the postoperative care unit in good condition. The patient will be discharged home with instructions for the use of topical antibiotics and anti-inflammatory drops, and the use of a metal shield at bedtime.

Post-Procedure Clinical Examination at 3 Weeks:

Visual Acuity (Snellen - Linear)

	Right	Left
Dist sc	20/30 +2	20/25

Tonometry (Applanation, 3:48 PM)

	Right	Left
Pressure	10	13

Pupils

	Pupils	APD
Right	PERRL	None
Left	PERRL	None

Visual Fields (Counting fingers)

Left	Right
Full	Full

Extraocular Movement

Right	Left
Full	Full

Slit Lamp Exam

	Right	Left
Lids/Lashes	Normal	Normal
Conjunctiva/Sclera	White and quiet	White and quiet
Cornea	Clear	Clear
Anterior Chamber	deep quiet, trace cells	Deep, quiet
Iris	round but slightly irregular	Round and reactive
Lens	PCIOL, pigment dusting on optic	PC IOL
Vitreous	Normal	Normal

Fundus Exam

	Right	Left
Disc	Normal	Normal
C/D Ratio	0.4	0.4
Macula	Normal	Normal
Vessels	Normal	Normal
Periphery	Normal	Normal

Patient 6: 66 year old female with a relevant past medical history of combined forms of essential hypertension, blepharitis, conjunctivochalasis, and age-related cataracts in both eyes. Previous ocular surgeries include LASIK in both eyes. This patient underwent left eye phacoemulsification with intraocular lens insertion (MX60E, Bausch + Lomb, Laval, Canada). At a follow-up exam, 0.8 months post-op there was residue noted at the anterior surface of the left intraocular lens.

Residue Recognition Clinical Examination Day Left Eye:

Visual Acuity (Snellen - Linear)

	Right	Left
Dist sc		20/25

Correction: Glasses

Pupils

	APD
Right	None
Left	None

Visual Fields (Counting fingers)

Left	Right
Full	Full

Extraocular Movement

Right	Left
Full, Ortho	Full, Ortho

Slit Lamp Exam

	Right	Left
Lids/Lashes		Normal
Conjunctiva/Sclera		White and quiet
Cornea		Clear
Anterior Chamber		Deep and quiet
Iris		Round and reactive
Lens		Centered posterior chamber intraocular lens, Dexycu residue on anterior optic

After 2.57 months from the original operation, the patient consented and received a re-operation to try to remove the residue.

The following procedure was used:

Two 1 mm clear corneal paracentesis incisions was created through which lidocaine with epinephrine was injected into the anterior chamber followed by viscoelastic (DiscoVisc ®, Alcon Inc., Geneva, Switzerland) to stabilize the anterior chamber. The Tano diamond brush (Synergetics Inc., O'Fallon, MO, US) was used to carefully remove the residual Dexycu® material from the anterior aspect of the intraocular lens. This was accomplished without complication. The bimanual I/A was used to remove the remaining viscoelastic and Dexycu® debris from the anterior chamber. The corneal wound edges were hydrated with balanced salt solution on a cannula and the irrigation/aspiration handpiece was used to extract the remaining viscoelastic. Vigamox was injected into the anterior chamber at the end of the case. The wounds were inspected and were found to be watertight. Eye tension was adjusted to normal physiologic pressure. Topical Betadine, Brimonidine, and antibiotic drops were placed on the corneal surface.

The patient tolerated the procedure well and was taken to the postoperative care unit in good condition. The patient will be discharged home with instructions for the use of topical antibiotics and anti-inflammatory drops, and the use of a metal shield at bedtime.

Post-Procedure Clinical Examination at Day 0 (only note available):

OS: IOP 13

Eye is well formed, paracenteses closed with no leaks, no corneal epithelial defects, 1+ cell, lens centered in bag.

Patient 7: 69 year old female with a relevant past medical history of central retinal vein occlusion with macular edema of the right eye, mucopurulent conjunctivitis of the right eye, posterior subcapsular polar age-related cataract of the right eye. This patient underwent phacoemulsification with intraocular lens implantation (MX60E, Bausch + Lomb, Laval, Canada) along with ab-interno canaloplasty, and Hydrus microstent insertion in the right eye. At a follow-up exam, 1.27 months post-op there was residue noted at the anterior surface of the right intraocular lens.

Residue Recognition Clinical Examination Day Right Eye:

Visual Acuity (Snellen - Linear)

	Right	Left
Dist sc	20/30 +2	20/30 -1

Tonometry (Tonopen, 4:32 PM)

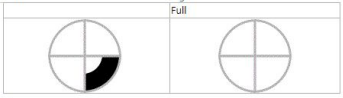
	Right	Left
Pressure	13	19

Pupils

	APD
Right	None
Left	None

Visual Fields (Counting fingers)

Left	Right
	Full



Extraocular Movement

Right	Left
Full	Full

Slit Lamp Exam

	Right	Left
Lids/Lashes	Normal	
Conjunctiva/Sclera	White and quiet	
Cornea	sup EBMD	
Anterior Chamber	deep, 2+ cell	
Iris	Round and reactive	
Lens	PCIOL, residual Dexycu stain on optic surface	

After 11.2 months from the original operation, the patient consented and received a re-operation to try to remove the residue.

