Direct Laser Photocoagulation of the Retinal Pigment Epithelium: A Novel Method to Seal Retinal Breaks during Pars Plana Vitrectomy for Retinal Detachment

Shu Du
1 Suzhou Medical College of Soochow University, Suzhou 2.Department of Fundus Diseases and Ocular Trauma, LiXiang Eye Hospital of Soochow University

Xun Yang (dryangxun@163.com)
Department of Fundus Diseases and Ocular Trauma, LiXiang Eye Hospital of Soochow University

Youyou Zha
Department of Fundus Diseases and Ocular Trauma, LiXiang Eye Hospital of Soochow University

Xing Chen
Wuxi No.9 Hospital Affiliated to Soochow University

Jing Zhang
Department of Fundus Diseases and Ocular Trauma, LiXiang Eye Hospital of Soochow University

Ferenc Kuhn
1.Helen Keller Foundation for Research and Education, Birmingham 2. Department of Ophthalmology, University of Pécs Medical School

Research Article

Keywords: Retinal detachment, vitrectomy, direct RPE laser photocoagulation, ocular endoscopy

Posted Date: August 21st, 2023

DOI: https://doi.org/10.21203/rs.2.437/v2

License: This work is licensed under a Creative Commons Attribution 4.0 International License. Read Full License
Abstract

**Aims:** To examine the clinical effectiveness of employing direct retinal pigment epithelium (RPE) laser photocoagulation to create chorioretinal adhesion around the retinal breaks.

**Methods:** Twenty eyes of 20 patients were included in the study; all eyes had rhegmatogenous or combined rhegmatogenous-tractional retinal detachment. Direct RPE laser photocoagulation during vitrectomy, using power of 100-150 mw for of 120-200 ms duration, was performed in the area where the edges of each retinal break would settle following retinal reattachment. The thickness of the neuroretina over the treated area was compared to that measured after traditional transretinal laser photocoagulation.

**Results:** The mean follow-up time was 24 (11-46) months. Postoperatively, an ophthalmoscopically visible pigmentary reaction developed over the treated area, except for a single eye where the retinal break was located in an area of myelinated nerve fibres. There were no serious complications, and the retinas in all 20 eyes remained reattached. The mean best-corrected visual acuity (BCVA) at the final follow-up was significantly higher than that before surgery (p=0.001). The thickness of the neuroretina at 1 month after surgery greatly differed between areas of direct versus transretinal laser photocoagulation: 217 μm in the former and 104 μm in the latter group.

**Conclusions:** The efficacy of direct RPE photocoagulation in retinal break sealing equals the effect of traditional transretinal photocoagulation, but without risking damaging the neurosensory retina, and the laser application is not hindered by retinal opacities.

**Key Messages**

Direct Laser Photocoagulation of the Retinal Pigment Epithelium can seal retinal breaks effectively without energy loss on neuroretina even it's not transparent and eliminate the risk of causing subsequent atrophic retinal holes, like gluing instead of welding.

1. Introduction

Retinal detachment (RD) develops when fluid vitreous enters the subretinal space through a retinal tear \[1\] or the preretinal (rarely, subretinal) traction forces overcome those keeping the retina attached. Countering traction and the sealing of the retinal tear, typically by photocoagulation, are the keys to successful retinal reattachment.

Laser is absorbed by the melanin contained inside the cells of the retinal pigment epithelium (RPE) and the haemoglobin inside the blood vessels; the absorption of the laser energy produces a thermal effect. This causes the tissue to coagulate and become necrotic, forming along the edge of the tear an adhesion between the RPE and the overlying neuroretina; this in turn seals the retinal tear.\[2-4\] Laser photocoagulation also promotes the absorption of the subretinal fluid and can prevent the occurrence of retinal detachment once the adhesion reaches its full strength\[5,6\].

The energy of the transretinal laser must be "just right": enough to produce adhesion but not so strong as to damage the overlying retinal fiber layer or create a retinal hole.

Undertreatment - insufficient laser power - reduces the success rate of retinal reattachment\[1\]. It is difficult for an effective laser spot to form in the presence of subretinal fluid. Finally, it is hard for the laser to penetrate any myelinated nerve fibers, should the retinal tear be located in such an area\[5,6\].
Overtreatment - excessive retinal laser energy - may increase the risk of retinal redetachment by causing retinal necrosis, especially in cases of hypopigmentation (such as in high myopia), ocular trauma, endophthalmitis, or retinal thinning associated with acute retinal necrosis. The risk of damaging the nerve fibers is especially high in areas with hyperpigmentation or retinal thinning. When the standard transretinal delivery is employed, it is not easy to determine the proper laser power in eyes with severe edema (such as in diabetic retinopathy) or to avoid areas of hemorrhage (such as in vein occlusions).

