

# Clinical Experience of External-route Retinal Detachment Surgery under a Surgical Microscope

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## Abstract

**Purpose:** To evaluate the efficacy of external-route retinal reattachment surgery under a surgical microscope.

**Methods:** A total of 86 patients (86 eyes) with rhegmatogenous retinal detachment underwent external-route retinal detachment surgery under a surgical microscope. Drainage of subretinal fluid, transscleral cryotherapy, scleral buckling, and intravitreal injection of gas were performed intraoperatively.

**Results:** Among 85 patients, 81 achieved postoperative retinal re-attachment after the first surgery and 5 after two surgeries. The visual acuity was elevated in 67 patients, unchanged in 15, and decreased in 4.

**Conclusion:** External-route retinal reattachment surgery under a surgical microscope is a convenient procedure for physicians to master and worthy of widespread application in clinical settings. (*Eye Science 2014; 29:43–46*)

**Keywords:** rhegmatogenous retinal detachment; microscope

Rhegmatogenous retinal detachment is an ocular disease that results in blindness. It is primarily treated by surgery, and closure of the retinal holes determines surgical success. Conventional surgeries are performed under direct or indirect ophthalmoscope. In 2001, Liu W et al. attempted to locate and close the retinal holes guided by direct microscopy, which is convenient to master and perform and is widely recognized by a majority of ophthalmologists. Based upon our clinical experience, we determined the location of retinal holes and used a transscleral surgical technique guided directly by a surgical microscope in this study.

## Materials and methods

### General materials

A total of 86 patients with rhegmatogenous retinal detachment were surgically treated in our hospital between October 2010 and August 2013; patients included 42 males and 44 females, aged from 13 to 75 years.

### Ophthalmic examination

All patients were subject to slit-lamp examination with preset lens and Goldmann three-mirror contact lens after admission. Eighty-six patients were diagnosed with unilateral rhegmatogenous retinal detachment. Visual acuity was evaluated as light perception (-1.0) and the number of retinal holes ranged from 1 to 3. The retinal holes were seen at the superior temporal position in 58 patients (67.4%), inferior temporal position in 11, superior nasal in 14, and inferior nasal in 3. Patients had a PVR (proliferative vitreoretinopathy) grade ranging from A to C1.

### Surgical approach

The surgical plan was determined based on preoperative fundus examination. Patients with retinal holes alone received filling with silicone oil. Retinal holes, complicated with degeneration and PVR-C1 in multiple quadrants, were treated by a combined technique of filling of silicone oil and scleral buckling. Intraoperatively, retrobulbar anesthesia was conducted via conventional administration of 2% lignocaine and 0.75% bupivacaine, the eyelid was cut open using an eye speculum, the bulbar conjunctiva was cut with a ring-shape incision along with the corneal limbal under microscope, and cut open in a radial pattern at 10 and 4 o'clock positions, the rectus was separated and exposed, and the tractional suture was kept within the rectus, fully exposing the

sclera. The subretinal fluid was drained using a disposable 5 ml syringe, parallel to corneoscleral limbus, to puncture into the scleral surface with an angle of 45° and then gently pressing the puncture site and draining the fluid to soften the eyeballs. If the amount of drained subretinal fluid was too small and the eyeballs were not softened, a portion of 0.3 ml of aqueous humor was drained from the anterior chamber.

The physicians utilized ophthalmic curved forceps to performed scleral indentation. The retinal holes were located under direct vision using a microscope. The posterior limbus was marked by scleral surface cauterization and cryotherapy was conducted by scleral indentation using a cryoprobe until the retina became whitened, accurately evaluating the efficacy of cryotherapy. The placement of silicone oil was conducted based on the scleral position. Scleral indentation was performed by clipping the silicone oil slot using an ophthalmic curved forceps and the retinal holes located at the scleral ridges were examined. The position of the silicone oil slot was adjusted when necessary. The silicone oil strip was shortened by 10 mm according to the axial diameter. Intraocular gas injection was conducted depending on postoperative intraocular pressure; ultimately, 12 eyes were injected with filtered air. After surgery, conventional antibiotics and steroid hormone were administered for 3 d. On the 1<sup>st</sup> postoperative d, compound steroid eye drops were given in the operated eyes. The visual acuity, intraocular pressure, uveal response, retinal re-attachment, and subretinal fluid absorption were observed.

## Results

### Surgical efficacy

During subsequent follow-up, the visual acuity was elevated in 67 patients, stable in 15, and decreased in 4. Retinal re-attachment was successfully performed in 86 subjects: 5 underwent a second surgery, 2 had retinal re-attachment after silicone oil adjustment, and 3 subjects with vitreous opacity and vitreous proliferation had retinal re-attachment following pars plana vitrectomy (PPV) plus silicone oil filling. All patients presented with normal intraocular pressure, mild uveal response, and medication con-

trol. All subjects had grade II cryotherapy spots. Neither insufficient nor excessive cryotherapy was noted.

### Postoperative complications

1. The symptoms of uveitis, scintillation in the anterior chamber of operated eyes, and vitreous opacity were treated with systemic administration of steroid hormones of a large dose and topical eye drops of steroid hormones, which were effectively alleviated 1 week later. The position of silicone oil was not precise and was adjusted postoperatively. The retinal re-attachment was obtained and the uveal response was equally allayed.

