

Case Report

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Subretinal Tissue Glue Injection in Surgery of Macular Detachment Associated With Congenital Optic Disc Pit

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Abstract

Congenital optic disc pit is a rare finding that develops from incomplete closure of the embryonic choroid fissure. Maculopathy is a major cause of visual deterioration. The treatment of the macular detachments associated with congenital optic disc pits remains controversial however it is emphasized that rerouting fluid from subretinal space may be efficient method. Main drawback of commonly use surgical methods is slow reabsorption of fluid taking weeks or even months. We report a different surgical approach in 2 patients consisting of vitrectomy, subretinal tissue glue injection followed by gas tamponade that allowed achieving very fast functional and anatomic recovery within 1 month.

Keywords: Congenital optic disc pit; Maculopathy; Surgery of macular detachment; Tissue glue; Subretinal fluid

Introduction

Congenital optic disc pit is rare finding that develops from incomplete closure of the embryonic choroid fissure. Retinal detachment observed in 50%-75% of cases may involve the passage of vitreous fluid to the subretinal space. Other potential sources of fluid influx may be subarachnoid space or abnormal blood vessels at the base of the optic disc pit [1,2]. It is suggested that vitreous macular traction play a vital role in the pathogenesis of optic disc pit maculopathy [3]. Many surgical options have been proposed so far however it is emphasized that rerouting fluid influx from the subretinal space may be the most efficient treatment [4,5]. Our report of 2 cases presents different surgical approach consisting of vitrectomy with aspiration of subretinal fluid and subretinal tissue glue injection followed by SF6 gas tamponade that allowed achieving dramatic functional and anatomic improvement within 1 month.

Case 1

A 22 year old woman presented with a history of painless; progressive reduction of central vision of the right eye of 3-month duration. There was no history of trauma. Her medical history was not significant. At the time of examination the best corrected visual acuity (BCVA) was Vod=0.2 and 0.05 in contralateral amblyopic eye; respectively. Fundoscopy revealed optic disc pit located laterally and retinal detachment in macula. In SOCT images herniated dysplastic retina extending deeper into the pit and remnants of Cloquet's canal was observed (Figure 1).



Figure 1: SOCT imaging within optic disc in patient with maculopathy associated with congenital optic disc pit.

Surgical techniques comprised 23 G vitrectomy with posterior vitreous detachment. Active aspiration of subretinal fluid using 38 G cannula followed by subretinal tissue glue injection (TISSEL Lyo. Baxter) were performed. To keep the injection needle unblocked the components of tissue glue was injected sequentially (protein sealant solution followed by thrombin agent solution). Fluid air exchange; laser retinopexy around injection site and 20% SF6 gas tamponade concluded surgery (Figures 2 and 3).

There was no face down positioning post op. After 2 weeks of follow up the visual acuity gained to 0.7 with residual; small portion of subretinal fluid located extrafoveally (Figure 4). After 1 month full reattachment of macula with regaining 1.0 visual acuity was observed (Figure 5).

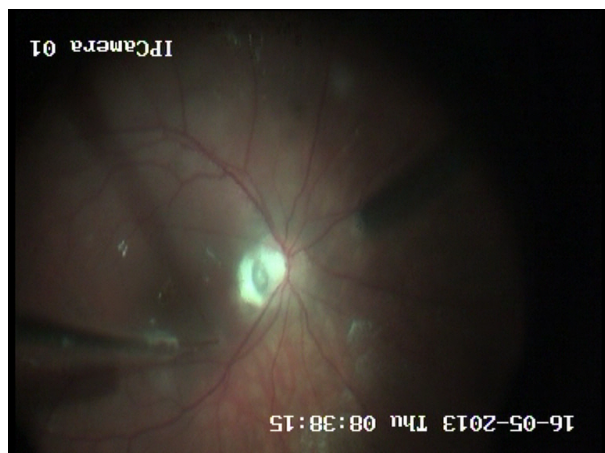


Figure 2: Injection of two components of tissue glue under the retina using 38 G cannula.

