

# Full-thickness scleral incisions technique for the treatment of a cyclodialysis cleft following ab interno trabeculotomy

*Daniela Alvarez-Ascencio, Jesus Jimenez-Roman, Rafael Castañeda-Diez, Gabriel Lazcano-Gomez*

Glaucoma Department, Asociación Para Evitar la Ceguera en México, IAP. Vicente García Torres 46, Coyoacán, Barrio San Lucas, Mexico City 11550, Mexico

**Correspondence to:** Daniela Alvarez-Ascencio. Alfredo de Musset 310-208, Polanco, Miguel Hidalgo, Mexico City 11550, Mexico. alvarezdann@gmail.com

Received: 2018-10-10 Accepted: 2019-05-21

**DOI:10.18240/ijo.2019.10.23**

**Citation:** Alvarez-Ascencio D, Jimenez-Roman J, Castañeda-Diez R, Lazcano-Gomez G. Full-thickness scleral incisions technique for the treatment of a cyclodialysis cleft following ab interno trabeculotomy. *Int J Ophthalmol* 2019;12(10):1662-1665

**Dear Editor,**

I am Dr. Daniela Alvarez-Ascencio from the Glaucoma Department at Asociación Para Evitar la Ceguera (APEC) in Mexico City, Mexico. I write to present a successful case of cyclodialysis repair in a direct visualization technique that was performed on a patient after a microincisional glaucoma surgery (MIGS) complication.

MIGS has contributed to the current revolution in glaucoma surgery and the new therapeutic algorithms to treat glaucoma patients. Before MIGS, surgical treatment for glaucoma was indicated when conservative management with topical medications, or laser failed to control intraocular pressure (IOP). Today, MIGS include a wide group of surgical procedures that have filled the gap between conservative treatment and traditional surgery for patients with mild to moderate glaucoma to achieve a target pressure that may decrease the rate of progression of the disease<sup>[1]</sup>.

MIGS can be performed with an ab externo or ab interno approach, and as a standalone or combined procedure with cataract surgery. Although these procedures are considered to have a better safety profile than traditional glaucoma surgical procedures<sup>[2]</sup>, several complications including hyphema, migration of device, and cyclodialysis cleft (CC); leading to hypotony and phthisis bulbi have been described<sup>[3-4]</sup>.

A CC is defined as the separation of the longitudinal ciliary muscle fibers from the scleral spur (SS), usually as a result of

ocular trauma or anterior segment surgery<sup>[5]</sup>. The presence of this cleft creates an abnormal pathway for aqueous humor (AH) to drain into the suprachoroidal space. Many complications, leading to diminished visual acuity (VA) and/or risk of phthisis bulbi, have been related with CC including: hypotony, choroidal effusion, maculopathy, retinal and choroidal folds, optic nerve swelling, and cataract formation<sup>[6-7]</sup>.

The diagnosis of CC can be achieved by directly visualizing the presence of an abnormal separation between the SS and the ciliary muscle by gonioscopy<sup>[8]</sup>. Ultrasound biomicroscopy (UBM), anterior segment optical coherence tomography (AS-OCT), and magnetic resonance imaging (MRI) have been described as complimentary technologies to establish the extent and location of the CC with a more objective and accurate method. Evaluation and follow-up after laser or surgical treatment can also be achieved with these technologies.

The final goal of CC treatment is to restore normal IOP and to avoid complications. Different therapeutic pathways have been reported to successfully treat CC based on the extent and length of time of the anatomical defect. A conservative management, with topical cycloplegics and steroids, has been recommended by many authors for CC of less than 90° or less than 6wk<sup>[9]</sup>; however, some authors disagree about the usefulness of topical steroids arguing that a decrease of intraocular inflammation may affect the adhesion of the ciliary body (CB) to the sclera<sup>[10]</sup>.

For clefts larger than 100°-120° with more than 3mo with no response to conservative management, different therapeutic options including laser procedures (Argon, Nd:YAG, and diode), cryotherapy, and gas tamponade have been reported to be successful when treating this type of patients with very variable success rates<sup>[10-12]</sup>. Direct and indirect surgical cyclopepsy has been reported to have good visual prognosis and IOP control, although they can be complex procedures for unexperienced surgeons<sup>[13]</sup>. We report a full-thickness scleral incisions surgical technique for the treatment of a CC secondary to cataract extraction, combined with an ab interno trabeculotomy with Trabectome® (NeoMedix, Inc., CA, USA).

