Case Series

23-Guage Pars Plana Vitrectomy with Small-sized Autologous Internal Limiting Membrane Flap for Optic Disc Pit Maculopathy

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Abstract

Background: Optic disc pit maculopathy, although a rare condition, often leads to irreversible visual loss if left untreated. A few treatment options have been reported, but there is presently no set protocol for treatment of this condition. The surgical management of two patients with optic disc pit maculopathy is presented.

Method: We reviewed the pre-operative and post-operative visual acuity, the pre-operative and post-operative macula optical coherence tomography of both patients, and the surgical techniques performed.

Findings: Pars plana vitrectomy with autologous internal limiting membrane flap resulted in resolution of optic disc pit maculopathy

Conclusion: Prompt surgical intervention is necessary to optimize visual prognosis. We suggest pars plana vitrectomy with internal limiting membrane flap and gas endo-tamponade.

Keywords: Optic disc pit maculopathy, pars plana vitrectomy, internal limiting membrane flap, gas endo tamponade.

Introduction

Optic disc pit (ODP) is a rare condition that presents in 1 out of 11,000 persons.[1] Although usually asymptomatic, 25-75% of patients with ODP will develop its associated maculopathy, especially when the ODP is temporally located.[1] The size and the location of the ODP are important in determining the development of its associated maculopathy. Larger and temporal pits are implicated the most in the development of ODP-maculopathy.[1,2] While the exact source of the sub-retinal fluid in the development of ODP-maculopathy is yet to be fully ascertained and with numerous etiologies suggested, the ODP becomes the communication channel between the sub-retinal space and the vitreous cavity.[3]

For prophylaxis, laser photocoagulation has been used to seal off temporally-located ODPs to prevent the development of ODP-maculopathy.[3] However, this has been to varying effect. Pars plana vitrectomy (PPV) has been the main stay for definitive treatment. Adjuvant surgical techniques like sub-retinal fluid drainage, laser photocoagulation and the use of gas endo-tamponade have been used and reported.[4-6]

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We report the use of an autologous internal limiting membrane (ILM) flap to plug the ODP during PPV and gas-endotamponade in treating an eye with ODP-maculopathy.

Case Report 1

A 25 year old female presented to us with a 2 year history of sudden onset of poor vision in her left eye. There was no further significant ocular or systemic history. On examination, visual acuity was counting finger at 1 meter, with no improvement with pin-hole. Anterior segment findings were normal. Fundus examination showed a temporally located optic disc pit with neurosensory retinal detachment of the macula. Findings on her right eye were normal. Optical coherence tomography of her left macular revealed neurosensory retinal detachment and retinoschisis of the macula, and with central macular thickness of 987μm. She was billed to have pars plana vitrectomy with internal limiting membrane peeling and perfluoropropane (C_3F_8) gas under local anesthesia.

Three 23-guage transconjunctival sclerotomy ports were made to receive and anchor the infusion cannula, the vitrectomy cutter and the light probe. Posterior vitreous detachment was induced and vitrectomy was completed. This was confirmed by intra-vitreal injection of preservative-free triamcinolone. Fluid-air exchange was done and the ILM stained with reti-blue. ILM peeling was done, beginning from temporal to the fovea and advancing towards the disc, while leaving a pedicle of the flap attached to the temporal aspect of the optic nerve head to ensure that the flap is not lost in the vitreous cavity. The ILP flap was inverted and stuck into the optic disc pit. Fluid-air exchange was done and C_3F_8 was injected into the vitreous cavity as endo-tamponade. Scleral ports were closed with 7-0 vicryl suture. The patient was made to maintain a 3-day 'face-down' position after surgery.

Four weeks post-operative OCT done showed some resolution of the sub-retinal fluid, with central macular thickness of 511μm. OCT at 9 weeks post-op showed an almost complete resolution of the sub-retinal fluid and with a central macular thickness of 381μm. Visual acuity was improved to 3/60 on Snellen's chart. There was no improvement with pin-hole.

Case report 2

A 50 year old female presented with a three week history of sudden visual deterioration of her left eye. Visual acuity on the left eye was counting fingers at 2 meters (with no improvement with pi -hole. Further ophthalmic examination revealed a normal anterior segment, a temporally located optic disc pit and neurosensory retinal detachment of the macula. The right eye was essentially normal. OCT of her left macular revealed neurosensory retinal detachment and retinoschisis of the macula, and with central macular thickness of 1111μm.

With the same procedure described above, she then had pars plana vitrectomy with internal limiting membrane peeling and perfluoropropane (C_3F_8) gas under local anesthesia. OCT at 16 weeks post-op showed an almost complete resolution of the sub-retinal fluid. Visual acuity was improved to 6/36 on Snellen's chart. There was no improvement with pin-hole.

