·Clinical Research·

Application of a modified pars plana lensectomy within traumatic eyes

Yue Zhang[1], *Wan-Rong Huang*[1], *Shi Zhang*[2]

[1] STU/CUHK Joint Shantou International Eye Center, Shantou 515041, Guangdong Province, China
[2] Department of Pathology, Beihua University, Jilin 132011, Jilin Province, China
Correspondence to: Yue Zhang. STU/CUHK Joint Shantou International Eye Center, Shantou 515041, Guangdong Province, China. zhangyue@jsiec.org
Received:2008-02-28 Accepted:2008-04-12

Abstract

• AIM: To investigate a surgical method of modified lensectomy within combined lensectomy and vitrectomy surgery in traumatic eyes.

• METHODS: Clinical records were studied retrospectively for a series of consecutive 27 traumatic patients who were performed vitrectomy combined with lensectomy surgery. A modified lensectomy through pars plana incision of sclera was performed to these cases and lens capsule was reserved. It was then combined with vitreous and retinal operations.

• RESULTS: All lens were removed completely with lens capsule remained. All cases achieved improved visual acuity. Intraocular pressure (IOP) in all eyes was in normal range after surgery.

• CONCLUSION: The modified lensectomy is a safe and effective surgery manner which has few complications and is more suitable for traumatic eyes in the combined lensectomy and vitrectomy surgery.

• KEYWORDS: ocular trauma; lensectomy; vitrectomy

Zhang Y, Huang WR, Zhang S. Application of a modified pars plana lensectomy within traumatic eyes. *Int J Ophthalmol* 2008;1(2):119-121

INTRODUCTION

Lens was usually resected directly by vitreous cutter in the combined lensectomy and vitrectomy surgery through pars plana incision of sclera. But there are some complications in traumatic eyes, such as rupture of lens capsule, breaking of suspensory ligament of lens. The traditional surgery manner would be harmful to the damaged lens capsule and suspensory ligament of lens and increase the difficulty of vitrectomy and implantation of intraocular lens at Ⅱ stage. The modified lensectomy decreased complications usually occurred after traditional surgery and provided possibility of better vision for the patients. Clinical records were studied retrospectively for a series of consecutive 27 traumatic patients who were performed modified lensectomy surgery from October 2005 to January 2006. The modified lensectomy through pars plana incision of sclera was combined with vitrectomy and we got good clinical results. The modified surgery manner and summary of clinical outcomes are described.

MATERIALS AND METHODS

We identified 27 traumatic eyes of 27 consecutive patients (23 male, 4 female) who had undergone lensectomy combined with vitrectomy. The mean age was 39 years (ranged 6 to 54 years). Six cases had simple ocular perforating injury; 2 cases had ocular perforating injury complicated with lens foreign body; 19 cases had ocular perforating injury complicated with vitreous foreign body. Treatment time of patients in our hospital after injury ranged from 6 hours to 7 days. Preoperative vision ranged from light perception to 0.1. Preoperative intraocular pressure (IOP) ranged from 21 to 40mmHg in 3 cases, and the others' IOP were normal (ranged 10 to 20mmHg). The abnormal IOP was controlled under 21mmHg preoperatively. All these 27 cases were complicated with lens capsule rupture of different extents. Some other complications included 7 cases with anterior chamber hyphema and 22 cases with vitreous hemorrhage.

A standard 3-port pars plana vitrectomy (PPV) was performed to all patients. We pricked into the capsule of lens through scleral incisions at 2:30 and 9:30 positions and equator lentis by optical fiber and vitreous cutter simultaneously. Lens were fixed and lightened by optic fiber and vitreous cutter made flabellate rotation to suck out cortex of lens discontinuously with medium power (150-200mmHg, 20-26.7kPa). After most of the cortex of

crystalline lens was aspirated, high-range cutting speed (750 times/minute) was used to remove the harder lens nucleus. Vitreous perfusion was kept during the whole lensectomy process. Then vitrectomy was performed to the patients.