## CASE PRESENTATION

A 59-year-old woman with diagnosis of high myopia (sph -7.00 D) and pseudoexfoliation glaucoma (PXG) underwent

phacoemulsification surgery with intraocular lens implantation and ab interno trabeculotomy with Trabectome (NeoMedix, Inc.) in the left eye (OS). The ab interno trabeculotomy was performed in the inferior trabecular meshwork through the supero-nasal phaco incision. On the early postoperative period, the patient was managed with acetate prednisolone 1% *q.i.d.* tapered over a month, and gatifloxacin *q.i.d.* for 10d. Visual acuity (VA) of 20/40 and 9 mm Hg IOP at day 7 was reported in OS. One month after surgery, the patient referred an acute decrease in VA (20/160); on slit lamp examination, patient had 6 mm Hg IOP, corneal folds, and a 100° inferior and temporal CC visible with gonioscopy and choroidal detachment confirmed with UBM in OS (Figure 1).

The CC was managed conservatively, with atropine 1% *t.i.d.*, and acetate prednisolone 1% *b.i.d.*, tapered to *q.d.* over two months. After lack of response to medical treatment, with no improvement in IOP or VA, argon laser cleft photocoagulation was attempted without success. Four months after surgery, the best corrected visual acuity (BCVA) continued decreasing to 20/400, IOP fluctuated between 2-4 mm Hg, and macular optic coherence tomography (OCT) showed extensive macular folds (Figure 2). After failed medical and laser treatment, the patient underwent a direct cyclopexy surgery in OS.

#### SURGICAL TECHNIQUE

Surgery was performed using retrobulbar anesthesia with lidocaine 1% and bupivacaine 0.5%. A superior 7-0 vicryl corneal traction suture was placed, and a 100° temporal peritomy was performed (Figure 3). An anterior chamber (AC) paracentesis with a 15° stab knife was performed in order to produce direct contact between the ciliary body (CB) and sclera by decreasing the amount of aqueous humor bypassing from AC to the supraciliary space. At 1.5 mm posterior and parallel to surgical limbus, 4 full thickness scleral incisions (2 mm) were made over the 100° cyclodialysis area (Figure 4).

A 10-0 nylon suture with spatulated needle was used to achieve a 100° interrupted full thickness (sclera-CB-sclera) running suture through all the incisions (Figure 5). Conjunctiva was closed using the same 10-0 nylon suture. After surgery, atropine 1% *t.i.d.* and acetate prednisolone 1% *t.i.d.* were prescribed for 2wk.

#### RESULTS

IOP at day 1 and week 1 were 14 mm Hg and 11 mm Hg, respectively with no signs of hypotony including choroidal detachment and macular folds after week 1. At postoperative month 1 BCVA was 20/40, IOP 11 mm Hg, and a closed CC was visibly clinically and confirmed with UBM.

Follow-up at month-12, VA remained stable (20/40), IOP 12 mm Hg and gonioscopy showed no anatomical defect in the area of surgery. Image of UBM demonstrated no communication between AC and the supraciliary space (Figure 6).

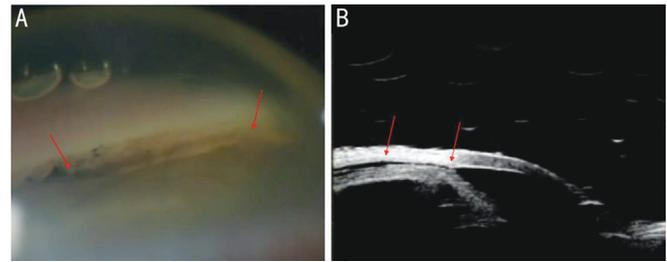


Figure 1 CC and choroidal detachment in OS A: Gonioscopic view of CC; B: UBM of CC and choroidal detachment.

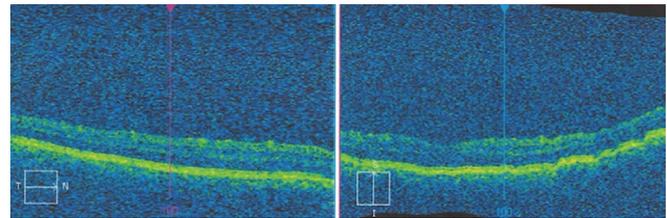


Figure 2 Macular OCT demonstrating macular folds.

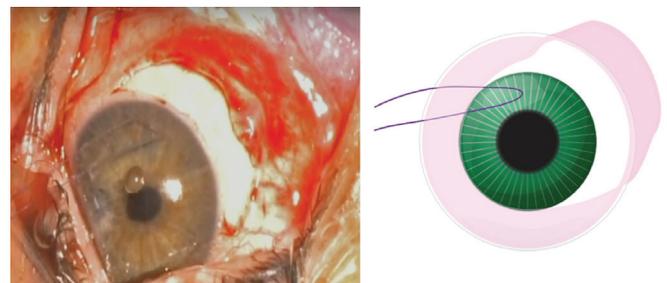


Figure 3 7-0 vicryl corneal traction suture and 100° peritomy that comprises the extent of the CC.

