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Conjunctival displacement to the corneal side for oblique-parallel insertion in 25-gauge vitrectomy

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PURPOSE. *To assess the usefulness of the method of oblique-parallel trocar insertion with conjunctival displacement to the corneal side in 25-gauge (G) transconjunctival vitrectomy.*
METHODS. *25-G vitrectomy was performed in 77 consecutive eyes. Before making oblique-parallel trocar insertions, the conjunctiva was conventionally displaced superiorly in 35 eyes, but was displaced toward the corneal side in 42 eyes. After surgery, the distance between the scleral and conjunctival wounds was measured with calipers. The frequency of scleral wound exposure was assessed.*
RESULTS. *After cannula removal at the end of surgery, inferior repositioning of the superiorly displaced conjunctiva was observed, while marked posterior repositioning of the corneal side caused displacement of the conjunctiva due to gravity. The superior displacement distances between the sclera and conjunctival wounds were 2.4±0.3 mm at the infusion port, 2.0±0.4 mm at the superior temporal port, and 1.9±0.4 mm at the superior nasal port, while the corresponding distances for corneal side displacement were 3.6±0.5, 3.5±0.5, and 2.5±0.5 mm, and were all significantly ($p<0.0001$) greater with corneal side displacement. The frequency of scleral wound exposure due to conjunctival damage around the cannula (infusion port) was significantly ($p=0.0164$) lower for corneal side displacement (0/42; 16.7%) than superior displacement (5/35; 14.3%). There was no postoperative endophthalmitis in all 77 patients studied.*
CONCLUSIONS. *In 25-G transconjunctival vitrectomy, using oblique-parallel trocar insertions with the conjunctiva displaced toward the corneal side results in marked posterior repositioning of the conjunctiva after cannula extraction. Corneal side conjunctival displacement is technically easy and completely covers the scleral wound. This method is expected to be effective in preventing endophthalmitis. (Eur J Ophthalmol 2008; 18: 848-51)*

KEY WORDS. *25-gauge transconjunctival vitrectomy, Oblique-parallel insertion, Corneal side conjunctival displacement, Superior displacement, Endophthalmitis*

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INTRODUCTION

The 25-gauge (G) transconjunctival vitrectomy offers several advantages over 20-G vitrectomy, including lower invasiveness for the conjunctiva (1), rapid recovery of postoperative visual acuity (2), and less corneal astigmatism (3). Therefore, this method is gaining popularity rapidly (4). In 2007, however, the incidence of postoperative endophthalmitis was reported to be 12-fold higher using 25-G vitrectomy than with 20-G vitrectomy (5). Since the visual outcome of postvitrectomy endophthalmitis is poor, reducing the incidence of endophthalmitis after 25-G vitrectomy is an urgent issue. In 2006, we reported the method of 25-G scleral tunnel transconjunctival vitrectomy by displacing the conjunctiva superiorly and inserting the trocars at a 30-degree angle parallel to the limbus (oblique-

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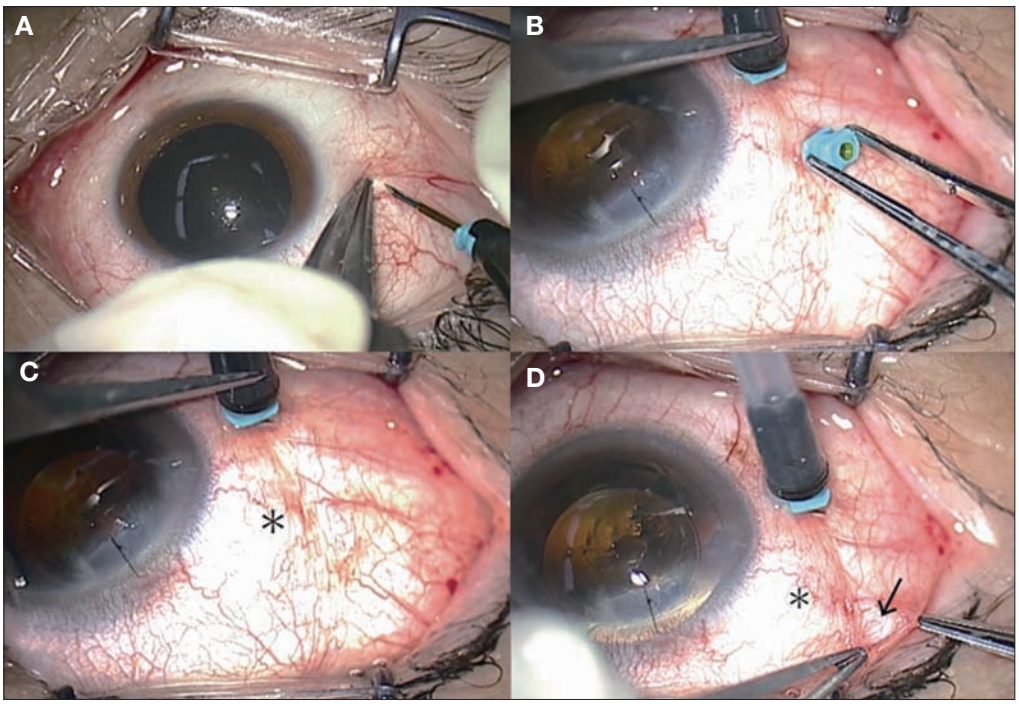

