

Fibrin glue for treatment of optic disc maculopathy

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Abstract:

We describe clinical and anatomical outcomes of optic disc maculopathy using internal limiting membrane (ILM) peeling and fibrin glue application over the optic nerve in this retrospective, interventional case series of five eyes. Extent of neurosensory detachment and foveoschisis along with foveal thickness at baseline and follow-up were evaluated. The mean age was 29 ± 10.6 years. The most common location of disc pit was temporal (3 eyes). All eyes underwent peripapillary laser with 532 nm green laser before surgery with a mean interval of 4.9 ± 1.9 months. The mean baseline and final vision was 0.68 ± 0.23 and 0.61 ± 0.33 logMAR, respectively, with a mean follow-up of 7.2 ± 3.5 months. Three eyes showed complete resorption of serous detachment, while the remaining two had reduction in schisis and subretinal fluid. None of the eyes had any complications. Glue application in addition to ILM peeling improves the visual prognosis in optic disc pit maculopathy with restoration of macular anatomy.

Keywords:

Fibrin glue, internal limiting membrane peeling, optic disc maculopathy

INTRODUCTION

Optic disc pit (ODP) is a rare congenital colobomatous anomaly of the optic nerve. Often asymptomatic, ODP may result in visual field defects or progressive central visual loss in the presence of ODP-maculopathy (ODP-M). This entity may cause serous macular detachment with or without schisis of the inner- and outer-retinal layers resulting in severely reduced vision and progressive inner- and outer-retinal atrophy.^[1,2]

The origin of submacular fluid may be cerebrospinal fluid from the subarachnoid space that enters through the pit.^[3] Others postulate that subretinal fluid may arise from vitreous entering the subretinal space.^[4] Some authors argue that subretinal fluid represents leakage from peripapillary blood vessels or from the choroid circulation that enters through the Bruch's membrane.^[5] Several surgical techniques, including pars plana vitrectomy (PPV) with and without laser, gas tamponade, and/or internal limiting membrane (ILM) peeling, have been reported with variable success.^[6,7] Direct sealing

of the optic pit has previously been reported in small sample studies using autologous platelets^[8,9] and autologous scleral flap^[10] or by eversion of the ILM into the pit as a seal.^[11] Challenges associated with surgical methods for closure include delayed re-attachment, long recovery times, and recurrent maculopathy.^[3,12]

We describe the clinical and anatomical outcomes of a novel approach in treatment of ODP-M, employing intravitreal Tisseel glue in combination with PPV, ILM peeling, and gas tamponade for serous macular detachments associated with ODPs.

CASE REPORTS

Case 1

A 49-year-old male presented with diminution of vision and a best-corrected visual acuity (BCVA) of 20/200. Fundus examination and baseline optical coherence tomography (OCT) confirmed the presence of ODP-M with schisis and neurosensory detachment (NSD) (a). Postoperative 3-month follow-up, OCT showed complete resolution of NSD with reduction in schisis (b). At 6 months, schisis has almost resolved with retinal thinning (c). BCVA was maintained at 20/200 [Figure 1].

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Case 2

A 28-year-old male presented with diminution of vision and a visual acuity of 20/50. Fundus examination showed the presence of NSD with ODP (a). OCT showed schisis and NSD (b). Postoperative 3-month follow-up, there was an increase of schisis and NSD (c). At 6 months, schisis reduced with flattening of NSD (d). At 12 months, the retina was anatomically flat with few cystoid spaces (e) [Figure 2].

Surgical technique

A standard three-port 23G PPV was performed, during which a core vitrectomy was followed by posterior hyaloid separation using the vitreous cutter. The posterior vitreous detachment was carefully extended around the optic nerve, across the macula, and into the mid-periphery. Next, the ILM was stained with brilliant blue G dye (0.025%) and was peeled off from the macula, nasally toward the disc pit followed by fashioning of the ILM flaps onto the pit. Tisseel fibrin sealant glue was prepared according to the manufacturer’s instructions and was dripped over the optic nerve. Then, a gas-air exchange was performed with 16% perfluoropropane (C3F8). Patients were instructed to assume prone position for 5 days. All the surgeries were performed by a single surgeon (JC).

Five eyes of five patients (including case 1 and 2) with a mean age of 29.4 ± 10.6 years (range 12–49 years) were included in the analysis. Written informed consent was obtained from all the study eyes. Ethical clearance was obtained from the institutional review board. The study conformed to the tenets

of the Declaration of Helsinki. All patients were male. Bilateral disc pit was noted in one patient. The most common location of disc pit was temporal (3 eyes). One eye had two disc pits (superotemporal and inferonasal). All eyes had undergone laser photocoagulation to temporal margin of optic disc using 532 nm laser with no resolution significant anatomical or visual benefits. The mean interval between the laser and surgery was 4.9 ± 1.9 months. Table 1 demonstrates the clinical characteristics and treatment outcomes of study eyes.