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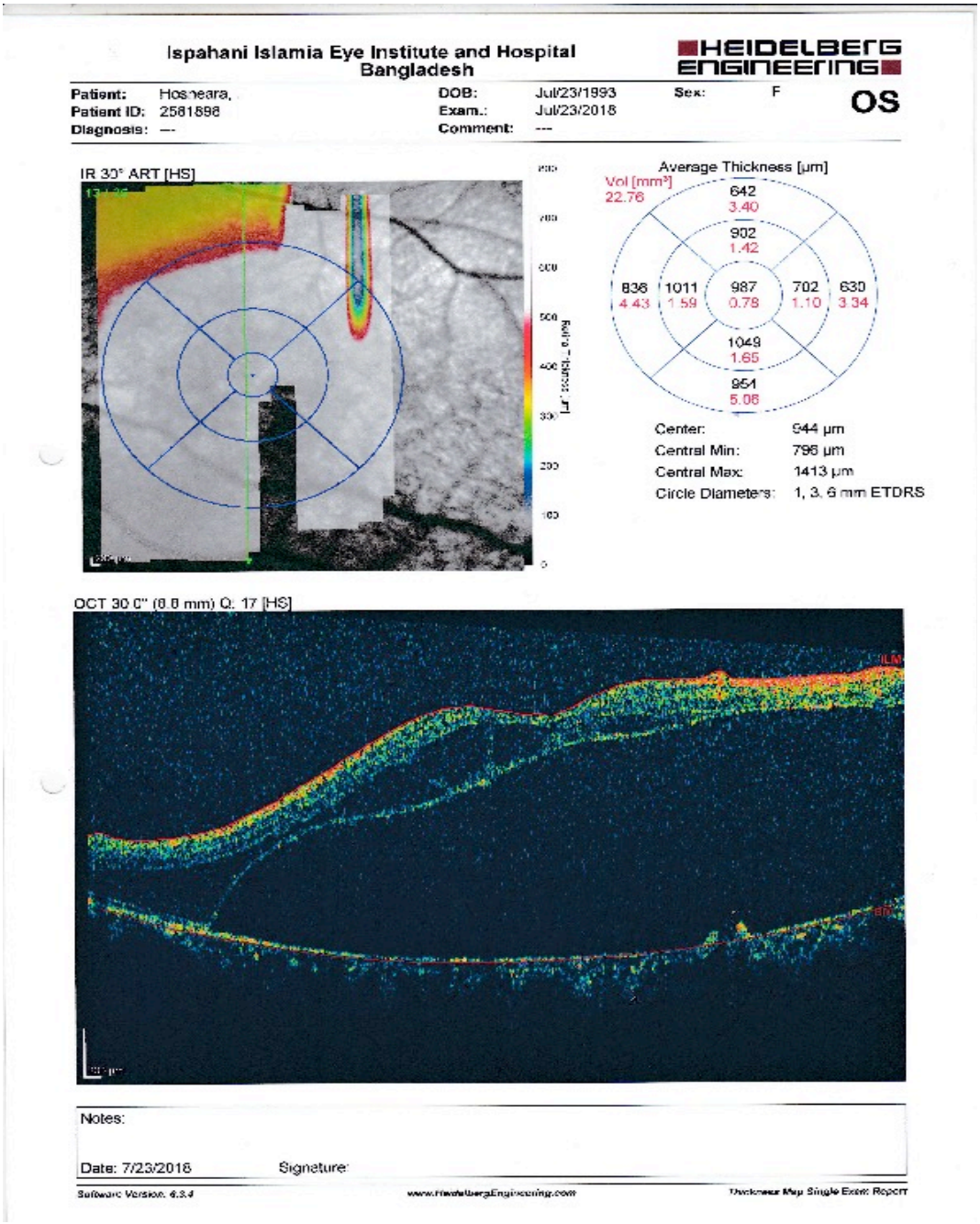

Figure 1: Showing pre-operative OCT findings in a 25 year old female with optic disc pit maculopathy.

