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Human Amniotic Membrane Patch for Optic Disc Pit Maculopathy Remains Integrated at 2 Years

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Abstract

Purpose: To evaluate the efficacy of a human amniotic membrane patch to treat optic disc pit maculopathy. **Methods:** Three cases are presented. **Results:** Three patients with optic disc pit maculopathy were treated with pars plana vitrectomy and a human amniotic membrane patch of the optic disc pit. The primary outcomes were resolution of subretinal fluid (SRF) and intraretinal fluid, changes in best-corrected visual acuity (BCVA), and any postoperative complications. Complete resorption of SRF and substantial decreases in central retinal thickness were seen at follow-up. Significant improvements in VA and microperimetry correspond with a decline in retinal responsiveness related to the chronicity of maculopathy. No patient reported complications or recurrences, and the patch remained visible on optical coherence tomography for up to 26 months of follow-up. **Conclusion:** Anatomic and visual improvement was seen in all 3 patients. The human amniotic membrane patch is a safe and effective treatment for optic disc pit maculopathy.

Keywords

optic disc pit maculopathy, human amniotic membrane, subretinal fluid resolution

Introduction

Optic disc pits are rare congenital anomalies of the optic nerve head. Although some patients remain asymptomatic, approximately 25% to 75% will develop optic disc pit maculopathy, which can significantly impair visual acuity (VA).[1]

The management of optic disc pit maculopathy is challenging, with patients with mild symptoms requiring only observation, while more severe or progressive cases necessitate surgical intervention. Common surgical approaches include pars plana vitrectomy (PPV) with or without gas tamponade, laser photocoagulation, and membrane peeling. However, these interventions often have variable outcomes, and there is no universally accepted treatment protocol.[2]

The success of treatment with human amniotic membrane patches for recurrent macular holes (MH) and, less frequently, for treating retinal breaks has been reported. Notably, adverse effects or rejection related to the tissue itself have not been reported, and postoperative dislodgment of the patch has been rare. Compared with other tissue types, this stability makes the human amniotic membrane an ideal choice for placement in the optic pit.[3] The human amniotic membrane patch is hypothesized to provide a barrier to prevent fluid intrusion into the macula, promoting retinal reattachment.[3] In recent years, this modality has emerged as a potential new therapeutic option for treating challenging cases such as optic disc pit maculopathy.[4]

This case report aims to evaluate the effectiveness of the human amniotic membrane patch to treat optic disc pit maculopathy, documenting the anatomic and functional outcomes of 3 patients over a 1-year follow-up period. With this study, we seek to add valuable insight into the management options available for this vision-threatening condition.

Case Reports

Case 1

A 26-year-old woman presented for evaluation of optic disc pit maculopathy in the right eye. The preoperative best-corrected VA (BCVA) was 6/200. A fundus examination showed the optic disc had an inferior and temporal optic pit with a serous retinal detachment (RD) (Figure 1F). A full peripheral examination found the