RESULTS

Lensectomy was performed successfully to 27 patients through pars plana scleral incisions. Lensectomy course was finished in 3-5 minutes in most cases. Lensectomy course was prolonged in some cases with harder lens nucleus. The longest time was 8 minutes. In the follow-up period (1-3 months), the best-corrected visual acuity (BCVA) was below 0.1 in 5 cases, 0.1-0.4 in 18 cases, over 0.4 in 4 cases. Three cases with 21-40mmHg preoperative IOP were controlled under 20mmHg after the operation. Complications of the surgery appeared in 4 cases, including retinal serrated edge detachment of 1 patient. After vitrectomy and intravitreal silicone oil filling, the BCVA was 0.05. Lens fragments had fallen into the vitreous in 3 cases. The pieces were cut off in the vitrectomy. The mean postoperative BCVA was over 0.1.

DISCUSSION

Ocular perforating trauma is one of the causes that result in irreversible blindness. Severe ocular perforating trauma can cause rupture of lens capsule, breaking of suspensory ligament of lens, some combined with vitreous hemorrhage and intraocular foreign body. Secondary glaucoma and uveitis can also occurred in some cases. Lensectomy combined with vitrectomy was needed at this time. To avoid more damage to injured lens capsule and suspensory ligament of lens, and to preserve relative integrity of lens capsule, the surgery would provide advantages for the implantation of intraocular lens at Ⅱ stage [1]. Preserving relative integrity of lens capsule can get better therapeutic effects in some special cases, such as slanting perforating trauma of lens. The preserved front and back capsule of lens can heal together, and it can effectively avoid silicone oil flowing into the anterior chamber in intravitreal injection of silicone oil . There are several kinds of surgery methods to remove traumatic lens now.

Choice of Surgery Methods There are three kinds of surgery manners of lens extraction combined with vitrectomy now. (1) Extracapsular cataract extraction combined with vitrectomy. The nucleus of lens can be wholly removed by this surgery manner, but many shortages still exist. First of all, the big incision at the corneal limbus would cause inevitable astigmatism[2-4]. This surgery manner increased the number of incisions and the difficulty of surgery, it also prolonged operation time. Secondly, the front capsule of lens was teared in the surgery, the intraocular lens couldn't be supported safely when bigger back capsular break of lens existed. So the tearing of front capsule of lens would increase the difficulty of posterior intraocular lens implantation at Ⅱ stage. Finally, when the patient was combined with teared back capsule of lens or partial breaking of suspensory ligament, the compression during lens nucleus removing would increase the extent of back capsular break or subluxation of lens. Lens pieces also have the chance to fall into the vitreous[5,6]. (2) Phacoemulsification combined with pars plana vitrectomy. Postoperative astigmatism would be decreased, but tearing of front capsule of lens was also needed and corneal endothelium was often damaged in this surgery [7-9]. The extent of corneal endothelium damage was often aggravated in traumatic eyes, especially in the patient complicated with corneal perforation, endophthalmitis or serious anterior chamber inflammation. In addition, the nucleus chopper and needle would also do harm to the lens capsule [10], and the surgery difficulty and expense would be higher correspondingly. (3) Lensectomy through pars plana of ciliary body combined with vitrectomy. Lens were resected by the vitreous cutter which pricked into the capsule of lens through scleral incisions. Not any other incisions were needed in this surgery manner. The operation was performed in the capsule of lens instead of the anterior chamber, so the potential damage to corneal endothelium and iris was decreased accordingly.

Traditional Lensectomy and Modified Lensectomy A standard width (0.9mm or 1.0mm) of micro vitreous retina blade (MVR blade) was used to puncture the equator of lens through scleral incision in traditional lensectomy and prick into the capsule of lens again through another scleal incision in the same manner. Capsule of lens was inserted by vitreous cutter and size 7-9 perfusion needle, vitreous perfusion closed and intracapsular perfusion of lens opened. Then the lens were cut off[10,11]. This surgery was suitable for the patients with capsule and suspensory ligament of lens in good condition, but showed some limitations in traumatic eyes with capsular tearing of lens or partial breaking of suspensory ligament. First of all, if the MVR blade was too close to the back capsule of lens, it would damage the back