Especially in scleral buckling surgery, but even during vitrectomy, residual subretinal fluid of various amounts is often found at the posterior edge of the retinal tear, unless the eye is filled up with some type of heavy liquid. The presence of subretinal fluid may make the surgeon increase the laser energy leading to the risks outlined above.

We hypothesised that lasering the RPE directly during vitrectomy is just as effective as that using the traditional transretinal delivery, but it allows much more precise control over the energy required, without the risk of overtreatment. We present here the results of our preliminary trial to evaluate this hypothesis.

2. Patients and Methods

2.1 Patients

Twenty patients, each with one eye affected by retinal detachment, were prospectively enrolled in the study at our hospital between January 2015 and October 2017. The retinal detachment was either rhegmatogenous or combined rhegmatogenous-tractional. This study was approved by the Committee for Research Ethics of our university, and was conducted in accordance with the official regulations for clinical research and the Declaration of Helsinki. We have obtained signed informed consent from each patient for participation in this study and consent to publish the findings.

The inclusion criteria included eyes in which the subretinal fluid that was impossible to completely remove or where the retinal transparency was seriously affected due to intraretinal hemorrhage, severe edema, or myelinated nerve fibers. Excluded were eyes where the traditional transretinal, rather than the direct RPE, photocoagulation constituted the main force in the creation of a chorioretinal seal.

The mean follow-up time was 24 (11-46) months. Each patient underwent a comprehensive eye exam including non-contact intraocular pressure (IOP), best corrected visual acuity (BCVA), slit lamp, B-ultrasound and fundus examination.

All 20 eyes underwent vitrectomy, retinal reattachment, air-fluid exchange, and gas- or silicone oil implantation; 11 eyes had a retinectomy for traction release. Each eye received direct RPE laser and 13 cases received traditional transretinal laser treatment as well; the wavelength used was 532nm (Alcon [Constellation], Fort Worth, TX, USA or Lumenis [Novus Spectra], Yokneam, Israel).

Postoperative visits were performed at 1 week, 1 month, 3 months, 6 months, 1 and 2 years after surgery. At each follow-up visit, the BCVA was taken, a full anterior segment examination was performed, and the IOP was measured. After fully dilating the pupil, the fundus was evaluated using a 90 D lens, and binocular indirect ophthalmoscopy was also performed. When possible, optical coherence tomography (OCT, Stratus; ZEISS; Oberkochen, Germany), and fundus photography were employed to document the status of the posterior retina. All Snellen visual acuities were converted to LogMAR for statistical analysis; "counting fingers" was defined as 2.3 logMAR, "hand movement" to 2.6 logMAR, and "light perception" to 2.9 logMAR.

2.2 Surgical procedure
All procedures were performed by the same surgeon (X.Y.) under general or local (retrobulbar) anaesthesia. A 23- or 25 g three-port vitrectomy (20 g in the case of endoscopy use) was performed to achieve complete vitreous removal, including the previously undetached posterior cortical vitreous. For visualization, either the surgical microscope (19 eyes) or an ocular endoscope (one eye) was employed. All traction forces were removed and if necessary a heavy liquid was used to aid in the removal of the subretinal fluid and reattachment of the retina. Retinectomy was performed in areas with severely fixed folds, retinal stiffness, or shortened, thickened, or curled areas that could not be flattened. The extent of the retinectomy depended on the size of the lesion, and varied between 45 degrees and 360 degrees.

Direct RPE photocoagulation was performed in the area where the edge of the subsequently reattached retina was to settle. Three to four rows of laser spots were delivered. The power of the laser for direct RPE photocoagulation was in the range of 100 to 150 mw, with a duration between 120 and 200 ms, spaced at half the diameter of the spots. The energy of the laser was high enough to create pale yellow spots while avoiding the formation of bubbles during laser delivery. After air-fluid exchange or heavy-liquid use and retinal reattachment, the pale yellow area that had been subjected to direct RPE laser could still be seen through the retina in most cases. If the retina settled so that the laser effect near the edge of the break was deemed insufficient, conventional retinal laser was used to supplement the treatment. If the area of conventional laser reached 50% of the break's margin or the retina's edge lay in an untreated area and conventional laser treatment was needed, the case was excluded from this series.