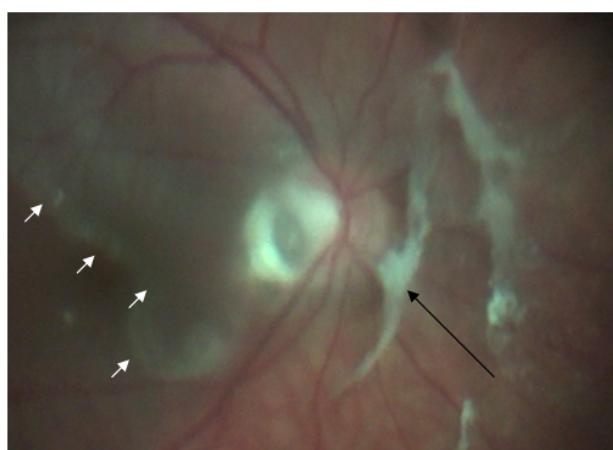


Figure 3: Well demarcated clot of tissue glue surrounding fovea (white arrows); extending backward through the pit on the surface of the disc and retina (black arrow).



Figure 4: SOCT image 2 weeks postoperatively showed partially reattached macula and residual extrafoveal subretinal fluid.

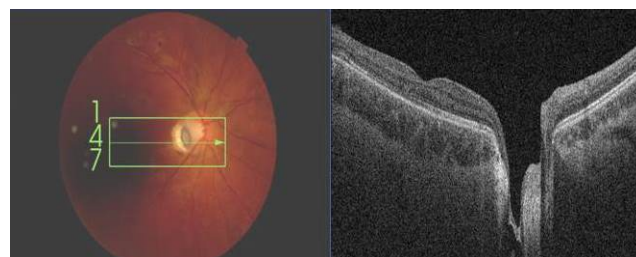


Figure 5: The SOCT image of complete recovery 1 month postoperatively.

Case 2

19 year old man, suffered from sudden, significant decrease of visual acuity 0.1 with his left eye. There was a small, temporal inferiorly located congenital optic disc pit and macular detachment. In SOCT images herniated dysplastic retina connected with posterior vitreous traction, retinoschisis and macular detachment was observed (Figures 6a, 6b and 6c).

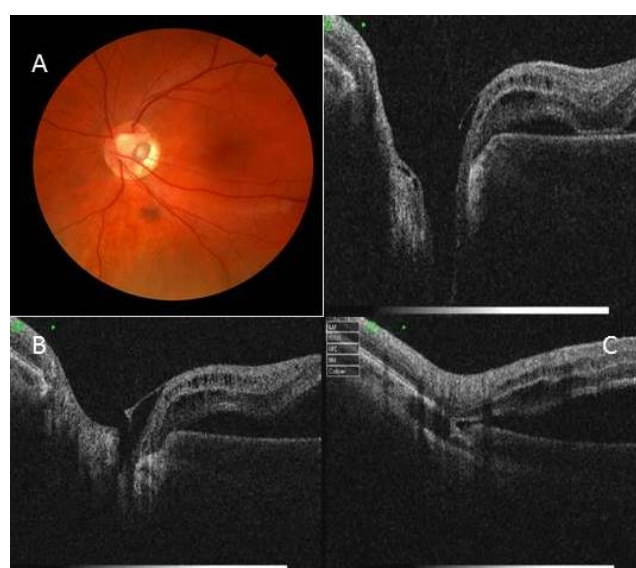


Figure 6: Small, temporal inferiorly located congenital optic disc pit associated with macula detachment (case 2) and series of SOCT images **a.** optic disc pit with herniated dysplastic retina; **b.** posterior vitreous traction in the projection of optic disc pit, retinoschisis **c.** communication fistula between the pit and subretinal/ intraretinal space (white arrow).

Three weeks after PPV with subretinal tissue glue injection patient presented 0.9 visual acuity with only residual subretinal fluid left temporally that eventually disappeared 2 weeks later. (Figures 7 and 8) There is no anatomical and functional changes; in both cases in 2 years follow up.

