

# Procedural Grand Rounds: A Grab Bag of Do's and Don'ts

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# FINANCIAL DISCLOSURE



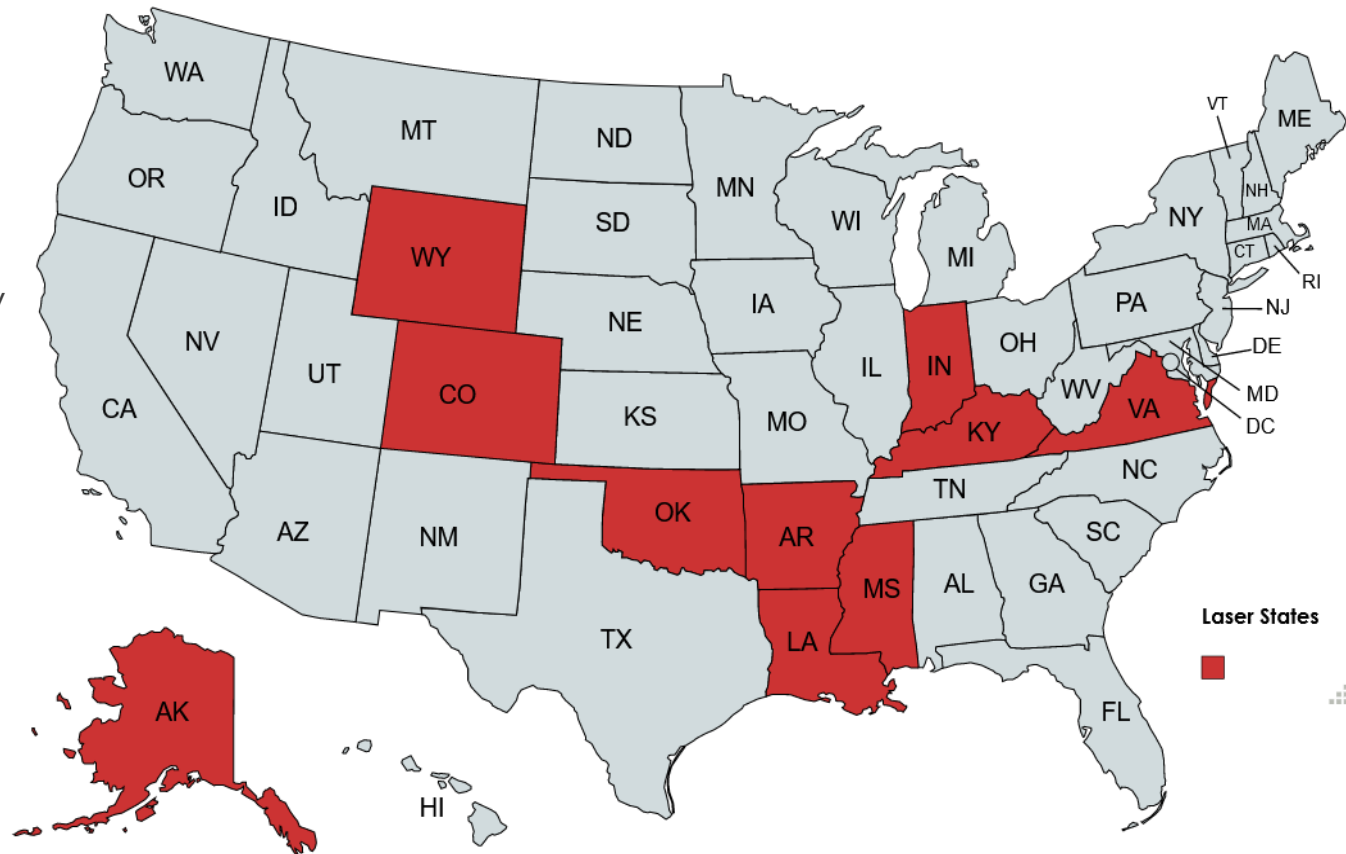
# Objectives

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- State of Procedures
- YAG
- LPI
- SLT
- Periocular procedures

# Procedural Scope

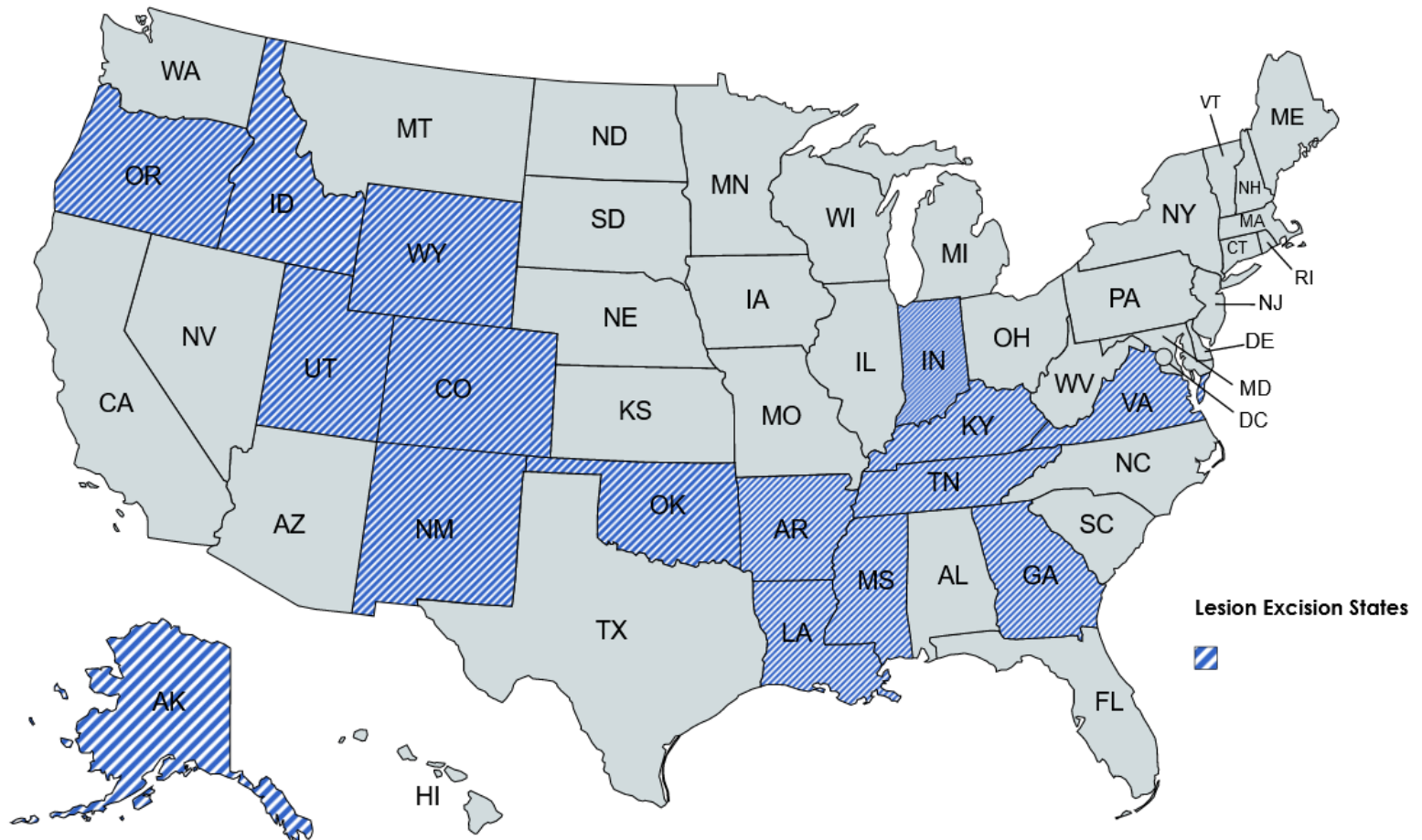
- Some combination of lasers (10):
  - Nd:YAG capsulotomy
  - Laser peripheral iridotomy
  - Selective laser trabeculoplasty
- PRK, crosslinking, etc. laws vary amongst group



<https://www.mapchart.net/usa.html>

# Procedural Scope

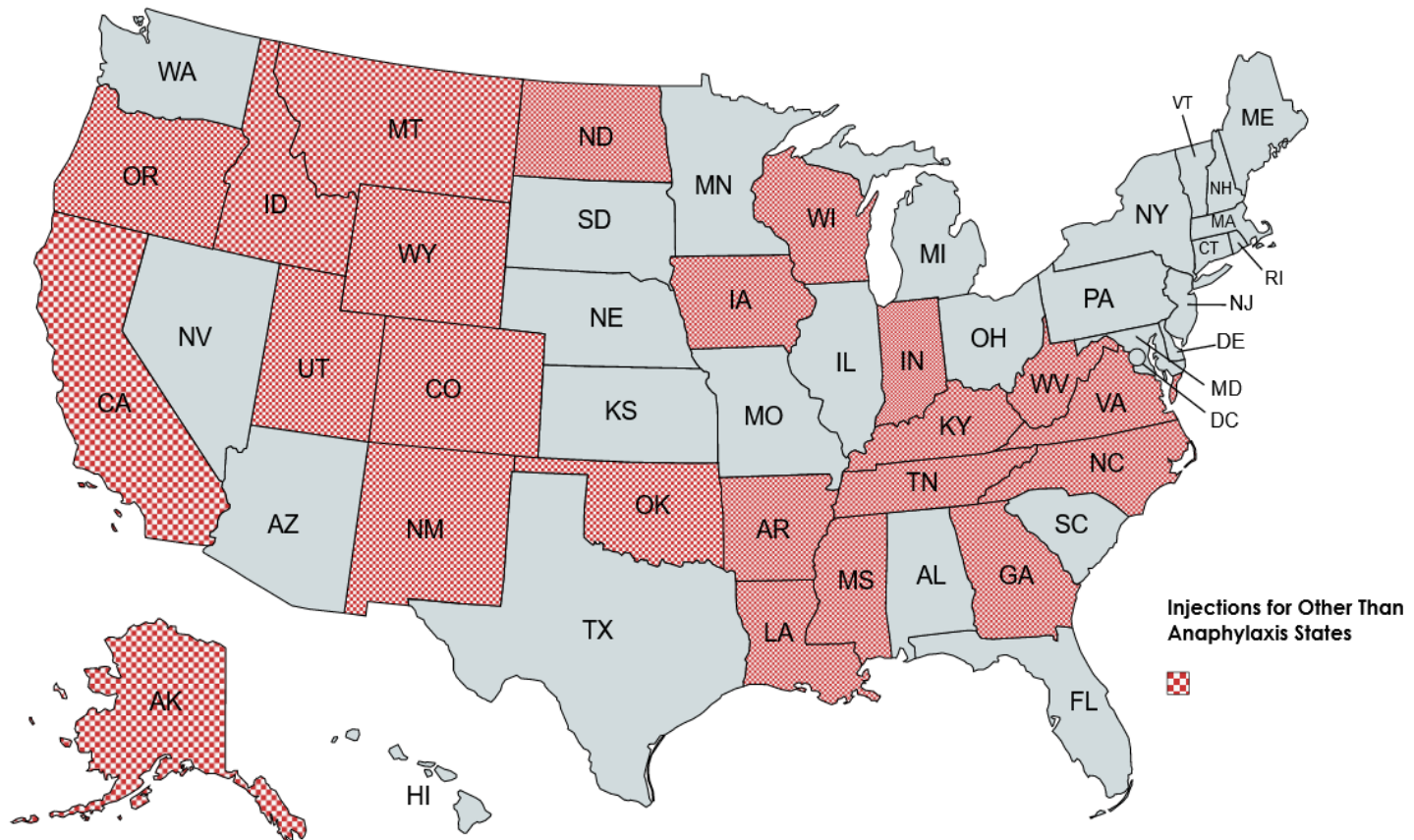
- Lesion excision (16)



<https://www.mapchart.net/usa.html>

# Procedural Scope

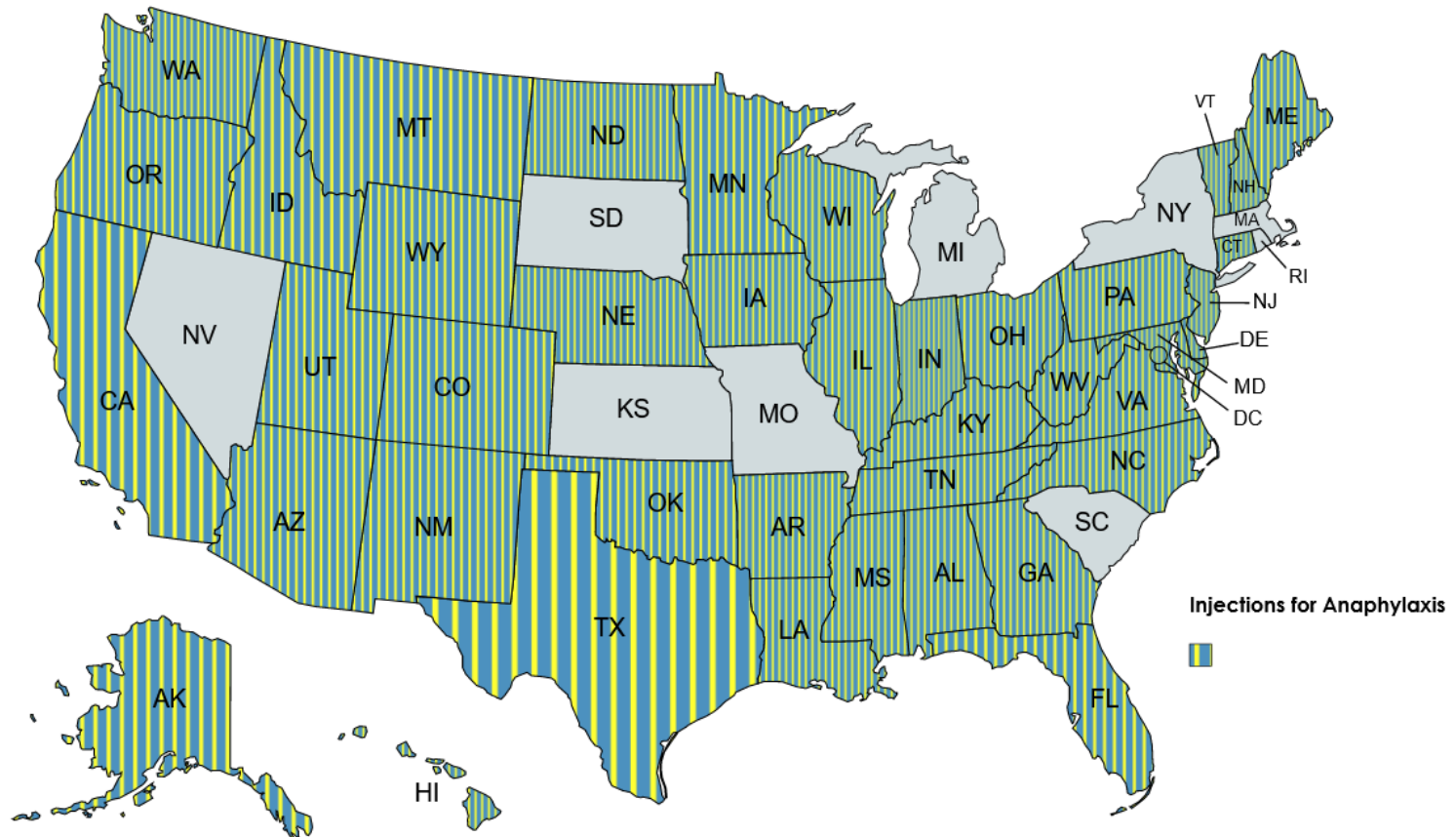
- Injections (not including for anaphylaxis) (23)



<https://www.mapchart.net/usa.html>

# Procedural Scope

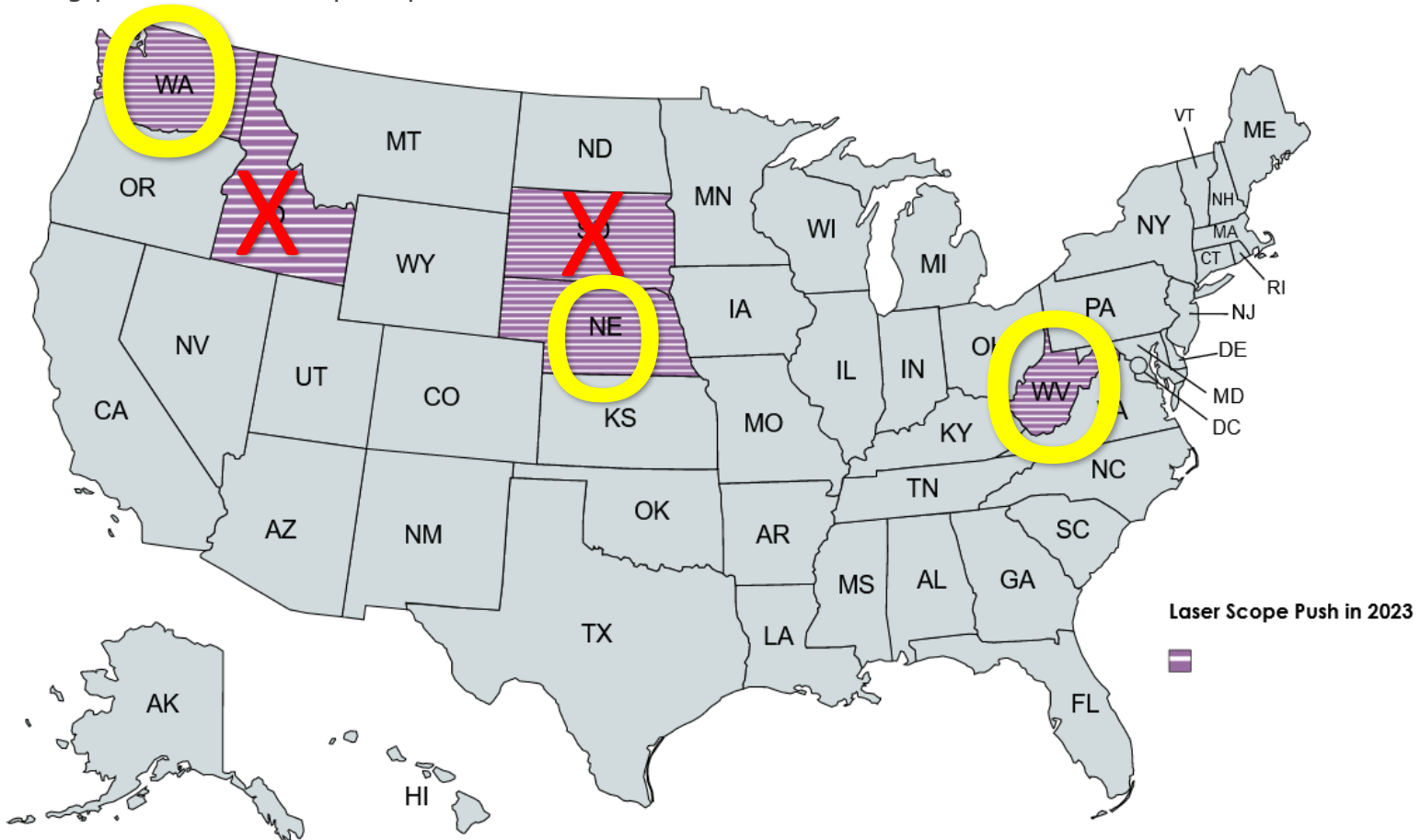
- Injections for anaphylaxis (41)



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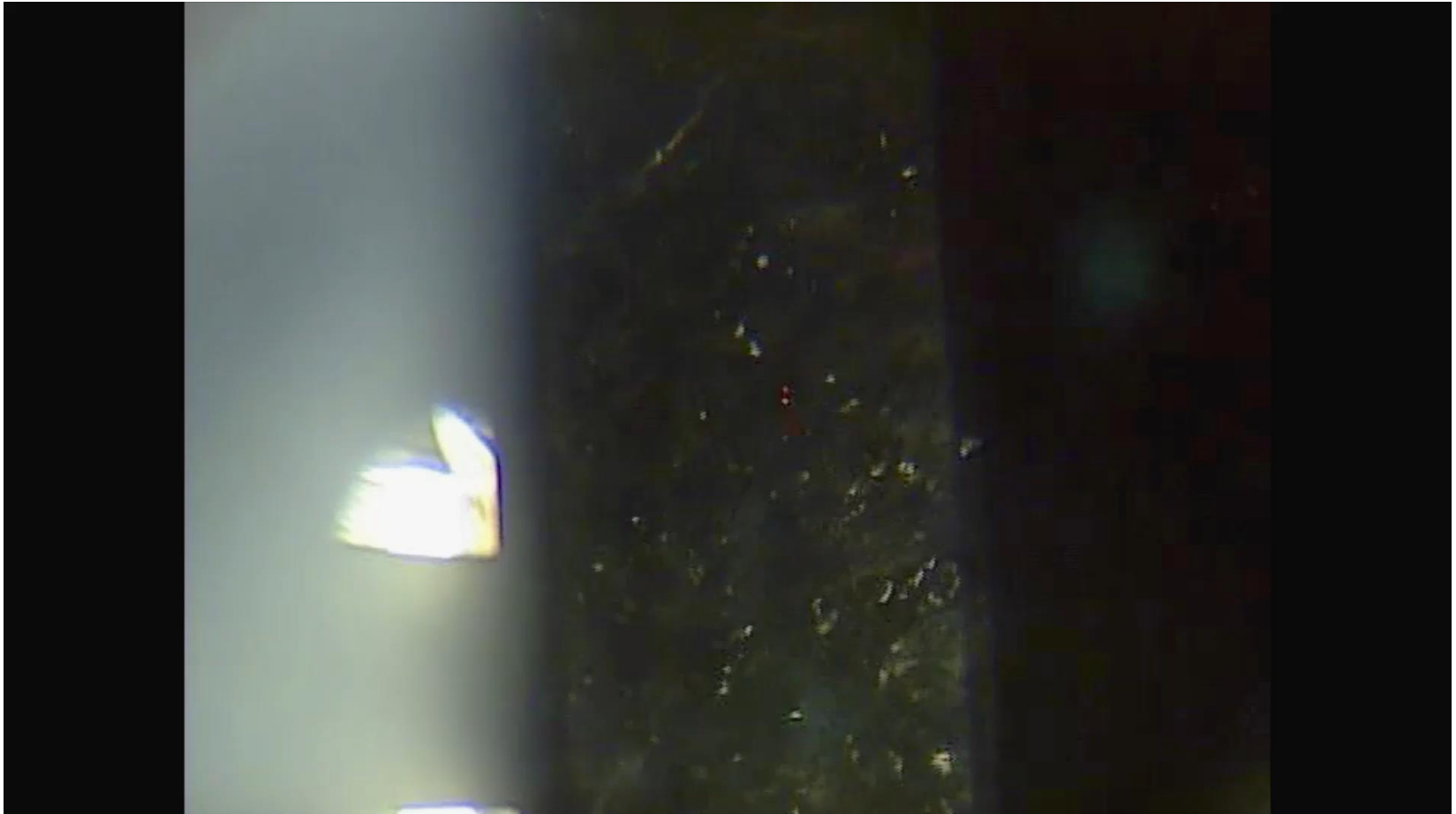
# Procedural Scope