capsule and if the MVR blade was too close to the front, it would damage the front capsule and suspensory ligament of lens. Secondly, MVR blade, perfusion needle and vitreous cutter pricking into the capsule of lens many times would increase the damage of capsule and suspensory ligament of lens. Besides, intracapsular perfusion of lens increased intracapsular pressure, which caused fragments of lens falling into the vitreous. The difficulty of surgery increased at the same time. The modified lensectomy used optical fiber and vitreous cutter pricking into the capsule of lens through scleral incisions at 2:30 and 9:30 level positions from equator lentis simultaneously. Lens was fixed by optic fiber in left hand and lens was resected from equator lentis by vitreous cutter in right hand. Vitreous perfusion was always maintained during the surgery procedure. Experience showed that the optic fiber (diameter less than 0.9mm) and vitreous cutter can directly puncture into the capsule of lens easily without any additional injury to the capsule. The advantages of the modified lensectomy: (1) Pricking into the capsule repeatedly was avoided, so the possibility of further damage to injured capsule and suspensory ligament was also decreased. (2) The optic fiber punctured into the capsule can not only fix the lens but also lighten the internal lens, which makes the operator observe the internal structure of lens and condition of traumatic capsule clearly. (3) Usage of vitreous perfusion caused relatively lower internal pressure within capsule, which decreased the chance of lens fragments falling into the vitreous.

Surgical Experience and Points for Attention (1) Midrange suction and high-range cutting speed were used in this operation. Lensectomy was performed after capsule of lens was filled with vitreous perfusion, so more damages to traumatic capsule by mistake could be avoided. (2) More aspiration and less cutting can wholly remove the cortex of lens, avoiding lens fragments production. (3) Vitrectomy was performed after lensectomy in the combined surgery because the traumatic lens can be supported by the vitreous. Thus the traumatic lens pieces couldn't fall down to the surface of retina. (4) Optic fiber and vitreous cutter were not as sharp as MVR blade, so it was necessary for optical fiber and vitreous cutter to prick into the capsule of lens simultaneously. (5) Retinal situation should be observed carefully after lensectomy, especially it should be noted whether retinal serrated edge detachment existed. (6) It should be based on the conditions of lens capsule and retina whether intraocular lens may be implanted at the first stage.

Clinical observations compared with traditional lensectomy showed that the modified lensectomy was a safe, rapid surgery with fewer complications, better BCVA, and good postoperative IOP. We can draw a conclusion that this modified lensectomy is a safe, effective surgery manner with few complications, especially is suitable for traumatic eyes. Long-term therapeutic effects and clinical experience need further clinical observations.

REFERENCES

1 Lin ZD, Li SZ. Small incision cataract surgery. Beijing: People's Medical Publishing House 2002

2 Masket S. Keratorefractive aspects of the scleral pocket incision and closure method for cataract surgery. J Cataract Refract Surg 1989;15:70-77

3 Armeniades CD, Boriek A, Knolle GE. Effect of incision length, location, and shape on local corneoscleral deformation during cataract surgery. J Cataract Refract Surg 1990;16:83-87

4 Li SZ. Ophthalmic surgery. Beijing: People's Medical Publishing House 2000: 834-835

5 Song XD, Shi YY. Phacoemulsification for mature or hypermature cataracts. Chin J Ophthalmol 1998;5: 336-338

6 Li AL, Mao SH. Analysis of the complication for phacoemulsification. J Clin Ophthalmol 2002;10(1):64-65

7 Liu XQ, Wang LT. The prevention and management of the complication for phacoemulsification. J Clin Ophthalmol 2003;11(1): 19-20

8 Wang Y. Complications of phacoemulsification. Journal of Basic Medicine College of Shangdong Univeristy 2003;17(2):126

9 Zou YP. A practical guide for cataract surgery. Beijing: Science Publishing House 2003:143-144

10 Li XX, Wang JZ. Vitreous and retinal surgery. Beijing: People's Publishing House 2000:187-188

11 Wang Q, Zhang WY, Meng RH, Kang J. Preservation of anterior capsule during vitrectomy and lensectomy. Int J Ophthalmol (Guoji Yanke Zazhi) 2006;6(5): 992-994