2. The incidence of secondary glaucoma was mainly observed in patients undergoing scleral buckling and intraocular gas injection. The intraocular pressure was maintained below 30 mmHg by topical administration of timoptol and brinzolamide eye drops.

3. Delayed absorption of subretinal fluid was noted in 5 patients. For two patients, the silicone oil was not properly placed and the position was adjusted postoperatively. The subretinal fluid was absorbed. The remaining 3 subjects had incomplete closure of the retinal holes. Along with the formation of cryotherapy spots and the cryotherapy effects, the retinal holes were completely closed and the subretinal fluid was fully absorbed.

4. Five patients had severe vitreous opacity and proliferation. This was significantly alleviated after medication therapy in 2 of these patients. The remaining 3 remained aggravated and retinal re-attachment was achieved after PPV plus silicone oil filling.

## Discussion

Rhegmatogenous retinal detachment is a common eye disease, which can eventually lead to blindness. A surgical approach is the primary treatment and aims to close the retinal holes and restore the anatomical position of retina, thereby recovering visual function. Previously, these operations were guided by direct ophthalmoscopy or binocular indirect ophthalmoscopy. In the present study, both retinal hole localization and surgical procedures were performed under the guidance of a surgical microscope, which is convenient and worthy of widespread application.

The limitations of performing surgery guided by direct ophthalmoscopy include a small range of observation, the negative influence of refractive media, blurry imaging, and difficulty in maintaining asepsis. Intraoperative application of the binocular indirect ophthalmoscope is also problematic. First, it requires a long time to attain proficiency with the ophthalmoscope. Second, identification of the tiny retinal holes is difficult due to inverse imaging and low magnification. Third, the physicians have to hold a preset lens in one hand and perform the surgery using the other hand, which is inconvenient and further increases the incidence of infection.

The surgical microscope is now commonly applied in ocular surgeries in all levels of hospitals. Based upon clinical experience, external-route retinal reattachment surgery was performed in 86 patients under direct vision using a surgical microscope and showed good clinical efficacy. External-route retinal detachment surgery under a microscope has the following advantages. 1. The surgical microscope is more widely used in local hospitals compared with the binocular indirect ophthalmoscope. 2. Positive images are obtained during the surgery and the magnification can be adjusted. Panretinal status can be observed based on the changes in the scleral indentation to prevent misdiagnosis. 3. Scleral status is explicitly displayed during scleral suturing and the incidence of penetration of the sclera is reduced. 4. The freezing effect is clearly seen during cryotherapy and thus the freezing temperature can be properly controlled. 5. The physicians can perform the operation using both hands.

External-route retinal detachment surgery is mainly applied in the treatment of simple rhegmatogenous retinal detachment, which is defined as the patients with PVR < C2, mild signs of hyperplastic primary vitreous, good retinal movement within the detachment area and clear refractive media. The selection of the surgical approach should abide by the following principles: 1. Simple operation is a preferential option over complex surgery; 2. External-route surgery is a primary choice compared with internal-route surgery; and 3. Simple silicon oil filling is a better technique than scleral buckling combined with silicon oil filling<sup>2</sup>. Consequently, physicians should have

a good understanding of the surgical indications and contraindications.

The following experience has been accumulated: 1. Prior to surgery, a Goldmann three-mirror contact lens examination should be performed to detect the retina, the number, position, morphology of retinal holes, the position of retinal degeneration, and the retinal proliferation. The observation outcomes should be recorded for subsequent operations. More importantly, no retinal holes should be omitted, which determines the success of surgery; 2. The responses of the frozen area can be classified as follows: grade I response is defined as no cryotherapy responses and normal retinal color; grade II as pigmentation and/or retinal detachment; grade III as epiretinal membrane forms in the frozen area<sup>2</sup>. Postoperative responses should be controlled at grade II. The cryotherapy should be halted at the presence of retinal whitening. Insufficient freezing may lead to incomplete closure of retinal holes, whereas excessive cryotherapy is likely to induce retinal surface and vitreous proliferation. Both factors determine the surgical success; 3. Transscleral drainage of subretinal fluid should be conducted at an appropriate site, avoiding the blood vessels and vortex vein. The angle of the puncture should be properly managed. When conducting drainage of subretinal fluid, the intraocular pressure should not be excessively low and the retina can be observed during scleral indentation. Excessively low intraocular pressure is likely to induce retinal and choroidal hemorrhage. It is difficult to suture during silicone oil fixation. Equilibrium liquid can be injected into vitreous cavity to increase IOP; 4. Physicians should pay more attention to the depth of scleral suture, especially the site surrounding rectus attachment, ensuring the needle is visible during scleral suturing and scleral penetration should be avoided. The needle should be withdrawn immediately upon scleral penetration. The scleral suture should be conducted at a new site. The penetrating site should be examined to identify whether retinal holes have been caused. Cryotherapy or adjusting retinal holes in front of a scleral buckling ridge should be conducted as necessary; and 5. IOP is one of the influential factors of the recovery of rhegmatogenous retinal detachment. After wound closure, IOP

should be measured by fingers and maintained between 20 and 30 mmHg. Excessively high IOP should be reduced by draining aqueous humor in the anterior chamber and low IOP elevated by intravitreal injection of filtered air.

To sum up, external-route retinal reattachment surgery is an efficacious treatment for simple rhegmatogenous retinal detachment. The surgical procedure is simplified and the learning time is shortened,

which makes it attractive for widespread application in clinical settings.

## References

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