- States having pursued laser scope expansion in 2023

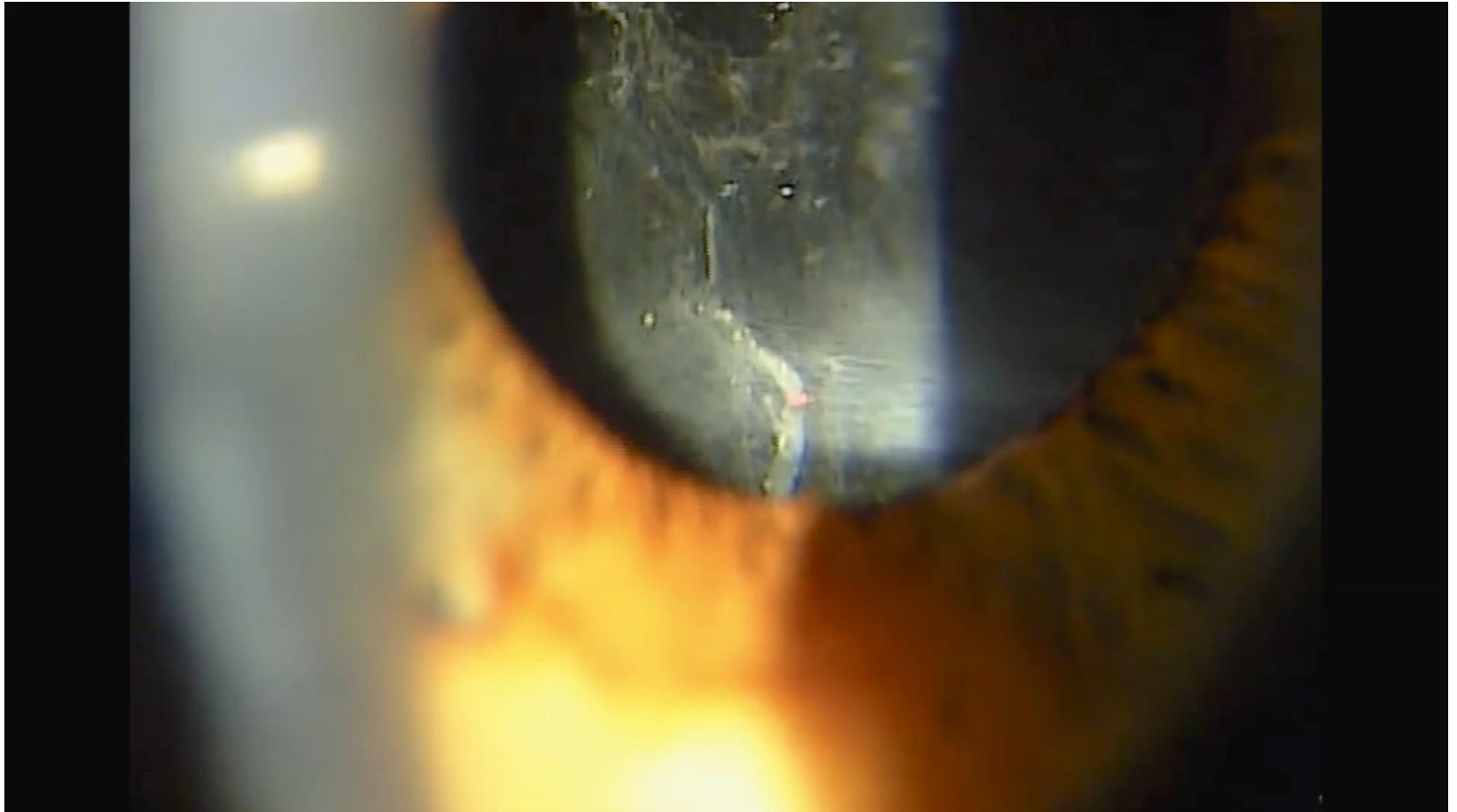


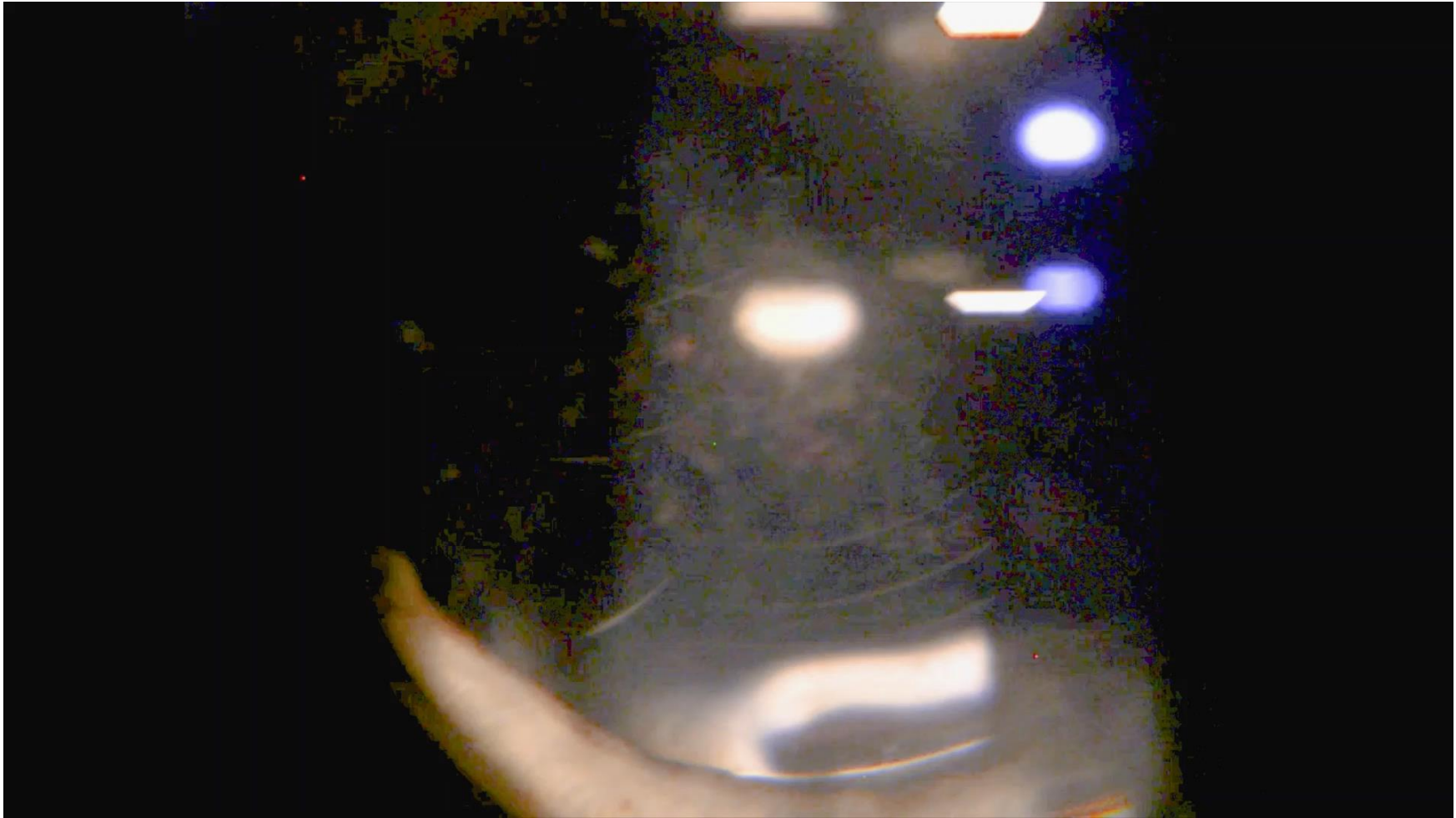
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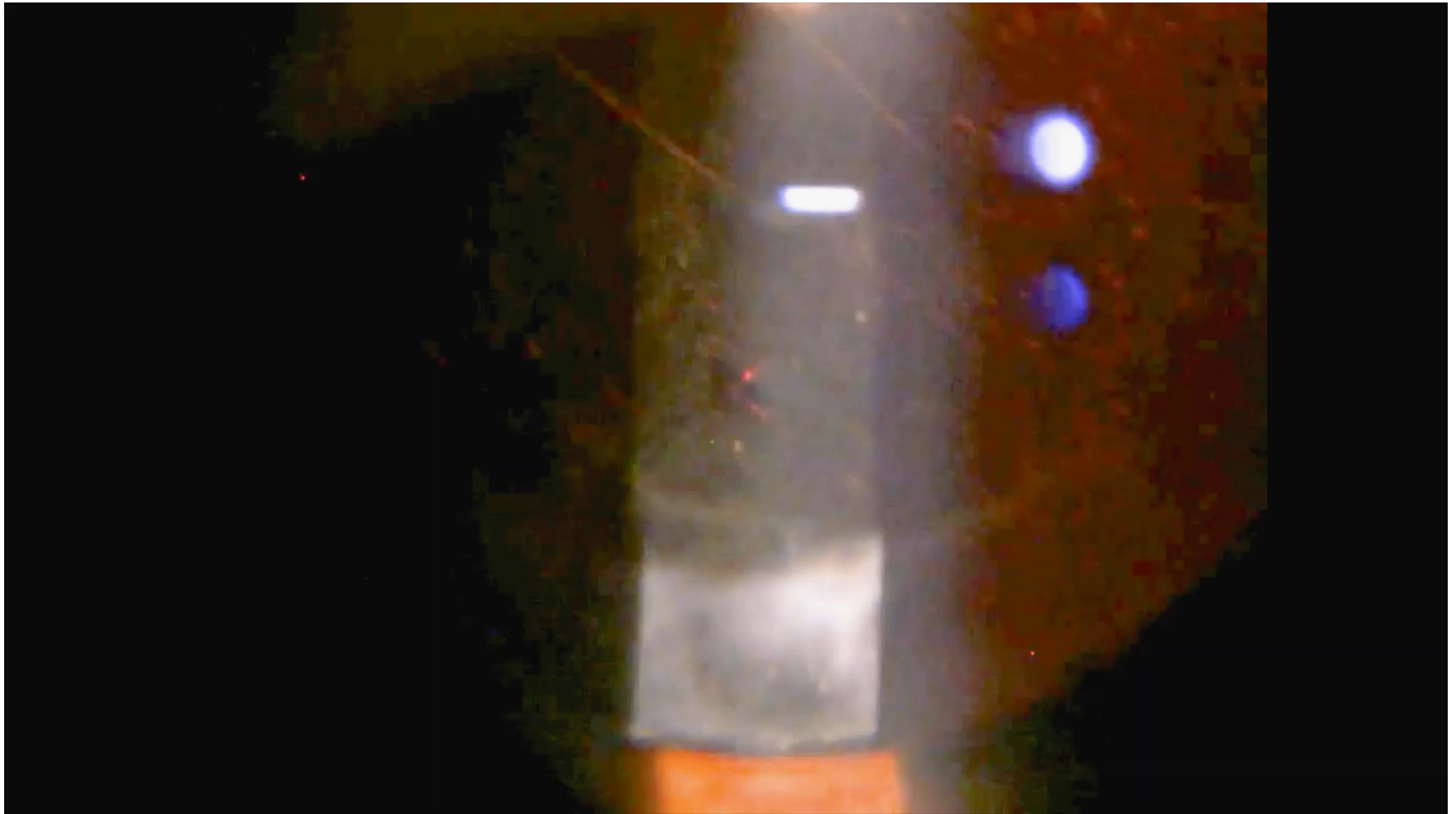