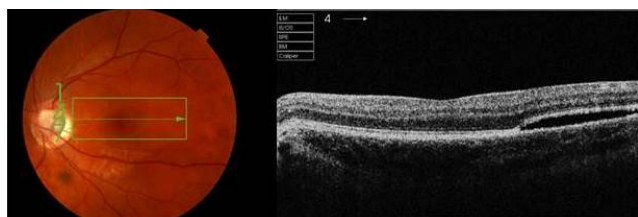


Figure 7: Significant anatomical and functional recovery with residual extrafoveal fluid is seen 3 weeks postoperatively.

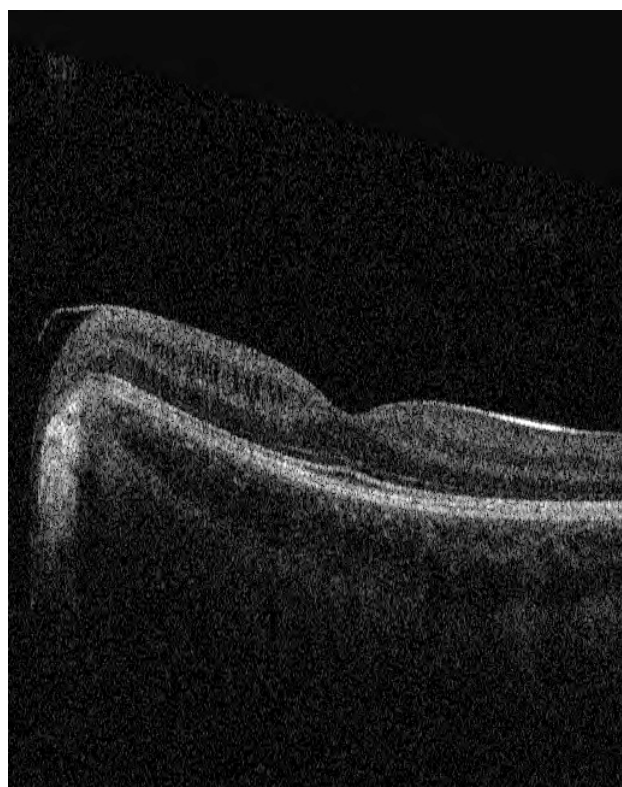


Figure 8: Complete reattachment of the macula 5 weeks postoperatively.

Discussion

Maculopathy associated with congenital optic disc pit remains enigmatic entity in terms of source of fluid flowing in the subretinal/intraretinal spaces. Based on dynamic pressure gradient theory the difference between cerebro- spinal (c-s) fluid and IOP or pressure fluctuation moves fluid under the retina when there is hole created in the bottom of the disc pit. It is emphasized that optic disc pit can act like a syringe aspirating vitreous fluid when the c-s pressure decreases and injects aspirated fluid when the pressure raises [6-9]. Pathogenesis of maculopathy associated with congenital optic disc pit seems to be completed as the vitreous traction hypothesis is taken into account. It is suggested that traction exerted by posterior vitreous induces small tear in transparent collagen-lined pocket of the herniated dysplastic

retina opens the hole for fluid movement [10-12]. Presence of remnants of Cloquet's canal extending to the pit margin; or fibers of posterior vitreous moving downwards to the optic disc pit; (also seen in our SOCT images) potentially confirm the aforementioned traction mechanism [13]. While it is generally accepted that fluid enters the subretinally/ intraretinally via the optic disc pit it is stressed that the most efficient method of treatment should be rerouting fluid influx from the subretinal space.

