SURGEON'S CORNER

New Viscodissection Instrument for Use With Microincisional Vitrectomy in the Treatment of Diabetic Tractional Retinal Detachments

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Objective: To report on the results of the surgical management of diabetic tractional retinal detachments using 25-gauge vitrectomy and a newly developed viscodissection instrument.

Design: Single-surgeon, noncomparative, consecutive case series of 30 eyes with severe diabetic tractional retinal detachment in patients who underwent viscodissection-assisted 25-gauge vitrectomy using the viscodissection instrument.

Results: Median preoperative visual acuity was 20/400. Median follow-up was 170 days. All retinas were attached at last follow-up. Median postoperative visual acuity was 20/70. Visual acuity improved by 2 or more lines in 17 eyes and remained stable in 11 eyes, without worsening of vision in any eyes.

Conclusion: The newly developed viscodissection instrument facilitates microincisional vitrectomy for complex diabetic tractional retinal detachment.

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Since 1971, with the first published description of vitrectomy for diabetic vitreous hemorrhage, the continued evolution and refinement of surgical instrumentation and techniques have expanded the role and improved the outcomes of vitreoretinal surgery in the management of proliferative diabetic retinopathy (PDR).[1] Microincisional, transconjunctival vitrectomy represents such an advance, with several reports highlighting its successful use in the surgical management of a growing number of conditions, including diabetic tractional detachment (TRD).[2,3]

Video available online at www.archophthalmol.com

Small-gauge, transconjunctival vitrectomy has several theoretical advantages over traditional 20-gauge vitrectomy in patients with TRD requiring surgical intervention. Smaller sutureless wounds allow for less induced trauma and potentially shorter surgical times, translating into reduced postoperative inflammation and morbidity with faster recovery times.[4,5] Furthermore, the decreased flow and cutter designs of available small-gauge systems, particularly the proximity of the cutter opening to the retinal surface, allow for precise and controlled dissection of preretinal membranes often in lieu of scissors or secondary instrumentation.

Despite the aforementioned advantages and recent improvements made in newer-generation small-gauge systems and instruments, many surgeons will opt for traditional 20-gauge systems in cases of severe PDR with extensive TRD. The yet limited number of options and functionality of intraocular instruments often make microincisional vitrectomy impractical in these complicated cases. We have found viscoelastic to be a useful adjunct to small-gauge vitrectomy in cases requiring complex membrane dissections. Though previously described, viscodelamination has not been widely implemented in vitreoretinal surgery, with only a few reports of its use in the literature and, to our knowledge, none involving microincisional vitrectomy.[6-11] We describe a newly developed viscodelamination instrument and the initial outcomes of its use in 25-gauge transconjunctival vitrectomy for the surgical management of severe TRD in PDR.

METHODS

VISCODELAMINATION INSTRUMENT

The viscodelaminator (Peregrine Surgical Ltd, Doylestown, Pennsylvania) (**Figure 1**) consists of an extendable, curved 25-gauge nitinol probe. It is connected through a short length of

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tubing to a 10-mL syringe partially filled with the viscoelastic. The syringe is in turn connected to a viscous fluid injector system, allowing for injection of the viscoelastic to be controlled via the vitrector foot pedal, as would be done for silicone oil injection.

SURGICAL TECHNIQUE AND METHODS

All cases were performed using the Alcon 25-gauge Microincisional Vitrectomy System in conjunction with the Accurus Vitrectomy System (Alcon Laboratories, Fort Worth, Texas). After displacement of the conjunctiva, trocars were inserted 3.25 to 3.75 mm posterior to the limbus depending on the phakic status. All wounds were constructed in an angled manner. The infusion cannula was placed inferotemporally in all cases. Visualization was achieved with a noncontact wide-angle viewing system (BIOM; Oculus, Wetzler, Germany). No lighted instruments or lighted infusion cannulas were used. All cases had severe PDR with large, broadly adherent fibrovascular membranes and TRDs (**Figure 2**A). The viscodelamination instrument was used in all cases (video, http://www.archophthalmol.com).