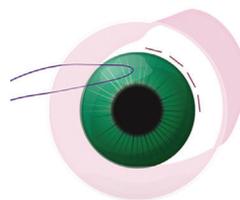
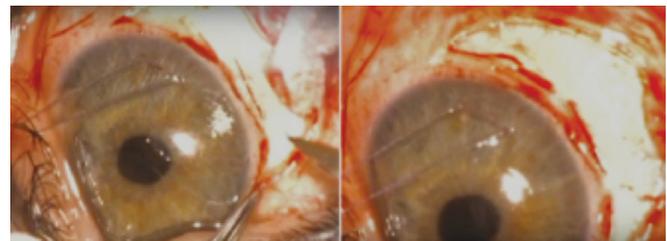
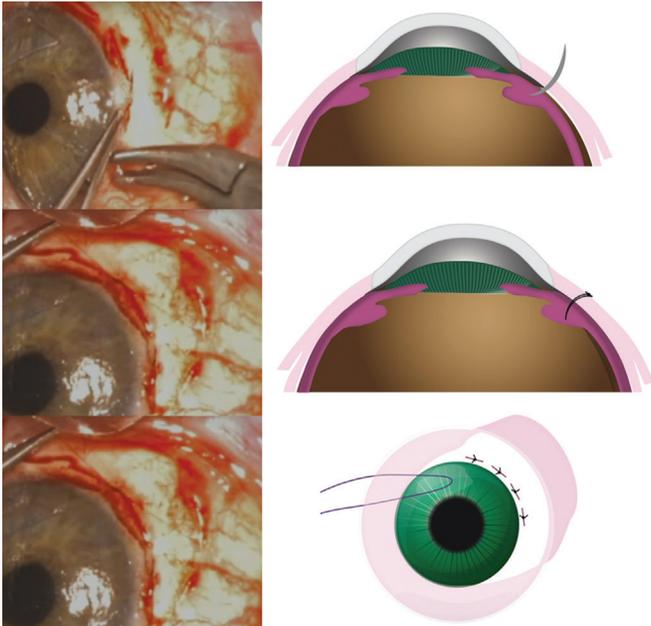


Figure 4 Full thickness scleral incisions at 1.5 mm posterior and parallel to surgical limbus over cleft area.

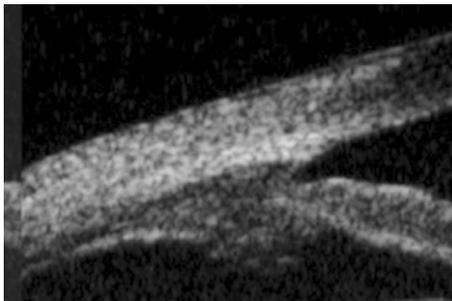
#### DISCUSSION

Numerous surgical techniques have been described for the treatment of traumatic CC with successful results<sup>[13]</sup>; although, these surgeries are always challenging and carry additional complexity due to the manipulation of a hypotonous eye and the increased risk of hemorrhage due to blind maneuvers that are required with some techniques<sup>[13-14]</sup>.

Techniques based on partial or full thickness scleral flaps, have a greater risk of transoperative hypotony, especially in large clefts, leading to a more difficult surgery with a high risk of



**Figure 5** A 10-0 nylon suture with spatulated needle is passed through the sclera and the ciliary body through all the incisions to achieve a 100° interrupted full thickness (sclera-ciliary body-sclera) running suture.



**Figure 6** UBM showing no communication between AC and supraciliary space.

bleeding and procedure failure. On the other side, transscleral and translimbal techniques are reported to be technically easier than those based on full thickness scleral flaps. Blind maneuvers have a high risk of hemorrhage and damage to intraocular structures, especially in phakic eyes<sup>[14]</sup>.

Different alternative surgical approaches such as anterior scleral buckling with or without cryotherapy<sup>[15-16]</sup>, ciliary sulcus sutured and/or ab externo fixed capsular tension ring (CTR)<sup>[17]</sup>, and placement of a 3-piece IOL in the sulcus<sup>[18-19]</sup> have been described in previous reports; although, these techniques require experience with CB surgery.

Direct cyclopexy with full-thickness scleral incisions we describe in this case, represents an easy and effective surgical therapy. In our opinion, the perilimbal full-thickness scleral incisions allow a simple approach with a lower risk of transoperative hypotony, while allowing direct visualization of the CB. The interrupted full thickness running suture enables a simpler approach to the detached CB, directly attaching the sclera to the CB. The characteristics of this technique allows

the treatment of all extensions clefts in phakic or pseudophakic eyes. Long-term follow up outcomes in this case, demonstrates the efficacy of the surgical technique.

## CONCLUSION

Cyclodialysis cleft is a relative infrequent complication with different clinical presentations; thereby, the preference for either conservative or surgical treatment remains controversial and lacks consensus. Hypotony and its subsequent complications, such vision loss and pthisis bulbi are the most feared complications of CC; thereby, the accurate diagnosis and successful treatment of these patients is essential for prompt rehabilitation<sup>[20]</sup>.

