## Commentary: Entry sites and access in retinopathy of prematurity surgery: How important are they?

Correct placement of sclerotomies is the primary and probably the most important step in vitrectomy for a non-rhegmatogenous retinal detachment (RD) or vitrectomy in the presence of a clear crystalline lens. Inappropriate port placement can not only cause damage to the crystalline lens anteriorly or the retina posteriorly but also can lead to complications related to inconvenient instrument positioning and difficulty in accessing desired tissues. This is especially true while dealing with tiny retinopathy of prematurity (ROP) eyes where there is uncertainty and variation in location of the ora serrata and configuration of RD.

To avoid sclerotomy related complications, it is necessary to understand anatomy of the infant eye and patho-anatomy of ROP.

In infants, the eye is smaller, the palpebral fissure is narrower but the lens is much larger. The sclera is thin, has more elasticity, and is less stiff. The pars plana is also under developed.

Generally in growing eyes, the pars plana length correlates closely with the axial length and postconceptional age. Contrary to this, in eyes with ROP, anterior growth and ora–limbal distance is reduced for first few weeks.[1] The ora to limbus distance is least nasally and maximum superiorly. For safe entry in vitreous cavity, it is recommended to anteriorize the nasal sclerotomy by 0.25–0.5 mm or to displace it as superiorly as possible.[2]

Considering the uncertainty of the ora serrata location and RD configuration, a thorough fundus evaluation can be performed using indirect ophthalmoscope under general anaesthesia to assess extent and configuration of RD for selection of sclerotomy sites. Alternatively, scleral transillumination can be used intraoperatively to choose potential site for sclerotomy.[3]

Although there are no clear guidelines about selection of the gauge, smaller gauge vitrectomy systems (MIVS) have certain distinct advantages. Owing to the immature pars plana and the size of the eye, few surgeons prefer two-port vitrectomy. But with MIVS, all three sclerotomies can effectively be placed in an area limited by an otherwise narrow palpebral fissure. The trocar-cannula system also allows free exchange of instruments across all sclerotomies for better access along all the meridians.

The pathology to be addressed determines the need for cannula. Cannula can be avoided at one or more entry sites, in eyes with anticipated anterior dissection. If the detached retina is pulled up in the areas of intended sclerotomies, the entry can be shifted to an unconventional locations and the surgeon may have to sit on one side.

In premature infants, an entry site closer to the limbus (0.5 mm) is more appropriate to avoid damage to the retina. During entry, the microvitreoretinal blade or trocar can be directed parallel to the visual axis. However in eyes with adequately lasered peripheral retina, sclerotomies can safely be made at 1.0 or 1.5 mm posterior to the limbus to minimize the risk of lens damage.[4]

Although a stepped entry gives better self-sealing effect, in premature infants the sclera is extremely thin and the incision is practically almost uniplanar. Transconjuctival 25 or 27 gauge sclerotomies can still be self-sealing in these eyes. However, it is important to check for leakage at the end of surgery and sclerotomies are preferably sutured, if needed.[5]

In eyes with stage 5 ROP with anteriorly pulled retina, there is no space for safe pars plicata entry. Also in few stage 4 ROP eyes, the fibrous tissues cannot be adequately dissected without lens damage. In these eyes, trans-limbal or clear corneal entry is preferred for combined vitrectomy and lensectomy. The infusion can be through self-retaining 20 gauge anterior

chamber maintainer, placed in the inferior quadrant. In eyes with well dilated pupils, the vitreous cavity can be approached through the pupillary area. Alternatively two iridectomies can be made at the iris root in the meridian of limbal entry to approach the vitreous cavity.