To date surgical treatment proposed in such cases comprised some options. Submacular buckle technique has been reported to achieve complete resolution of fluid in about 85% of cases; significant improvements in visual acuity and visual field as well as maintaining results for over 10 years; with very low rates of complications or recurrences [14]. The predominant approach for the treatment of optic disc pit maculopathy is pars plana vitrectomy (PPV). Numerous attempts to improve this technique have been proposed e.g. posterior vitreous detachment; gas tamponade; active subretinal drainage; ILM peeling or peripapillary laser retinopexy. Gas tamponade has been performed in the vast majority of cases; as it is used to create a temporary barrier blocking the passage of fluid thorough the optic disc pit. In a series of 10 patients treated with PPV; laser and gas tamponade; visual improvement was achieved in 90% and complete resolution of fluid in 70% [15]. Hirakata et al. reported on 11 optic disc pit maculopathy patients treated with PPV; induction of PVD and gas tamponade without laser; achieving complete resolution of fluids in 10 of them [16]. A few cases of PPV submacular drainage and gas tamponade has been reported to achieve good results which was maintained over 2 years since surgery [17]. It has been suggested that peeling the internal limiting membrane is important component of the surgical treatment increasing rate of successful resolution of optic disc pit maculopathy [18]. On the other hand conclusions of EVRS Optic Pit Multicentre Study conducted in 2014 underline the PPV or PPV with nonexpendable gas tamponade; laser photocoagulation without ILM peeling is highly recommended in these cases [19,20]. There are several reports suggested sealing of the optic disc pit during surgery prevents passage of fluid into the subretinal spaces. Techniques designed to seal the optic disc pit include injection of autologous platelets; covering optic disc pit with ILM inverted flap; tissue glue pit sealing; autologous sclera pit clotting [21,22]. In turn the results of fenestration of internal retina (partial thickness retinotomy) show complete resolution of foveal fluid in 94% of eyes; with significantly improved of visual acuity in 56% of cases [23].

The main drawback of currently used surgical techniques is slow reabsorption of subretinal fluid taking weeks or even months that in turn can diminish final functional results. To the best of our knowledge the subretinal tissue glue injection combined with PPV an active subretinal fluid aspiration and SF6 tamponade was not use previously [24].

Conclusion

We think that presented technique realizes the thesis of rerouting fluid from subretinal space arresting the subretinal fluid influx efficiently and making macula reattach within very short period of time. It is elegantly seen in surgery pictures that a white tissue glue clot fills the subretinal space and flows backward through the fistula on the optic disc and retina surface. From the surgical point of view the sequential injection of two different components of tissue glue is imposed by the potential clotting effect within the small gauge cannula. Moreover; based on our experience the injection should be performed

after fluid aspiration with macula partially pressed by PFCL. This helps guide the tissue glue directly to the fistula fencing off the macular area from the optic disc pit and make the clot and retina contour flat. While assume that tissue glue injection acts as a barrier between the optic disc pit and the subretinal space there are concerns whether the time of subretinal clot dissolution (according to Panda A., the glue dissolve over a two weeks period) [25] will be sufficient for permanent retinal reattachment and if its subretinal location allow for stable improvement of visual acuity. However presented cases showed very fast recovery without recurrences in 2 years follow up the further studies are required to evaluate this technique; although the implementation of large- series studies remains a challenge because of the rarity of cases of optic disc pit maculopathy.