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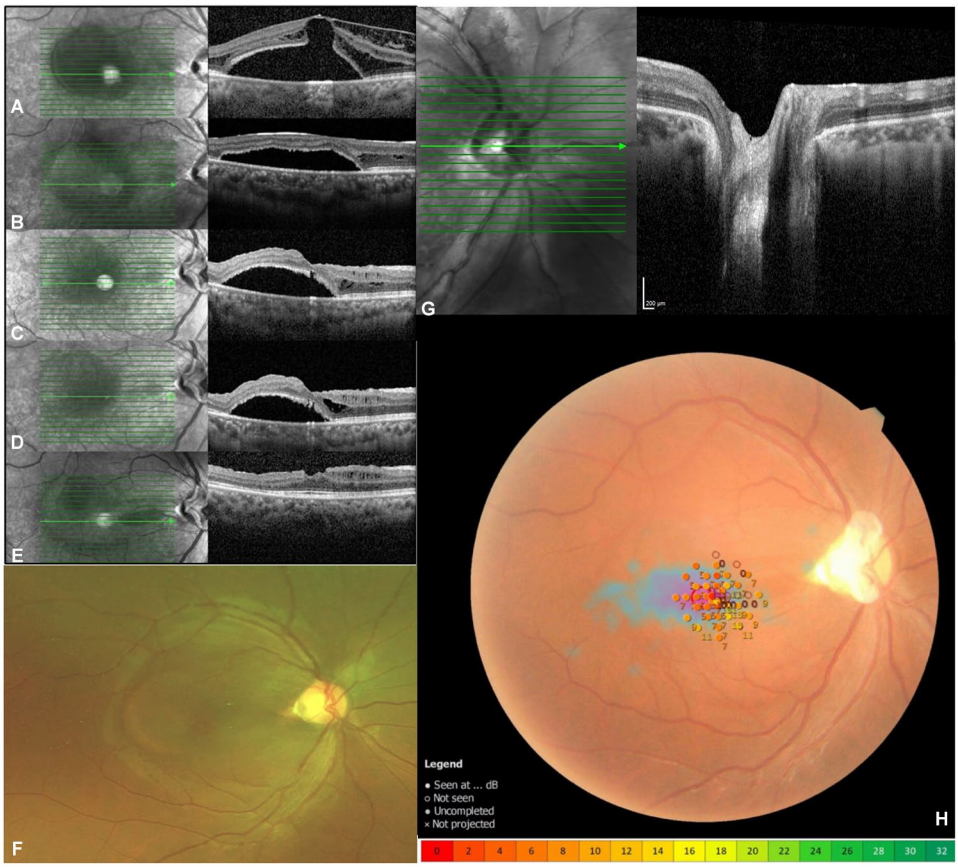

Figure 1. (A) Baseline optical coherence tomography (OCT) shows foveal thinning with outer plexiform and nerve fiber layer changes associated with exudative retinal detachment. (B) OCT at 1 postoperative month shows partial resolution. (C) OCT at 3 months. (D) OCT at 6 months. (E) OCT at 1 year. (F) Color fundus photograph shows a temporal optic disc pit with associated serous retinal detachment. (G) OCT through the optic disc demonstrates the pit with overlying human amniotic membrane patch integration. (H) Microperimetry at 1 year shows reduced sensitivity corresponding to the area of prior subretinal fluid.

retina to be flat bilaterally, with no breaks noted. Spectral-domain optical coherence tomography (OCT) of the macula confirmed the presence of inner and outer retinal schisis with a large collection of subretinal fluid (SRF) measuring 381 µm and a central retinal thickness of 649 µm (Figure 1A). The patient underwent PPV with a human amniotic membrane patch and tamponade with sulfur hexafluoride (SF_6). One month postoperatively, the patient's BCVA improved to 20/125, SRF was 238 µm, and central retinal thickness was 490 µm (Figure 1B). Three months postoperatively, the BCVA improved to 20/100, SRF was 249 µm, and central retinal thickness was 405 µm. An improvement was also seen in the inner and outer retinal schisis (Figure 1C). Six months postoperatively, the patient's BCVA was 20/40. OCT showed a decrease in SRF to 164 µm and a slight increase in central retinal thickness to 434 µm (Figure 1D). At 12 months postoperatively, the BCVA was maintained at 20/40. OCT showed a complete resolution of SRF, a decrease in central retinal thickness to 407 µm, and complete resolution of inner and outer macular schisis (Figure 1E). The human amniotic membrane patch remained integrated in the pit, as evidenced by OCT of the optic nerve (Figure 1G). Microperimetry was performed 1 year postoperatively to assess macular function, finding a moderate decline in retinal sensitivity that corresponded with the collection of SRF previously seen on OCT (Figure 1H).

Case 2

A 14-year-old adolescent female who had lost her right eye due to chronic RD and coloboma presented with decreased vision in her left eye. A fundus examination showed optic nerve head and SRF. The patient's BCVA at presentation was 20/60. OCT confirmed the finding of inner and outer retinal schisis, with SRF measuring 435 µm and central retinal thickness 650 µm (Figure 2A). A PPV was performed with a human amniotic membrane patch draped over the optic nerve pit and SF_6 as tamponade. One month postoperatively, the patient's BCVA was 20/80, SRF measured 195 µm, and central retinal thickness was 342 µm (Figure 2B). Three months postoperatively, the BCVA was 20/70, SRF was 102 µm, and central retinal thickness was 260 µm (Figure 2C). Six months later, the BCVA reached 20/125, SRF was 76 µm,

