Indocyanine green-assistedmacular epiretinal membrane combined in ternal limiting membrane peeling for idiopathic macular epiretinal membrane

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ABSTRACT: Objective: To investigate the effect of indocyanine green (ICG) assisted macular epiretinal membrane combined internal limiting membrane (ILM) peeling for idiopathic macular epiretinal membrane (IMEM). **Methods:** Twenty nine cases (29 eyes) with IMEM were treated. A standard three-port pars planavitrectomy was done. After removal of posterior hyaloid, 0 .25% ICG was used to assist IMEM and ILM peeling. The process and results were recored. **Results:** After staining, t he free boundary of the IMEM became obvious and IMEM was peeled directly in17 of The 29 Eyes (58%); Inthe others (4 2%), a free petal of ILM was made, IMEM and ILM were peeled together; In all the 29 eyes, the peeled zonecould be easily recognized. No serious intraoperative complication was found; Themean postoperative follow-upwas (9.65 ± 7.58) months (Range, 1 to 28 months). In 20 of the 29 eyes (69%) the visual acuity was improved.N o IM EM recurred. **Conclusion:** ICG-assisted ILM peeling could makethe surgery of IMEM safer and prevent recurrence.
[WAN Wen-cui, DAI Fang-fang, JIN Xue-min. **Indocyanine green-assistedmacular epiretinal membrane combined in ternal limiting membrane peeling for idiopathic macular epiretinal membrane.** *Life Sci J* 2013;10(2):753-756] (ISSN:1097-8135). http://www.lifesciencesite.com. 106

Keywords: Macular epiretinal membrane (MEM); Internal limiting membrane (ILM); The Green indocyaine (ICG);Idiopathic; Staining

1.Introduction

Idiopathic macularepiretinalmembrane (IMEM) for no apparent reason, occurred in the macular area limiting membrane surface, the chronic progressive growth of blood vessels fiber cell proliferative membrane [1].Pearlstone examined 1000 cases of people over the age of 50, found that 6.4% visible macular epiretinal membrane, it was positively correlated with age, more common in women [2]. Most clinical symptoms are mild, some can cause significant vision loss and visual distortion. Clinical IERM vitreo-macular traction syndrome, macular pseudohole, macular lamellar hole concurrent. Complete removal of the vitrous is the surgery key. We used indocyanine green (indocyanine green, ICG) staining auxiliary peeling, 29 patients (29 eyes) with idiopathic macular epiretinal membrane patients underwent surgery, and record the first film in the summary of intraoperative indocyanine green staining the scope, shape and peeling, the results were satisfactory.

2.MATERIALS AND METHODS

2.1. Case Selection

June 2010 to September 2012, in my ward surgical treatment of idiopathic macular membrane in patients with a total of 29 cases (29 eyes), the simple macular membrane in 16 eyes, macular membrane and vitreo-macular traction syndrome (6 eyes), epiretinal membrane and macular pseudohole three eyes, epiretinal membrane and lamellar macular hole in 4 eyes. Surgical indications: (1) vision <0.3; (2) visual acuity>0.3, double vision or visual distortion require surgery. Patient age of 10 years To 81 years (mean 57.3 years), male to female ratio: 3:7, preoperative best corrected visual acuity of 0.05 to 0.9 *(average0.26).* All suffering from eye preoperative routine fundus slit lamp and OCT examination.

2.2 Surgical approach

First standard three-incision closed vitrectomy, triamcinolone acetonide (Italy, 4 mg / 1 ml) staining posterior vitreous cortex, the absence or insufficiency cortex after detachment line induced from the complete resection. 1ml syringe to draw 0.1 ml of 0.25% ICG (Dandong Pharmaceutical Yichuang, limited liability company), bolus injection of a small amount (about 3 to 5 drops) in the macular surface after 30 seconds the flute needle aspiration in addition to. Observed and recorded the macular region, as the retinal surface staining (before the film, the internal limiting membrane, and the two form and scope). If we can find the edge of the membrane free, the retina tweezers gripping stripping, followed by 0.25% ICG staining, stripping the limiting membrane of the macular area. Can not distinguish appressed close formation or adhesion of the membrane range or before the film and the internal limiting membrane, since the internal limiting membrane flap, will be stripped of the internal limiting membrane and membrane. Combined vitreomacular traction

syndrome, false macular hole, macular lamellar hole of eyes 16% C3F8 or sterile air-filled, select the perfusion fluid filling the remaining simple macular membrane of eyes. Postoperative urge gas fill to maintain the prone position 1 to 2 weeks, all suffering from eye regular points antibiotics and glucocorticoid eyes water.