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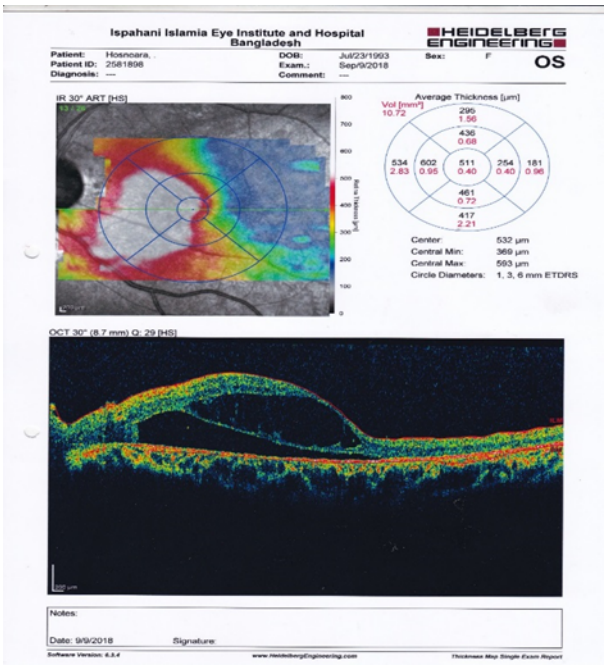

Figure 2a: Showing post-operative OCT findings at 4 weeks post-operative in a 25-year-old female with optic disc maculopathy.

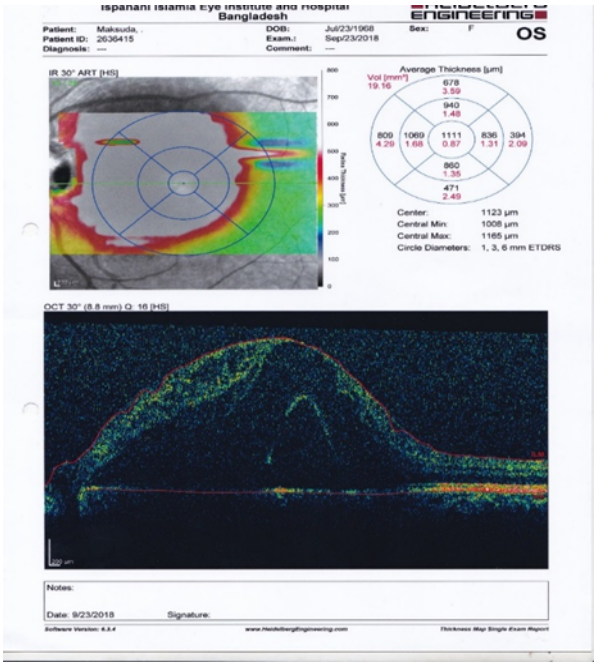

Figure 3a: Shows pre-operative OCT in a 50 year old female with ODP maculopathy.

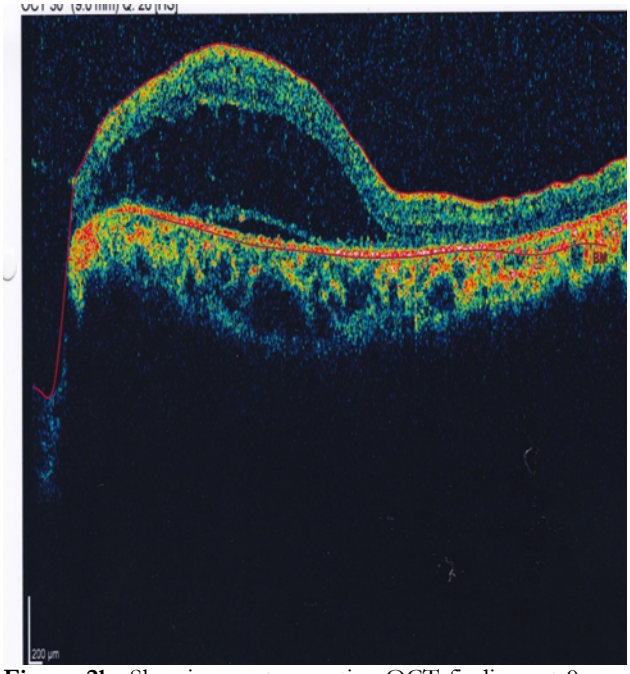

Figure 2b: Showing post-operative OCT findings at 9 weeks post-operative in a 25-year-old female with optic disc maculopathy.