Fig. 1 - *Displacement of the conjunctiva to the corneal side for oblique-parallel trocar insertions in 25-gauge vitrectomy.* **(A)** *The conjunctiva is displaced slightly to the corneal side with forceps. At a site 4.0 mm from and parallel to the limbus, a trocar is inserted with the bevel facing downward at a 30-degree angle.* **(B)** *At the end of surgery, the cannula is removed with forceps.* **(C)** *The conjunctiva is repositioned posteriorly for a considerable distance due to gravity, covering the scleral wound (*).* **(D)** *The distance between the scleral wound (*) and the conjunctival wound (→) is 4 mm.*

parallel insertion) (6). However, since the conjunctiva is attached to the limbus, superior and interior movements of the conjunctiva are not efficient and inadequate coverage of the scleral wound by the conjunctiva is sometimes observed after cannula retraction. In addition, the peripheral vitreous is excised while using forceps to compress the conjunctiva, and traction exerted on the conjunctiva around the cannula may damage the conjunctiva. When conjunctival coverage is not sufficient, there is a concern that the scleral wound may be exposed through the damaged conjunctiva, increasing the risk of endophthalmitis. In this study, we designed a method of displacing the conjunctiva toward the corneal side for oblique-parallel insertion, and examined the usefulness of this method.

METHODS

We studied 77 eyes of 77 consecutive patients (32 male and 45 female, from 35 to 83 years of age, mean 65.4±9.6 years) undergoing 25-G transconjunctival vitrectomy for the first time. Cataract surgery was conducted simultaneously in 63 eyes (81.8%). The conventional method of displacing the conjunctiva superiorly and then inserting trocars in an oblique-parallel manner was used in 35 eyes undergoing surgery in November 2007. The new method of displacing the conjunctiva to the corneal side before performing oblique-parallel insertions was used in 42 eyes operated in December 2007 (Fig. 1). At the end of surgery, the conjunctival repositioning distance from the scleral wound to the conjunctival wound was measured using calipers in units of 0.5 mm (Tab. I). Measurements were made at the inferior temporal infusion port, superior temporal port, and superior nasal port. We also assessed the frequency of scleral exposure from the conjunctiva damaged at the infusion port due to compression with forceps during peripheral vitrectomy. Treatment was conducted after obtaining informed consent from each patient.

Vitrectomy was performed with the Accurus 800CS (Alcon Surgical, Fort Worth, TX, USA) using a 25-G high speed cutter (2500 cuts/minute; Medical Instrument Development Laboratories, San Leandro, CA, USA). The conjunctiva was slightly displaced with forceps. At a site 4.0 mm from and parallel to the limbus, a trocar was inserted with the bevel facing downward at a 30-degree angle. In all patients, peripheral vitrectomy was performed while compressing the conjunctiva with forceps. In patients with proliferative diabetic retinopathy, macular hole, or retinal detachment, the peripheral vitreous was shaved. At the completion of vitrectomy, no intraocular fluid leakage was found. A suction stick was used to examine for vitreous prolapse through the scleral wound at the three ports.

Mann-Whitney test was used to compare the distances displaced, and Fisher exact test to compare the rates of scleral wound exposure. A p value less than 0.05 was considered significant.

RESULTS

Displacement toward the corneal side was easier than superior displacement.