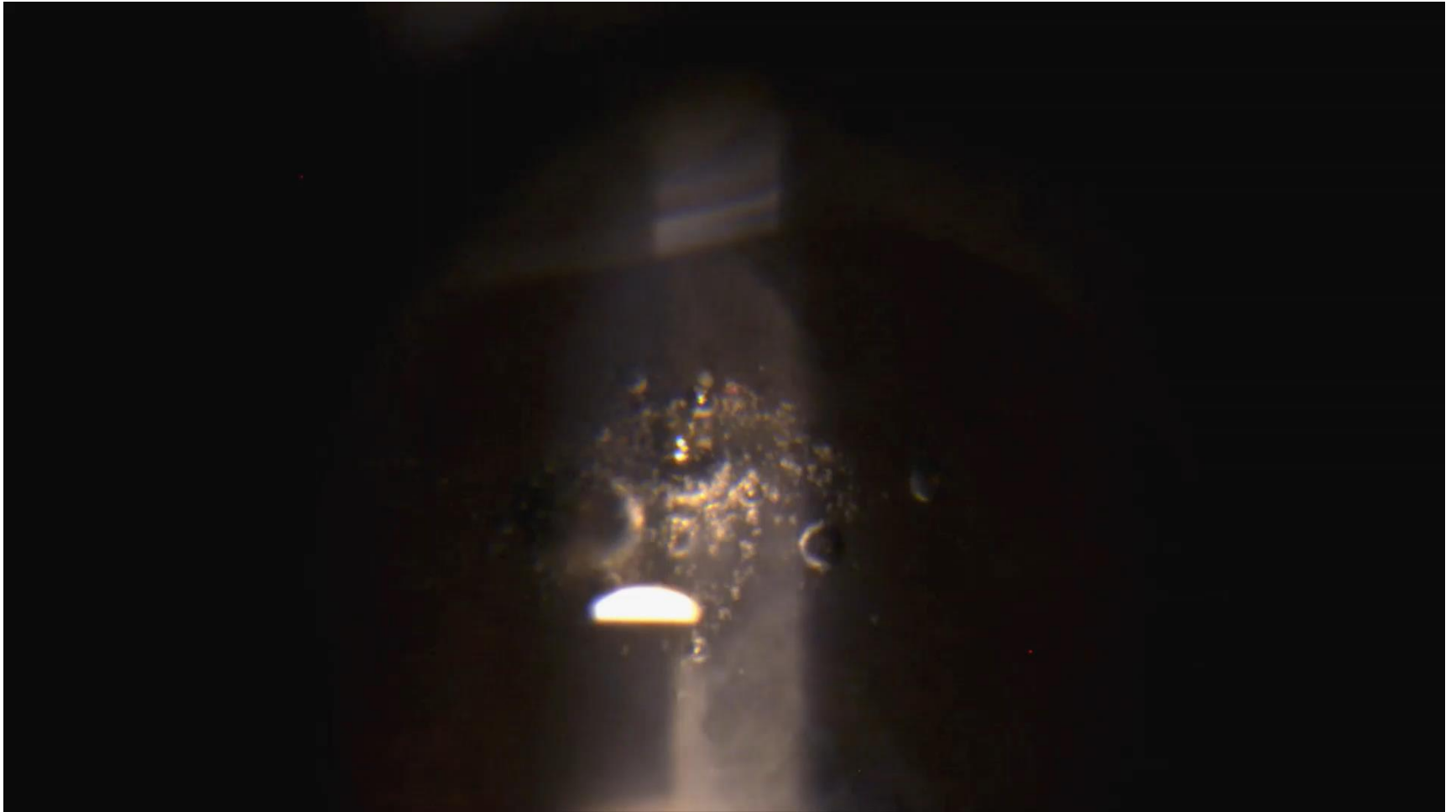




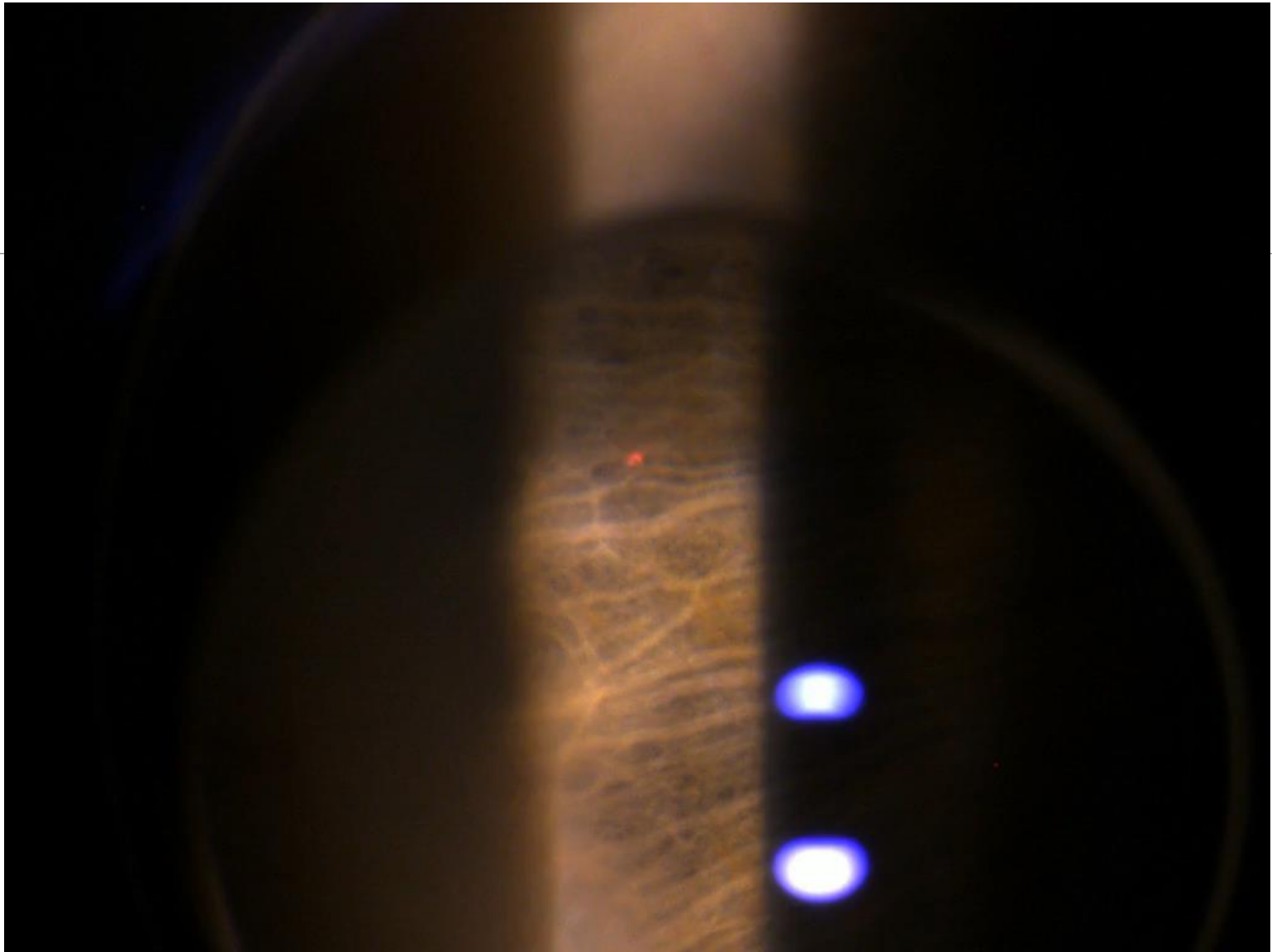


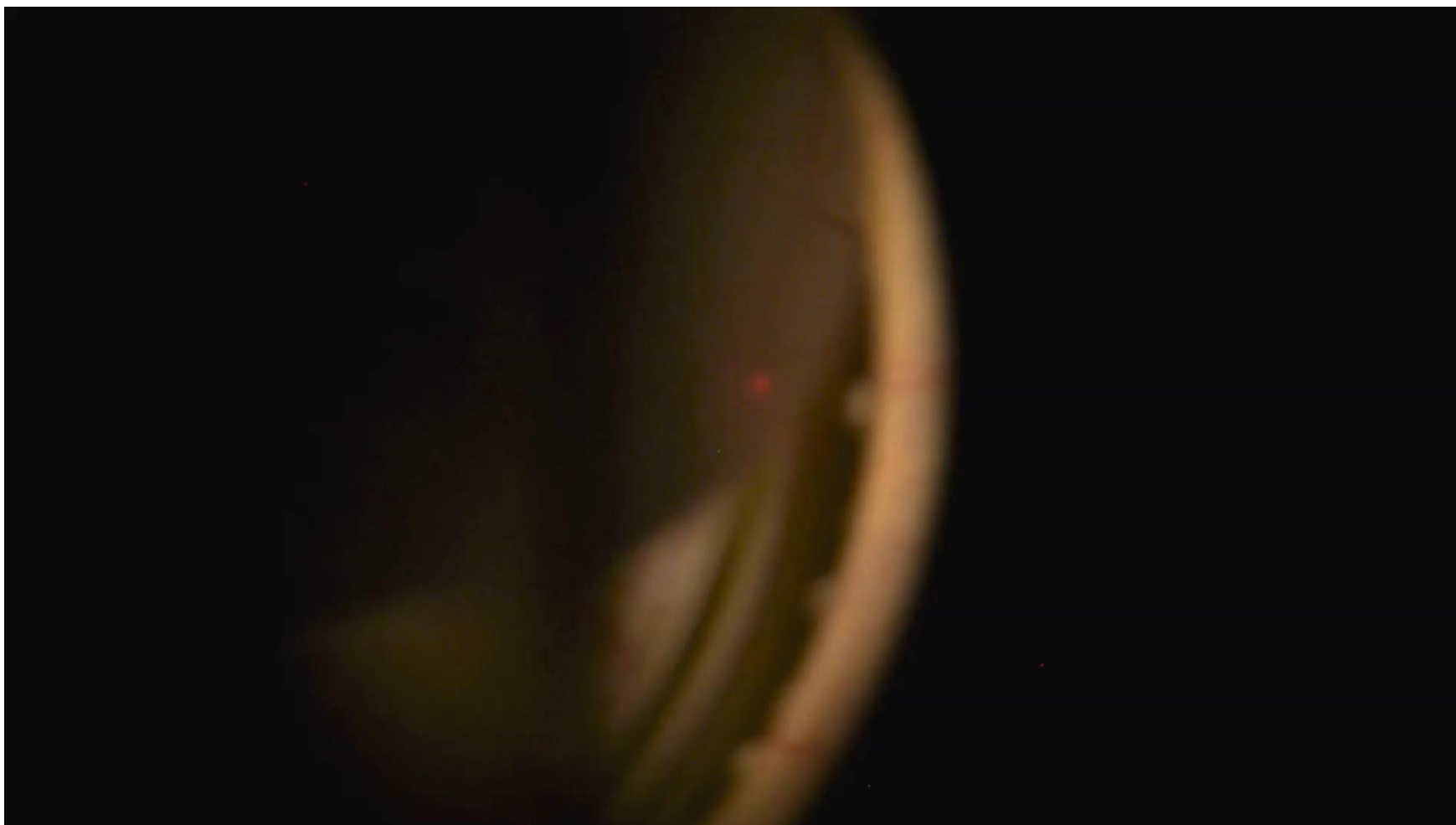


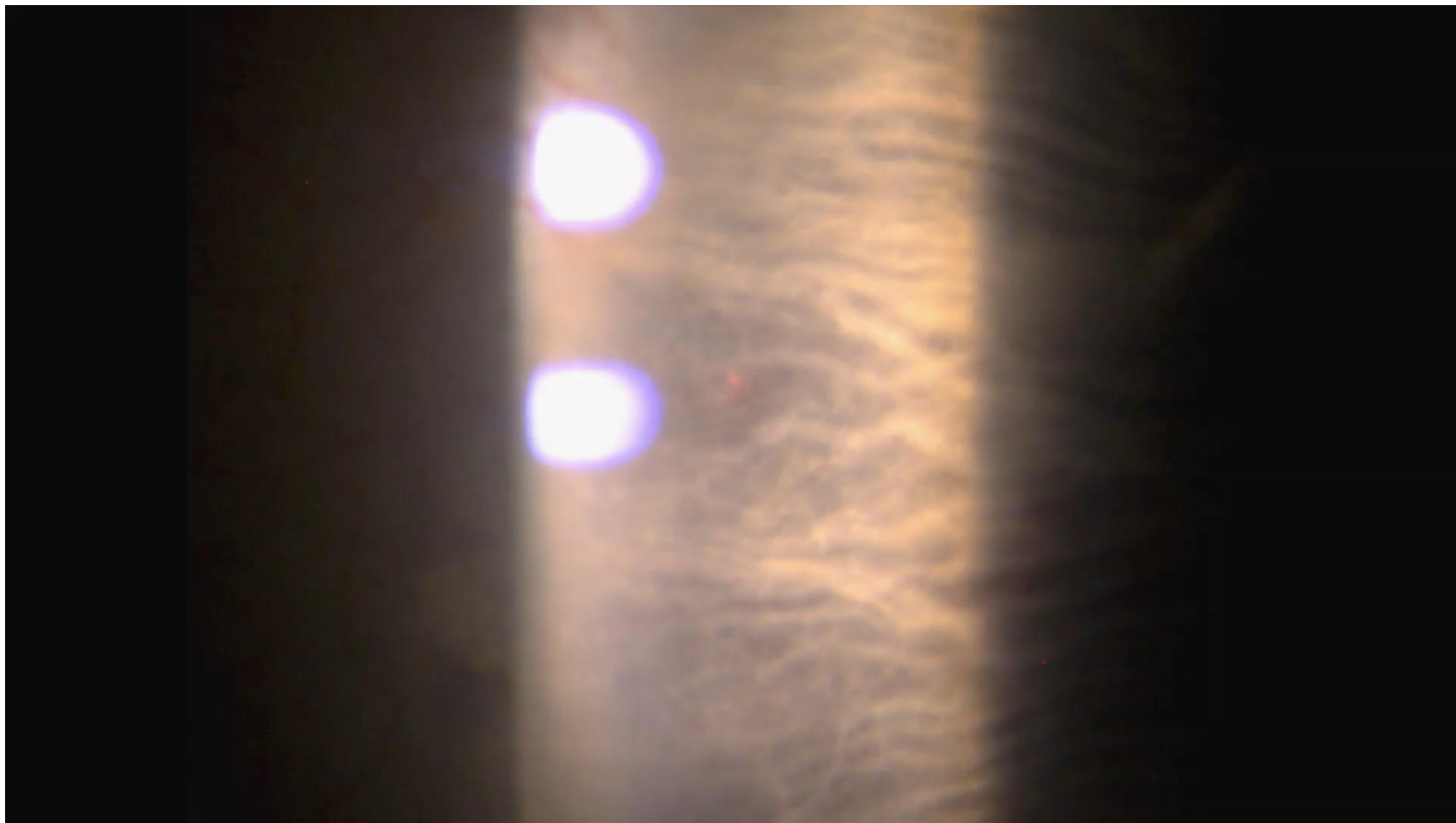




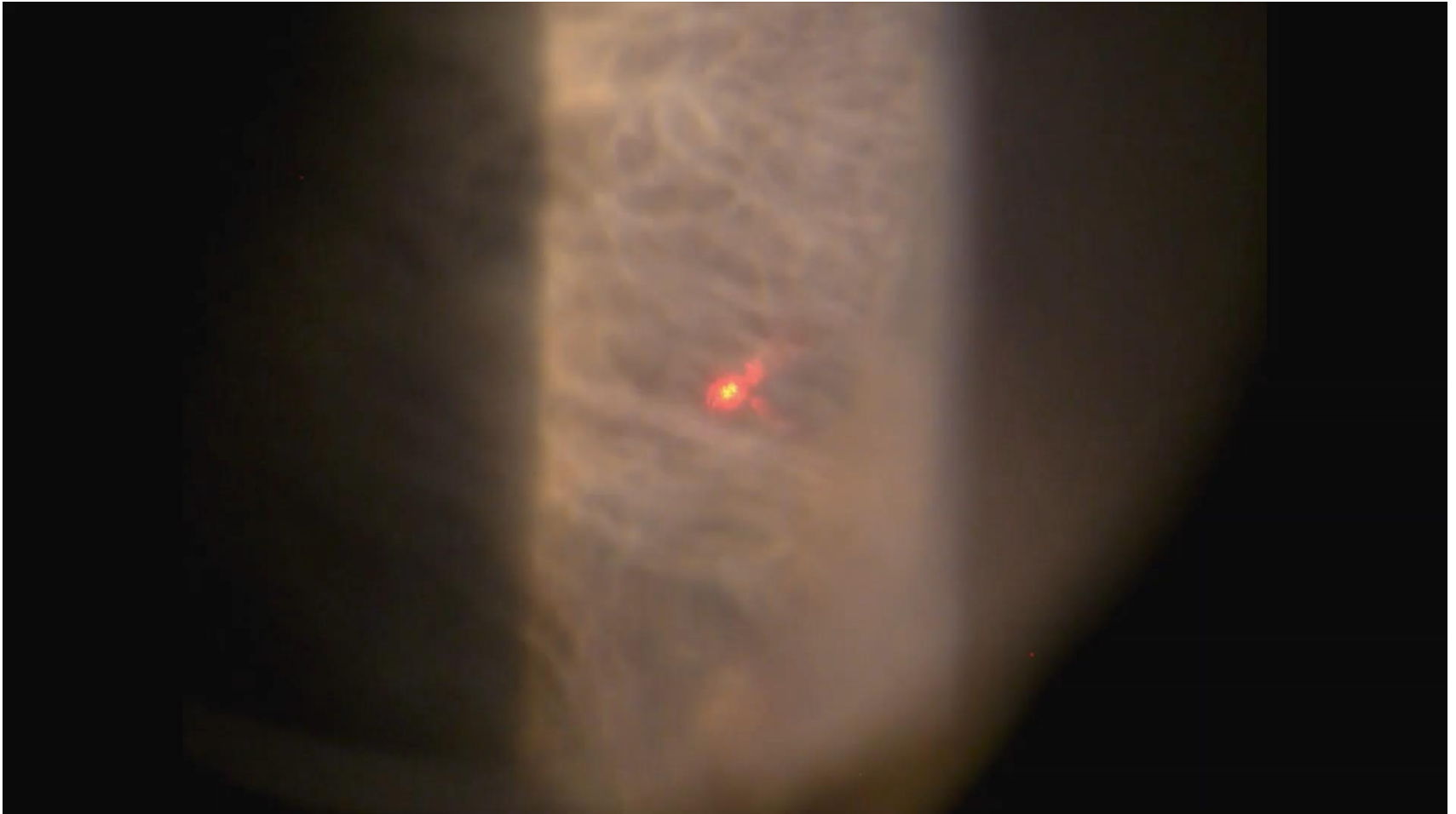


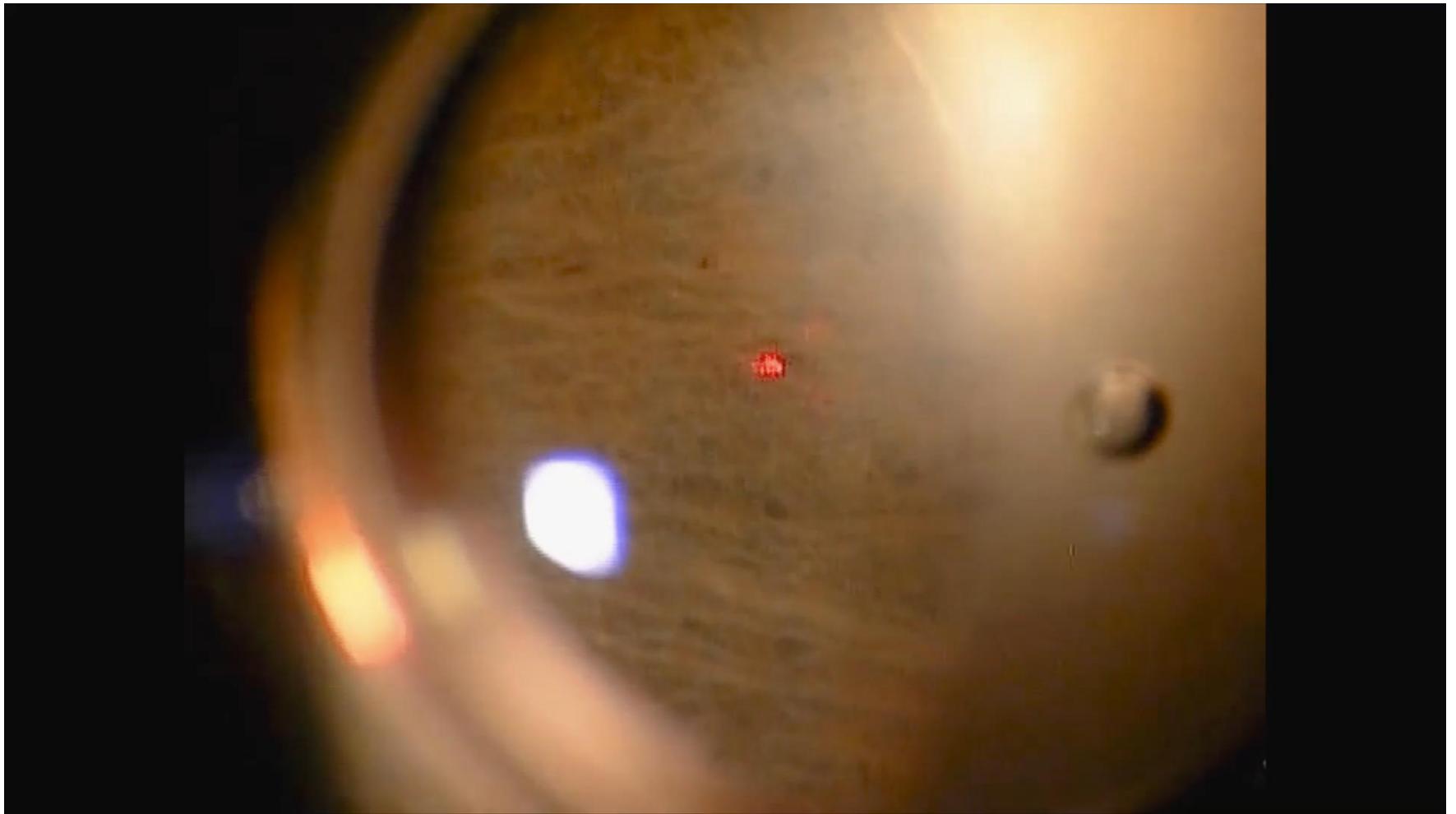


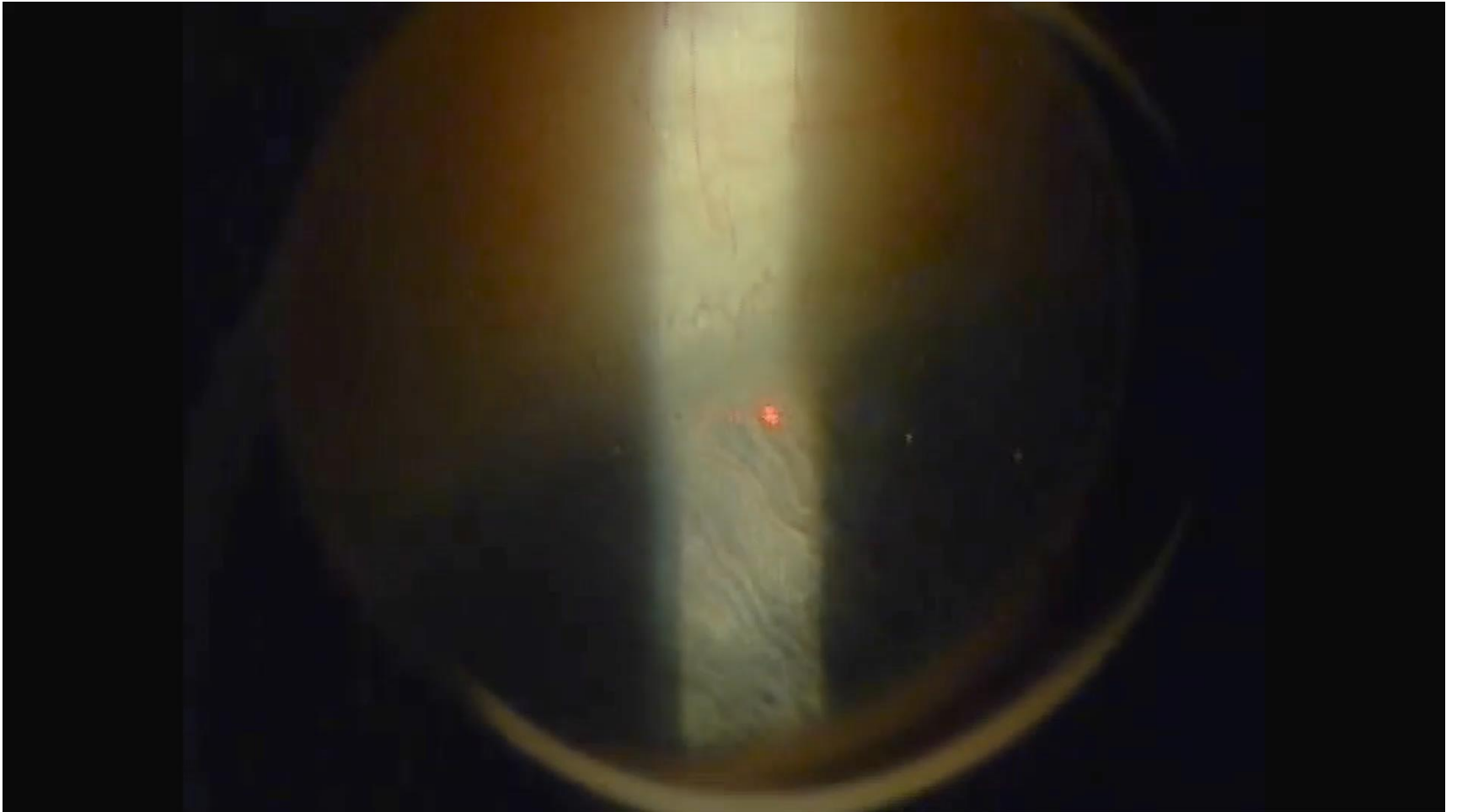