Although several treatment options have been described to be successful, most surgical approaches are complex and carry many intraoperative and postoperative risks, even for experienced surgeons. We describe a technique that we the authors consider straightforward, and easier than previous cyclopexy methods, and can be used in small or large clefts in phakic or pseudophakic eyes with a decreased risk of complications. Long-term follow up in this patient has showed that this simplified technique has good prognosis results in the long run; follow-up of more cases using this technique is necessary to confirm the effectiveness, safety and repeatability of our approach.

## ACKNOWLEDGEMENTS

**Conflicts of Interest:** Alvarez-Ascencio D, None; Jimenez-Roman J, None; Castañeda-Diez R, None; Lazcano-Gomez G, None.

## REFERENCES

- 1 Kerr NM, Wang J, Barton K. Minimally invasive glaucoma surgery as primary stand-alone surgery for glaucoma. *Clin Exp Ophthalmol* 2017;45(4):393-400.
- 2 Bovee CE, Pasquale LR. Evolving surgical interventions in the treatment of glaucoma. *Semin Ophthalmol* 2017;32(1):91-95.
- 3 Manasses DT, Au L. The new era of glaucoma micro-stent surgery. *Ophthalmol Ther* 2016;5(2):135-146.
- 4 Richter GM, Coleman AL. Minimally invasive glaucoma surgery: current status and future prospects. *Clin Ophthalmol* 2016;10:189-206.
- 5 Ioannidis AS, Barton K. Cyclodialysis cleft: causes and repair. *Curr Opin Ophthalmol* 2010;21(2):150-154.
- 6 González-Martín-Moro J, Contreras-Martín I, Muñoz-Negrete FJ, Gómez-Sanz F, Zarallo-Gallardo J. Cyclodialysis: an update. *Int Ophthalmol* 2017;37(2):441-457.
- 7 Malandrini A, Balestrazzi A, Martone G, Tosi GM, Caporossi A. Diagnosis and management of traumatic cyclodialysis cleft. *J Cataract Refract Surg* 2008;34(7):1213-1216.
- 8 Konstantopoulos A, Hossain P, Anderson DF. Recent advances in ophthalmic anterior segment imaging: a new era for ophthalmic diagnosis? *Br J Ophthalmol* 2007;91(4):551-557.

- 9 Ormerod LD, Baerveldt G, Sunalp MA, Riekhof FT. Management of the hypotonous cyclodialysis cleft. *Ophthalmology* 1991;98(9):1384-1393.
- 10 Kuchle M, Naumann GO. Direct cyclopexy for traumatic cyclodialysis with persisting hypotony. Report in 29 consecutive patients. *Ophthalmology* 1995;102(2):322-333.
- 11 Kato T, Hayasaka S, Nagaki Y, Matsumoto M. Management of traumatic cyclodialysis cleft associated with ocular hypotony. *Ophthalmic Surg Lasers* 1999;30(6):469-472.
- 12 Parikh RS, Parikh SR, Thomas R. Surgical repair of cyclodialysis cleft. *Curr J Glaucoma Pract With Dvd* 2008;41-44.
- 13 Agrawal P, Shah P. Long-term outcomes following the surgical repair of traumatic cyclodialysis clefts. *Eye (Lond)* 2013;27(12):1347-1352.
- 14 Metrikin DC, Allinson RW, Snyder RW. Transscleral repair of recalcitrant, inadvertent, postoperative cyclodialysis cleft. *Ophthalmic Surg* 1994;25(6):406-408.
- 15 Demeler U. Surgical management of ocular hypotony. *Eye (Lond)* 1988;2(Pt 1):77-79.
- 16 Mandava N, Kahook MY, Mackenzie DL, Olson JL. Anterior scleral buckling procedure for cyclodialysis cleft with chronic hypotony. *Ophthalmic Surg Lasers Imaging* 2006;37(2):151-153.
- 17 Yuen NS, Hui SP, Woo DC. New method of surgical repair for 360-degree cyclodialysis. *J Cataract Refract Surg* 2006;32(1):13-17.
- 18 Ahmed II, Crandall AS. Ab externo scleral fixation of the Cionni modified capsular tension ring. *J Cataract Refract Surg* 2001;27(7):977-981.
- 19 Mardelli PG. Closure of persistent cyclodialysis cleft using the haptics of the intraocular lens. *Am J Ophthalmol* 2006;142(4):676-678.
- 20 Berk TA, An JA, Ahmed IIK. Inadvertent cyclodialysis cleft and hypotony following ab-interno trabeculotomy using the trabectome device requiring surgical repair. *J Glaucoma* 2017;26(8):742-746.