If transretinal laser photocoagulation was used, the settings were: 100-250 mw power and 150-300 ms duration.

One eye (case 3) had concurrent cataract removal, via phacofragmentation, but without the implantation of an intraocular lens.

At the conclusion of the operation, the vitreous cavity was filled with silicone oil or gas (C₃F₈ or SF₆), as demanded by the patient's history and the intraoperative findings. The silicone oil was removed 3 to 6 months after the operation.

2.3 Statistical analysis
We used SPSS 17.0 statistical software (IBM/SPSS, Inc., Chicago IL) for statistical analysis. The mean BCVA before and after operation, which were provided as logMAR BCVA, were compared using the paired t-test. A p value less than 0.05 was considered statistically significant.

3. Results
Twenty eyes of 20 patients qualified for this study. There were 12 males and 8 females, with a mean age of 47 (24-69) years. The basic characteristics of the patients and eyes are summarized in Table 1.

Table 1. Basic characteristics of patients (n = 20) with retinal detachment.
<table>
<thead>
<tr>
<th>No</th>
<th>Principal Diagnosis</th>
<th>Comment</th>
<th>Preoperative Snellen BCVA</th>
<th>Final Snellen BCVA</th>
<th>Photocoagulation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>RRD</td>
<td>Medullated fibres Retinectomy</td>
<td>0.40</td>
<td>20/20</td>
<td>RPE</td>
</tr>
<tr>
<td>2</td>
<td>RRD; myopia</td>
<td>Retinectomy</td>
<td>FC/10 cm</td>
<td>20/667</td>
<td>RPE + Retina</td>
</tr>
<tr>
<td>3</td>
<td>LRD; HIM</td>
<td>Retinectomy</td>
<td>LP</td>
<td>20/4</td>
<td>RPE</td>
</tr>
<tr>
<td>4</td>
<td>RRD; HIM</td>
<td>Giant retinal tear</td>
<td>20/63</td>
<td>20/4</td>
<td>RPE + Retina</td>
</tr>
<tr>
<td>5</td>
<td>VH</td>
<td>Giant retinal tear</td>
<td>HM/40 cm</td>
<td>20/40</td>
<td>RPE + Retina</td>
</tr>
<tr>
<td>6</td>
<td>LRD</td>
<td>Retinectomy</td>
<td>HM/10 cm</td>
<td>20/32</td>
<td>RPE + Retina</td>
</tr>
<tr>
<td>7</td>
<td>RRD</td>
<td>Giant retinal tear</td>
<td>20/20</td>
<td>20/20</td>
<td>RPE + Retina</td>
</tr>
<tr>
<td>8</td>
<td>RRD</td>
<td>Retinectomy</td>
<td>20/800</td>
<td>20/25</td>
<td>RPE</td>
</tr>
<tr>
<td>9</td>
<td>RRD</td>
<td>Giant retinal tear</td>
<td>20/80</td>
<td>20/32</td>
<td>RPE + Retina</td>
</tr>
<tr>
<td>10</td>
<td>PVR</td>
<td>Retinectomy</td>
<td>HM/10 cm</td>
<td>20/250</td>
<td>RPE + Retina</td>
</tr>
<tr>
<td>11</td>
<td>DR; TRD</td>
<td>Intraoperative iatrogenic retinal breaks</td>
<td>HM/10 cm</td>
<td>20/100</td>
<td>RPE</td>
</tr>
<tr>
<td>12</td>
<td>RRD; HIM</td>
<td>Retinectomy</td>
<td>20/25</td>
<td>20/100</td>
<td>RPE + Retina</td>
</tr>
<tr>
<td>13</td>
<td>RRD</td>
<td>Giant retinal tear</td>
<td>FC/50 cm</td>
<td>20/40</td>
<td>RPE +Retina</td>
</tr>
<tr>
<td>14</td>
<td>RRD; MH; HIM</td>
<td>Retinectomy</td>
<td>HM/50 cm</td>
<td>20/200</td>
<td>RPE + Retina</td>
</tr>
<tr>
<td>15</td>
<td>LRD; HIM</td>
<td>Retinectomy</td>
<td>FC/30 cm</td>
<td>20/20</td>
<td>RPE</td>
</tr>
<tr>
<td>16</td>
<td>ReRD; HIM</td>
<td>Retinectomy</td>
<td>20/1000</td>
<td>20/32</td>
<td>RPE</td>
</tr>
<tr>
<td>17</td>
<td>RRD; HIM; MH</td>
<td>Retinectomy</td>
<td>20/333</td>
<td>20/63</td>
<td>RPE + Retina</td>
</tr>
<tr>
<td>18</td>
<td>ReRD; Myopia</td>
<td>Retinectomy</td>
<td>20/50</td>
<td>20/32</td>
<td>RPE + Retina</td>
</tr>
<tr>
<td>19</td>
<td>VH; Oculartrauma; LRD</td>
<td>Retinectomy</td>
<td>LP</td>
<td>FC/30 cm</td>
<td>RPE</td>
</tr>
<tr>
<td>20</td>
<td>RRD; MH; HIM</td>
<td>Retinectomy</td>
<td>20/400</td>
<td>20/200</td>
<td>RPE + Retina</td>
</tr>
</tbody>
</table>