The mean baseline BCVA was 0.68 ± 0.23 logMAR (Snellen’s equivalent 20/100) which improved to 0.61 ± 0.33 logMAR (Snellen’s equivalent 20/80) at the last follow-up. The mean follow-up duration was 7.2 ± 3.5 months. Three eyes showed complete resorption of serous detachment, and the remaining two had reduction in schisis and subretinal fluid with visual acuity improvement at the last follow-up.

DISCUSSION

We describe the successful treatment of ODP-M utilizing Tisseel glue with PPV, ILM peeling, and gas tamponade. Other groups have also reported the use of Tisseel and Evicel (Ethicon, Somerville, NJ, USA) tissue sealants with PPV and gas tamponade without ILM peel or removal of peripapillary vitreous in a small series of four and three eyes, respectively, with stable outcomes.^[13,14] The advantage of this surgical technique is the relatively rapid postoperative results both functionally and anatomically. In our series, patients

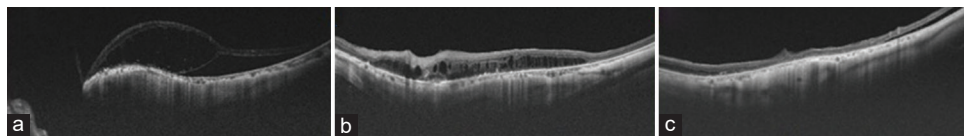


Figure 1: Optical coherence tomography images of patient 1 at baseline (a), 3-month (b), and 6-month (c) postoperative period

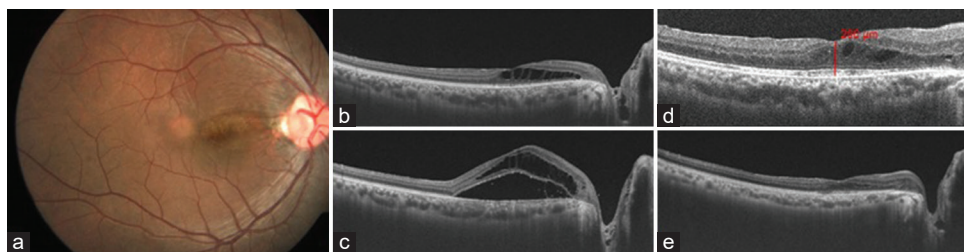


Figure 2: Preoperative fundus photograph (a) and optical coherence tomography (b) of patient 2. Postoperative optical coherence tomography scans at 3 (c), 6 (d), and 12 months (e), respectively

Table 1: Clinical characteristics and treatment outcomes of study eyes

Case	Age (years)	BCVA		NSD height (μ)		Schisis extent		CMT (μ)		Follow-up (months)
		Baseline	Final	Baseline	Final	Baseline	Final	Baseline	Final	
1	49	20/200	20/200	367	Absent	Till fovea	Nasal to fovea	454	81	6
2	24	20/80	20/200	406	541	Nasal to fovea	Nasal to fovea	586	742	3
3	28	20/50	20/30	441	Absent	Till fovea	Till fovea	727	241	12
4	34	20/200	20/80	Absent	Absent	Till fovea	Absent	125	264	12
5	12	20/50	20/40	732	166	Till fovea	Till fovea	824	447	3

BCVA=Best corrected visual acuity; NSD=Neurosensory detachment; CMT=Central macular thickness

gained an average of three lines at 6 months postoperatively. Three eyes in our series showed complete resorption of serous detachment, with a mean time interval at complete resolution being 7 months. This may reduce the risk of retinal pigment epithelium and retinal atrophy.

Various authors have described inverted autologous ILM graft for ODP-M, which have shown comparable outcomes.^[10,11] Future studies comparing the efficacy of ILM abrasion with vitreous removal alone or in adjunct with fibrin glue could further help elucidate the individual effect of either surgical factor to successful closure of ODP-M.

Tisseel glue is widely used in ocular surgery with no directly reported retinal toxicity.^[13-15] However, long-term studies in eyes with ODP-M treated with tissue glue using electroretinography and progressive visual field testing may provide further insight into the long-term safety of its intravitreal use. The main drawback to the use of Tisseel and other fibrin glues is the potential risk of viral transmission and high cost.^[15] Other limitations of our study include small sample size with no comparative group of Tisseel glue without ILM peeling or any other surgical intervention. In conclusion, our series report encourages outcomes and faster recovery of retinal architecture following Tisseel glue and ILM peeling for ODP-M.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to be reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

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