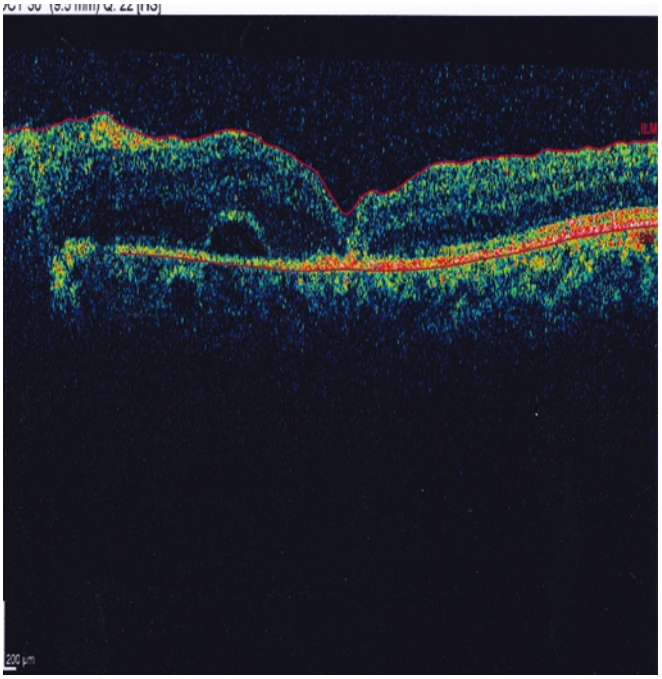

Figure 3b: Shows 16 week post-operative OCT in a 50 year old female with ODP maculopathy.

Discussion

In their natural history, up to 75% of cases of temporal ODPs result in maculopathy causing poor vision.[1,3]

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Spontaneous resolution of ODP maculopathy is known to occur after spontaneous posterior vitreous detachment. However, this does not often translate to improvement in visual acuity.[1] Over time, and without any intervention, patients with resolved ODP maculopathy would experience a decline in their visual acuity up to 6/60 or worse[1-3] Thus, improving the chances of visual recovery in patients with ODP-maculopathy necessitates intervention.

OCT done for the patients in this report showed two levels of retinal separation: at the outer plexiform layer (retinoschisis) and between the neurosensory retina and retinal pigment epithelium (neurosensory retinal detachment). ODP maculopathy is seen to often involve two level of retinal separation. Studies using optical coherence tomography have shown that fluid tracking in through the ODP often separate the inner and outer retinal layers, resulting in an inner retinal schisis before a retinal detachment.[1-3] Findings from the macula OCT done for these patients helped to confirm that separation at the different levels of the retina in the macula area is largely responsible for the presenting poor vision. Although, the presence of sub-retinal and intra-retinal fluid as the implicated agent for ODP maculopathy has been established, the exact source is still largely theoretical. The presence of late hyper-fluorescence of the optic disc pit during fundus fluorescein angiography has led to the suggestion that leaky vessels on the ODP were the source of the sub-retinal fluid.[7] Another theory is that the sub-retinal fluid is from the choroid via the Bruch's membrane to the sub-retinal space.[1] The two most plausible theories of the source of the sub-retinal fluid in ODP maculopathy are from the subarachnoid space and from the vitreous cavity.[1] Kuhn et al reported a case of migration of silicon oil from the vitreous cavity to the subarachnoid of a patient with ODP.[8] On the basis of this interaction between the vitreous cavity and the subarachnoid space through the ODP, it became theorized that a reverse flow of cerebrospinal fluid from the subarachnoid space through the ODP could track into the sub-retinal space of the macula. The theory of the vitreous cavity causing the accumulation of the sub-retinal fluid proposes that traction of the vitreous on the posterior pole could generate a negative pressure in the optic nerve head and in the sub-retinal space of the macula.[1] This could lead to inflow of fluid from the posterior vitreous into the sub-retinal space through the ODP, causing retinoschisis and retinal detachment in the macula.[1]

On the basis of ODP maculopathy occurring as a result of tangential vitreo-macular traction, we performed 23-guage pars plana vitrectomy with ILM flap plugging of optic disc pits and C_3F_8 gas endo-tamponade with a compulsory 'face-down' position for three days after surgery. Post-operative assessment of the patient showed steady resolution of the sub-retinal fluid. In two series of studies by Hirakata et al,[4-5] complete resorption of sub-retinal fluid with subsequent retinal re-attachment was seen in 10 out of 11 eyes and 7 out of 8 eyes after 12 months and 16 months respectively. Also, the adjuvant use of C_3F_8 gas endo-tamponade with pars plana vitrectomy has been used. The patient would be expected to maintain a "face-down" position in the immediate post-operative period. The expansive intra-vitreal gas would act as tamponade, giving a directly opposite effect on the macula as vitreo-macular traction would. The idea is that the endo-tamponade effect of C_3F_8 would facilitate resorption of sub-retinal fluid, and enhance retinal re-attachment and visual improvement. Of note is that Teke et al in his study found out that there was no difference in eventual post-operative visual outcome and macular anatomical restoration in eyes that had PPV alone and the ones that had PPV and intra-vitreal injection of gas.[9] Nonetheless, Coca et al reported re-detachment occurring several years after PPV alone.[10] Thus, removal of vitreo-macular traction alone by monotherapy may not suffice.

