The comparison of post-operative astigmatisms after small gauge transconjunctival sutureless vitrectomy versus 20-gauge conventional vitrectomy

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Introduction
Small gauge vitrectomy utilizing 23- and 25-gauge instrumentation has definite advantages including decreased surgical times, less tissue manipulation, reduced inflammation and pain postoperatively with more rapid visual recovery. The evolution of instruments for vitrectomy has been occurring with the advent of smaller instruments with better functionality. Eckardt1 (1993) developed 23-gauge vitrectomy instrumentation that causes no surgical trauma to the conjunctiva, requires no scleral suture, and entails a distinctly reduced surgical incision. The 23-gauge system (Vita eyes pars plana vitrectomy) in 2002 that developed a microsurgical instrument system that includes microcameras for three-port pars plana vitrectomy and an array of 25-gauge instruments for procedures of which vitrectomy is a part and named this set of instruments the transconjunctival sutureless vitrectomy system (TSV). The TSV allows for completely sutureless closed vitrectomy, obviates the need for conjunctival perimetry, permits interchangeability of instruments between entry sites, protects the vitreous base from damage, and decreases surgical times progressively at early stages. Transconjunctival sutureless vitrectomy (TSV) system, both 25- and 22-gauge, is becoming increasingly popular and is replacing conventional 20-gauge vitrectomy system (CVT). Surgically induced astigmatism is an unwanted variable that can lead to poorer visual and refractive outcomes in patients undergoing vitrectomy.

Sutured sclerotomies induced astigmatism transiently in many eyes following 20-gauge vitrectomy.1,2 The aim of this study was to evaluate the changes in regular corneal astigmatism after transconjunctival sutureless vitrectomy (25-gauge or 23-gauge) and 20-gauge conventional vitrectomy.

Materials and methods
A retrospective comparative study was conducted on 70 consecutive patients (70 eyes) who underwent pars plana vitrectomy. The indications of vitreoretinal surgery were idiopathic vitreous hemorrhage, idiopathic macular hole or epiretinal membrane, or diabetic retinopathy or retinal vein occlusion, and tractional retinal detachment due to proliferative diabetic retinopathy. Inclusion criteria were that patients only received pars plana vitrectomy, no previous ophthalmic surgical treatment within 1 year. Exclusion criteria were as follows: (1) combine surgery with cataract extraction, (2) large variation of five refractive value, (3) any identified corneal pathology or and/or conjunctival disease, and (4) previous refractive surgery, previous ocular traumas, (5) any other new onset ophthalmic pathology during a 6-month follow-up.

Patient examinations
Each patient underwent complete preoperative ophthalmic examinations including refraction, best-corrected visual acuity, slit-lamp biomicroscopy, intraocular pressure measurement using application tonometry, and fundus examination by indirect ophthalmoscopy. All eyes received the diagnostic data of spherical power and regular astigmatism were measured by auto-refractor (Auto-refractor Topcon RM-8800) preoperatively, and at postoperative months 1, 3, and 6. Measure the refractive status for at least 5 times and recorded the average values. The absolute values of change differences in astigmatism power and axis were analyzed.

Surgical procedures
The surgical procedures were performed by two experienced surgeons from September 2011 to February 2013.

• All procedures were performed by two surgeon in Kaohsiung medical university hospital with experience in the 20G, 23G, and 25G TSV system.

• The sutureless incisions were made parallel to the limbus. The three scleral incisions were done at equidistant distances, which were located at 40 mm from the limbus in both phakic and pseudophakic eyes.

• Constellation® Surgical System from Alcon Laboratories was utilized for vitrectomy.

• A superior nasal and temporal conjunctival peritomy was performed and, in the end, a conjunctival and scleral suture with vicryl 7-0 in the 20-gauge system.

RESULTS
The dioptric data of spherical power and regular astigmatism was measured with auto-refractor (AutoRefractor Topcon RM-8800). The absolute values of change differences in astigmatism power and axis were analyzed. Statistically significant difference were observed in the change of corneal astigmatism power in post-operative 1 month follow-up measurement (p < 0.0001), whereas no statistically significant difference in axis change (p=0.1384).

There is no statistically significant difference in change of corneal astigmatism power in post-operative 3 months (P=0.1777) or 6 months (P=0.0655) follow-up measurement. There is no statistically significant difference in surgical outcomes (improvement of vision, 0.77 and 0.72 in range of six-point pressure, P=0.4224) and incidence of postoperative complications (P=0.6348).

CONCLUSIONS
Small gauge transconjunctival sutureless vitrectomy induces less change and exerts little influence on astigmatism compare with 20-gauge vitrectomy in the post-operative first month measurement. However, this difference of changes in astigmatism between the two groups is no longer statistically significant after 3 months. Compared with CVT, TSV induces significantly less discomfort, similar complication rate and visual acuity improvement.

Table 1. Retrospective comparative study was conducted on 70 consecutive patients (70 eyes) who underwent pars plana vitrectomy. The indications of vitreoretinal surgery were idiopathic vitreous hemorrhage, idiopathic macular hole or epiretinal membrane, or diabetic retinopathy or retinal vein occlusion, and tractional retinal detachment due to proliferative diabetic retinopathy. Inclusion criteria were that patients only received pars plana vitrectomy, no previous ophthalmic surgical treatment within 1 year. Exclusion criteria were as follows: (1) combine surgery with cataract extraction, (2) large variation of five refractive value, (3) any identified corneal pathology or and/or conjunctival disease, and (4) previous refractive surgery, previous ocular traumas, (5) any other new onset ophthalmic pathology during a 6-month follow-up.

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