After cannula removal at the end of surgery, the superiorly displaced conjunctiva was repositioned to the inferior side, while the corneal side displaced conjunctiva was repositioned to the posterior side for a considerable distance due to gravity. The displacement distances displaced from the sclera wound to conjunctival wound for superior displacement were 2.4±0.3 (range, 2.0–3.0) mm at the infusion port, 2.0±0.4 (1.5–2.5) mm at the superior temporal port, and 1.9±0.4 (1.5–2.5) mm at the superior nasal port, while the corresponding distances for corneal side displacement were 3.6±0.5 (3.5–4.5), 3.5±0.5 (3.0–4.5), and 2.5±0.5 (2.0–3.0) mm. At all three sites, the distances were significantly (Mann Whitney test: $p<0.0001$) greater with corneal side displacement. The frequency of scleral wound exposure at the inferior temporal infusion port was significantly (Fisher exact probability test: p=0.0164) lower for corneal side displacement (0/42; 16.7%) than superior displacement (5/35; 14.3%). No significant differences were observed at the superior temporal port or the superior nasal port (Fisher exact probability test: p=0.4545 and 0.2033, respectively). There was no postoperative endophthalmitis in all 77 patients studied.

DISCUSSION

Since 25-G vitrectomy does not require scleral wound suturing, reliable closure of the scleral wound and reliable conjunctival coverage of the wound are important. In performing 25-G vitrectomy, superior or inferior conjunctival displacement with oblique insertion of trocars parallel to the limbus has come into widespread use (6, 7). Since the conjunctiva is attached to the limbus, inferior or superior displacement from the oblique posterior side does not provide great mobility. In particular, after the infusion port is created as the first port, the cannula immobilizes the conjunctiva like an anchor, superior displacement of the

TABLE I - METHODS OF CONJUNCTIVAL DISPLACEMENT AND REPOSITIONING DISTANCE IN 77 CASES STUDIED

Method of displacement (no. of eyes)	Infusion port (mm)	Superior temporal port (mm)	Superior nasal port (mm)	Frequency of scleral wound exposure (%)	Disease (number of eyes)
Superior displacement (35)	2.4±0.3* (2.0–3.0)	2.0±0.4† (1.5–2.5)	1.9±0.4‡ (1.5–2.5)	Infusion port: 5/35 (14.3%)§ Superior temporal port: 1/35 (2.9%) Superior nasal port: 2/35 (5.7%)¶	Proliferative diabetic retinopathy (11) Epiretinal membrane (10) Macular hole (5) Diabetic macular edema (4) Retinal detachment (3) Retinal vein occulusion (1) Viteous opacity (1)
Corneal side displacement (42)	3.6±0.5* (3.0–4.5)	3.5±0.5† (3.0–4.5)	2.5±0.5‡ (2.0–3.0)	Infusion port: 0/42 (0%)§ Superior temporal port: 0/42 (0%) Superior nasal port: 0/42 (0%)¶	Proliferative diabetic retinopathy (11) Epiretinal membrane (8) Macular hole (8) Diabetic macular edema (6) Retinal vein occulusion (3) Viteous opacity (3) Retinal detachment (3)

Mann-Whitney test: *p<0.0001, †p<0.0001, ‡p<0.0001. Fisher exact probability test: §p=0.0164, || p=0.4545, ¶p=0.2033

superior temporal conjunctiva becomes difficult, and the conjunctiva sometimes moves inferiorly. In creating the superior nasal port, sufficient displacement cannot be achieved in cases with a shallow conjunctival sac. Displacing the conjunctiva to the corneal side is easier than superior displacement. Therefore, the displaced distances at all three ports were significantly greater. Sufficient displacement at the superior nasal port can be obtained even in cases with a shallow conjunctival sac. Since the cannula at the infusion port no longer acts as an anchor, the same degree of conjunctival displacement is achieved at the inferior temporal infusion port as in the superior temporal port.

In 25-G vitrectomy, since peripheral vitrectomy is carried out by compressing the conjunctiva with forceps, inferior traction is exerted on the conjunctiva around the cannula, which may damage the conjunctiva. Most notably, the infusion port is strongly fixed, and when the conjunctival sac is pulled by forceps posteriorly, the conjunctiva around the port can easily be damaged. In this study, the rate of scleral wound exposure associated with damaged conjunctiva at the inferior temporal infusion port was significantly reduced from 5/35 (14.3%) in the case of superior displacement to 0/42 (0%) in case of corneal side displacement. With corneal side displacement, the conjunctiva is repositioned posteriorly for a considerable distance due to gravity, which probably reduces the risk of scleral wound exposure from the damaged conjunctiva. The 25-G transconjunctival vitrectomy, using oblique-parallel trocar insertion, with the conjunctiva displaced to the corneal side, results in marked posterior repositioning of the conjunctiva after cannula extraction. Corneal side conjunctival displacement is technically easy and completely covers the scleral wound. This method is expected to be effective in preventing endophthalmitis.

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