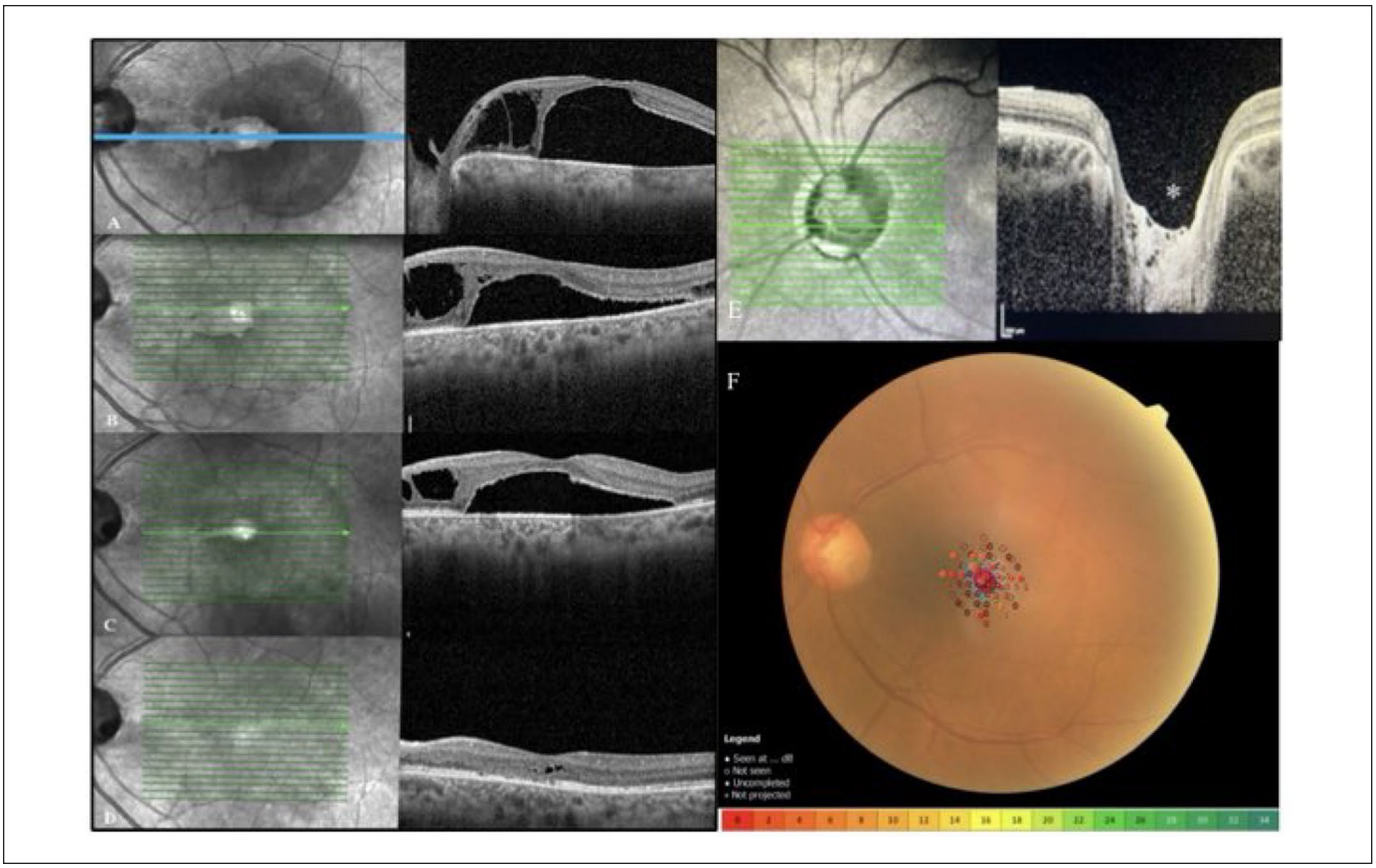

Figure 2. A) Optical coherence tomography shows significant foveal thinning and associated changes in the outer plexiform and nerve fiber layers of the exudative retinal detachment (B) OCT at postoperative month 1 shows gradual resolution. (C) OCT at 3 postoperative months. (D) OCT at 1 postoperative year. (E) Human amniotic membrane patch integrated over the optic nerve. The membrane at 1 postoperative year is indicated with an asterisk. (F) Microperimetry at 1 postoperative year shows reduced sensitivity corresponding to the area of subretinal fluid.