In the cases in this report, we used inverted ILM flap to seal the optic disc pits. This was aimed at halting the communication between the sub-retinal and intra-retinal spaces and the vitreous cavity via the optic disc pit in both cases. We ensured that a pedicle of ILM flap was left attached to the optic nerve head to prevent the loss of the ILM flap in the vitreous cavity. Fibrin sealant and autologous scleral flaps[1] have been reported as materials used for this adjuvant intra-operative technique.[11] However, the use of autologous ILM was considered and performed in our cases due to the advantage of reduced post-operative traction on the macula that ILM peeling could offer. Also, we considered the possible effective sealing effect that ILM flap could have on the optic disc pit due to its similar physiological properties with the other structures at the posterior pole.

Implications of the finding: Due to its rarity, there is no set protocol of the management of optic disc pit maculopathy. This study however highlights the need for the collaboration between the neuro-ophthalmologist and vitreo-retinal surgeon in the management of optic disc pit. Routine macula OCT should be done during follow-up, especially in the presence of visual deterioration to ensure early diagnosis of sub-retinal and intra-retinal fluid. Prompt surgical intervention of optic disc pit maculopathy with pars plana vitrectomy with inverted ILM flap and gas endo-tamponade should be carried out once the diagnosis of ODP maculopathy is

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made, followed by proper counseling on visual prognosis.

Limitations of the study: although both cases were performed with the same techniques and by the same surgeon, the small number of cases (two) would not be sufficient in establishing a protocol and advantages of this surgical technique over others in the management of optic disc pit maculopathy.

Conclusion

Due to its rarity, optic disc pit and optic disc pisc maculopathy could easily be missed or diagnosed as other conditions. Early diagnosis of ODP maculopathy and prompt intervention is required to optimize visual prognosis.

Ethical Consideration: This work was carried out in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki Declaration of 1975, as revised in 2000.

Conflict of interest: There was no conflict of interest**.**

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Authors Contribution: Pathan performed the surgeries and prepared the Introduction and Methods. Otabor-Olubor prepared the discussion and was in communication with Dr Pathan during the correspondence.

References

1. Moisseiev E, Moisseiev J, Loewenstein A. Optic disc pit maculopathy: when and how to treat? A review of the pathogenesis and treatment options. International journal of retina and vitreous. 2015;1(1):1-9.
2. Qayum S, Sullivan T, Park SC, Merchant K, Banik R, Liebmann JM, Ritch R. Structure and clinical significance of central optic disc pits. Ophthalmology. 2013;120(7):1415-1422.
3. Postel EA, Pulido JS, McNamara JA, Johnson MW. The etiology and treatment of macular detachment associated with optic nerve pits and related anomalies. Transactions of the American Ophthalmological Society. 1998; 96:73 – 93.
4. Hirakata A, Okada AA, Hida T. Long-term results of vitrectomy without laser treatment for macular detachment associated with an optic disc pit. Ophthalmology. 2005;112(8):1430-1435.
5. Hirakata A, Inoue M, Hiraoka T, McCuen II BW. Vitrectomy without laser treatment or gas tamponade for macular detachment associated with an optic disc pit. Ophthalmology. 2012;119(4):810-818.
6. Abouammoh MA, Alsulaiman SM, Gupta VS, Mousa A, Hirakata A, Berrocal MH, Chenworth M, Chhablani J, Oshima Y, AlZamil WM, Casella AM. 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. British Journal of Ophthalmology. 2016;100(4):478-483.
7. Georgalas I, Ladas I, Georgopoulos G, Petrou P. Optic disc pit: A review. Graefes Arch Clin Exp Ophthalmol. 2011; 249: 1113–1122.
8. Kuhn F, Kover F, Szabo I, Mester V. Intracranial migration of silicone oil from an eye with optic pit. Graefe's Archive for Clinical and Experimental Ophthalmology. 2006;244(10):1360-1362.
9. Teke MY, Citirik M. 23 gauge vitrectomy, endolaser, and gas tamponade versus vitrectomy alone for serous macular detachment associated with optic disc pit. American journal of ophthalmology. 2015;160(4):779-785.
10. Coca MN, Tofigh S, Elkeeb A, Godley BF. Optic disc pit maculopathy recurring in the absence of vitreous gel. JAMA Ophthalmology. 2014; 132:1375–1376.
11. Kumar N, Al Sabti K. Fibrin glue in ophthalmology. Indian J Ophthalmol. 2010; 58:176.

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