RRD, Rhegmatogenous retinal detachment; RPE, retinal pigment epithelium; FC, finger counting; HIM, high myopia; LRD, long-standing retinal detachment; LP, light perception; VH, vitreous haemorrhage; HM, hand movements; PVR, proliferative vitreoretinopathy; DR, diabetic retinopathy; TRD, traction retinal detachment; MH, macular hole; ReRD, recurrent retinal detachment.

There were 11 eyes with fresh, primary rhegmatogenous retinal detachment (cases 1, 2, 4, 7-9, 12-14, 17 and 20); three of these (cases 14, 17 and 20), also had a macular hole, although these were not the cause of the retinal detachment. Two eyes (cases 16 and 18) had a fresh redetachment, four had chronic retinal detachment (cases 3, 6, 15 and 19, Fig. 1 and Fig 2); the remaining eyes had combined rhegmatogenous-tractional retinal detachment. Six eyes had high myopia, two had moderate myopia, and one had mild myopia. One eye had myelinated nerve fibers near the optic disc, with the retinal break inside the myelinated area. Five eyes presented with a giant retinal break.
No major intraoperative complication occurred and all retinas were attached at the conclusion of the surgery. Postoperatively, no redetachment occurred, and no further surgery other than silicone oil removal was performed. One eye suffered a postoperative vitreous hemorrhage, probably from the scleral incision site, but it spontaneously reabsorbed within one month.

In 19 eyes, there was a visible pigmentary reaction around the laser-treated retinal tear; in the eye with myelinated nerve fibers the pigmentation was difficult to visualize.

The mean preoperative IOP was 11 (7-15) mmHg. The mean postoperative IOP was 18 (9-22) mmHg at 6 months, by which time the silicone oil has already been removed. Two eyes required topical therapy to control the IOP.

The preoperative mean LogMAR BCVA was 1.60 (Snellen equivalent 20/800) with a range of light perception to 20/20. At 6 months postoperatively the mean LogMAR BCVA was 0.56 (Snellen equivalent 20/63); at the last follow-up, it was 0.53 (20/63). The mean BCVA at 6 months postoperatively and at the last follow-up was significantly higher than that before surgery ($p = 0.002$ and $p = 0.001$, respectively). There was no statistically significant difference between the BCVA at 6 months and at the last follow-up ($p = 0.806$). The main changes in the vision before and after surgery are shown in Table 1 and Fig.3.

The postoperative visual acuity in our study was statistically significantly greater at 6 months than the preoperative values. There was no significant change in the visual acuity during the follow-up period past 6 months.

In three eyes with posterior retinal breaks that could be detected by OCT, the thickness of the neuroretina both in the areas of direct RPE- and transretinal photocoagulation was measured postoperatively. The mean thickness was 217 (181-280) µm in the area of direct RPE photocoagulation and 104 (55-133) µm in the area of transretinal photocoagulation at one month, the thickness was 148 and 94 µm respectively at almost 4 years. (case 14; Figs. 4 and 5).

4. Discussion

The goals of surgery in eyes with retinal detachment include the sealing of the edge of the retinal break so as to prevent access of the intravitreal fluid to the subretinal space. Today such a seal is created almost exclusively by laser.