and central retinal thickness measured 260 μm. In addition, we noticed complete resolution of inner and outer macular schisis. At the 12-month follow-up, the BCVA had decreased to 20/200, complete resolution of SRF was seen, and the central retinal thickness was 268 μm (Figure 2D). The decrease in BCVA was related to development of cataracts and improved to 20/60 after cataract surgery. The human amniotic membrane patch remained integrated in the optic nerve, as evidenced by OCT (Figure 2E). Microperimetry at 1 year postoperatively indicated a moderate decline in retinal sensitivity corresponding to the area of SRF on the previous OCT (Figure 2F).

Case 3

A 47-year-old man presented with complaints of decreased vision in his left eye. The fundus examination showed a BCVA of 4/200, and an optic pit was seen inferiorly and temporally with SRF. OCT confirmed the finding of SRF measuring 480 μm, inner retinal schisis, and central retinal thickness of 814 μm (Figure 3A). One month later, the BCVA was 20/300, and OCT showed SRF measuring 346 μm and a central retinal thickness of 814 μm (Figure 3B). Three months later, the patient's BCVA improved to 20/30, and SRF decreased to 252 μm and the central retinal thickness to 440 μm, as seen on OCT (Figure 3C). Six months later, the BCVA remained at 20/30. OCT showed complete resolution of SRF and a central retinal thickness measuring 360 μm (Figure 3D). Twelve months after presentation, the patient's BCVA was still 20/30, and OCT showed improvement in the central retinal thickness to 234 μm and resolution of inner and outer macular schisis (Figure 3E). The macula remained dry 26 months after surgery. The human amniotic membrane patch remained integrated in the pit, as evidenced by a color fundus photo of the optic nerve (Figure 3F). Microperimetry 1 year after surgery indicated a moderate decline in retinal sensitivity corresponding to the area of SRF previously seen on OCT (Figure 3H).

Throughout the 12-month follow-up period, there were no reported adverse reactions or rejection to the human amniotic membrane patch and no procedure-related complications.

Conclusions

To our knowledge, ours is the first study to use human amniotic membrane patches to drape the optic nerve pit, resulting in persistent integration of the patch that lasts more than 1 year.