The following procedure was used:

A 1 mm clear corneal paracentesis incision was created superiorly through which lidocaine with epinephrine was injected into the anterior chamber. Viscoelastic (DiscoVisc ®, Alcon Inc., Geneva, Switzerland) was used to stabilize the anterior chamber. An additional clear corneal paracentesis incision was made inferiorly. A Malyugin ring manipulator was used to inspect the edges of the intraocular lens. A Tano scrubber (Synergetics Inc., O'Fallon, MO, US) was used to gently polish the lens. Bimannual I/A was used to remove residual crystalline lens material from the anterior chamber. An Ahmed gonioprism was used to inspect the angles. The corneal wound edges were hydrated with balanced salt solution on a cannula and the irrigation/aspiration handpiece was used to extract the remaining viscoelastic. Then, 0.1 ml of Vigamox was injected into the anterior chamber. The wounds were inspected and were found to be watertight. Topical Betadine, Alphagan P, and antibiotic drops were placed on the corneal surface.

The patient tolerated the procedure well and was taken to the postoperative care unit in good condition. The patient will be discharged home with instructions for the use of topical antibiotics and anti-inflammatory drops, and the use of a metal shield at bedtime.

Post-Procedure Clinical Examination at 2 Weeks:

Visual Acuity (Snellen - Linear)

	Right	Left
Dist cc	20/70	20/20 -3
Dist ph cc	20/60 -1	
Correction: Glasses		

Tonometry (Applanation, 8:03 AM)

	Right	Left
Pressure	12	18

External Exam

	Right	Left
External	Normal	Normal

Slit Lamp Exam

	Right	Left
Lids/Lashes	Normal	
Conjunctiva/Sclera	White and quiet	
Cornea	Superior EBMD	
Anterior Chamber	Deep, trace cell, Hydrus nasal angle	
Iris	Round and reactive, scattered atrophy	
Lens	PCIOL	

During 2020-2021, Dexycu® was billed 1,076 times in conjunction with cataract surgery at the Moran Eye Center. Of these patients, postoperative persistent residue was noted in 8 eyes of 7 patients. The median age of patients with residue was 66 years (range 53-79). Regarding surgery type, 3 eyes underwent routine phacoemulsification with IOL placement, 3 underwent combination procedures (e.g. ABiC™+Phaco+IOL), and 2 underwent complex phacoemulsification with IOL placement (e.g. complicated by synechialysis).

Patients received a 0.3 mL injection of lidocaine with epinephrine. The phacoemulsification was performed with 500 mL of Omidria® phenylephrine/ketorolac infusion (Omeros Corp., Seattle, WA). After lens removal, 0.1 mL of intracameral moxifloxacin was administered. The viscoelastic used in all 8 cases was DisCoVisc® (Alcon, Geneva, Switzerland). Six eyes received monofocal MX60E lenses (Bausch + Lomb, Bridgewater, NJ) and 2 eyes received toric lenses, the MX60UT125 and MX60UET350 (Bausch + Lomb, Bridgewater, NJ). A Dexycu® pellet was placed posterior to the iris in all patients per manufacturer specifications [5].

The average time from surgery to the discovery of the residue was 1.63 months (range 0.20-4.23). Of the 8 eyes with residue, 6 underwent the polishing procedure. The average time between the initial surgery and the polishing procedure was 4.71 months (range 1.90-11.20).This case series also describes utilizing a Tano diamond brush (Synergetics Inc., O'Fallon, MO, US) to delicately polish the IOL without compromising the optical quality of the lens. The risks of an additional procedure must be evaluated in the context of benefit to the individual patient. In our cohort, two of the eyes did not undergo polishing because the risks of the additional procedure exceeded the potential benefit to the patient.

3. DISCUSSION

The finding of persistent intraocular lens residue associated with the use of Dexycu® is not well studied and this case series is a significant addition to the medical literature.

Adhesion of foreign material to artificial intraocular lenses is a well-known phenomenon, with calcifications and silicone oil being identified as common culprits in various case studies [6-13]. An experimental study by Kageyama and Yaguchi showed that silicone oil was most likely to interact with silicone IOLs and least likely to interact with hydrophobic acrylic lenses [9]. In the aqueous milieu of the posterior chamber, the hydrophobic Verisome® spherule of Dexycu® could promote

the precipitation of residue on a hydrophobic IOL. In this case series, the depositions observed involved the acrylic hydrophobic lenses B&L MX60 and its toric varieties.

The Bausch and Lomb intraocular lenses seem to be predisposed to a Dexycu® persistent opacification, however correlation does not equate with causation. The occurrence of opacification on an intraocular lens post-cataract surgery is not unique and has been well documented in the literature [14].

Further laboratory analysis with detailed sampling of the actual opacified matter is required to fully elucidate whether the molecular interaction between the MX60 hydrophobic lenses and Dexycu® is truly occurring as it appears. One should note that of the 8 surgeries, 5 surgeries involved additional procedures or ocular comorbidities. Several of the patients had diabetes mellitus type 2 predisposing them to metabolic syndromes [15-17]. Dexycu® is a steroid which is a diabetes risk factor. The unusual Dexycu® staining may be a symptom of underlying metabolic imbalance. Hence, further inquiry may determine whether there is a relationship between the presence of residue, the type of surgery, or pre-existing medical problems.

4. CONCLUSION

This article documents cases of persistent IOL residue with the use of Dexycu® in 8 eyes of 7 patients. Although all the patients who experienced this complication had MX60 lenses and its toric varieties, the relationship between the composition of the Dexycu® suspension and these lenses remains unclear. Further research is needed to characterize and better understand this phenomenon.

Ethical Approval and Consent

Approval to retrospectively review patient charts was obtained from the University of Utah IRB (#00146975). All patients consented to the publication of their case details and patient images were taken and shared with documented permission in their charts. As per international standard or university standard written ethical approval has been collected and preserved by the author(s).

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All authors attest that they meet the current ICMJE criteria for authorship.

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