Two-Way Fluid–Gas Exchange Syringe for Postvitrectomy Patients in Outpatient Setting

 Pars plana vitrectomy is a surgical procedure for the treatment of diseases such as rhegmatogenous retinal detachment, proliferative diabetic retinopathy, macular hole, and macular pucker (also called epiretinal membrane). In clinical medical practices, complications such as postvitrectomy vitreous hemorrhage, unsuccessful closure of macular holes, and insufficient gas tamponade may happen after pars plana vitrectomy procedures. Subsequently, vitreous cavity lavage with either single syringe or two syringes is needed to remove the intraocular fluid from vitreous cavity and complete the air or gas tamponade.1–3 Single-syringe or two-syringe fluid–gas exchange method has been used for decades. Unfortunately, these techniques can cause rapid changes in intraocular pressures (according to our unpublished data: 6–40 mmHg pressure changes for single-syringe method and 10–35 mmHg pressure changes for 2-syringe method). The rapid intraocular pressure changes could induce spontaneous expulsive choroidal hemorrhage and secondary retinal nerve damage. To solve the problem, we have designed a two-way fluid–gas exchange syringe system (Figure 1A) which can be used in an outpatient setting for postvitrectomy patients to reduce the rapid pressure changes during vitreous cavity lavage (see Video, Supplemental Digital Content 1, http://links.lww.com/IAE/A416).

This study was approved by the Ethics Committee of Clinical Medicine, Yangzhou University. All patients signed informed consent before treatment. The procedure to use the two-way fluid–gas exchange syringe system is described as follows. All procedures are performed in the outpatient operating room. Preparation of sterilized gas: Using a millipore filter, fill the syringe with 20% octafluoropropane (C₃F₈) diluted with air to 5.0 mL. One needle (24 G, 0.56 mm) with an auxiliary wing is attached to each end of the syringe. Place the patient in the supine position. Apply proparacaine for topical anesthetic. Prepare the eyelid with 5% povidone–iodine solution. Cover the eyelid margin with a sterile ophthalmic drape. Place the speculum. Apply 5% povidone–iodine solution to the conjunctiva. Patient then turns to lateral position of the suffering eye. Insert the needle that is attached to the syringe cavity filled with C₃F₈ in the nasal pars plana. Insert the inferior needle on the temporal side for draining vitreous cavity fluid. Both insertions are 4.0 mm away from the limbus. Pressing the handle in the middle part of the syringe system slowly till the fluid–gas exchange procedure is finished (Figure 1B). After removing the needles, press down the injection sites with cotton swabs for 30 seconds. Apply topical tobramycin and patch the eye.

We have found this technique useful. The advantage of using this two-way fluid–gas exchange syringe is that one can control the fluid–gas exchange process to

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Fig. 1. A. A two-way fluid–gas exchange syringe attached with two needles. B. The patient is in the lateral position; two needles injection site: 4.0 mm away from limbus, one at the 3-o’clock position for gas injection, another at the 9-o’clock position for draining vitreous cavity fluid; pushing the handle in the middle of the syringe slowly to complete fluid–gas exchange.
provide an equal volume fluid–gas replacement, which prevents remarkable intraocular pressure changes.

Key words: a two-way fluid–gas exchange syringe system, fluid–gas exchange, pars plana vitrectomy.

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References