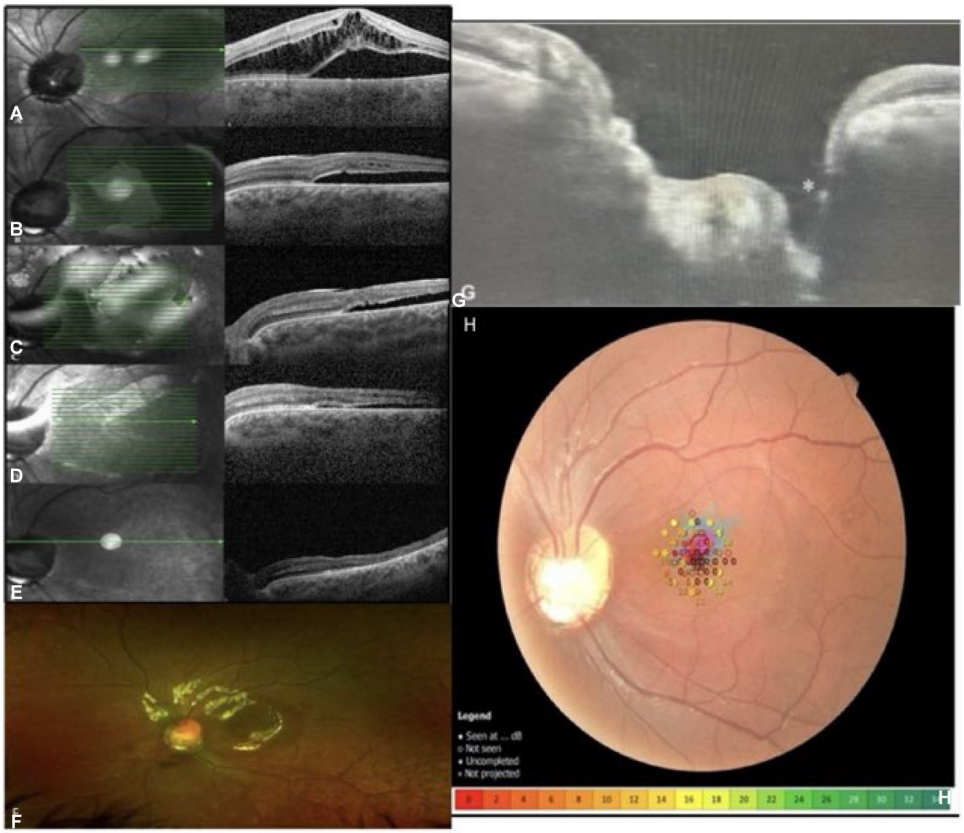

Figure 3. (A) Baseline optical coherence tomography (OCT) shows foveal thinning with outer plexiform and nerve fiber layer changes associated with exudative retinal detachment. (B) OCT at 1 postoperative month shows partial resolution. (C) OCT at 3 months. (D) OCT at 6 months. (E) OCT at 1 year. (F) Color fundus photograph shows a temporal optic disc pit with associated serous retinal detachment. (G) OCT through the optic disc demonstrates the integrated human amniotic membrane patch (*) at 26 months. (H) Microperimetry at 1 year shows reduced sensitivity corresponding to the area of prior subretinal fluid.

Newer approaches in treating optic disc pit maculopathy have shown promising outcomes amidst concerns over the high risk of traditional methods, such as juxtapapillary laser photocoagulation and associated localized photoreceptor damage.[2] Although vitrectomy with an internal limiting membrane (ILM) flap patch is a common strategy, serious complications can occur, such as MH formation in 9.2% to 50% of cases.[5] These methods have been successful in some cases, achieving up to 75% anatomic success in terms of fluid resolution, but the risk of complications and the invasive nature of the procedure pose significant risk.[2]

Techniques that use human amniotic membrane patches have emerged as effective alternatives. For instance, in a case report of a pediatric patient with optic disc pit maculopathy in whom ILM-flap surgery failed, a human amniotic membrane patch led to successful resolution of the maculopathy with improvement in VA.[6] Alternative patches, such as autologous scleral partial-thickness patches harvested from the same eye, have shown high anatomic resolution rates of 87.5% and improved VA; however, these procedures are technically challenging and carry risks related to scleral integrity and tissue dislodgment.[7] Notably in our report, the human amniotic membrane patch was used to drape the optic nerve pit and successfully resulted in complete resolution of SRF and macular schisis, as seen on OCT. For up to 26 months of follow-up, the patch remained integrated in the pit, appearing to behave similarly to the patch used in MHs. This observation illustrates the versatility of the tissue in achieving the desired effects and lends this technique to less experienced surgeons.[8,9] However, it is imperative that the perfluorocarbon bubble be carefully introduced away from the optic nerve because one of the main risks of the procedure is the bubble percolating into the optic nerve pit and, invariably, the subarachnoid space.[10]

During our functional evaluation we found that the improvement in VA after treatment did not correspond with the microperimetric evaluation of moderate reduction in retinal sensitivity. This finding could be attributed to a previous report that showed retinal sensitivity to be negatively affected by the presence of SRF and intraretinal fluid at the inner plexiform and nerve fiber layer in optic disc pit maculopathy.[11] Nevertheless, the same report showed significant recovery on follow-up after resolution of fluid, which may have appeared in our 3 cases if the microperimetry evaluation had been repeated at a later stage. This recovery was

not attained when the ILM flap technique was employed, however, further supporting our belief that the technique carries higher risks than the human amniotic membrane patch.[12]

The current study showed the potential of using a human amniotic membrane patch to treat optic disc pit maculopathy, as evidenced by significant anatomic and visual improvements. The complete resolution of SRF, a notable reduction in central retinal thickness, and stability of the patch at the 1-year follow-up suggest that the human amniotic membrane patch acts as an effective barrier against fluid intrusion while promoting retinal attachment and healing.

The promising results of this study prove very valuable for cases of optic disc pit maculopathy where traditional methods have failed. Given the lower risk for complications, particularly MHs when an ILM flap is employed, this new technique might even serve as a first-line treatment option.