During traditional laser treatment, the energy is delivered through the neuroretina, but the laser’s desired effects occur in the RPE and the choroidal melanocytes that absorb it, leading to coagulation necrosis. When the laser energy is low, the RPE cells and the mitochondria get swollen, the endoplasmic reticulum expands, the villi are reduced, tight junctions between cells are destroyed, and a small proportion of the RPE cells become necrotic, which causes mild cell proliferation and may not be enough to seal the breaks$^{[3,5,15]}$.

As the laser energy is increased, the energy absorbed by the RPE cells increases, and so does the range of thermal effects. As a result, the cellular damage is aggravated, the RPE cells are lysed and destroyed, and the heat is transmitted back to the neuroretina, causing damage to the outer retinal cells$^{[12,15]}$. If the laser power is significantly higher, the damage also involves the inner retinal layers, including the nerve fibers and may cause retinal holes.

The laser can destroy the pigment epithelial tissue and increase the production of growth factors, and also promote cell proliferation and repair. The RPE proliferation around the photocoagulation zone covers the destruction zone; the proliferating RPE cells have less pigment and fewer tight junctions between the cells$^{[16-19]}$. 


For these reasons, it is important for the surgeon to deliver the laser energy at the "ideal" level: enough to produce a reaction that results, in the case of retinal detachment surgery, in a chorioretinal adhesion, without causing extensive damage to the neuroretina. The surgeon determines this "ideal" energy level using visual feedback: a mild whitening of the retina. If the retina is not adequately transparent (edema, hemorrhage, myelinated nerve fibers, etc.), the titration of the laser energy becomes very difficult.

Direct, rather than transretinal, photocoagulation of the RPE avoids both of these problems: the effect on the pigmented cells can be clearly visualized and the neuroretina sustains no damage during laser delivery. If the retina is reattached soon after the laser treatment, the desired adhesion to the underlying RPE layer will still develop. It appears from our preliminary study that the laser at the settings we employed (100–150 mw, 120 and 200 ms), while achieving proper chorioretinal adhesion around the break (bonding the two tissues like a glue), results in reduced retinal damage. Furthermore, the retinal thickness remained normal in the area of direct RPE laser photocoagulation while reduced by almost two-thirds in the area of the traditional transretinal laser treatment, where the fusion is achieved by a thermal effect. Since glial and RPE cells may play an important role in the closure of retinal break, the preservation of the integrity to the extent possible of both the neuroretina and RPE may enhance the formation of the seal. The effectivity of the direct RPE laser photocoagulation is shown by the fact that the retinal reattachment rate remained 100% after a long follow-up, even without supplementary traditional photocoagulation.

The power of the laser during direct RPE delivery is not substantially lower as compared to that used during traditional photocoagulation: the neuroretina cannot inflict its insulating effect during direct RPE lasering as it is replaced by fluid, which carries away the heat generated by the laser. The distance between two laser spots can be reduced to half the diameter of the spot since with direct RPE lasering the spot size barely grows with time. This has an added benefit in eyes in which the pathology for which the laser is employed is close to the fovea.

In addition to performing a vitrectomy as complete as possible, we paid particular attention to the removal of all traction forces during surgery; yet retinectomy was still necessary in 11 eyes, due to retinal shortening such as in eyes with high axial length or proliferative tissues that prove impossible to separate from the retina.

Finally, it appears that direct RPE photocoagulation may also reduce the tendency of RPE cells to migrate and proliferate: although the PVR development was a rather significant risk in our cohort, not a single case has occurred. The lack of distant adverse effects is shown by the fact that the visual acuity improved in all eyes, and all eyes reached their maximum visual potential within 6 months postoperatively.

In summary, direct laser photocoagulation of the RPE has several possible advantages of RPE photocoagulation in sealing retinal breaks: (1) The process does not generate heat on any layer of the neuroretina, thereby eliminating the risk of causing atrophic retinal holes; (2) even in eyes with reduced transparency of the neuroretina, the laser energy can be kept to the minimum since the laser light does not have to traverse the neuroretina; (3) there is proper visual feedback from RPE to allow precise titration of the laser energy, irrespective of retinal transparency; (4) it appears that bypassing the retina with the laser reduces the risk of post-laser retinal thinning; (5) since the laser spots barely grow post-treatment, direct RPE lasering is advantageous in eyes with a pathology close to the fovea.