After a core vitrectomy had been performed, a small opening was created in the posterior hyaloid adjacent to the proliferative membrane using the vitrector or an MVR blade. Particular care was taken to preserve the continuity of the posterior hyaloid and associated membranes. The viscodissection cannula was then extended through the opening in the posterior hyaloid so that the tip of the cannula was oriented parallel with the retinal surface (**Figure 3**). Controlled injection of viscoelastic (Provisc; Alcon Laboratories) along with gentle blunt dissection using the cannula itself was progressively carried out to delaminate hyaloid and fibrovascular membranes from the retinal surface (Figure 3). Once viscodissection of the epiretinal tissues was achieved in this manner, the vitrector was used to remove the separated membranes and posterior hyaloid (Figure 3). The vitrectomy was then completed and carried out to the vitreous base with the aid of scleral depression. Panretinal endolaser photocoagulation was applied in all cases. In those cases where a retinal break was present, laser retinopexy was applied followed by either a complete air-fluid exchange or gas tamponade.

After obtaining approval from the institutional review board of Emory University, records were reviewed for all consecutive cases of pars plana vitrectomy for TRD associated with PDR between December 2006 and March 2009 in which 25-gauge vitrectomy with viscodelamination was used. Thirty eyes of 28 patients were identified. All cases were performed by a single surgeon (G.B.H.), using the viscodelamination instrument and viscodissection technique described earlier.

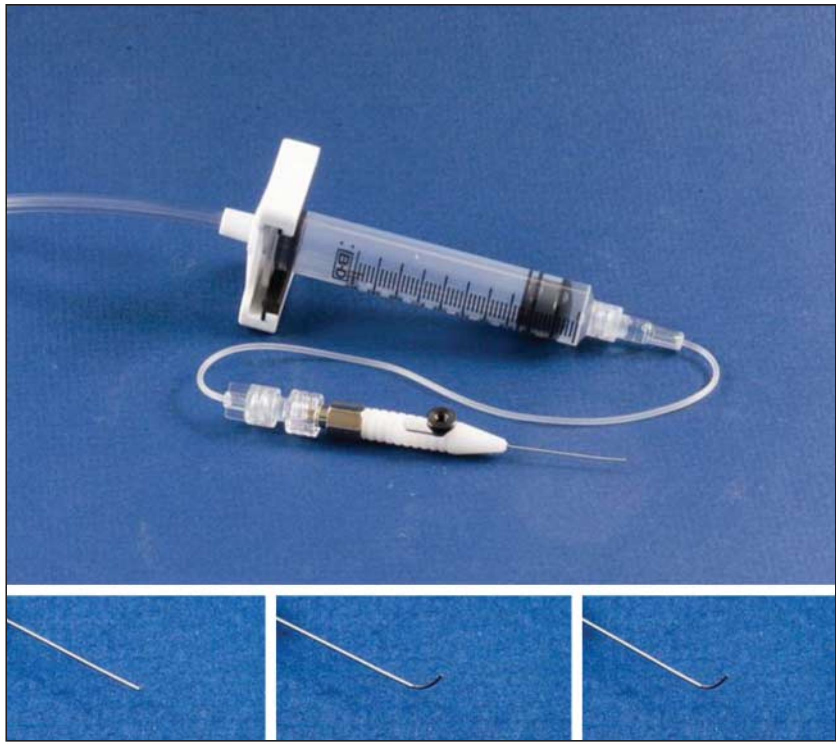

Figure 1. The viscodissection instrument consists of an extendable nitinol probe with a lumen connected by a short length of tubing to the viscous fluid injector. Flow of the viscoelastic is controlled via the vitrector foot pedal.