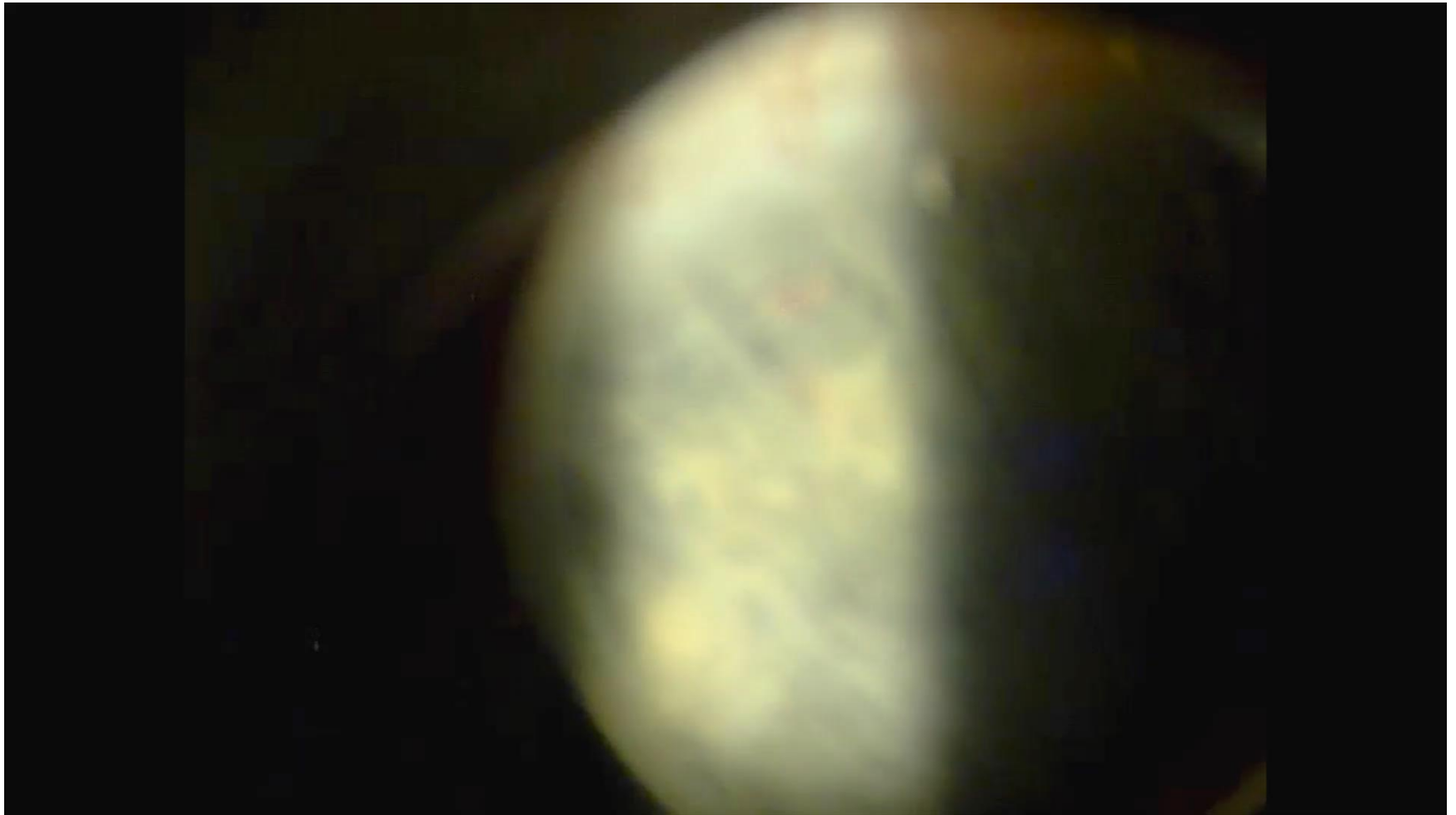


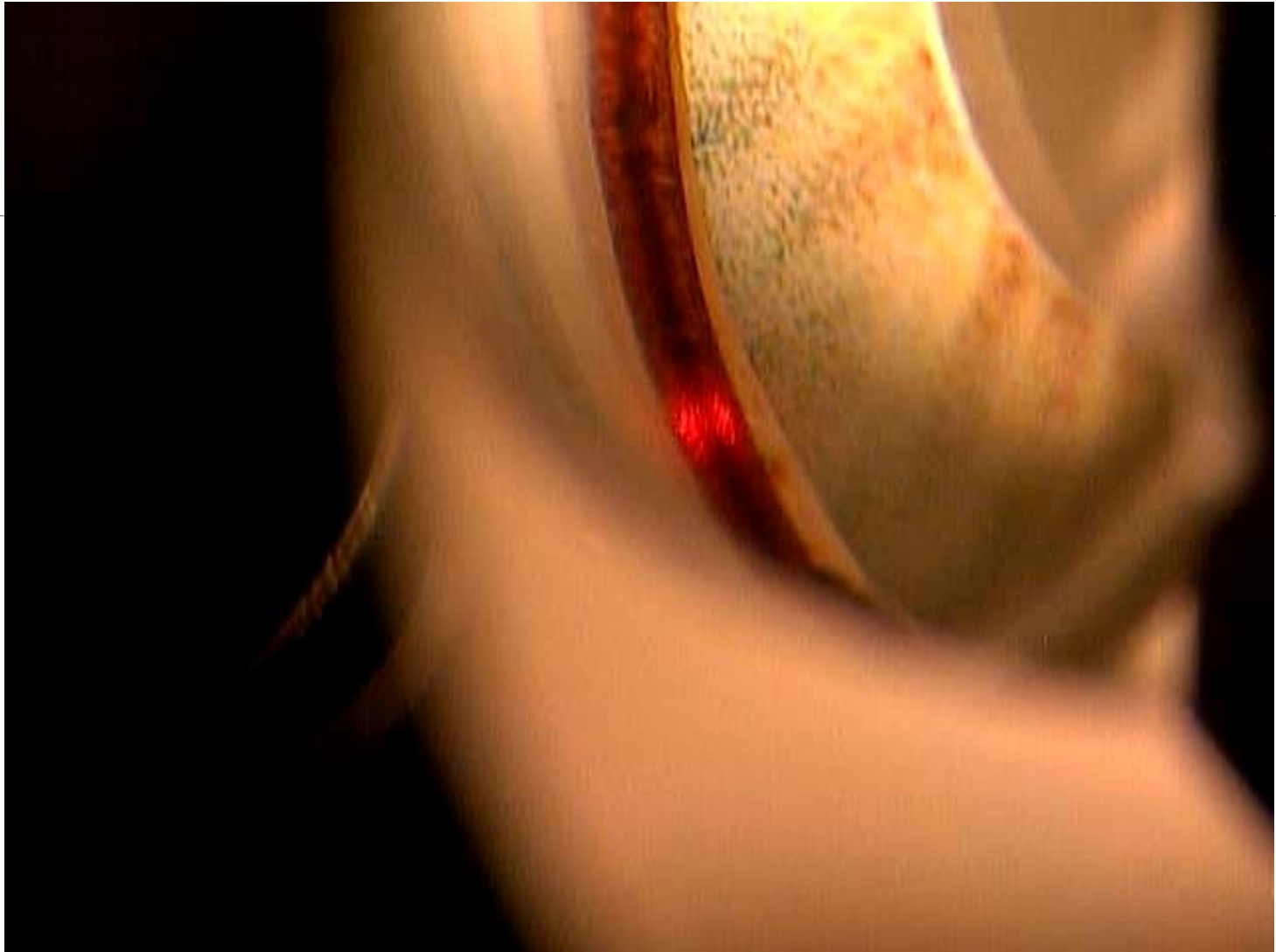




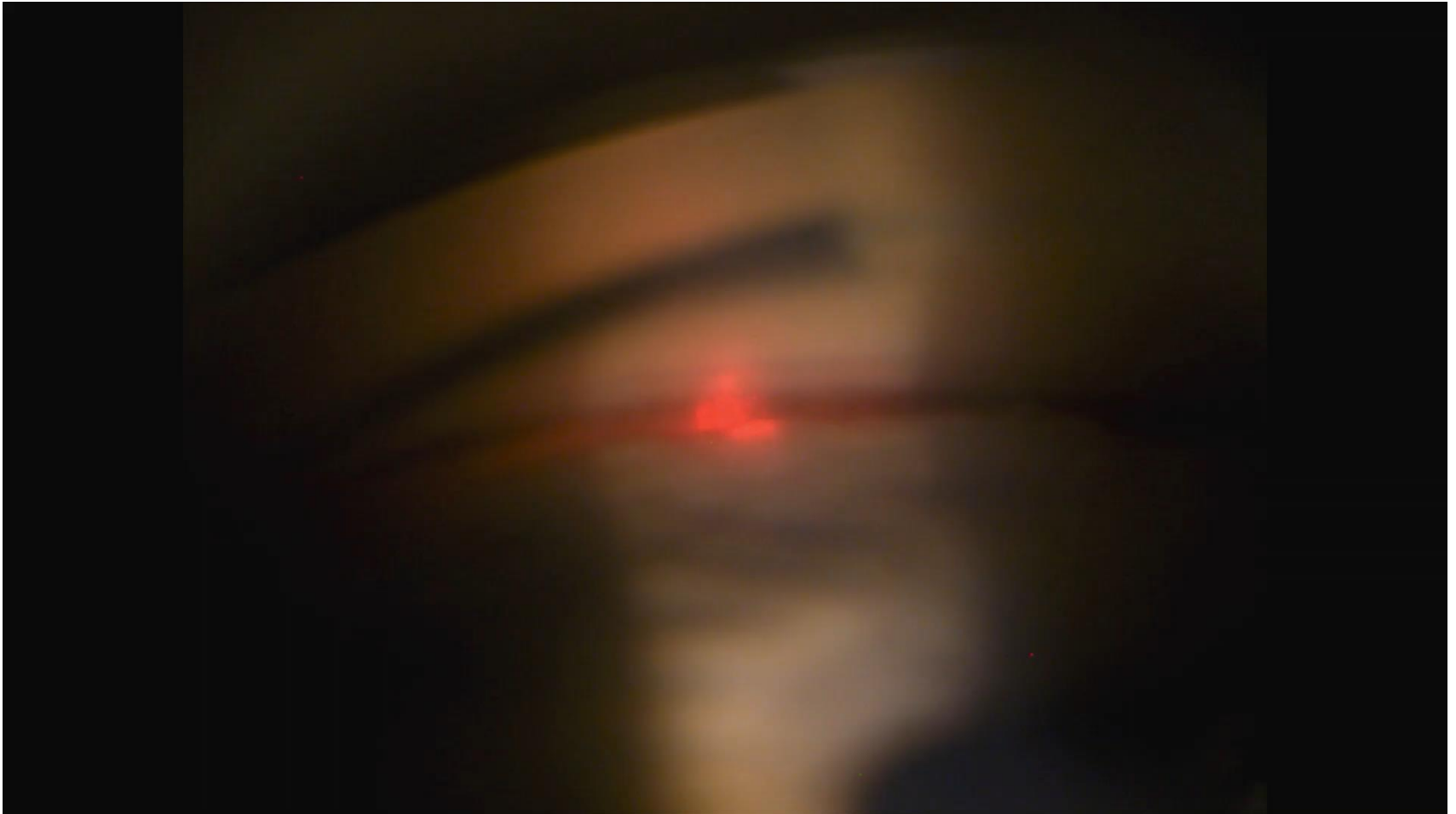


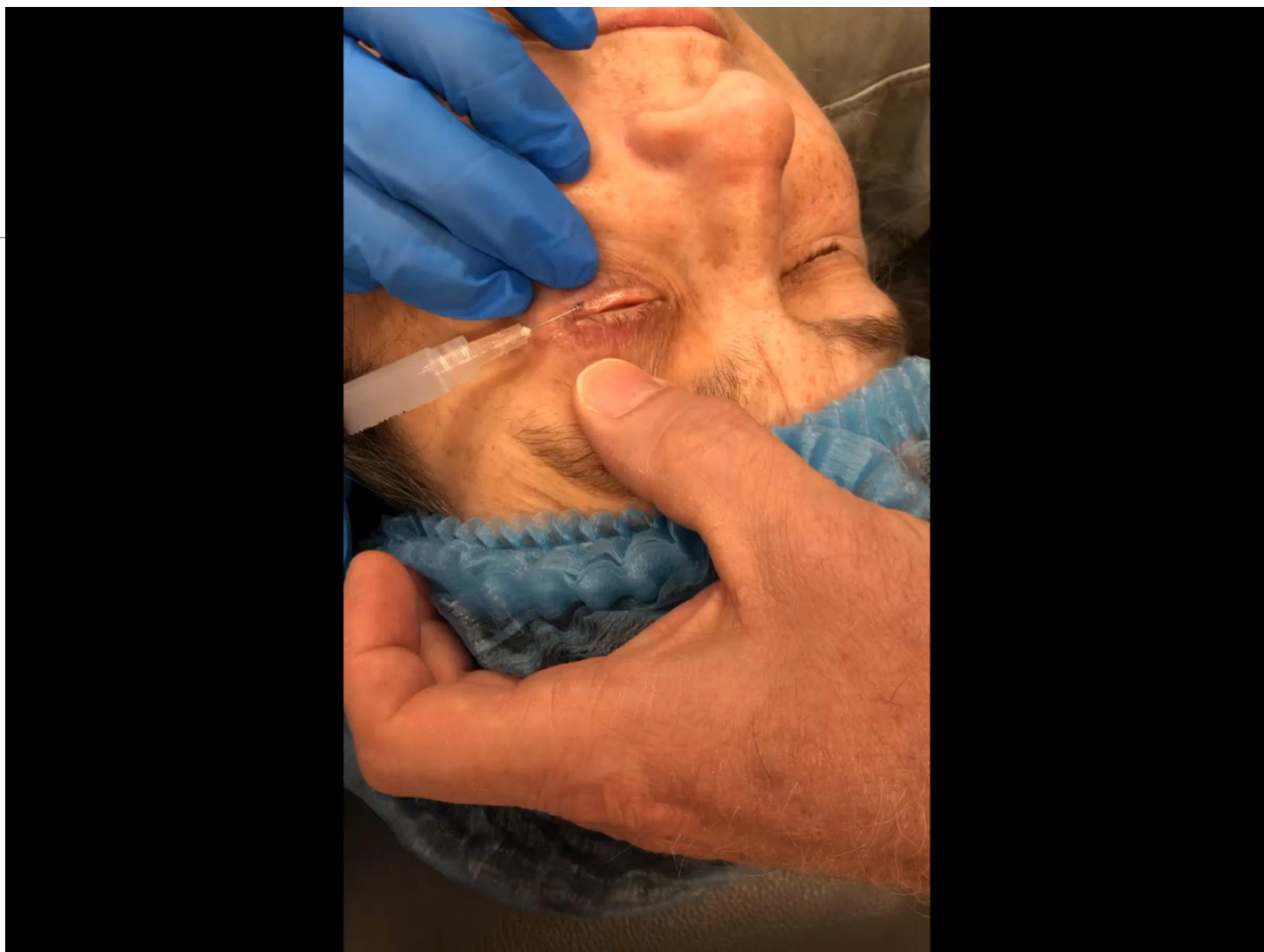


















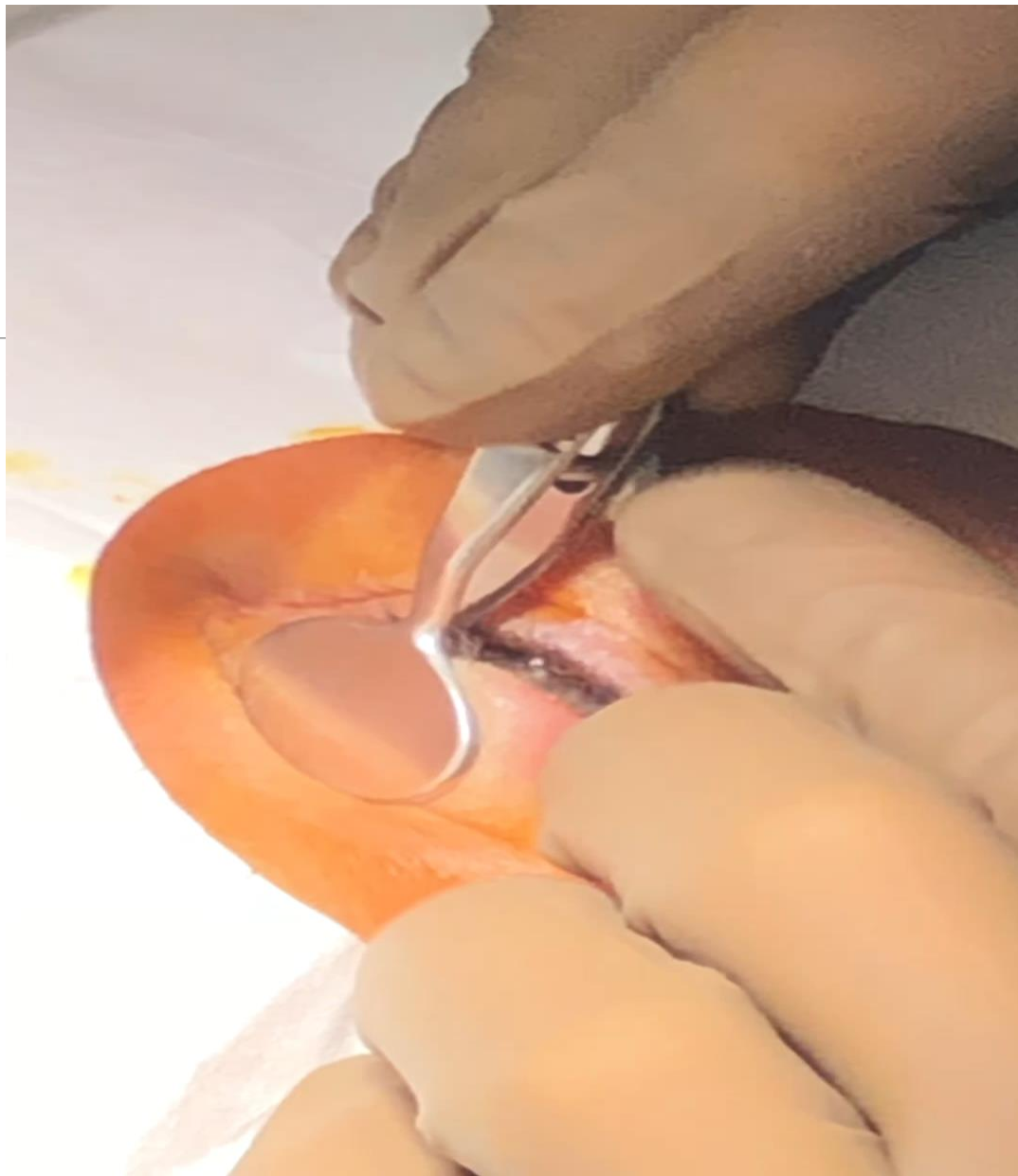








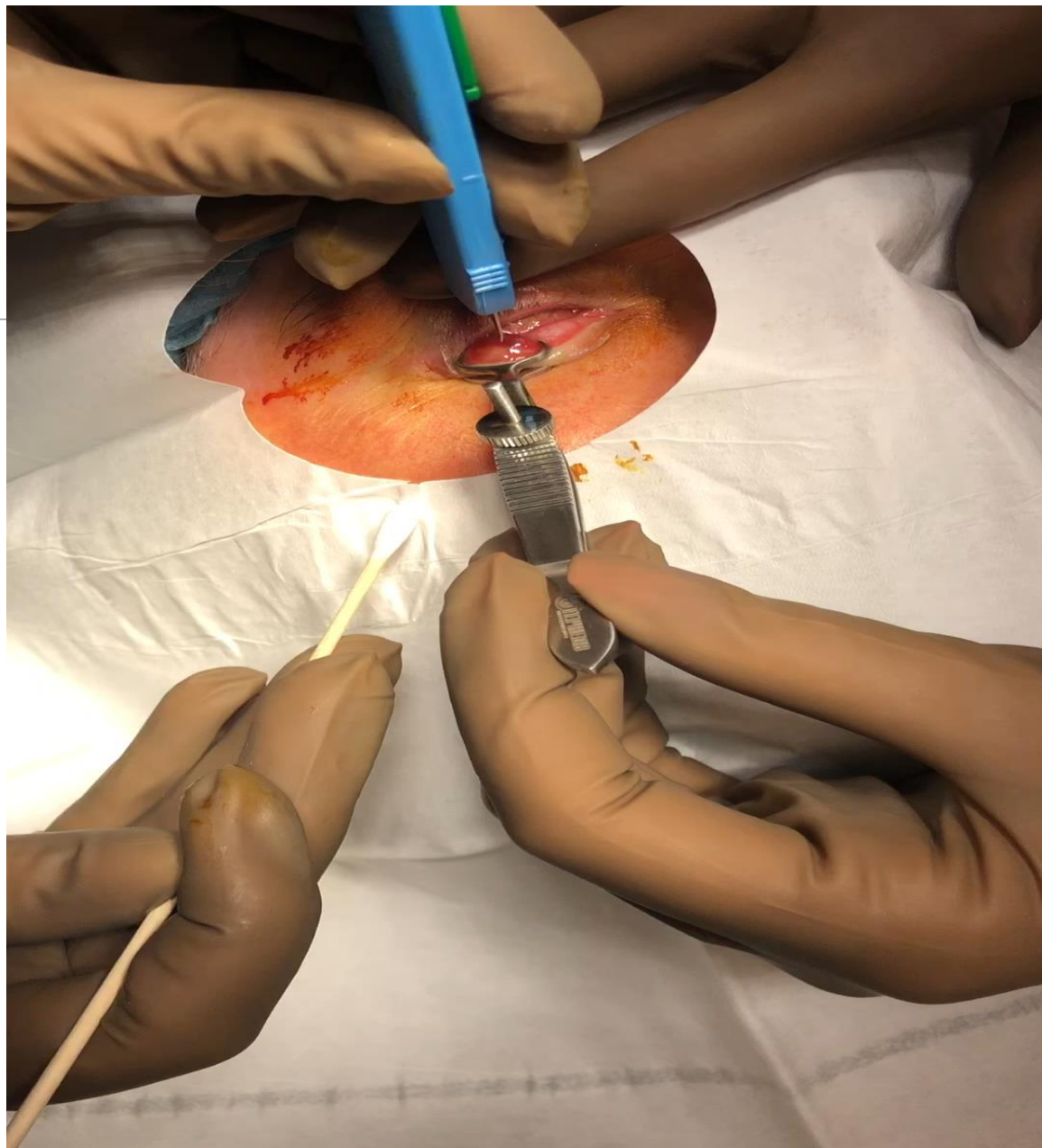






