

Removal of 5000-Centistoke Silicone Oil Using 25-gauge Vitrectomy

This technique is associated with a shorter operative time and less involved surgery compared with a 20-gauge approach.

BY SHLOMIT SCHAAL, MD, PhD

In this issue of Retina Today, Shlomit Schaal, MD, PhD, discusses the use of sutureless 25-gauge vitrectomy for removal of 5000-centistoke silicone oil.

We extend an invitation to readers to submit pearls for publication in Retina Today. Please send submissions for consideration to Dean Elliott, MD (dean_elliott@meei.harvard.edu); or Ingrid U. Scott, MD, MPH (iscott@hmc.psu.edu). We look forward to hearing from you.



— Dean Elliott, MD; and Ingrid U. Scott, MD, MPH

Silicone oil (polydimethylsiloxane) is a synthetic viscous liquid polymer similar to silicone rubber and composed of repetitive Si-O units of a given molecular weight. It differs from silicone rubber by having shorter, non-crosslinked polymer chains, and its viscosity is dependent on the number of repetitive units.¹ Most silicone oils commonly used in vitreoretinal surgery have a viscosity of 1000 or 5000 centistoke units. Surface tension and specific gravity are similar between these 2 oil types; however, the more viscous 5000-centistoke oil has a significantly higher molecular weight. Lower-viscosity silicone oil was found to have a higher tendency to emulsify.²

Silicone oil was first introduced into the field of ophthalmology 5 decades ago by Stone, who found it to be well tolerated when injected into the vitreous cavity of rabbit eyes.³ Soon after the successful animal experiments, Cibis et al⁴ were first to use silicone oil in the repair of complex retinal detachments deemed non-repairable by other methods available at that time. Silicone oil tamponade has become a well-established

technique for the management of complicated retinal detachment and proliferative vitreoretinopathy.⁵

After successful tamponade has been accomplished, silicone oil removal is important to prevent postoperative complications such as cataract, glaucoma, and keratopathy.⁵ Multiple techniques have been described for removal of silicone oil.⁶ Most commonly, removal of silicone oil is performed using a 20-gauge pars plana vitrectomy system. This technique requires conjunctival dissection and sclerotomy incisions to access the vitreous cavity. This can be difficult and time consuming in eyes that have had multiple previous surgeries. In 2002, Fujii et al⁷ introduced a 25-gauge system for transconjunctival sutureless vitrectomy, which has been proven to be effective for the treatment of a variety of vitreoretinal pathologies.

There have been very few published reports pertaining to safety and efficacy of 25-gauge pars plana vitrectomy removal of silicone oil. In a small cohort of patients, Kapran et al⁸ reported that removal of 1000-centistoke silicone oil can be achieved safely and effectively using 25-gauge transconjunctival sutureless sclerotomies.

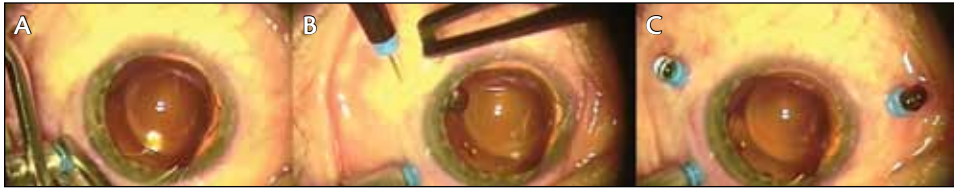


Figure 1. Twenty-five-gauge cannulas are placed using a 2-step beveled technique with a trocar-cannula system. (A) Connection of the 25-gauge infusion line to the cannula. (B) Creation of the superior sclerotomy. (C) View after placement of the 3 ports prior to vitrectomy and silicone oil removal.



Figure 2. Removal of silicone oil using a syringe with a 25-gauge adapter. (A) View of the silicone oil inside the syringe. (B) Silicone oil bubble is bisecting the pupil. (C) Remnant silicone oil next to the syringe port.

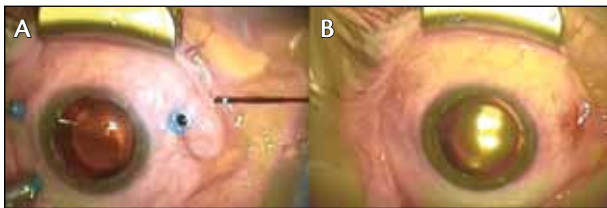


Figure 3. Complete removal of 5000-centistoke silicone oil. (A) Last droplet of silicone oil is evacuated from the vitreous cavity. (B) View of the eye after removal of 25-gauge cannulas.

Jusuftbegovic et al⁹ reported the first prospective study comparing silicone oil removal with a 20-gauge vitrectomy system versus a 25-gauge vitrectomy system and showed that the removal of silicone oil through the 25-gauge cannula was safe and effective. There was no difference in the complication rates between the groups. The mean total surgical time was significantly shorter in the 25-gauge group than in the 20-gauge group (25 ± 6 minutes vs 42 ± 10 minutes, respectively). This 40% reduction in surgical time translates into cost reductions due to decreased operating room time.

TECHNIQUE FOR 25-GAUGE REMOVAL OF SILICONE OIL

Twenty-five-gauge cannulas are placed using a 2-step beveled technique with a trocar-cannula system (Alcon Laboratories, Inc.). The conjunctiva is displaced anteriorly from the intended sclerotomy site with forceps (Figure 1). A trocar is inserted at an angle of approximately 30°

parallel to the limbus. Once the trocar has been inserted past its sleeve, the angle is changed to perpendicular to the ocular surface, and the cannula is inserted into the eye. The cannula is held in place with forceps, and the trocar is removed. The first sclerotomy is made in the inferotemporal region, and a 25-gauge infusion cannula is attached. Its position is verified using the light pipe. After the infusion line is opened, 1 cannula is placed superotemporally and 1 superonasally. Depending on the surgeon's preference, the silicone vacuum tube connected to an adapter is placed over the cannula either superonasally or superotemporally (Figure 2). Aspiration (200 to 600 mm Hg vacuum) and removal of silicone oil is followed by several fluid-air exchanges to wash out any remnant oil bubbles. The vitreous cavity is left filled with air, and the trocars are removed (Figure 3).

DISCUSSION

The primary advantage of small-gauge vitrectomy for the removal of silicone oil is shorter operative time. In addition, these patients have already undergone prior complex retinal surgery, which may have rendered the conjunctiva scarred and challenging to work with during 20-gauge vitrectomy. The reasons for a shorter surgery time with the transconjunctival sutureless systems are obvious. At the beginning of the vitrectomy, the simplified insertion of the 25-gauge cannula is much faster than the time-consuming preparation of sclerotomies for 20-gauge instruments, which involves conjunctival dissection, bleeding control, and penetration of the sclera. At the end of the operation, the 25-gauge cannulas are simply pulled out, while with the 20-gauge system, the 3 scleral ports and the conjunctiva are sutured.

Small-gauge vitrectomy is a less involved surgery and, therefore, associated with decreased inflammation and



Weigh in on this topic now!



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Which approach do you prefer for the removal of 5000-centistoke silicone oil?

- ☐ 20-gauge vitrectomy
- ☐ 25-gauge vitrectomy

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decreased pain postoperatively compared with 20-gauge vitrectomy. Although indications for small-gauge vitrectomy are expanding, there are no definite criteria with regard to proper case selection, and each vitreoretinal surgeon develops his or her own preferences according to personal experience and expertise. Small-gauge technology has revolutionized the way we perform vitrectomy surgery today. ■

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