RESULTS

Median preoperative visual acuity was 20/400 (range, 20/40 to hand motions). Postoperative clinical information was available on 28 eyes. Median follow-up was 170 days (range, 23-688 days). No eyes required intervention for recurrent retinal detachment. Three eyes required reoperation for postoperative vitreous hemorrhage. All retinas were attached, with resolution of TRDs at last follow-up (Figure 2B). Silicone oil tamponade was not used in any case. Median postoperative visual acuity was 20/70 (range, 20/25 to hand motions). Postoperatively, visual acuity improved by 2 or more lines in 17 eyes and remained stable in 11 eyes (within 1 line of preoperative visual acuity) without worsening of vision in any eyes. Iatrogenic breaks were created in 15 cases. In 1 early case, a single sclerotomy site was enlarged to accommodate 20-gauge scissors. Otherwise, neither conversion to 20-gauge vitrectomy nor the use of intraocular scissors was required in any case.

COMMENT

Viscodissection was first described by Stenkula and Tornquist[6] in 1983 as a surgical technique for the removal of epiretinal membranes. Since then, there have been relatively few reports of its use in posterior segment surgery. McLeod and James[10] first reported anatomical and functional success with viscodelamination in eyes with TRD associated with PDR. More recently, in a comparative, nonrandomized, consecutive case series of eyes with diabetic TRD, Grigorian and colleagues[11] found viscodelamination to be comparable in efficacy with traditional pick-and-scissors dissection. We believe the design of the viscodelamination instrument used in the current series may allow for viscodissection to be carried out with greater technical ease than previously reported with fixed curvature and manually injecting cannulas. The

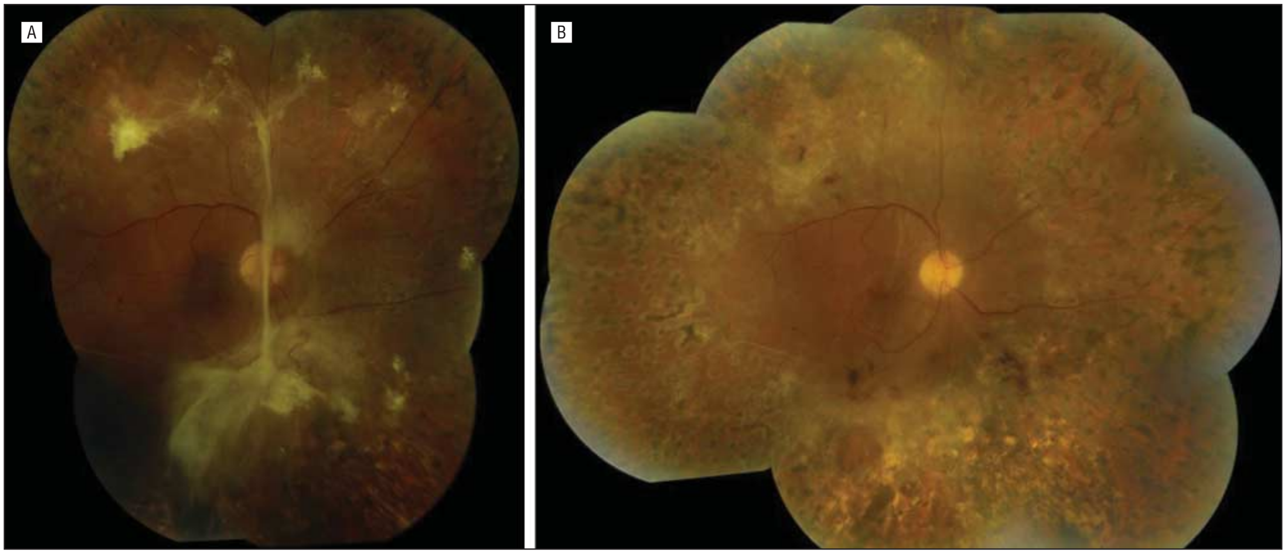

Figure 2. Fundus photographs. A, Preoperative fundus photograph showing broadly attached fibrovascular proliferation with tractional retinal detachments. B, Three weeks postoperatively after viscodissection-assisted 25-gauge vitrectomy and endolaser.