Few surgeons prefer relatively larger gauge sclerotomies for smooth entry of instruments. For 23 gauge or 25 gauge instruments, 20 or 23 gauges sclerotomies respectively allow safe and snug entry.[6]

Just behind the limbus, the thickness of the sclera is roughly 0.5 mm and ideally any cannula longer than that should be able to enter the vitreous cavity.[7] A shorter and narrower trocar-cannula system can potentially minimize damage to the lens and surrounding retina in these eyes. DORC (27 gauge) and ALCON (25 gauge) have come with new shorter vitrectomy instruments. An added advantage of the reduced length is that it makes these instruments stiffer for better control and manoeuvrability during vitrectomy.

In the absence of shortened instruments, existing instruments can be modified to enhance the safety. Wong *et al*. threaded 2 pieces of Watzke sleeve over the 25 gauge trocar to reduce its effective length to 2 mm.[8] Babu *et al* have used a trimmed 42-silicone band as a spacer to shorted the length of the 25-gauge cannulas.[9] A similar approach can be adopted for the 27gauge system.[10]

In another technique described in the current issue, the trocar is inserted partially till the cannula impinges the sclera and then, the cannula alone is pushed in the vitreous cavity holding the trocar in place obviating the need for complete insertion of the trocar and limiting the chances of injury to the crystalline lens or anteriorly lifted retina.[11]

In infant eyes with retinal detachments due to ROP and similar vascular retinopathies, the configuration of the RD varies from case to case and one standard technique cannot be applied uniformly. The need to evaluate and understand the pathology in each quadrant and plan the location of the sclerotomy is just the beginning. Methods to minimize damage due to entry, exit and manoeuvring of relatively large instruments in a compromised space require innovative thinking and approaches. As these techniques get more refined, surgical results in these potentially blinding disorders would be more predictable and satisfying.

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## References

1. Hairston RJ, Maguire AM, Vitale S, Green WR. Morphometric analysis of pars plana development in humans. Retina 1997;17:135-8.
2. Wright LM, Harper CA, Chang EY. Management of infantile and childhood retinopathies: Optimized paediatric pars plana vitrectomy sclerotomy nomogram. Ophthalmol Retina 2018;2:122734.
3. Sharma A, Ali A, Henderson RH, PatelCK, VandenHoven C, Lam WC. Accuracy of scleral transillumination techniques to identify infant ciliary body for sclerostomy and intravitreal injections. Clin Exp Ophthalmol 2019;47:478-83.
4. Yonekawa Y, Fine HF. Practical pearls in paediatric vitreoretinal surgery. Ophthalmic Surg Lasers Imaging Retina 2018;49:561-5.
5. Gonzales CR, Boshra J, Schwartz SD. 25-guage pars plicata vitrectomy for stage 4 and 5 retinopathy of prematurity. Retina 2006;26(Suppl):S42-6.
6. Chandra P, Kumawat D, Tewari R. Hybrid clear corneal micro-incision surgical technique for stage 5 retinopathy of prematurity. Indian J Ophthalmol 2019;67:936-8.
7. Olsen TW, AabergSY, Geroski DH, Edelhauser HF. Human sclera: Thickness and surface area. Am J Ophthalmol 1998;125:237-41.
8. Wong IY, Iu LP, Lai CH. A simple modification to the 25-gauge trocar and cannula system for retinopathy of prematurity related lens-sparing vitrectomy. BMC Ophthalmol 2016;16:38.
9. Babu N, Shah PK, Narendran V, Kalpana N, Kim R. An easy method to raise the 25-gauge trocar and cannula system for retinopathy of prematurity related lens-sparing vitrectomy. Retina 2014;34:1014-5.
10. Shah PK, Prabhu V, Narendran V. Outcomes of transconjuctivalsutureless 27-gauge vitrectomy for stage 4 retinopathy of prematurity. World J Clin Pediatr 2018;7:62-6.
11. Dogra MR, Singh SR, Katoch D, Dogra M, Moharana B, Jain S. '*Stop-and-Slide*' technique for trocar insertion during lens-sparing vitrectomy for retinopathy of prematurity. Indian J Ophthalmol 2020;68:2209-11.



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