Direct laser photocoagulation of the RPE also poses technical difficulties. (1) The surgeon must rely on experience to predict the position of the reattached retinal breaks, and deliver the laser spots accordingly; if the prediction was incorrect, either traditional laser treatment must be used to supplement the direct photocoagulation (which is what we did in 13 eyes in this study) or the retina be redetached and the direct RPE laser repeated at the verified location. (2) The laser spots may be difficult to visualize if retinal transparency is severely compromised. In such cases, again, either additional transretinal laser treatment is needed or the direct RPE laser application is to be repeated after retinal...
redetachment. (3) Finally, especially when the retinal break is small, very peripheral, and the pupil narrow, endoscopy may be necessary to complete the photocoagulation of the break.

Furthermore, this preliminary study has important limitations, despite its promising findings. Ours was a case series with no controls, and the number of eyes was limited. A properly organized, much larger study is needed to confirm that the novel technique of direct RPE lasering indeed has benefits, and lacks any adverse effects, in retinal detachment surgery as identified in our preliminary trial.

**Declarations**

**Authors' Contributions:** Conceptualization, X.Y.; Surgery, X.Y.; investigation: S.D., Y.Y.Z. and X.Y.; data curation, S.D., Y.Y.Z. and J.Z.; writing—original draft preparation, X.C.; writing—review and editing, X.Y., S.D. and F.K., project administration, S.D.; All authors have read and agreed to the published version of the manuscript.

**Acknowledgements:** The manuscript was posted on Research Square platform with DOI:10.21203/rs.2.437/v1; it has not been peer reviewed or published by any journal.

**Data Availability:** The data are available upon request from the corresponding author.

**Conflicts of Interest:** The authors declare that there is not any conflicts of interest regarding the publication of this paper, and none of the authors have any proprietary interests or conflicts of interest related to this submission.

**Ethics declarations:** This study was approved by the Suzhou LiXiang Eye Hospital of Soochow University Committee for Research Ethics(SLER20150301), registered at the Chinese Clinical Trial Registry (ChiCTR-INR-2100044107), conducted in accordance with the official regulations for clinical research and the Declaration of Helsinki. We have obtained signed informed consent from each patient for participation in this study and consent to publish the findings.

**References**


Figures

![Figure 1](image)

**Figure 1**

**Direct retinal-pigment-epithelial laser photocoagulation in the midperiphery.**

Intraoperative image (case 3) showing 360-degree retinal-pigment-epithelial photocoagulation being performed after 360-degree retinectomy. Traditional retinal photocoagulation was not considered due the peripheral retina being very...
thin in this highly myopic eye.

Figure 2

Direct retinal-pigment-epithelial laser photocoagulation in the posterior pole.

In this eye (intraoperative image; case 11), the laser is employed to treat around an iatrogenic break that occurred during removal of extensive posterior proliferative membranes in diabetic retinopathy. The retina was not transparent enough to allow transretinal photocoagulation.
Visual acuity changes before and after vitrectomy.

The postoperative visual acuity in our study was statistically significantly greater at 6 months than the preoperative values. There was no significant change in the visual acuity during the follow-up period past 6 months.
Figure 4

Direct retinal-pigment-epithelial laser photocoagulation in an eye with rhegmatogenous retinal detachment.

This eye had high myopia and a macular hole (case 14). A. Preoperative B-scan ultrasonography showing the retinal detachment and a longer-than-normal axial length. B. Intraoperative image with the yellow arrows pointing to the line of retinectomy. Direct retinal-pigment-epithelial laser photocoagulation was then applied along the incision. C. One month postoperatively, there is visible pigmentation at the laser site (arrows). D-E. Optical-coherence-tomography images one month postoperatively. The thickness of the neuroretina in the area of transretinal photocoagulation is 55 μm (D); in the area of direct retinal-pigment-epithelial photocoagulation the thickness of the neuroretina is 181 μm (E).
Figure 5

Postoperative optical-coherence-tomography images.

A. In this highly myopic eye (case 17), the thickness of the neuroretina in the area of transretinal photocoagulation area is 124 μ, as opposed to a thickness of 189 μ in the direct RPE retinal-pigment-epithelial photocoagulation laser treatment. B. The same, relevant numbers in case 20 are 133 μ and 280 μ, respectively, one month postoperatively. C. Almost 4 years postoperatively, the same area as A (case 17).