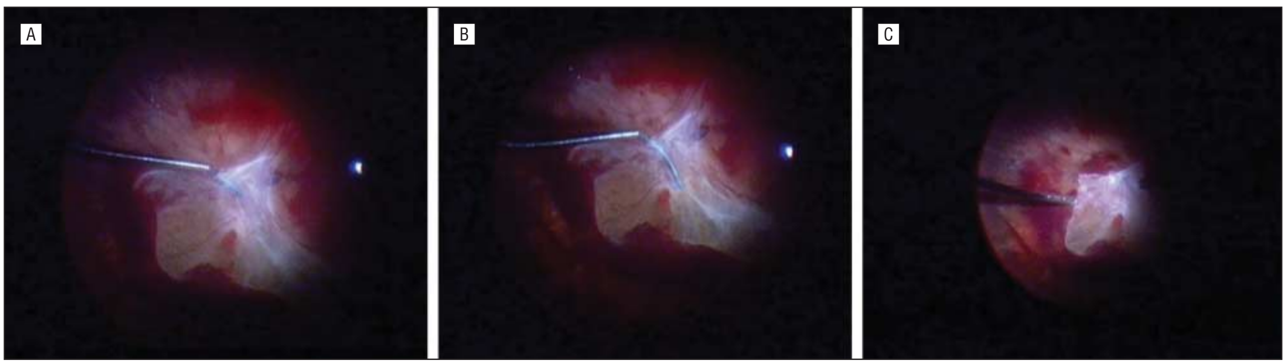

Figure 3. The extendable probe allows for controlled injection of viscoelastic under the membrane and parallel to the retinal surface (A and B). Once safely dissected off the retina, the membrane is removed with the high-speed cutter (C).

variably curved, extendable tip permits improved and more extensive access for complete delamination of broad fibrovascular membranes. The use of a short length of tubing between the instrument and the syringe containing viscoelastic allows the instrument to be easily maneuvered without having to handle a bulky syringe. Use of the foot pedal allows for a more controlled and gradual delivery of the viscoelastic by the surgeon without need of an assistant.

We acknowledge that viscodelamination is not necessary for all cases of diabetic TRD. With small-gauge vitrectomy systems, it is often possible to dissect membranes using the vitreous cutter alone. We reserve the use of this technique for select complex cases with large, broadly adherent membranes. The complexity of these cases may account for the rate of iatrogenic tears reported in this series (15 of 30). Additionally, our general approach in these complex cases assigns greater weight to the benefit of complete membrane removal than to the risk of creating small retinal breaks.

Cases in which viscodissection is particularly advantageous include the following: (1) cases with broad attachments between fibrovascular membranes and the retina, particularly those with midperipheral or equatorial proliferation that is difficult to access; (2) tractional detachments with a combined rhegmatogenous component, where increased mobility of the underlying retina often makes dissection more challenging; and (3) eyes with minimal or no separation of the posterior hyaloid. This last characteristic not only makes the use of viscodelamination favorable, but as described earlier, minimal disruption of posterior hyaloidal continuity at the beginning of viscodissection is preferable. As with traditional en bloc dissection, maintaining the anterior-posterior vector of vitreous traction is beneficial. Additionally, preservation of posterior hyaloidal continuity helps to contain the viscoelastic material between the surface proliferation and the underlying retina by preventing its egress into the vitreous cavity. Thus, delaminating forces are compartmentalized, improving the effectiveness and efficiency of viscodissection.

The current report supports the use of viscodelamination as a valuable technique for the dissection of epiretinal fibrovascular proliferation in PDR. The newly developed viscodelamination instrument further facilitates this technique. Applied in conjunction with microincisional vitrectomy, successful anatomical and visual outcomes can be achieved in cases of severe TRD associated with PDR.

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Online-Only Material: The video is available at http://www.archophthalmol.com.

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