Figure1: ICG staining visible membrane (⇦) free edge (A); tear off the membrane (⇦), the release zone is not peeling clearSee (B)

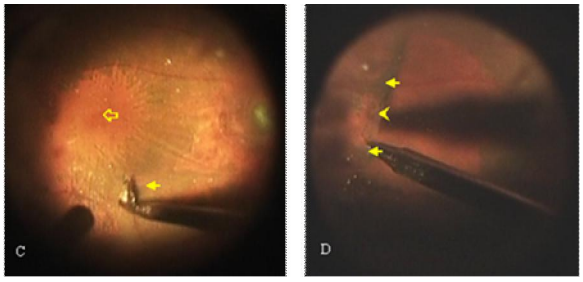

Figure 2: epiretinal membrane （⇦） with internal limiting membrane （➔） appressed flat (C); valve from the internal limiting membrane, peeling from the both （➔） (D)

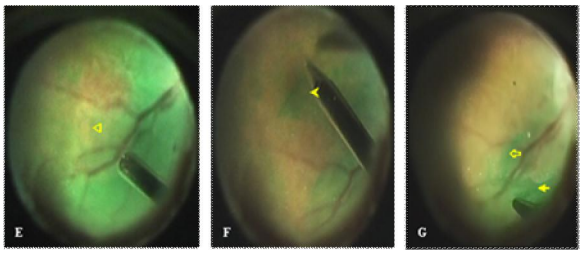

Figure3 (E, F, G):the same patient, before the film edge of the area and the internal limiting membrane appressed flat, but the internal limiting membrane rupture exists （◁） from the internal limiting membrane both （➔） peeling(F), G shows the partial separation of the peeling process membrane （⇦） with internal limiting membrane （➔）

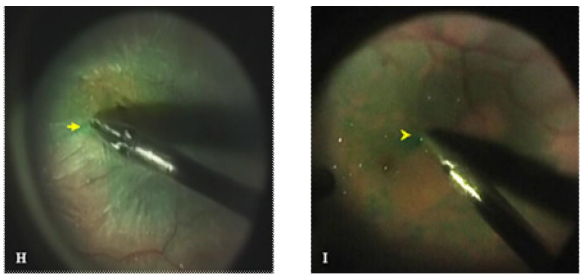

Figure 4 (H, I): the scope of the former film is unclear (overall staining mottled), by the internal limiting membrane （➔） from the valve, peeled before the film and the inner limiting membrane （➤）

3. Result

3.1 peeling situation

ICG staining, the membrane near the inner limiting membrane was stained light green, before the film does not stain or uneven staining (observed to have both been stripped of a 10-year-old boy macular membrane in the cortex induced posterior vitreous detachment surgery). Membrane clear (sheet dyeing District, or merge staining island) in 23 eyes (79%), which is able to distinguish between the former film free boundary directly stripping the membrane 17 eyes (58%)(Figure1), the first film with internal limiting membrane appressed formation or adhesions more closely both by the internal limiting membrane from the valve while stripping six eyes (21%) (Figure 2, Figure 3); simple stripping film, the ICG staining, the visible internal limiting membrane rupture (28%), the nine cases internal limiting membrane intact (30%); not well resolved before the film range (overall mottled staining) are used by the internal limiting membrane from the flap before peeling the membrane and internal limiting membrane (6 eyes, 21%)(Figure 4). Before stripping film and the internal limiting membrane, ICG-stained, you can clearly not peeling or cracking of the edge of the internal limiting membrane and release zone, based on the need to re-stripping.

