27-Gauge Vitrectomy for Primary Rhegmatogenous Retinal Detachment: Is it Feasible?

Dear Editor,

Pars plana vitrectomy (PPV) using the 27-gauge transconjunctival approach is the last frontier of small gauge vitrectomy. Only 1 paper has been published so far describing the use of 27-gauge vitrectomy in a limited number of cases, including epiretinal membranes, idiopathic macular holes, diabetic vitreous haemorrhages, a vitreous biopsy for presumed vitreoretinal lymphoma and a focal diabetic retinal detachment.[1] The use of 27-gauge vitrectomy systems, although innovative and efficient thanks to the high cut rate and vacuum, has met with some skepticism for the treatment of rhegmatogenous retinal detachments (RRD).[2] The main concerns are related to the stiffness of the light and vitrectomy probe, the ability of adequately removing the vitreous gel throughout such small probe, and the time required to perform a full vitrectomy. Furthermore, there is concern for potential postoperative hypotony due to the loss of tamponade, recognised as a major complication in eyes treated for RRD.[3]

We report our experience using a 27-gauge vitrectomy system for repair of primary RRD.

Surgical Technique

A phakic 45-year-old myopic man presented with a macula-off RRD with a large (2 o'clock hours) horseshoe retinal tear from 1 to 3 o'clock hours and smaller retinal tears in the upper quadrant of his right eye. The preoperative best-corrected visual acuity (BCVA) was hand motion (Fig. 1).

Surgery was performed under retrobulbar block with a 27-gauge transconjunctival sutureless vitrector using a 1-step system (Synergetics, USA Inc., O'Fallon, MO). The conjunctiva was displaced and 30° angled incisions were made through conjunctiva and sclera at 4 mm from the limbus (Fig. 2). The surgical parameters were the following: fixed cut rate to 2500, proportional vacuum from 150 mmHg to 500 mmHg, intraocular pressure (IOP) at 30 mmHg. A core vitrectomy was performed and the posterior hyaloid was detached and removed. During vitrectomy, the vitreous base was thoroughly trimmed with transcleral indentation with the help of the assistant surgeon (Fig. 3). The retinal periphery was inspected for retinal breaks, and any break found was treated with cryotherapy and with endolaser photocoagulation. There was no evidence of iatrogenic damage. Air-fluid exchange was then performed with humidified air. At the end of the surgical procedure, air-gas mixture (C3F8 12%) was injected. The overall surgical time for vitreous removal was 15 minutes.

The surgeon had no difficulty going throughout the different phases of the surgery, including trimming of the peripheral vitreous in a phakic eye and the air-fluid exchange. The lens was not touched during the procedure.

On the first postoperative day, the eye presented a complete gas filling (gas meniscus was not visible at indirect ophthalmoscopy examination). The IOP was 14 mmHg, ocular hypotony (IOP ≤6 mmHg) was not recorded in any of the follow-up visits. Retinal reattachment was achieved since the first follow-up and it remained stable

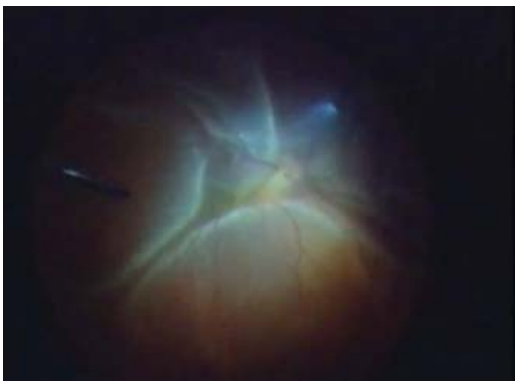

Fig. 1. Intraoperative view of total rhegmatogenous retinal detachment.

Fig. 2. Intraoperative 27-gauge vitrectomy trocars and infusion line.

Fig. 3. Intraoperative peripheral vitreous base trimming of the big horseshoe break.

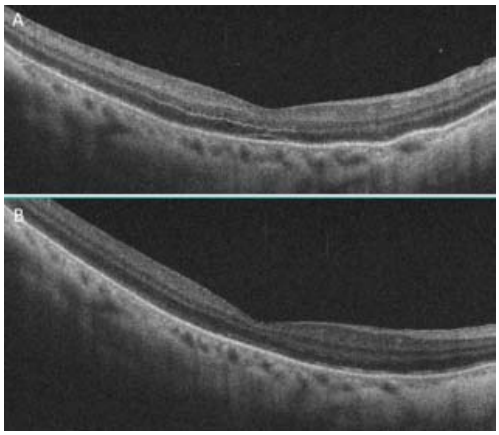

Fig. 4. OCT images. A) At month 1, interruption of both of the external limiting membrane (ELM) and inner segment/outer segment junction (IS/OS) band. B) At month 3 with integrity of the ELM and restoration of the IS/OS band.

at 1- to 3-month visits, as reported by optical coherence tomography (OCT) scan (Fig. 4). At the first month, the BCVA was 0.3 and progressively improved to 0.45 in the third month control with -5.50 spherical correction. At 3 months, an initial cortical cataract was also noted. No complications were recorded.

Discussion

As reported in the literature, the main benefits of small gauge vitrectomy are decreased inflammation and enhanced visual recovery, whereas these techniques do not seem to offer any advantage in terms of anatomical outcomes over 27-gauge vitrectomy.[4]

The main complications reported for 25-gauge and 23-gauge vitrectomy are postoperative hypotony and an increased risk for exogenous endophthalmitis, mainly due to the leakage of sclerotomies.[3] The patient did not complain about any postoperative pain, and despite of a macula-off RRD, he gradually achieved functional and anatomical improvement. The OCT showed an interruption of both the external limiting membrane and the inner segment/outer segment (IS/OS) junction or ellipsoid zone, which progressively healed in the following visits. This is considered a good prognostic factor for potential functional recovery, as we have previously demonstrated.[5]

The advantage of 27-gauge vitrectomy is the decreased risk of leakage and the reduced traction on the retina due to the smaller port of the cutter. With the parameters used in this case, the flow rate was still satisfactory for the surgeon, but we believe that the increase of the vacuum over 600 mmHg and the cut rate could have further advantage in terms of safety, stability of vitreous cavity and speed of vitreous removal.

In our opinion, the main limit of 27-gauge instruments is the access to the peripheral retina, where the retinal tears are usually located. The reduced stiffness of the light pipe and of the cutter probe increase the difficulty of rotating the eye.

Conclusion

To the best of our knowledge, this is the first published report of a RRD operated with a 27-gauge calibre. We found it possible and easily feasible to perform a 27-gauge vitrectomy for primary RRD. We are currently performing a randomised trial on a large number of patients comparing 25-gauge versus 27-gauge PPV for primary RRD, in order to assess the risks and complications for this promising mini-invasive surgical approach.

The latest generation of the 27-gauge vitrectomy probe offers a new approach in inducing less traction with high flow instrumentation, keeping the safety of small gauge vitrectomy and the efficiency of small gauge techniques intact. The 27-gauge system has, at the same time, a high speed cutting rate and a smaller diameter compared with previous systems. This means reduced outflow and tractions, resulting in a safer peripheral shaving and a better fluidic stability, which are important in RRD working with a mobile retina. The 27-gauge takes a faster and smaller ''vitreous bite'' due to the high vacuum settings, allowing an adequate flow rate during the vitreous removal. Another advantage of a smaller calibre is the reduced risk for postoperative vitreous incarceration, avoiding further tractional phenomena and increased infection risk. In the near future, a different blade motion of the cutter probe will influence its kinetic energy, reducing the acceleration and fluid turbulence.[6]

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