Commentary: Cataract surgery in small eyes: Choosing between complications

The term "Small eyes" encompasses a myriad of entities which can be classified as: (a) microphthalmos (b) relative anterior microphthalmos (short anterior chamber depth and normal axial length), and (c) high axial hyperopia (normal anterior chamber depth). Eyes with microphthalmos may be subdivided further into those with simple microphthalmos (or nanophthalmos) and complex microphthalmos. In the latter, microphthalmos is accompanied by anatomic malformations, including chorioretinal colobomas and persistent hyperplastic primary vitreous and retinal dysplasia.[1]

Cataract surgery in eyes with small anterior segment poses a significant challenge to the finest of the surgeons. Cases with microcornea, nanophthalmos, or microphthalmos develop dense lenticular sclerosis prematurely and cause visual deterioration in an already compromised optical system. To make matters worse, the disease is frequently bilateral and intervention is necessary. The risk of complications increases in proportion to the reduction in axial length.[2]

Major difficulty in operating these cases is related to the lack of surgical space in a crowded malformed anterior chamber that makes any kind of cataract surgery (phacoemulsification/ECCE/ICCE/SICS) difficult. Conventional cataract surgery brings with itself the risks of severe anterior and posterior segment complications. Thus anterior segment surgeons at times may be reluctant to perform surgery or defer it, despite the availability of various "safe or safer" techniques.[3] In this issue of the journal, the technique of effecting a lens drop intentionally and emulsifying the lens in the vitreous cavity is presented as a retrospective series.[4]

For the simple reason of crowded anterior chamber in subjects with microcornea, careful preoperative evaluation and modification of surgical steps are needed to optimize the outcomes. It should be known that intraoperative complications are secondary to microcornea, shallow central and peripheral chamber, peripheral anterior synechiae, chronic angle closure glaucoma (CACG), poorly dilating pupil and thickened choroid and sclera leading to intraoperative challenges because of lack of adequate maneuvring space within the chamber.

In a fairly similar case scenario of cataract surgery in nanophthalmos and microphthalmos eyes, the preoperative considerations more or less remain the same though the choice of surgical procedure and postoperative refractive outcomes may vary significantly. Since the axial length of eye is less, the surgical technique of phacofragmentation in posterior segment can cause intraoperative difficulties and subsequent complications; hence, cataract surgery is advisable to be performed through anterior route. It demands certain intricacies such as rhexis to be performed with microinstruments using high molecular weight cohesive viscoelastics, preferably with soft-shell technique. Bimanual surgery offers more margin of error in very small eyes. Soft nuclei may be partially hydroprolapsed and emulsified in parts. However, in hard nuclei, the bulk of the nucleus may be decreased by shaving away epinucleus within the bag and then using divide and conquer or crater and chop technique.

The technique as described by Sen A *et al*.[4] seems to be a remarkable one owing to good visual outcomes with minimal affliction to anterior chamber. This technique sounds ironical to general principals of cataract surgery that are immensely focussed at prevention of posterior capsular rupture (PCR), a feared complication. However in such a situation of intentional PCR, it becomes a well-conceived and controlled method of opening an "extra capsular" approach to the sclerotic lens! There is an added advantage that the anterior capsule can be spared peripherally for a future implant if the biometry of the eye permits. In contrast, when vitrectomy needs to be done in emergency setting, the cornea would likely be edematous and even securing ports can potentially be difficult let alone performing phacofragmentation.[5] The chief advantage of this technique lies in giving space to the surgeon. The vitreous chamber depth is much more than the anterior chamber depth, and there is definitely more room for instrumentation in the posterior cavity. Further using a four-port system would also allow a bimanual approach to the lens as described before.[5]

However, all is not green in phacoemulsification on the other side of the posterior capsule either. These eyes, especially the ones with choroidal colobomas are very well known to be at risk for retinal detachment (RD) and retinal breaks spontaneously, and vitrectomy can be the cause, lead to or predispose the eye to it.[5] Even this series notes around 10% of eyes have such complications.[4] Though the authors of this series have not done laser around the choroidal excavation, it should be noted that complete laser of the coloboma edge is often not possible due to involvement of the macula; thus, even such lasers may not be preventive fully. Induction of the posterior vitreous detachment is very difficult in these eyes, and injection of PFCLs (often used for posteriorly dislocated lens[5]) is also contraindicated relatively as it may seep below the intercalary membrane in presence of break at its edge. Vitrectomy setups are scarce in comparison to cataract surgery theaters. Furthermore surgical factors like small pupils, the inability to visualize vitreous initially due to cataract, long

vitreous cavities, and the inability to place viewing systems perfectly in such eyes make vitrectomy also difficult.

Limitations of the current study include its retrospective design, small sample size, and the short-term follow-up. Given these issues, the authors have agreeably concluded that "comparing this with the current standard approach is needed." The publication of this study sets a ground worthy for further investigation and with continuous advances in vitrectomy this technique may get safer and easier. Though cataract surgery in short or microphthalmic eyes has shown encouraging outcomes,[6-8] a prospective trial with larger sample size is recommended to generalize results in small eyes.

In light of the technical difficulties in performing such operations, each case should be thoroughly evaluated and the procedure should only be undertaken once the functional indications for cataract extractions outweigh the risks for the same. Clearly, a balance should be struck between the degree of surgical difficulty and the long-term risks of surgical and postsurgical complications.

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