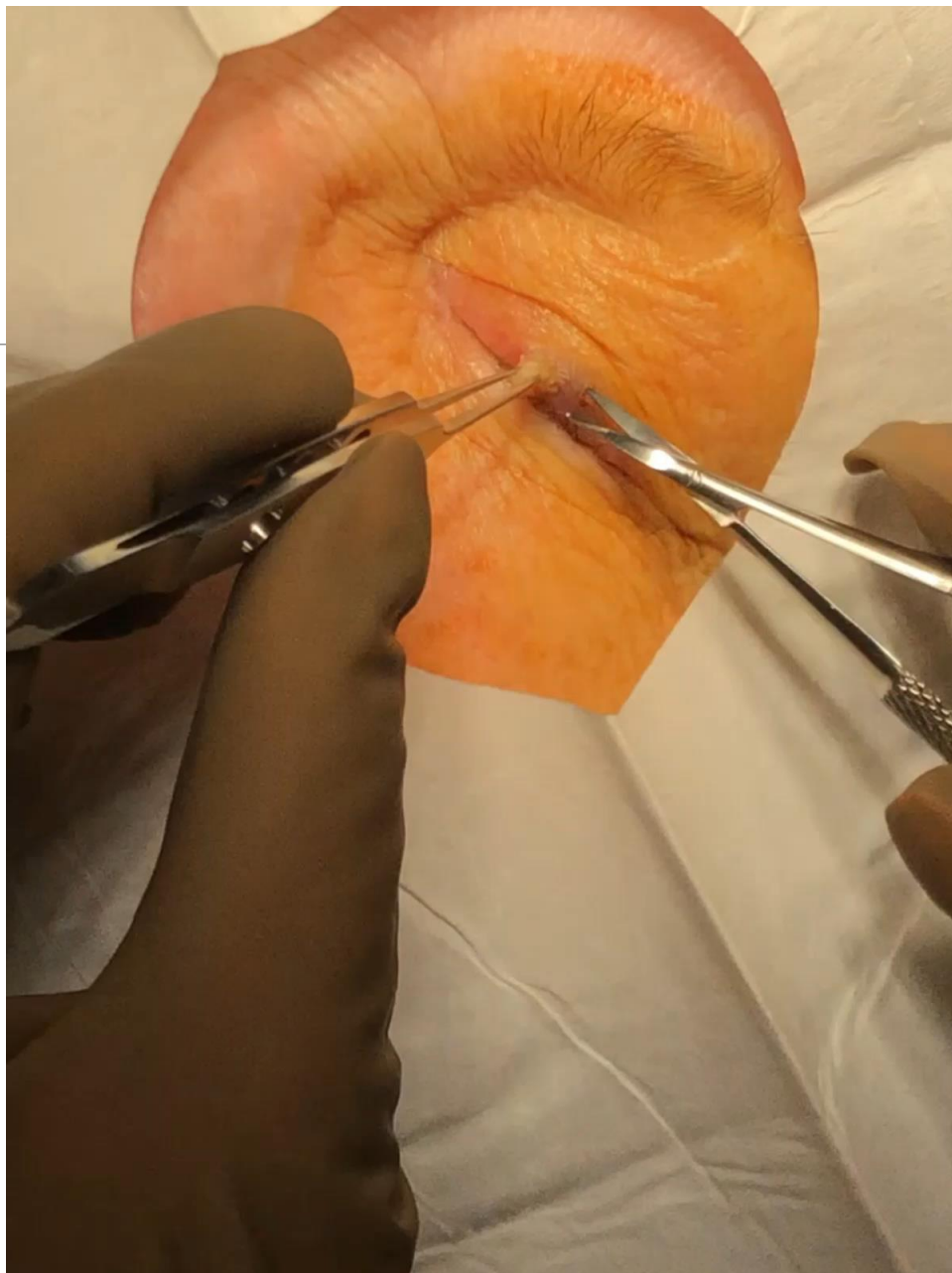




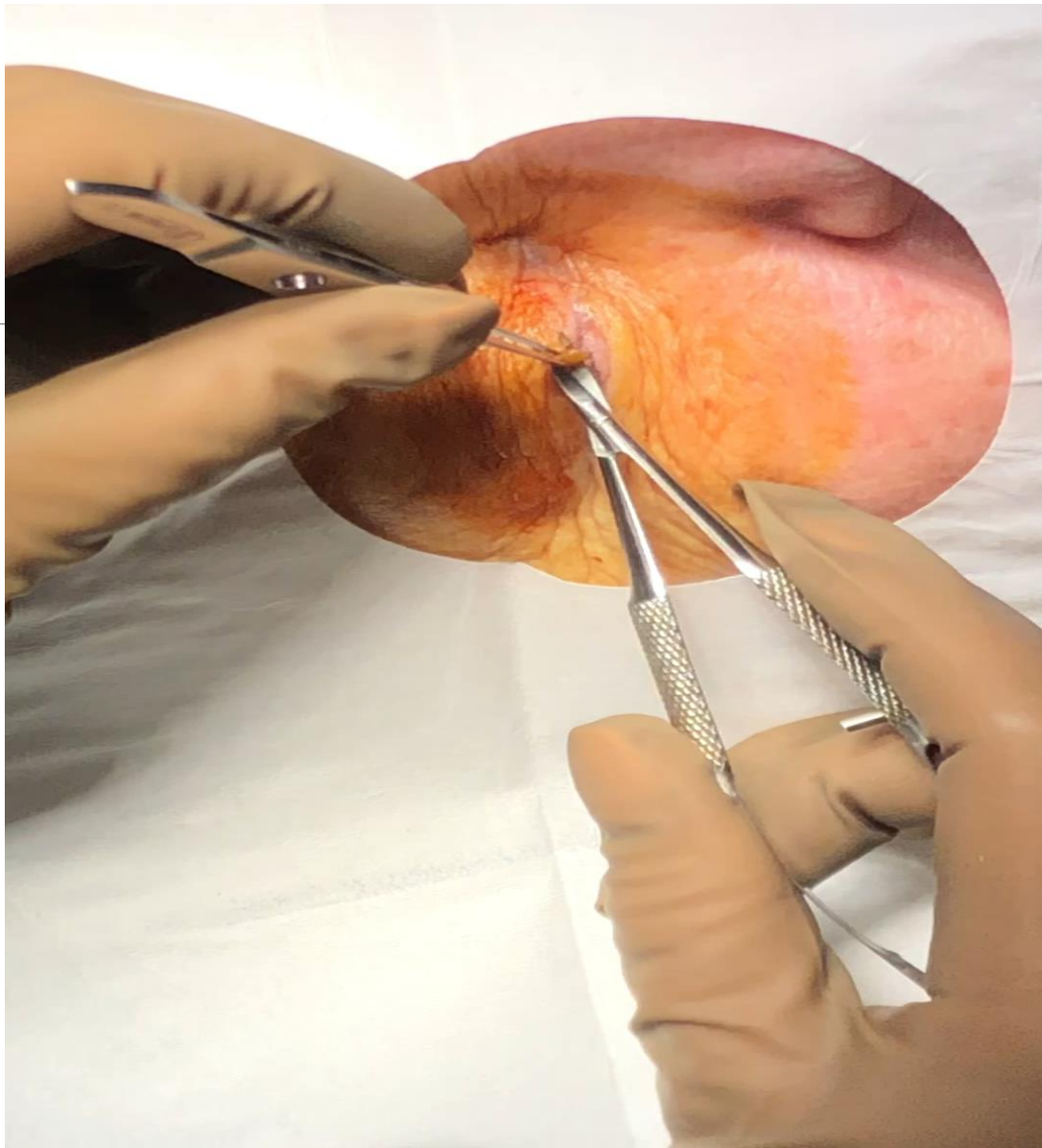


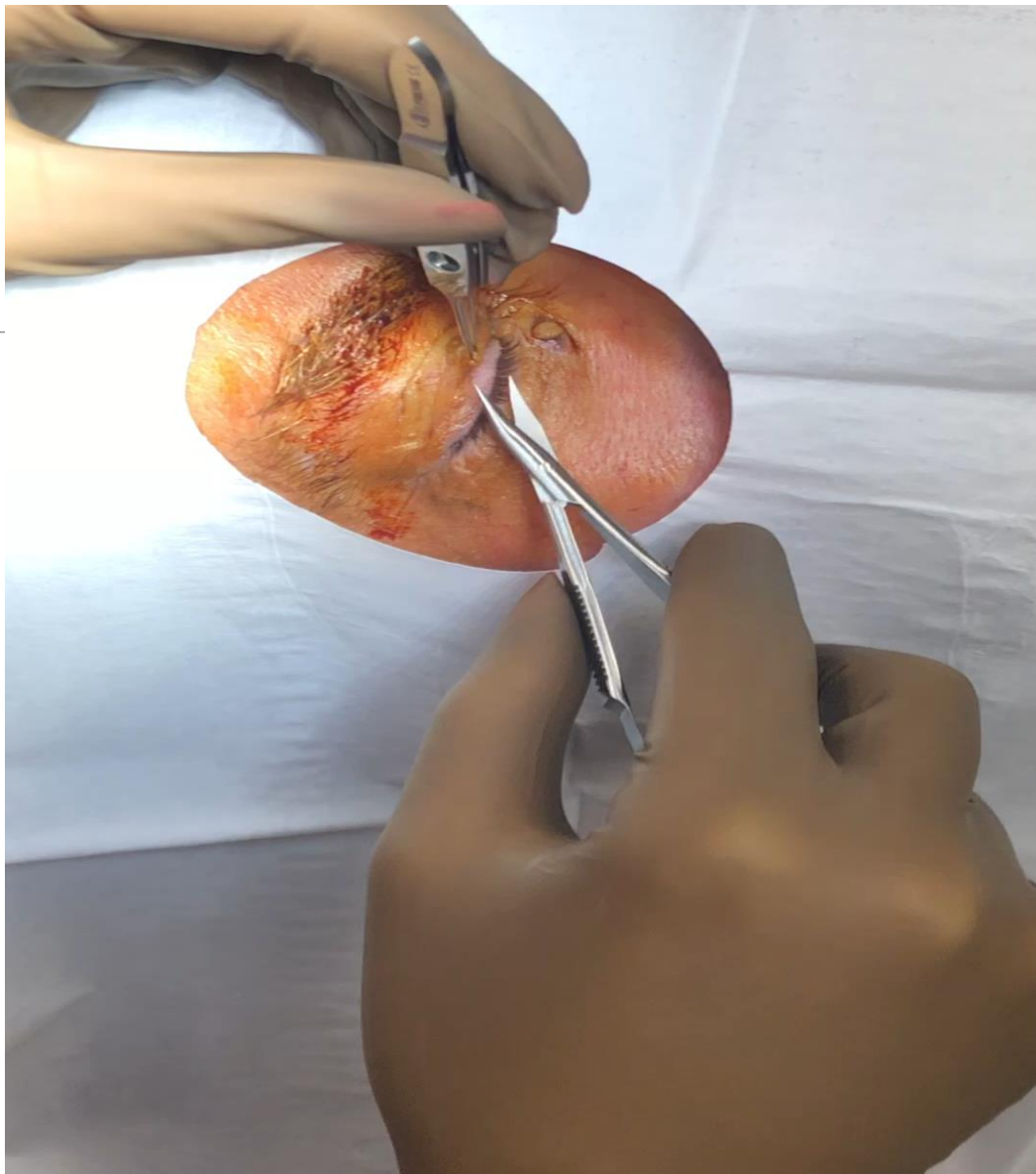














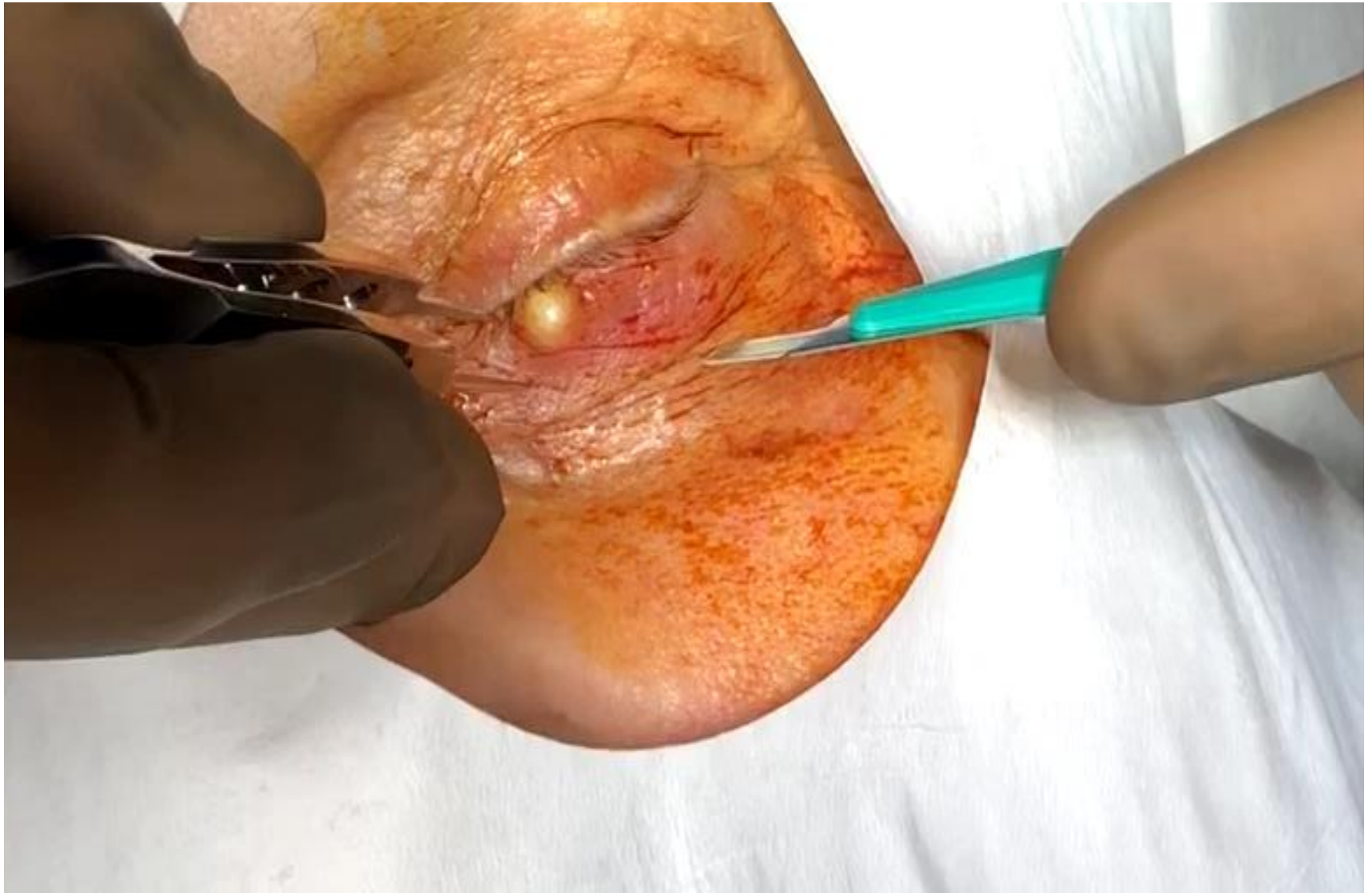


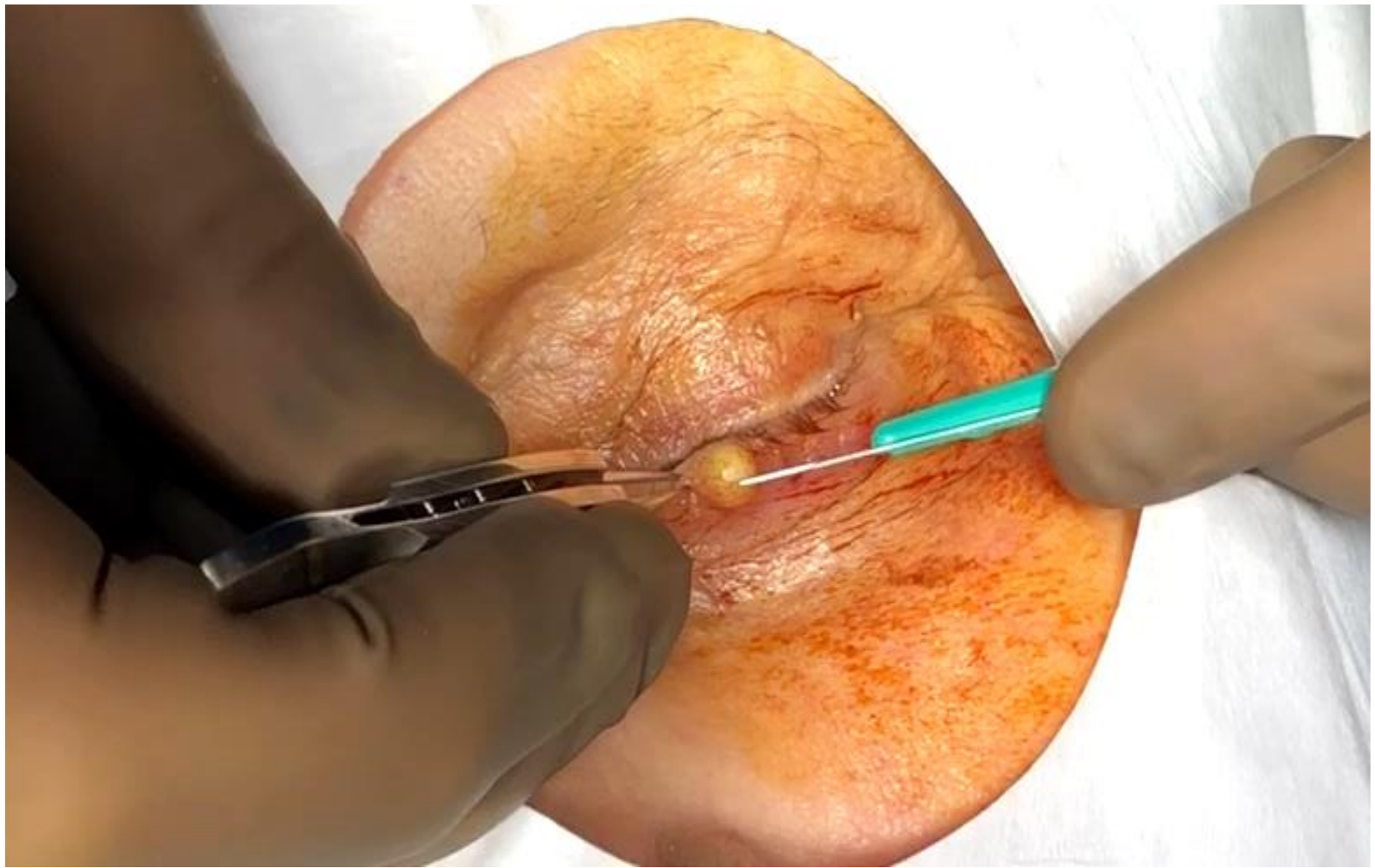




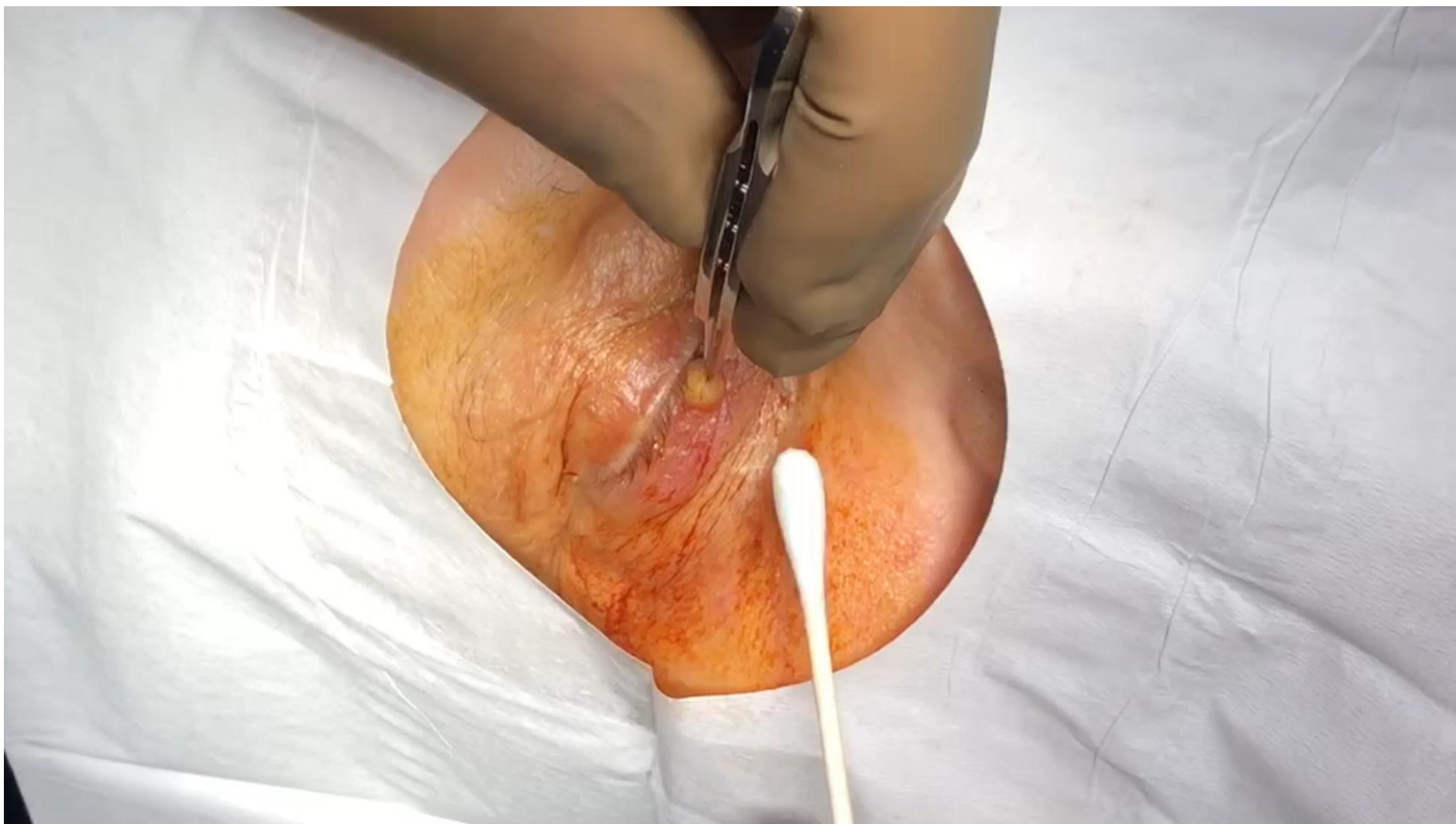
