References

- Maia OO Jr, Soriano DS, Takahashi WY, Suzuki H (2008) Surgical treatment of macular detachment secondary to congenital pit of the optic disc: case report. *Arq Bras Oftalmol* 71: 874-877.
- Ohno-Matsui K, Hirakata A, Inoue M, Akiba M, Ishibashi T (2013) Evaluation of congenital optic disc pits and optic disc colobomas by swept-source optical coherence tomography. *Invest Ophthalmol Vis Sci* 54: 7769-7778.
- Kuhn F, Kover F, Szabo I, Mester V (2006) Intracranial migration of silicone oil from an eye with optic pit. *Graefes Arch Clin Exp Ophthalmol* 244: 1360-1362.
- Lee PY, HM, Wang TJ (2012) Optic disc pit combining with an optic nerve cyst. A case report. *Taiwan J Ophthalmol* 2: 31.
- Friberg TR, McLellan TG (1992) Vitreous pulsations, relative hypotony, and retrobulbar cyst associated with a congenital optic pit. *Am J Ophthalmol* 114: 767-769.
- Dithmar S, Schuett F, Voelcker HE, Holz FG (2004) Delayed sequential occurrence of perfluorodecalin and silicone oil in the subretinal space following retinal detachment surgery in the presence of an optic disc pit. *Arch Ophthalmol* 122: 409- 411.
- Jain N, Johnson MW (2014) Pathogenesis and treatment of maculopathy associated with cavitary optic disc anomalies. *Am J Ophthalmol* 158: 423-435.
- Bonnet M (1991) Serous macular detachment associated with optic nerve pits. *Graefes Arch Clin Exp Ophthalmol* 229: 526-532.
- Johnson TM, Johnson MW (2004) Pathogenic implications of subretinal gas migration through pits and atypical colobomas of the optic nerve. *Arch Ophthalmol* 122: 1793-1800.
- Akiba J, Kakehashi A, Hikichi T, Trempe CL (1993) Vitreous findings in cases of optic nerve pits and serous macular detachment. *Am J Ophthalmol* 116: 38-41.
- Hirakata A, Hida T, Wakabayashi T, Fukuda M (2005) Unusual posterior hyaloid strand in a young child with optic disc pit maculopathy: intraoperative and histopathological findings. *Jpn J Ophthalmol* 49: 264-266.
- Theodossiadis PG, Grigoropoulos VG, Emfietzoglou J, Theodossiadis GP (2007) Vitreous findings in optic disc pit maculopathy based on optical coherence tomography. *Graefes Arch Clin Exp Ophthalmol* 245: 1311-1318.
- Akiba J, Yoshida A, Ohta I, Igarashi H, Kakehashi A (1993) Anomalous Cloquet's canal in a case of optic nervehead coloboma associated with extensive retinal detachment. *Br J Ophthalmol* 77: 381-382.
- Theodossiadis GP, Chatziralli IP, Theodossiadis PG (2015) Macular buckling in optic disc pit maculopathy in association with the origin of macular elevation: 13-year mean postoperative results. *Eur J Ophthalmol* 25: 241-248.
- Taiel-Sartral M, Mimoun G, Glacet-Bernard A, Delayre T, Coscas G (1996) [Vitreotomy-laser-gas for treating optic disk pits complicated by serous macular detachment]. *J Fr Ophthalmol* 19: 603-609.
- Hirakata A, Okada AA, Hida T (2005) Long-term results of vitrectomy without laser treatment for macular detachment associated with an optic disc pit. *Ophthalmology* 112: 1430-1435.
- Ziahosseini K, Sanghvi C, Muzaffar W, Stanga PE (2009) Successful surgical treatment of optic disc pit maculopathy. *Eye (Lond)* 23: 1477-1479.
- Ishikawa K, Terasaki H, Mori M, Sugita K, Miyake Y (2005) Optical coherence tomography before and after vitrectomy with internal limiting membrane removal in a child with optic disc pit maculopathy. *Jpn J Ophthalmol* 49: 411-413.
- Georgalas I, Kouri A, Ladas I, Gotzaridis E (2010) Optic disc pit maculopathy treated with vitrectomy, internal limiting membrane peeling, and air in a 5-year-old boy. *Can J Ophthalmol* 45: 189-191.
- <http://www.evrs.eu/op-study-connect/>
- Kumar N, Al Sabti K (2009) Optic disc pit maculopathy treated with vitrectomy, internal limiting membrane peeling, and gas tamponade: A report of two cases. *Eur J Ophthalmol* 19: 897.
- Al Sabti K, Kumar N, Chow DR, Kapusta MA (2008) Management of optic disk pit-associated macular detachment with tisseel fibrin sealant. *Retin Cases Brief Rep* 2: 274-277.
- Ooto S, Mittra RA, Ridley ME, Spaide RF (2014) Vitrectomy with inner retinal fenestration for optic disc pit maculopathy. *Ophthalmology* 121: 1727-1733.
- Kumar N, Al Sabti K (2010) Fibrin glue in ophthalmology. *Indian J Ophthalmol* 58: 176.
- Panda A, Kumar S, Kumar A, Bansal R, Bhartiya S (2009) Fibrin glue in ophthalmology. *Indian J Ophthalmol* 57: 371-379.