3.2vision

The patients were followed up for 1 to 28 months, an average of 9.65 ± 7.58 months. Patients logMAR visual acuity showed a normal distribution, we use SPSS18.0 statistical software, be paired sample *t* test, get the best logMAR visual acuity before surgery was 0.72 ± 0.67, postoperative logMAR visual acuity 0.62 ±**0.56,** paired *t-test* statistic *t*= 2.37, *P*= 0.025, *a* statistically significant difference in visual acuity before and after surgery, visual acuity better than before surgery vision. Improvement of visual acuity of 20 eyes (69%) (≥ 2

lines), four eyes (14%) in the same visual acuity (± 1 line), 5 eyes (17%), decreased visual acuity (≥ 2 line).

3.3 Complications

ILM peeling in 23 eyes (79%) intraoperative retinal surface punctate or filamentous bleeding without treatment. All patients were no serious complications. 8 eyes (28%) early postoperative high intraocular pressure, can the drug control and returned to normal within 1 to 2 weeks. In addition to the three eyes preoperative IOL, and the remaining 26 eyes of seven eyes (27%) were followed up for a clouding of the lens or the original lens opacity severity. All patients no case of membrane recurrence.

4. Discuss

Idiopathic macular epiretinal membrane specific pathogenesis is not clear. But the majority of patients with cortical detachment [4], and more than that the incidence of posterior vitreous detachment and macular membrane to form a close relationship. Under normal circumstances, the adhesion of the vitreous disc macular and retinal vessels were in prison, when for some reason caused by the vitreous detachment, the parts of the internal limiting membrane easy to damage the rupture, resulting in glial cells broken by internal limiting membrane to the macular surface growth and the formation of a film-like structure [5] [6]. Gass[7] macular film is divided into 3: 0 "cellophane-like membrane, thin and transparent, no deformation inner retina (macular retinal visible gold foil-like reflective); a" wrinkled cellophane-like film, retinal surface deformation (mild retinal folds and pull cable); 2 macular pucker, thick, gray, vascular unclear (pulling small vascular tortuosity of the macular area deformation, plate spot beam vascular out of shape straightened), retinal significant deformation. Symptoms of advanced disease is mainly visual distortion, depending on the material smaller, flashes of light and varying degrees of vision loss. These are considered to epiretinal membrane contraction, increase in retinal thickness, retinal vascular leakage and other factors.

Early idiopathic macular membrane medication is still in the experimental research stage. For the the advanced macular film surgical treatment is still based. Pole vitreous completely clear and complete stripping macular membrane surgery key [3]. Triamcinolone acetonidecortex from the validity of the helper-inducer have formed a consensus. But then for those thin, transparent membrane, intraoperative ophthalmologist naked eye alone, will have greatly reduced the effect of surgery.

ICG with internal limiting membrane bound and low membrane affinity membrane near the inner limiting membrane was dyed pale green, before the film does not stain or uneven dyeing. Intraoperative joint internal limiting membrane peeling method in previous years application of indocyanine green stained internal limiting membrane peeling for macular hole based on 29 cases of idiopathic macular epiretinal membrane patients underwent surgery. The stripping surgery are summarized as follows: (1) an overall increase in the visibility of the front membrane and internal limiting membrane, the membrane can be more easily identified free curled edge (be able to tell before the film accounted for 58% of the free boundary). ② thin transparent membrane frangible, brittle, while the results of the dyeing makes the peeling area and unstripped obvious lesson, thereby reducing poor visibility due to the film before the multiple operations for the wounds of the retina (peeling area not peel well to identify 100%).The③ membrane range appear not clear enough or clear, but before the film and omentum appressed very smooth from the adjacent inner limiting membrane flap, it is easy to front film tear off (in this case represent the 32%).④ For thicker membrane (gray), is easy to read, consider the often local and omental adhesions close, then stripped from the thickest is not desirable, because it will increase the possibility of injury omentum . Before staining will allow membrane and internal limiting membrane rupture of apparent adhesion strength between the conditions within the limiting membrane and inner retina is relatively weak, can be selected by the internal limiting membrane from the valve, before the film and the internal limiting membrane in conjunction tear in addition to (10%).The⑤ ICG to make the whole process of stripping with visibility, to make the membrane integrity stripping is guaranteed.