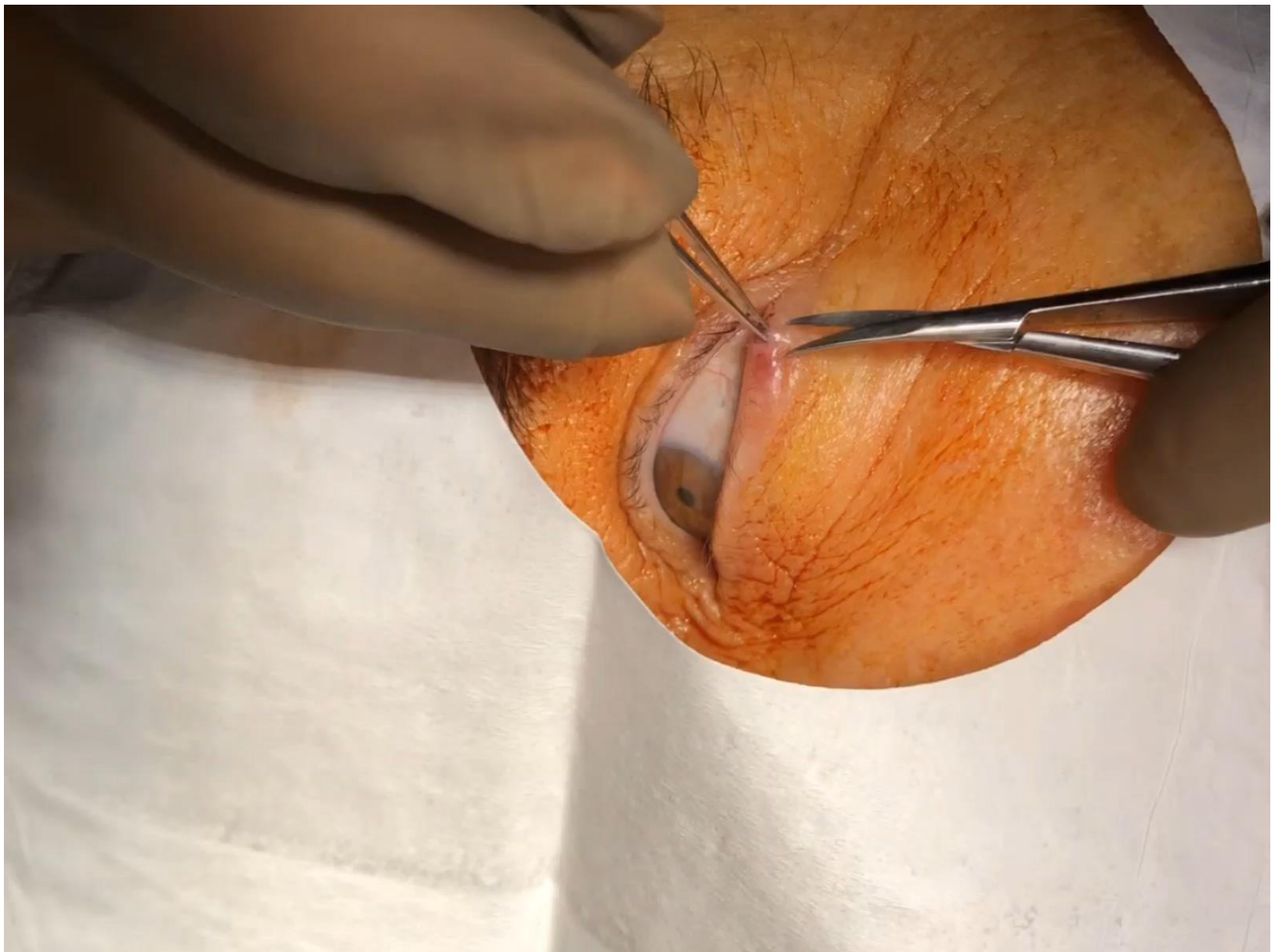






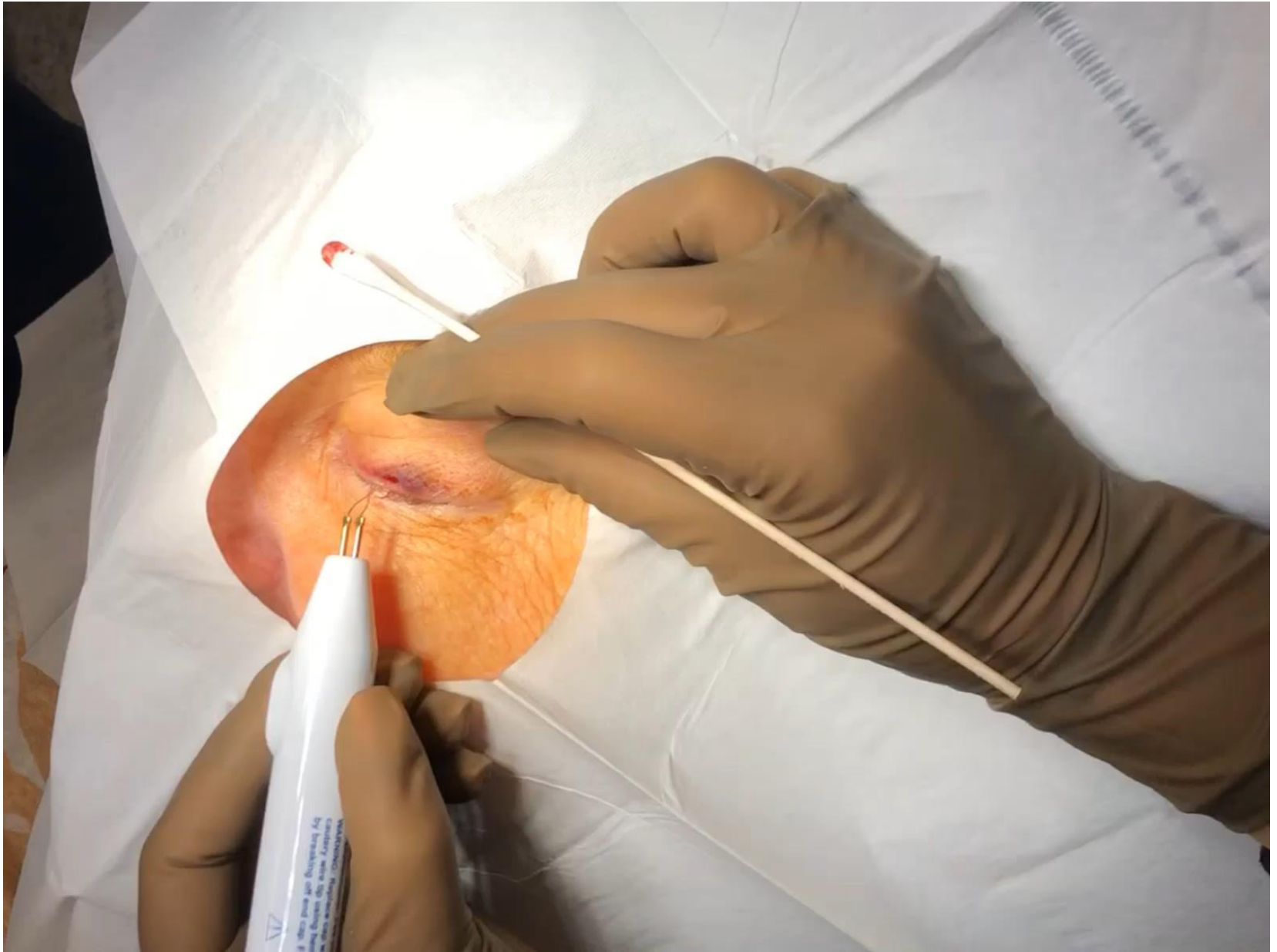




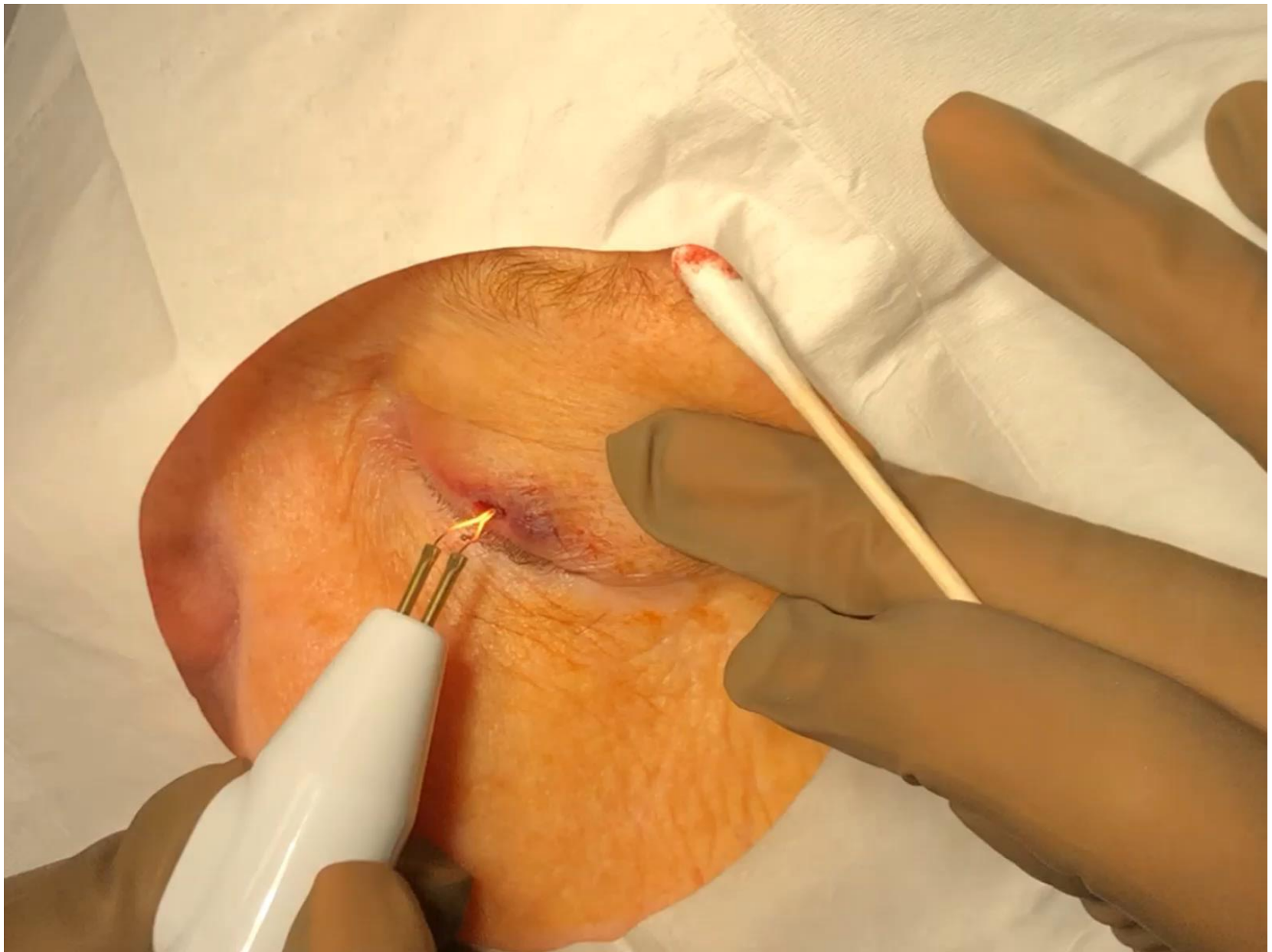




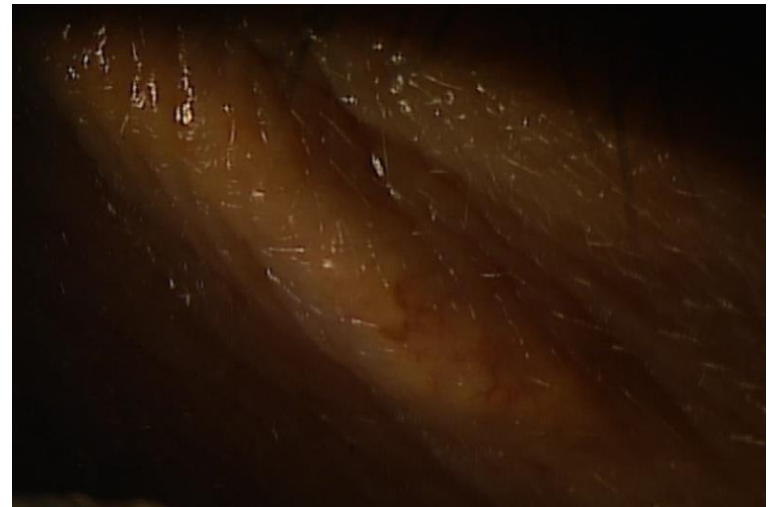
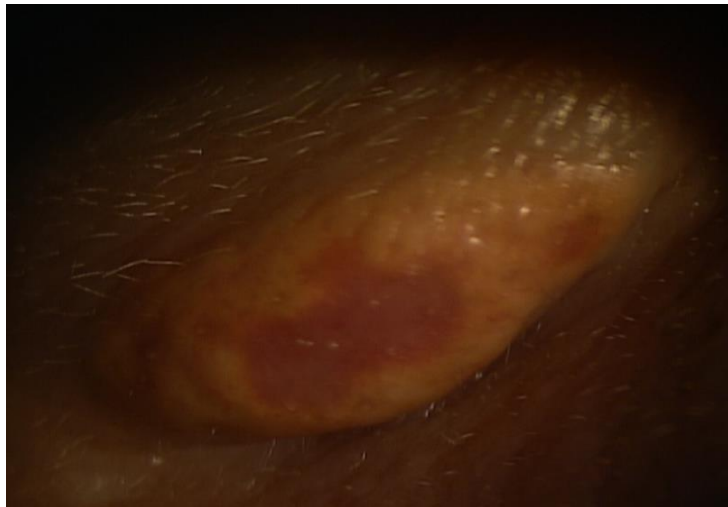
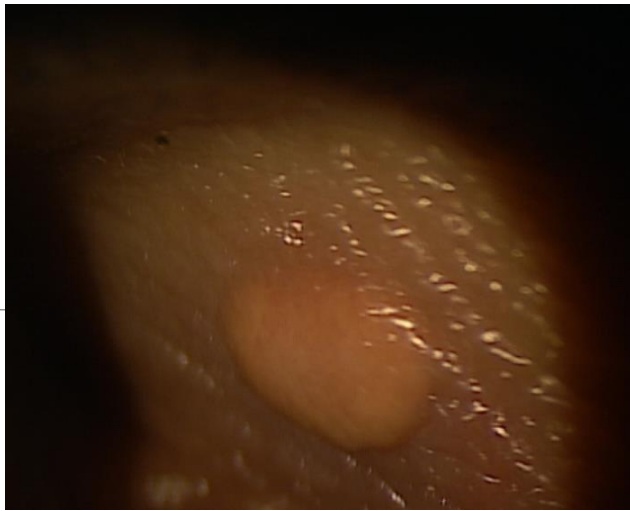