The limitations of this study include the small sample size, retrospective nature, and the lack of preoperative microperimetric evaluation to further support the functional effect of treatment. Long-term follow-up beyond 1 year is needed to assess the durability of the treatment.

In conclusion, using a human amniotic membrane patch to treat optic disc pit maculopathy offers significant clinical benefits, including improved anatomic and functional outcomes. The integration of the patch by draping the optic nerve pit suggests the ease of the technique and the versatility of human amniotic membrane in achieving the desired results.

Ethical Approval

This case report was conducted in accordance with the Declaration of Helsinki. The collection and evaluation of all protected patient health information was performed in a Health Insurance Portability and Accountability Act (HIPAA)–compliant manner.

Statement of Informed Consent

Informed consent was obtained prior to performing the procedures, including permission for publication of all photographs and images included herein.

Declaration of Conflicting Interests

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References

1. Rao SL, Thool AR. A classical presentation of optic disc pits with complex maculopathy. *Cureus*. 2022;14(12):e32469. doi:10.7759/cureus.32469
2. Abouammoh MA, Alsulaiman SM, Gupta VS, et al. Pars plana vitrectomy with juxtapapillary laser photocoagulation versus vitrectomy without juxtapapillary laser photocoagulation for the treatment of optic disc pit maculopathy: the results of the KKESH International Collaborative Retina Study Group. *Br J Ophthalmol*. 2016;100(4):478-483. doi:10.1136/bjophthalmol-2015-307128
3. Rizzo S, Caporossi T, Tartaro R, et al. A human amniotic membrane plug to promote retinal breaks repair and recurrent macular hole closure. *Retina*. 2019;39(suppl 1):S95-S103. doi:10.1097/IAE.0000000000002320
4. Caporossi T, D'Amico G, Tartaro R, et al. Optic disk pit maculopathy treatment using a human amniotic membrane patch: one-year results. *Am J Ophthalmol*. 2022;240:30-36. doi:10.1016/j.ajo.2022.02.014
5. Ho TC, Chen MS, Huang JS, Shih YF, Ho H, Huang YH. Foveola nonpeeling technique in internal limiting membrane peeling of myopic foveoschisis surgery. *Retina*. 2012;32(3):631-634. doi:10.1097/IAE.0B013E31824D0A4B
6. Kelkar A, Bolisetty M. Management of recurrent optic disc pit-associated maculopathy with human amniotic membrane graft in a pediatric case. *Indian J Ophthalmol*. 2023;71(2):674. doi:10.4103/ijo.IJO_2000_22
7. Babu N, Kohli P, Ramasamy K. Comparison of various surgical techniques for optic disc pit maculopathy: vitrectomy with internal limiting membrane (ILM) peeling alone versus inverted ILM flap "plug" versus autologous scleral "plug". *Br J Ophthalmol*. 2020;104(11):1567-1573. doi:10.1136/bjophthalmol-2019-315075
8. Garcin T, Gain P, Thuret G. Epiretinal large disc of blue-stained lyophilized amniotic membrane to treat complex macular holes: a 1-year follow-up. *Acta Ophthalmol*. 2022;100(2):e598-e608. doi:10.1111/aos.14909
9. Baradad-Jurjo MC, Vela Segarra JI, Díaz-Cascajosa J, Vilimelis JC, Bassaganyas F. Intraretinal human amniotic membrane after macular hole repair. *Retin Cases Brief Rep*. 2024;18(1):129-130. doi:10.1097/ICB.0000000000001332
10. Prahs PM, Valmaggia C, Helbig H. [Subretinal silicone oil and perfluorocarbon in a patient with an optic disc pit]. *Klin Monbl Augenheilkd*. 2010;227(3):191-193. German. doi:10.1055/s-0029-1245270
11. Chen FK, Acheson JF, Franks WA, Da Cruz L. Microperimetry evidence of functional improvement after vitrectomy for optic disc pit-related intraretinal fluid without serous detachment. *Clin Exp Ophthalmol*. 2011;39(7):707-710. doi:10.1111/j.1442-9071.2011.02508.x
12. Sborgia G, Recchimurzo N, Sborgia L, et al. Inverted internal limiting membrane-flap technique for optic disk pit maculopathy: morphologic and functional analysis. *Retin Cases Brief Rep*. 2021;15(1):31-37. doi:10.1097/ICB.0000000000000731