In recent years, some ophthalmologists surgery triamcinolone acetonide assisted stripping and spreading ballast on the front surface of the membrane, although the release zone not peel obvious dividing line, compared with the ICG, triamcinolone acetonide and can not be increased before the film can be used visibility, stripping incomplete higher rate [8], there is also the risk of postoperative intraocular pressure (IOP).

ICG toxicity has been a concern: Some scholars said the ICG can cause cultured human RPE cell apoptosis upregulated genes [9].ICG staining assisted internal limiting membrane after REMOVED few months still observed internal limiting membrane the ICG fluorescence [10], but in patients with membrane there is no full-thickness macular hole, ICG does not directly contact with the RPE cells. In addition, we use the ICG solution concentration of 0.25%, intraoperative and postoperative significant side effects were not found. There are many foreign scholars reported 0.25% ICG assisted internal

limiting membrane tear off macular hole postoperative visual acuity, fundus vision [11] [12].

In the present study, no surgery appears obvious complications, this surgical method is the higher security. Results after surgery, visual acuity improved in 20 eyes (69%). The related internal limiting membrane peeling can release macular fold, clear closely attached to the front surface of the retina in the macula of inflammatory substances, is conducive to the recovery of macular function. Five patients (17%), decreased vision, a follow-up period is short, the refractive media is not clear enough and the gas has not been completely absorbed relevant, more than 4 Department of lens opacity severity caused. In addition, all patients with macular membrane follow-up period no case of recurrence of membrane, affirmed the importance of the internal limiting membrane of the membrane surgery stripping film growth bracket, Shimada[8] findings.

In summary, we draw the following conclusions: the application of indocyanine green staining can increase the visibility of the epiretinal membrane and internal limiting membrane peeling epiretinal membrane and internal limiting membrane becomes simple and fast. Surgery combined with internal limiting membrane peeling before the film easier to complete stripping to reduce the former film recurrence rate, postoperative results were satisfactory.

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References

[1] Bell MB, Wise GN,HenkindP. Ultrastructure and clinic opathologic correlation of idiopathic preretinalmacular fibrosis [J]. Am J Ophthalmol, 1975,79:366-373.
[2] Pearlstone, AD. The incidence of idiopathic preretinal macular gliosis [J]. Ann Ophthalmol, 1985, 17:378 -380.
[3] Zhang SC, former high Rulong macular vitrectomy for proliferative diseases [J]. Ophthalmology -166 2001,37:164.
[4] Wise GN. Clinical features of idiopathic preretinal macular fibrosis [J]. Am J Ophthalmol, 1975,79:349 - 35 7.
[5] Foos RY. Vitreoretinal juncture: epiretinal membranes and vitreous [J]. Invest Ophthalmol, 1977, 16:416-422.
[6] Bellhorn MB FA, Wise GN, Henkind P. Ultrastructure and clinic opathologic correlation of idiopathic preretinal macular fibrosis [J]. Am J Ophthalmol, 1975,79:366 - 373.
[7] Gass JDM. Stereoscopic atlas of macular disease [M]. Vol 2. St. Louis: Mosby, 1987:693 - 695.
[8] Shimada H, Nakashizuka H, Hattori T, et al. Double staining with Brilliant Blue G and double peeling for epiretinal membranes [J]. Ophthalmology, 2009, 116:1370 - 1376.
[9] Sippy BD, Engelbrecht NE, Hubbard GB, et al. Indocyanine green effect on cultured human retinal pigmentepithelial cells: implication for macular hole surgery [J]. Am J. Ophthalmol, 2001, 132:433 - 43 5.
[10] Tadayoni R, Paques M, Girmens JF, et al. Persistence of fundus fluorescence after use of indocyanine green for macular surgery [J]. Ophthalmology, 2003, 110: 604-608.
[11] Ben Simon GJ, Desatnik H, Alhalel A, et al. Retro-spective analysis of vitrectomy with and without internal limiting membrane peeling for stage 3 and 4macular hole [J].Ophthalmic Surg Lasers Imaging, 2004, 35:109 - 1 15.
[12] Kwok AK, Lai TY, Wong VW. Idiopathic macular hole surgery in Chinese patients: a randomised study to compare indocyanine green-assisted internal limiting membrane peeling with no internal limiting membrane peeling [J].Hong Kong Med J, 2005, 11:259 - 2 66.

4/18/2013