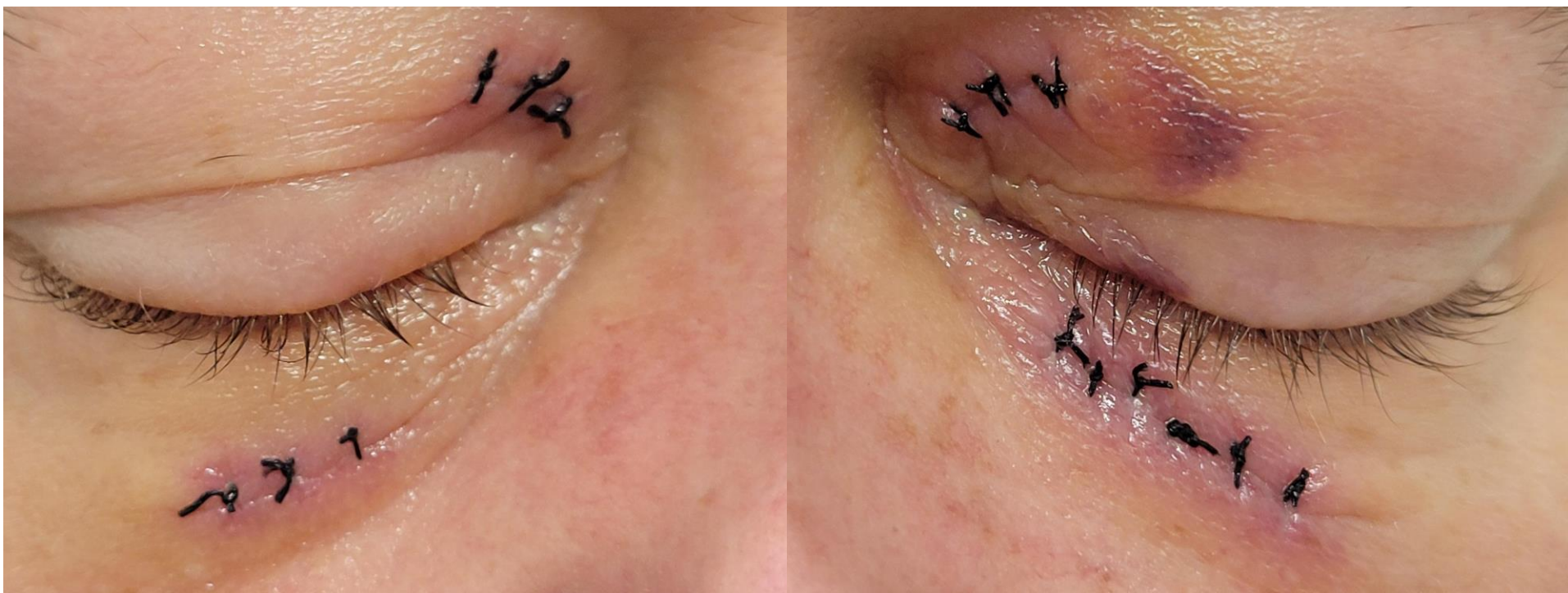






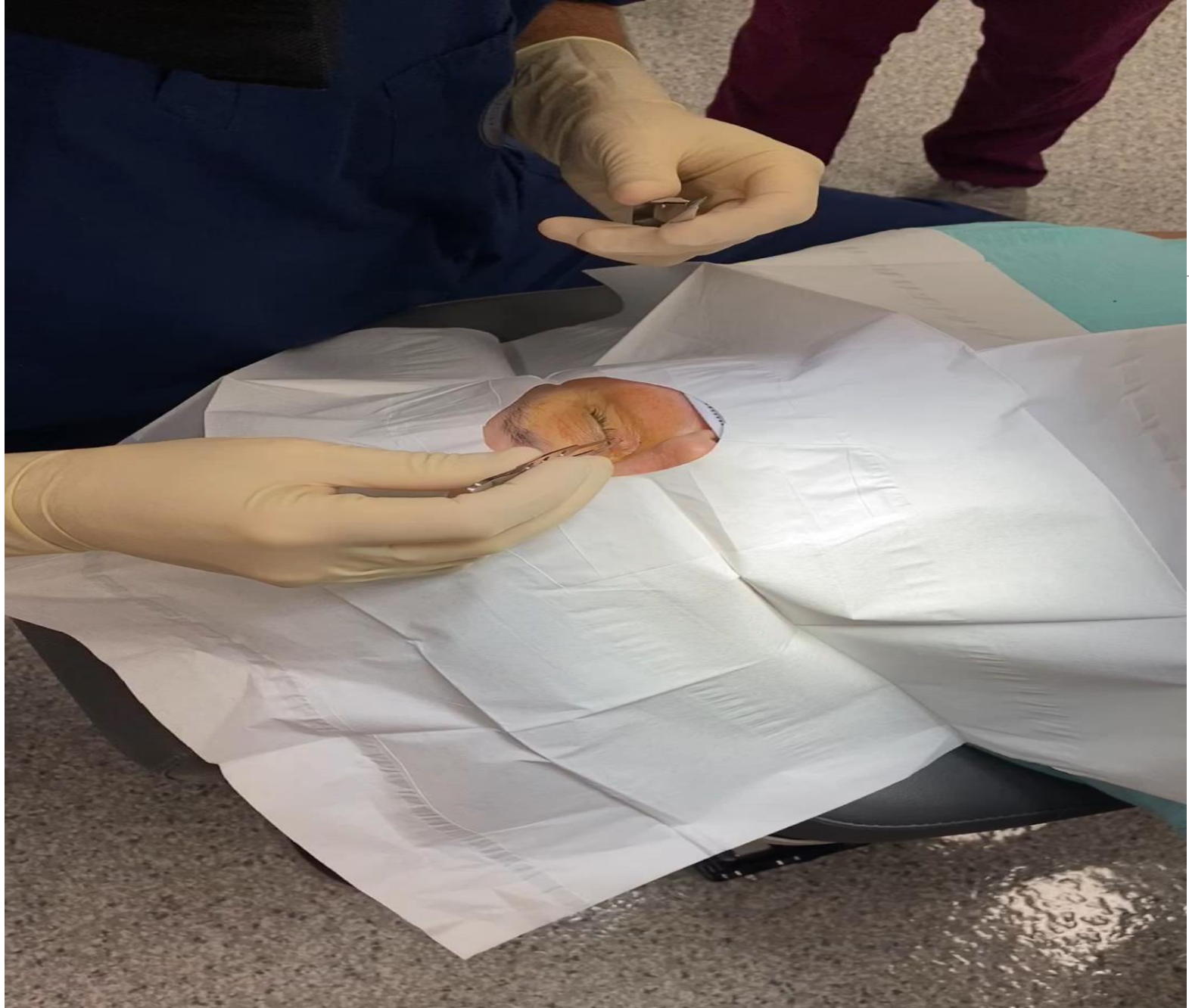


















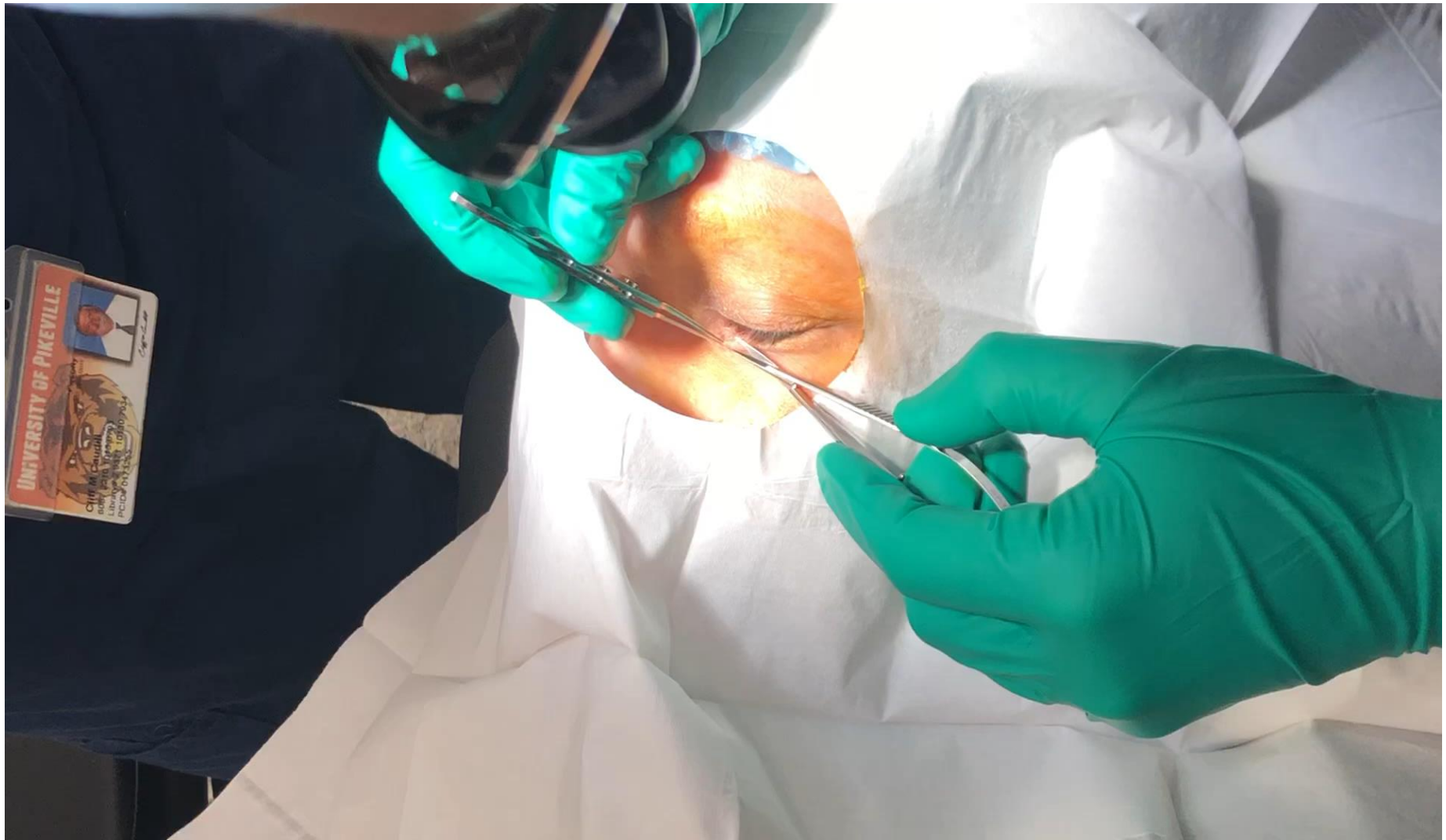


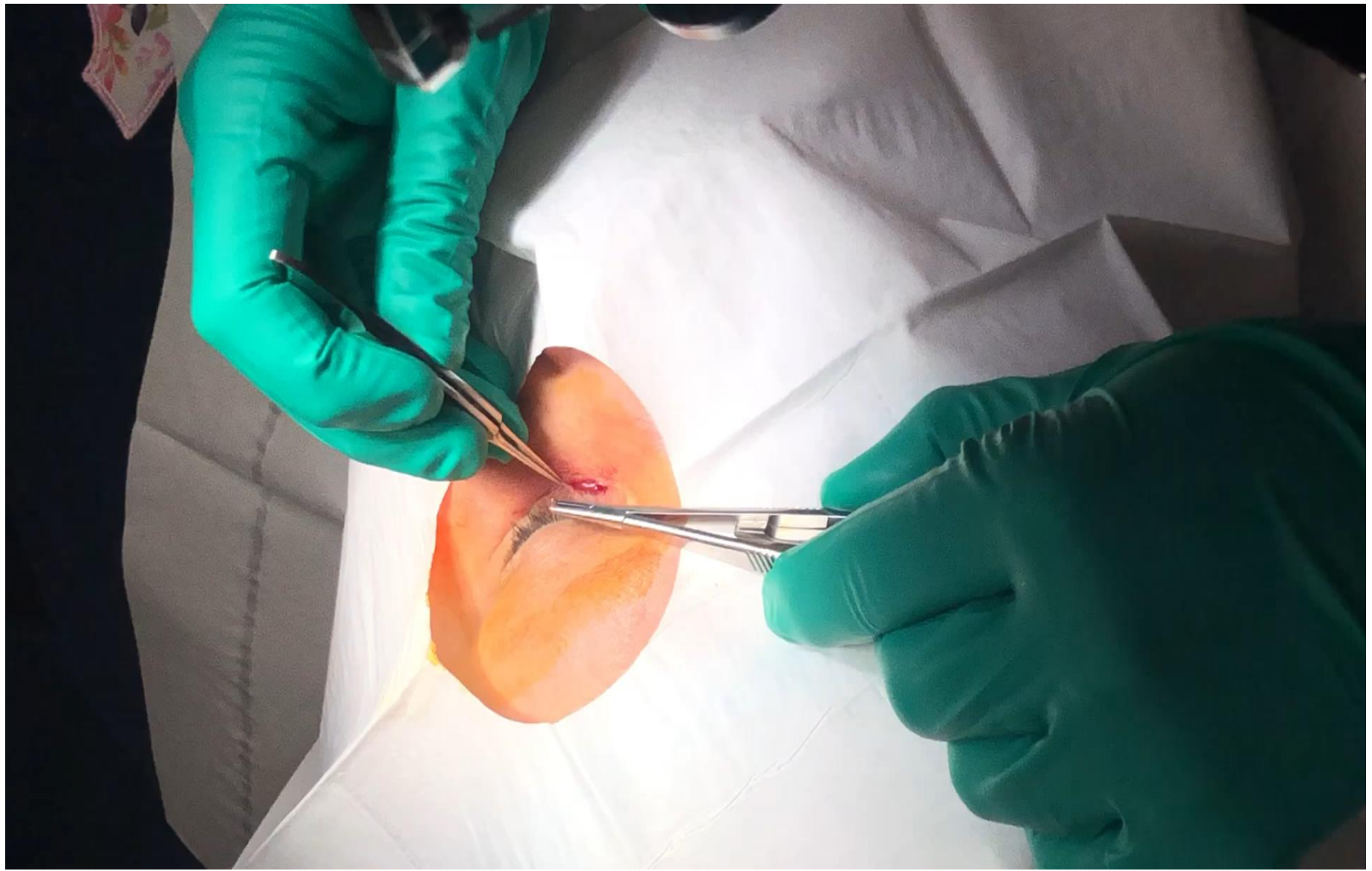


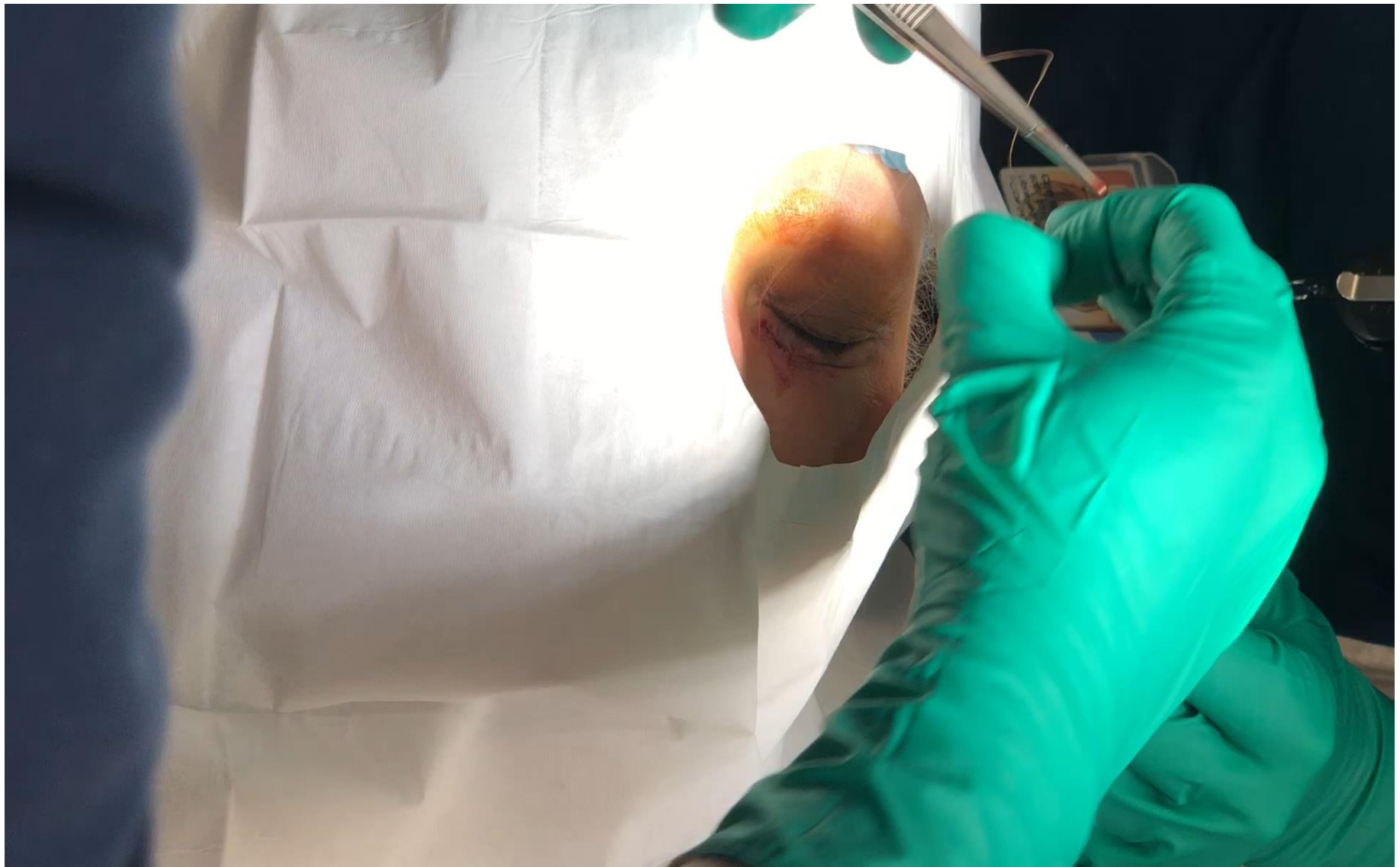




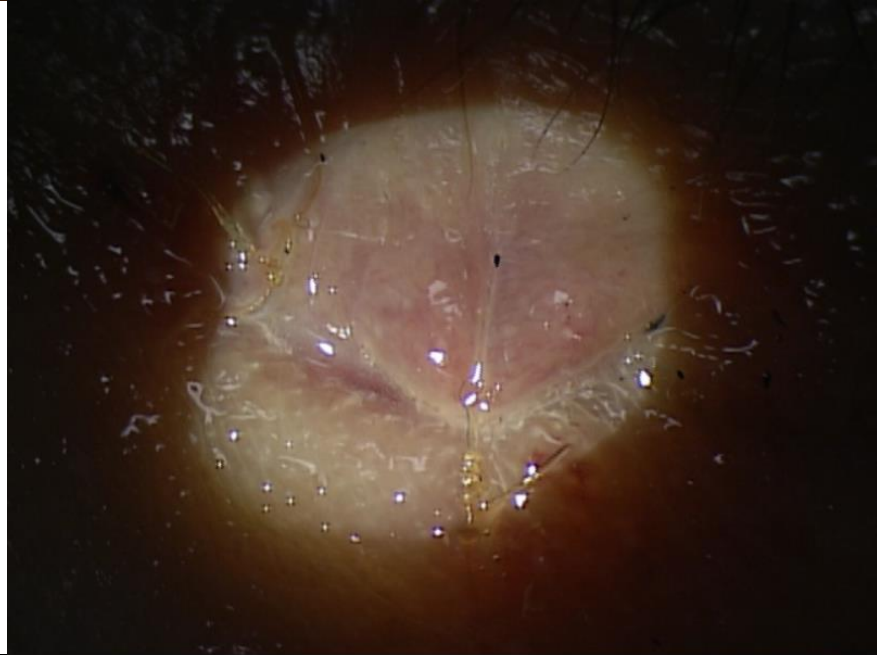
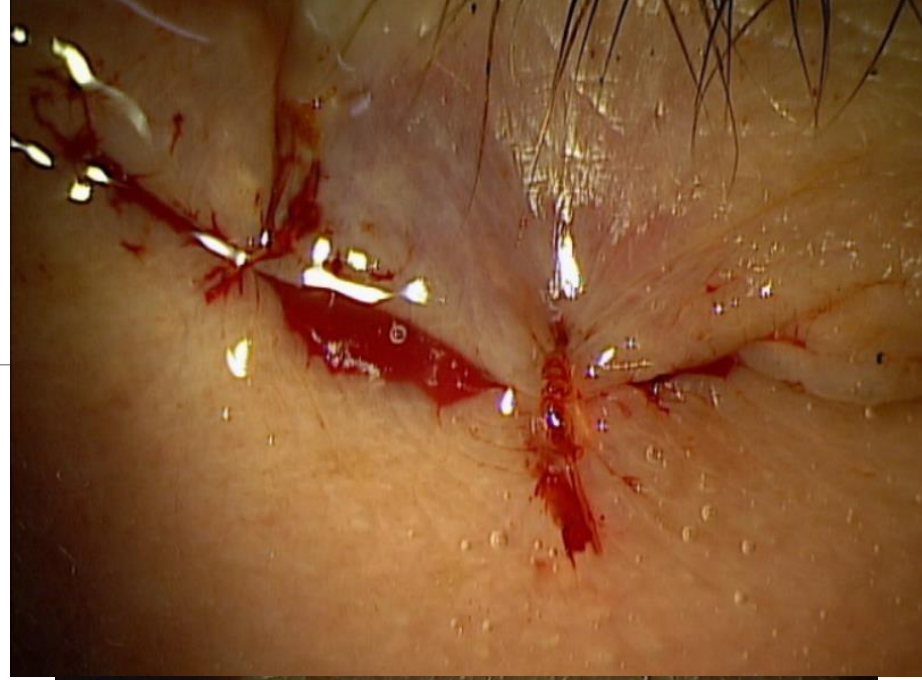












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**Thank you.**



# Works Cited

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- "5 Year Incidence of YAG Capsulotomy and PCO after Cataract Surgery with Single-Piece Monofocal Intraocular Lenses: a Real-World Evidence Study of 20,763 Eyes." *Nature News*, Nature Publishing Group, Oct. 2019, [www.nature.com/articles/s41433-019-0630-9/figures/1](http://www.nature.com/articles/s41433-019-0630-9/figures/1).
- Achiron, Asaf. "Intraocular Pressure Spikes Following Neodymium-Doped Yttrium Aluminum Garnet Laser Capsulotomy: Current Prevalence and Management in Israel." *Journal of Current Glaucoma Practice*, vol. 11, no. 2, 2017, pp. 63–66., doi:10.5005/jp-journals-10028-1225.
- Bhargava, Rahul, et al. "Neodymium-Yttrium Aluminium Garnet Laser Capsulotomy Energy Levels for Posterior Capsule Opacification." *Journal of Ophthalmic and Vision Research*, vol. 10, no. 1, 2015, p. 37., doi:10.4103/2008-322x.156101.
- Bergandi, Loredana. "Induction of Oxidative Stress in Human Aqueous and Vitreous Humors by Nd:YAG Laser Posterior Capsulotomy." *International Journal of Ophthalmology*, 2018, doi:10.18240/ijo.2018.07.12.
- Hawlina, Gregor, et al. "Optical Coherence Tomography for an in-Vivo Study of Posterior-Capsule-Opacification Types and Their Influence on the Total-Pulse Energy Required for Nd:YAG Capsulotomy: a Case Series." *BMC Ophthalmology*, vol. 14, no. 1, 2014, doi:10.1186/1471-2415-14-131.
- "How Lasers Work - A Complete Guide." *Scientized*, 2017, [www.youtube.com/watch?v=\\_JOchLyNO\\_w&t=758s](http://www.youtube.com/watch?v=_JOchLyNO_w&t=758s).
- Karahan, Eyyup, et al. "The Effect of ND:YAG Laser Posterior Capsulotomy Size on Refraction, Intraocular Pressure, and Macular Thickness." *Journal of Ophthalmology*, vol. 2014, 2014, pp. 1–5., doi:10.1155/2014/846385.
- Kim, Jin Soo. "Comparison of Two Nd:YAG Laser Posterior Capsulotomy: Cruciate Pattern vs Circular Pattern with Vitreous Strand Cutting." *International Journal of Ophthalmology*, 2018, doi:10.18240/ijo.2018.02.09.
- Lindstrom, Richard. "Why Using A New Generation of Nd:YAG Laser Matters With Premium IOLs." *Refractive Surgery Feature Story*, 2010, [crstoday.com/wp-content/themes/crst/assets/downloads/crst0610\\_rs\\_lindstrom.pdf](http://crstoday.com/wp-content/themes/crst/assets/downloads/crst0610_rs_lindstrom.pdf).
- Niranjana Awasthi, PhD. "Posterior Capsular Opacification." *Archives of Ophthalmology*, American Medical Association, 13 Apr. 2009, [jamanetwork.com/journals/jamaophthalmology/fullarticle/422987](http://jamanetwork.com/journals/jamaophthalmology/fullarticle/422987).
- Parajuli, Anil, et al. "Effect of Nd:YAG Laser Posterior Capsulotomy on Intraocular Pressure, Refraction, Anterior Chamber Depth, and Macular Thickness." *Clinical Ophthalmology*, Volume 13, 2019, pp. 945–952., doi:10.2147/ophth.s203677.
- Topete, Ana, et al. "Intraocular Lenses as Drug Delivery Devices." *International Journal of Pharmaceutics*, vol. 602, 2021, p. 120613., doi:10.1016/j.ijpharm.2021.120613.
- Shaik, Asif. "LASER." *Nd*, [www.physics-and-radio-electronics.com/physics/laser/ndyaglaser.html](http://www.physics-and-radio-electronics.com/physics/laser/ndyaglaser.html).

# Works Cited

---

- Dhawan, Bodhraj. *Endocapsular Hematoma: A Rare Form of Ocular Hemorrhage after Thrombolysis with Streptokinase*. [https://www.researchgate.net/publication/265610570\\_Endocapsular\\_Hematoma\\_A\\_Rare\\_Form\\_of\\_Ocular\\_Hemorrhage\\_after\\_Thrombolysis\\_with\\_Streptokinase](https://www.researchgate.net/publication/265610570_Endocapsular_Hematoma_A_Rare_Form_of_Ocular_Hemorrhage_after_Thrombolysis_with_Streptokinase).
  - Figueiredo, Ricardo, and Tiago Morais-Sarmiento. "Vitreous Wick Syndrome." *EyeWiki*, 24 Aug. 2021, [https://eyewiki.aao.org/Vitreous\\_Wick\\_Syndrome](https://eyewiki.aao.org/Vitreous_Wick_Syndrome).
  - Lang, Jacob. "Endocapsular Hematoma." *Modern Optometry*, Bryn Mawr Communications, <https://modernod.com/articles/2021-sept/endocapsular-hematoma?c4src=article%3Ainfinite-scroll>.
  - Muñoz, A. Ibáñez, et al. "Endocapsular Haematoma: An Unusual Complication of Phacoemulsification and Non-Penetrating Deep Sclerectomy." *Archivos De La Sociedad Española De Oftalmología (English Edition)*, Elsevier Doyma, 28 Aug. 2020, [https://www.sciencedirect.com/science/article/abs/pii/S2173579420301699?dgcid=rss\\_sd\\_all](https://www.sciencedirect.com/science/article/abs/pii/S2173579420301699?dgcid=rss_sd_all).
  - Vislisel, Jesse. "Anterior Capsule Phimosis." *Atlas Entry - Anterior Capsular Phimosis*, <http://webeye.ophth.uiowa.edu/eyeforum/atlas/pages/capsular-phimosis/index.htm>.
- Elmohamady, Mohamed Nagy, et al. "Circular YAG Laser Anterior Capsulotomy for Anterior Capsule Contraction Syndrome." *International Ophthalmology*, no. 11, Springer Science and Business Media LLC, Mar. 2019, pp. 2497–503. *Crossref*, doi:10.1007/s10792-019-01094-9.
- Jinagal, Jitender, et al. "Quantification of Inflammation Following Nd:YAG Laser Capsulotomy and Assessing the Anti-Inflammatory Effects of Nepafenac 0.1% and Betamethasone 0.1%." *Ocular Immunology and Inflammation*, no. 2, Informa UK Limited, Oct. 2019, pp. 411–16. *Crossref*, doi:10.1080/09273948.2019.1668025
- Katsanos, Andreas, et al. "Safety and Efficacy of YAG Laser Vitreolysis for the Treatment of Vitreous Floaters: An Overview." *Advances in Therapy*, no. 4, Springer Science and Business Media LLC, Feb. 2020, pp. 1319–27. *Crossref*, doi:10.1007/s12325-020-01261-w
- Kokavec, Jan, et al. "Nd:YAG Laser Vitreolysis versus Pars Plana Vitrectomy for Vitreous Floaters." *Cochrane Database of Systematic Reviews*, no. 6, Wiley, June 2017. *Crossref*, doi:10.1002/14651858.cd011676.pub2.
- Ludwig, Gustavo D., et al. "Efficacy and Safety of Nd:YAG Laser Vitreolysis for Symptomatic Vitreous Floaters: A Randomized Controlled Trial." *European Journal of Ophthalmology*, no. 3, SAGE Publications, Nov. 2020, pp. 909–14. *Crossref*, doi:10.1177/1120672120968762
- Shah, Chirag P., and Jeffrey S. Heier. "YAG Laser Vitreolysis vs Sham YAG Vitreolysis for Symptomatic Vitreous Floaters." *JAMA Ophthalmology*, no. 9, American Medical Association (AMA), Sept. 2017, p. 918. *Crossref*, doi:10.1001/jamaophthalmol.2017.2388.
- Souza, Carlos E., et al. "Objective Assessment of YAG Laser Vitreolysis in Patients with Symptomatic Vitreous Floaters." *International Journal of Retina and Vitreous*, no. 1, Springer Science and Business Media LLC, Jan. 2020. *Crossref*, doi:10.1186/s40942-019-0205-8.

# works cited

---

- Allingham, R. Rand. *Shields Textbook of Glaucoma*. Wolters Kluwer, 2021.
- Azuara-Blanco, Augusto. "The Effectiveness of Early Lens Extraction with Intraocular Lens Implantation for the Treatment of Primary Angle Closure Glaucoma: a Randomised Controlled Trial (EAGLE)." *Http://Isrctn.org/*>, 2013, doi:10.1186/isrctn44464607.
- Bansal, Surbhi, et al. "Subsequent Receipt of Interventions for Glaucoma Among a Nationwide Sample of Patients Who Underwent Laser Peripheral Iridotomy." *American Journal of Ophthalmology*, vol. 160, no. 2, 2015, doi:10.1016/j.ajo.2015.04.031.
- Coh, Paul, et al. "Lens Position Parameters as Predictors of Intraocular Pressure Reduction After Cataract Surgery in Glaucomatous Versus Nonglaucomatous Eyes." *Investigative Ophthalmology & Visual Science*, vol. 57, no. 6, 2016, p. 2593., doi:10.1167/iov.16-19384.
- Desai, Manishi. "Plateau Iris." *EyeWiki*, 4 Apr. 2020, eyewiki.aao.org/Plateau\_Iris.
- Ertel, Monica. "Aqueous Misdirection." *EyeWiki*, 18 May 2020, eyewiki.aao.org/Aqueous\_misdirection.
- H. George Tanaka, MD. "The Asymptomatic PAC Suspect: LPI or No LPI?" *Review of Ophthalmology*, 25 Sept. 2018, www.reviewofophthalmology.com/article/the-asymptomatic-pac-suspect-lpi-or-no-lpi.
- Javanbakht, Mehdi, et al. "Early Lens Extraction with Intraocular Lens Implantation for the Treatment of Primary Angle Closure Glaucoma: an Economic Evaluation Based on Data from the EAGLE Trial." *BMJ Open*, vol. 7, no. 1, 2017, doi:10.1136/bmjopen-2016-013254.
- Jiang, Yuzhen, et al. "Longitudinal Changes of Angle Configuration in Primary Angle-Closure Suspects: the Zhongshan Angle-Closure Prevention Trial." *Ophthalmology*, U.S. National Library of Medicine, Sept. 2014, www.ncbi.nlm.nih.gov/pmc/articles/PMC4624262/.
- Kahook, George. "Iridoplasty." *Glaucoma Today*, Bryn Mawr Communications, 2006, glaucomatoday.com/articles/2006-july-aug/0706\_10.html.
- Kam, Jason, et al. "Resident-Performed Laser Peripheral Iridotomy in Primary Angle Closure, Primary Angle Closure Suspects, and Primary Angle Closure Glaucoma." *Clinical Ophthalmology*, Volume 11, 2017, pp. 1871–1876., doi:10.2147/opth.s148467

# works cited

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- Lavanya R;Baskaran M;Kumar RS;Wong HT;Chew PT;Foster PJ;Friedman DS;Aung T; "Risk of Acute Angle Closure and Changes in Intraocular Pressure after Pupillary Dilation in Asian Subjects with Narrow Angles." *Ophthalmology*, U.S. National Library of Medicine, 2012, [pubmed.ncbi.nlm.nih.gov/22118999/](https://pubmed.ncbi.nlm.nih.gov/22118999/).
- Lighthizer, Nathan. "Laser Therapy in Narrow Angles, Angle Closure". NSUCO Advanced Procedures Course. Philadelphia 2019.
- Melese, Ephrem, et al. "Comparing Laser Peripheral Iridotomy to Cataract Extraction in Narrow Angle Eyes Using Anterior Segment Optical Coherence Tomography." *PLOS ONE*, vol. 11, no. 9, 2016, doi:10.1371/journal.pone.0162283.
- Silva, Andre. "Laser Peripheral Iridotomy." *EyeWiki*, 4 Apr. 2020, [eyewiki.aao.org/Laser\\_Peripheral\\_Iridotomy](https://eyewiki.aao.org/Laser_Peripheral_Iridotomy).
- Srinivasan K;Zebardast N;Krishnamurthy P;Abdul Kader M;Raman GV;Rajendrababu S;Venkatesh R;Ramulu PY; "Comparison of New Visual Disturbances after Superior versus Nasal/Temporal Laser Peripheral Iridotomy: A Prospective Randomized Trial." *Ophthalmology*, U.S. National Library of Medicine, 2017, [pubmed.ncbi.nlm.nih.gov/29096997/](https://pubmed.ncbi.nlm.nih.gov/29096997/).
- Tsui, Jolly L., et al. "The Role of Lens Extraction in Glaucoma Management." *Annals of Translational Medicine*, vol. 8, no. 22, 2020, pp. 1550–1550., doi:10.21037/atm-20-3251a.
- Vera V;Naqi A;Belovay GW;Varma DK;Ahmed II; "Dysphotopsia after Temporal versus Superior Laser Peripheral Iridotomy: a Prospective Randomized Paired Eye Trial." *American Journal of Ophthalmology*, U.S. National Library of Medicine, 2014, [pubmed.ncbi.nlm.nih.gov/24531024/](https://pubmed.ncbi.nlm.nih.gov/24531024/).
- Yusuf, Imran H, et al. "Silicone Oil Pupil Block Glaucoma in a Pseudophakic Eye." *BMJ Case Reports*, BMJ Publishing Group, 23 Sept. 2014, [www.ncbi.nlm.nih.gov/pmc/articles/PMC4173143/](https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4173143/).

# works cited

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- Abo-Shasha, Rami. "Management of Pupillary Seclusion and Occlusion of an Iris Enclaved Intraocular Lens." *Define\_me*, [https://www.canadianjournalofophthalmology.ca/article/S0008-4182\(20\)30631-1/fulltext](https://www.canadianjournalofophthalmology.ca/article/S0008-4182(20)30631-1/fulltext).
- "Academy." *Heidelberg Engineering Academy*, [https://academy.heidelbergengineering.com/course/view.php?id=516&he\\_locale=en\\_US&he\\_country=US&he\\_site=us](https://academy.heidelbergengineering.com/course/view.php?id=516&he_locale=en_US&he_country=US&he_site=us).
- "Angle Closure Can Be Missed Using the Van Herick Method." *Dr Vincent Lee*, <https://www.drvincentlee.com.au/news/angle-closure-can-be-missed-by-van-herick-technique>.
- *Anterior Segment Oct: Precision Angle Imaging*. [https://assets.bmctoday.net/glaucomatoday/pdfs/0319GT\\_F1\\_Chopra.pdf](https://assets.bmctoday.net/glaucomatoday/pdfs/0319GT_F1_Chopra.pdf).
- Brinton, Jason. "FDA Approves Evo Visian Lens." *Healio*, <https://www.healio.com/news/ophthalmology/20220328/fda-approves-evo-visian-lens>.
- Debrouwere, Veroniek, et al. "Outcomes of Different Management Options for Malignant Glaucoma: A Retrospective Study - Graefe's Archive for Clinical and Experimental Ophthalmology." *SpringerLink*, Springer-Verlag, 20 Aug. 2011, <https://link.springer.com/article/10.1007/s00417-011-1763-0/figures/4>.
- "Eyereum Menu." *EYEREUM*, <https://eyereum.com/en/center/icl>.
- "Gonioscope GS-1: Retina & Glaucoma: Nidek Co.,Ltd.." *Eye & Health Care NIDEK CO., LTD.*, [https://www.nidek-intl.com/product/ophthalptom/diagnostic/dia\\_retina/gs-1.html](https://www.nidek-intl.com/product/ophthalptom/diagnostic/dia_retina/gs-1.html).
- MD, Wallace L M Alward, and Reid A Longmuir MD. "Abnormalities Associated with a Closed Angle." *American Academy of Ophthalmology*, 24 June 2021, <https://www.aao.org/disease-review/abnormalities-associated-with-closed-angle>.
- MD, Wallace L M Alward, and Reid A Longmuir MD. "The Normal Angle." *American Academy of Ophthalmology*, 24 June 2021, <https://www.aao.org/disease-review/the-normal-angle>.
- Sunjta Radhakrishnan, MD. "Diagnosing Angle Closure: Gonioscopy vs. Oct." *Review of Ophthalmology*, 5 Apr. 2019, <https://www.reviewofophthalmology.com/article/diagnosing-angle-closure-gonioscopy-vs-oct>.
- Themes, UFO. "17." *Ento Key*, 2 Sept. 2016, <https://entokey.com/17-2/>.
- Ursea, Roxana. *Ultrasound Biomicroscopy Images of Malignant Glaucoma (a ...* [https://www.researchgate.net/figure/Ultrasound-biomicroscopy-images-of-malignant-glaucoma-A-Anterior-segment-in-horizontal\\_fig4\\_42372682](https://www.researchgate.net/figure/Ultrasound-biomicroscopy-images-of-malignant-glaucoma-A-Anterior-segment-in-horizontal_fig4_42372682).
- Usmani, Nazmi. "Glaucoma Specialist Blog: 'The Glog.'" *GLAUCOMA SPECIALIST BLOG: "THE GLOG"*, 16 June 2019, <http://ourgsc.blogspot.com/2019/06/malignant-glaucoma-guest-author-nazmi.html>.
- Yusuf, Imran H, et al. "Silicone Oil Pupil Block Glaucoma in a Pseudophakic Eye." *BMJ Case Reports*, BMJ Publishing Group, 23 Sept. 2014, <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4173143/>.



# works cited

---

A, Park SSE;Barmettler. "Vision Loss Secondary to Facial and Periorbital Steroid Injection: A Systematic Review." *Ophthalmic Plastic and Reconstructive Surgery*, U.S. National Library of Medicine, 2021, <https://pubmed.ncbi.nlm.nih.gov/33481540/>.

Beier. "Chalazion." *PubMed*, StatPearls Publishing, 2022.

"Chalazion: Symptoms, Causes, Treatments." *Cleveland Clinic*, <https://my.clevelandclinic.org/health/diseases/17657-chalazion>.

Kayikcioglu, Ozcan Rasim, et al. "Miliary Microemboli of the Retinal Arterioles and Choriocapillaris after Subcutaneous Injection of Triamcinolone Acetonide." *Journal of Current Ophthalmology*, Elsevier, 3 July 2018, <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6407092/>.

Lenci. "Merkel Cell Carcinoma of Eyelid." *Merkel Cell Carcinoma of the Eyelid*, 2015, <https://webeye.ophth.uiowa.edu/eyeforum/cases/217-Merkel-Cell-Carcinoma-Eyelid.htm>.

Li, Gang, et al. "Embolitic Retinal and Choroidal Vascular Occlusion after Peribulbar Triamcinolone Injection: A Case Report." *Medicine*, Wolters Kluwer Health, Apr. 2018, <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5944486/>.

Li, Junping, et al. "Effects of Chalazion and Its Treatments on the Meibomian Glands: A Nonrandomized, Prospective Observation Clinical Study." *BMC Ophthalmology*, BioMed Central, 11 July 2020, <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7353760/>.

McLaughlin, Jonathan, et al. "Just Another Chalazion?" *Indian Journal of Ophthalmology*, Medknow Publications & Media Pvt Ltd, Feb. 2019, <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6376835/>.

Merritt, Helen, et al. "Merkel Cell Carcinoma of the Eyelid and Periocular Region." *Cancers*, MDPI, 9 May 2014, <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC4074820/>.

Onur. "A Chalazion: Causes, Surgery, and Treatment." *South Texas Eye Institute*, 20 Apr. 2022, <https://www.southtexaseyeyeinstitute.com/2016/04/14/chalazion-causes-surgery-treatment/>.

Raven. "Merkel Cell Carcinoma of the Eyelid." *American Academy of Ophthalmology Journal*, American Academy of Ophthalmology, 2014, [https://www.aaojournal.org/article/S0161-6420\(16\)30281-0/fulltext](https://www.aaojournal.org/article/S0161-6420(16)30281-0/fulltext).

Shields, Jerry A, et al. "Eyelid Chalazion or Not?" *Indian Journal of Ophthalmology*, Wolters Kluwer - Medknow, Oct. 2019, <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6786182/>.

Stokkermans. *Malignant Eyelid Lesions*, StatPearls, 2022, <https://www.ncbi.nlm.nih.gov/books/NBK582127/#!po=60.2941>.

Suzuki. "Reconsidering the Pathogenesis of Chalazion." *ClinicalKey*, Ocular Surface, 2022, <https://www.clinicalkey.com/#!/content/playContent/1-s2.0-S154201242100149X?returnurl=null&referrer=null>.

Wu, Albert Y, et al. "Conservative Therapy for Chalazia: Is It Really Effective?" *Acta Ophthalmologica*, U.S. National Library of Medicine, June 2018, <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6047938/>.

# works cited

---

- Ahsanuddin, Salma, et al. "Adverse Events Associated With Botox as Reported in a Food and Drug Administration Database." *Aesthetic Plastic Surgery*, vol. 45, no. 3, 2020, pp. 1201–1209., doi:10.1007/s00266-020-02027-z.
- American Academy of Plastic Surgeons, 2020, pp. 2–2, *Plastic Surgery Statistics Report 2020*.
- Rayess, Y.A., et al. "Botulinum Toxin for Benign Essential Blepharospasm: A Systematic Review and an Algorithmic Approach." *Revue Neurologique*, vol. 177, no. 1-2, 2021, pp. 107–114., doi:10.1016/j.neurol.2020.03.022.
- Singh, Bal Ram, and Roshan Kukreja. "The Botulinum Toxin as a Therapeutic Agent: Molecular and Pharmacological Insights." *Research and Reports in Biochemistry*, 2015, p. 173., doi:10.2147/rrbc.s60432.
- Spiegel, Lauren L., et al. "FDA Approvals and Consensus Guidelines for Botulinum Toxins in the Treatment of Dystonia." *Toxins*, vol. 12, no. 5, 2020, p. 332., doi:10.3390/toxins12050332.
- *Highlights of Prescribing Information - Rxabbvie*. Abbvie, [https://www.rxabbvie.com/pdf/botox\\_pi.pdf](https://www.rxabbvie.com/pdf/botox_pi.pdf).
- <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6785961/>
- <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5921443/>
- <https://webeye.ophth.uiowa.edu/eyeforum/video/plastics/9/excision-upper-and-lower-xanthelasma.htm>
- <https://www.ncbi.nlm.nih.gov/books/NBK531501/>
- <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5739544/>
- <https://www.ncbi.nlm.nih.gov/books/NBK582155/?report=reader>
- <https://www.ncbi.nlm.nih.gov/books/NBK470251/>

# works cited

---

"100PCS 9 Models Glue Liquid Dispenser Needles Pinhead Steel for Syringe." *Bonanza*, [https://www.bonanza.com/listings/100PCS-9-Models-Glue-Liquid-Dispenser-Needles-Pinhead-Steel-for-Syringe/1166661896?goog\\_pla=1&qpid=294505072980&keyword=&pos=&ad\\_type=pla&gclid=Cj0KCQjw8\\_qRbChCXARIsAE2AtRZHNrPYBAX6EKaQsdHBy-ExV3jIZsBtAy6SyedrwIyDfck6nnrWlpkaAsUbEALw\\_wcB](https://www.bonanza.com/listings/100PCS-9-Models-Glue-Liquid-Dispenser-Needles-Pinhead-Steel-for-Syringe/1166661896?goog_pla=1&qpid=294505072980&keyword=&pos=&ad_type=pla&gclid=Cj0KCQjw8_qRbChCXARIsAE2AtRZHNrPYBAX6EKaQsdHBy-ExV3jIZsBtAy6SyedrwIyDfck6nnrWlpkaAsUbEALw_wcB).

Anna. "What Is a 3-Part Syringe? - KMED-Leading Infusion Set Manufacturer, Disposable Medicals Supplier." *Kmed*, Kmed, 12 July 2021, <https://www.kmedhealth.com/what-is-a-3-part-syringe/>.

"BD 305155 - Needle Reg Bevel 22gx1." *CIA Medical – Central Infusion Alliance*, <https://www.ciamedical.com/bd-305155-case-needle-reg-bevel-22gx1>.

Cai, Chenxu, et al. "Clinical Flexible Needle Puncture Path Planning Based on Particle Swarm Optimization." *Computer Methods and Programs in Biomedicine*, Elsevier, 5 May 2020, <https://www.sciencedirect.com/science/article/abs/pii/S0169260719322576>.

Castillo, Richard. "Office Based Local Anesthesia Video Series." *Asos Speakers Bureau - American Society of Optometric Surgeons*, [https://asos.clubexpress.com/content.aspx?page\\_id=22&club\\_id=19363&module\\_id=341026](https://asos.clubexpress.com/content.aspx?page_id=22&club_id=19363&module_id=341026).

"Epinephrine Therapy in Patients Receiving Beta Blocker Treatment." *American Academy of Allergy Asthma & Immunology*, <https://www.aaaai.org/allergist-resources/ask-the-expert/answers/old-ask-the-experts/epi>.

*EyeRounds.org: Retrobulbar Block, Peribulbar Block and Common Nerve Blocks in Ophthalmology*, <https://webeye.ophth.uiowa.edu/eyeforum/tutorials/retrobulbar-nerve-blocks.htm>.

Farkas, Josh. "Methemoglobinemia." *EMCrit Project*, 30 Nov. 2021, <https://emcrit.org/ibcc/methemoglobinemia/>.

GERLACH, Raquel Fernanda, et al. "The Use of Epinephrine-Containing Anesthetic Solutions in Cardiac Patients: A Survey." *Revista De Odontologia Da Universidade De São Paulo*, Universidade De São Paulo, 1 Oct. 1998, <https://www.scielo.br/j/rousp/a/hY7Dc5NtXft7xsvwRtFNrTs/?lang=en>.

Health, Medilog Bio. "Medical Needle Types, Sizes, Color-Coding and Uses." *MediLog Bio Health*, Blogger, 16 Feb. 2022, <https://www.medilogbiohealth.com/2021/03/types-of-medical-needles.html>.

Ian K McLeod, MD. "Local Anesthetics: Introduction and History, Mechanism of Action, Chemical Structure." *Local Anesthetics: Introduction and History, Mechanism of Action, Chemical Structure*, Medscape, 23 Dec. 2021, <https://emedicine.medscape.com/article/873879-overview#a3>.

# works cited

---

"Iowa Head and Neck Protocols." *Maximum Recommended Doses and Duration of Local Anesthetics | Iowa Head and Neck Protocols*, <https://medicine.uiowa.edu/iowaprotocols/maximum-recommended-doses-and-duration-local-anesthetics>.

Khadem, Moshen. (PDF) *a Mechanics-Based Model for Simulation and Control ...* [https://www.researchgate.net/publication/277557906\\_A\\_Mechanics-based\\_Model\\_for\\_Simulation\\_and\\_Control\\_of\\_Flexible\\_Needle\\_Insertion\\_in\\_Soft\\_Tissue](https://www.researchgate.net/publication/277557906_A_Mechanics-based_Model_for_Simulation_and_Control_of_Flexible_Needle_Insertion_in_Soft_Tissue).

Lee, Ji Min, and Teo Jeon Shin. "Use of Local Anesthetics for Dental Treatment during Pregnancy; Safety for Parturient." *Journal of Dental Anesthesia and Pain Medicine*, The Korean Dental Society of Anesthesiology, June 2017, <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5564152/>.

"Lidocaine (Intradermal Route) Side Effects." *Mayo Clinic*, Mayo Foundation for Medical Education and Research, 1 Feb. 2022, <https://www.mayoclinic.org/drugs-supplements/lidocaine-intradermal-route/side-effects/drg-20137337?p=1>.

McConnell, Arnesia. "Analgesia vs Anesthesia." *SlideShare a Scribd Company*, <https://www.slideshare.net/arnesia22/analgesia-vs-anesthesia>.

"Selecting Syringes and Needles." *Vitality Medical*, 22 Apr. 2015, <https://www.vitalitymedical.com/blog/selecting-syringes-and-needles.html>.

Taylor, A, and G McLeod. "Basic Pharmacology of Local Anaesthetics." *BJA Education*, Elsevier, Feb. 2020, <https://www.ncbi.nlm.nih.gov/pmc/articles/PMC7808030/>.

Torp, Klaus D. "Lidocaine Toxicity." *StatPearls [Internet]*., U.S. National Library of Medicine, 4 Feb. 2022, <https://www.ncbi.nlm.nih.gov/books/NBK482479/>.

"Types of Anesthesia - Made for This Moment." *Made For This Moment | Anesthesia, Pain Management & Surgery*, <https://www.asahq.org/madeforthismoment/anesthesia-101/types-of-anesthesia/>.

"Types of Anesthesia." *UCLA Anesthesiology & Perioperative Medicine*, <https://www.uclahealth.org/anes/types-of-anesthesia>.

Whyte, John. "FDA Implements New Labeling for Medications Used during Pregnancy and Lactation." *American Family Physician*, 1 July 2016, <https://www.aafp.org/afp/2016/0701/p12.html>.

# works cited

---

"5 Ways Quitting Drinking Affects Your Brain." *Renewal Lodge* |, <https://www.renewallodge.com/5-ways-quitting-drinking-affects-your-brain/>.

*Amazon.com : Alcohol Prep Pads, Medium 2-Ply - 400 Alcohol ...* <https://www.amazon.com/Alcohol-Prep-Pads-Medium-2-Ply/dp/B07SNV2K4J>.

*Amazon.com : Philips Avent Fast Baby Bottle Warmer with ...* <https://www.amazon.com/Philips-Temperature-Control-Automatic-Shut-Off/dp/B0876T9DQZ>.

*Amazon.com: MedPride Powder-Free Nitrile Exam Gloves ...* <https://www.amazon.com/MedPride-Powder-Free-Nitrile-Gloves-Medium/dp/B00GS8W3T4>.

"Anaesthesia: Types, Procedure, Side Effects and Risks." *Netmeds*, <https://www.netmeds.com/health-library/post/anaesthesia-types-procedure-side-effects-and-risks>.

"Axons: The Cable Transmission of Neurons." *Queensland Brain Institute*, 17 Mar. 2021, <https://qbi.uq.edu.au/brain/brain-anatomy/axons-cable-transmission-neurons>.

"Bacteriostatic Sodium Chloride Injection, USP." *U.S. National Library of Medicine*, National Institutes of Health, <https://dailymed.nlm.nih.gov/dailymed/fda/fdaDrugXsl.cfm?setid=e5e325d1-0d58-40c9-9645-3ae402ff9d92&type=display>.

"Category:Epidural Anaesthesia." *Wikimedia Commons*, [https://commons.wikimedia.org/wiki/Category:Epidural\\_anaesthesia](https://commons.wikimedia.org/wiki/Category:Epidural_anaesthesia).

Chandra Manuepillai, MD. "Allergic Reaction and Anaphylaxis." *Symptoms & Treatment*, Buoy Health, Inc., 30 Mar. 2022, <https://www.buoyhealth.com/learn/allergic-reaction-anaphylaxis>.

"CME Activity: Eyelid Laceration: Osteopathic Medicine." *CME Activity | Eyelid Laceration | Osteopathic Medicine*, <https://www.statpearls.com/physician/cme/activity/27007?deg=DO>.

"Dr. Sudeep Roy - Hollow Eye Filler." *YouTube*, YouTube, 13 Oct. 2020, <https://www.youtube.com/watch?v=vkRoeRHNwPo>.

*EyeRounds.org: Retrobulbar Block, Peribulbar Block and Common Nerve Blocks in Ophthalmology*, <https://webeye.ophth.uiowa.edu/eyeforum/tutorials/retrobulbar-nerve-blocks.htm>.

*Foot-Operated Stainless Steel Mayo Stand with Extra-Large ...* <https://www.amazon.com/Foot-Operated-Stainless-Steel-Stand-Extra-Large/dp/B00T57SF18>.

Grebeshkovmaxim. "Fast Icon Vector Image on Vectorstock." *VectorStock*, 5 Aug. 2019, <https://www.vectorstock.com/royalty-free-vector/fast-icon-vector-26611534>.

Heidi Shafford, DVM. "Minimizing the Risks of Anesthesia in Dogs." *Preventive Vet*, 14 June 2014, <https://www.preventivevet.com/dogs/minimizing-the-risks-of-anesthesia-in-cats-and-dogs>.

"Human?" *Are You a Human?*, <https://www.newegg.com/medline-first-aid-medical-supplies/p/N82E16848063134>.

"Intravenous Sedation." *NY NJ Anesthesia, LLC*, <http://www.nynjanesthesia.com/intravenous-sedation>.

"Lumbar Activities Booklet." *Lumbar Activities Booklet: Strengthening Exercises*, [https://brain-spine.com/lumbar\\_activities/strengthening\\_exercises.html](https://brain-spine.com/lumbar_activities/strengthening_exercises.html).

PhD, Patricia Silva. "Abdominal Muscles Involved in Cardiopulmonary Pathology in..." *Muscular Dystrophy News*, 13 Mar. 2015, <https://musculardystrophynews.com/2015/03/13/abdominal-muscles-involved-in-cardiopulmonary-pathology-in-subjects-with-muscular-dystrophy/>.

"Shooting Daggers Crazy Eyes." *Zimbio*, <https://www.zimbio.com/18+Photos+That+Prove+Tyra+Banks+Is+the+Real+Crazy+Eyes/articles/n9p8UcWxzMx/Shooting+Daggers+Crazy+Eyes>.

"Slow Sign." *Depositphotos*, <https://depositphotos.com/12127150/stock-illustration-slow-sign.html>.

"Test the Elasticity of Your Skin with a 'Pinch Test.'" *Healthy Skin & Beauty Treatment Center*, 25 Oct. 2021, <https://healthy-skin.me/test-the-elasticity-of-your-skin-with-a-pinch-test/>.

Vetriciyaart. "Download Medical Ambulance in a Flat Cartoon Style on a Light Blue Background. Vector Image, Icon for Free." *Vecteezy*, <https://www.vecteezy.com/free-vector/medical-ambulance-in-a-flat-cartoon-style-on-a-light-blue-background-vector-image-icon>.