

## Commentary: Three-dimensional heads up display assisted surgery – A leap into the future

The three-dimensional (3D) heads-up viewing system is the latest advance in ophthalmic surgery. The 3D viewing system has found its place for not only vitreoretinal surgeries but is also being graciously accepted for various anterior segment surgeries.<sup>[1]</sup> This modern system is currently under-utilized due to its learning curve and perceived time lag despite the many advantages it offers in the form of better ergonomics for the surgeon as well as better depth perception.

The advantage of the 3D visualization system can be well envisioned with the looming COVID-19 pandemic which has affected the learning of residents and fellows. Aerosol generation during phacoemulsification has been a recent concept that is being explored especially in view of the raging pandemic which not only puts the surgeon at risk but also the assistant. This risk can be mitigated through the 3D visualization system as the surgeon assumes a physiologic position that is further away from the patient as well as the use of passive polaroid glasses which add an additional barrier to aerosols. The 3D visualization system also provides the same view to the surgeon as well as the residents allowing a better understanding of the surgical steps to the students and the assisting staff.<sup>[2]</sup>

A study done in our center showed that the clinical outcomes for macular hole surgery using the 3D heads-up display was noninferior to the conventional microscope. The study also reiterated the advantages of superior ergonomics, reduced phototoxicity, better peripheral visualization, and magnification.<sup>[3]</sup> Similar results have also been seen in vitrectomy surgery for rhegmatogenous retinal detachment (RRD) with proliferative vitreoretinopathy (PVR) using the 3D visualization system.<sup>[4]</sup> An additional study was done in patients with inferior RRD with PVR wherein the better stereopsis, magnification, and depth perception of the 3D visualization system was used for vitrectomy without an encircling band. Due to the many advantages of this system, better vitreous visualization and its subsequent removal was key to the success of surgery without an encircling band.<sup>[5]</sup> Similar studies have also been done for anterior segment surgery and have shown promising outcomes with similar safety and efficiency as the traditional microscope.<sup>[6]</sup>

The study published in this issue of the journal concisely describes the many advantages of the 3D visualization system for anterior segment surgeries such as phacoemulsification with lens implantation, scleral buckling, trabeculectomy, glaucoma triple procedure, and scleral fixated intraocular lens.<sup>[7]</sup> Although they describe an initial learning curve, it was easily overcome and the many advantages of the system triumphed. Any apparent time lag was overcome in the post-learning phase. Complication rate was statistically insignificant between the groups with similar surgical outcomes between the groups. As the system comes into vogue, its further utility for other ophthalmic surgery will become apparent and may ultimately revolutionize ophthalmic teaching.

The many benefits of the visualization system are better image resolution, depth perception, illumination, postural

comfort, larger field of view, superior magnification and acts as an unsurpassed teaching tool. In conclusion, the 3D visualization system has brought about a paradigm shift in ophthalmic surgery.

**Atul Kumar, Veena Balaji, Nawazish Shaikh**

Dr. Rajendra Prasad Centre for Ophthalmic Sciences,  
All India Institute of Medical Sciences, New Delhi, India

**Correspondence to:** Dr. Nawazish Shaikh,  
Senior Resident, Dr. Rajendra Prasad Centre for Ophthalmic  
Sciences, AIIMS, New Delhi - 110 029, India.  
E-mail: shaikh.nawazish@gmail.com

## References

1. Moura-Coelho N, Henriques J, Nascimento J, Dutra-Medeiros M. Three-dimensional display systems in ophthalmic surgery – A review. *Eur Opth Rev* 2019;13:31-6.
2. Kumar A, Agarwal D, Nayak S. Commentary: Improving training in retina in Indian residency programmes. *Indian J Ophthalmol* 2019;67:1819.
3. Kumar A, Hasan N, Kakkar P, Mutha V, Karthikeya R, Sundar D, *et al.* Comparison of clinical outcomes between “heads-up” 3D viewing system and conventional microscope in macular hole surgeries: A pilot study. *Indian J Ophthalmol* 2018;66:1816.
4. Rani D, Kumar A, Chandra P, Chawla R, Hasan N, Agarwal D. Heads-up 3D viewing system in rhegmatogenous retinal detachment with proliferative vitreoretinopathy-A prospective randomized trial. *Indian J Ophthalmol* 2021;69:320.
5. Narde HK, Puri P, Shaikh NF, Agarwal D, Kumar A. Vitrectomy without encircling band for rhegmatogenous retinal detachment with inferior break utilizing 3D heads up viewing system. *Indian J Ophthalmol* 2021. doi: 10.4103/ijo.IJO\_2028\_20.
6. Weinstock RJ, Diakonis VF, Schwartz AJ, Weinstock AJ. Heads-up cataract surgery: Complication rates, surgical duration, and comparison with traditional microscopes. *J Refract Surg* 2019;35:318-22.
7. Bawankule PK, Narnaware SH, Chakraborty M, Raje D, Phusate R, Gupta R, *et al.* Digitally assisted three-dimensional surgery – Beyond vitreous. *Indian J Ophthalmol* 2021;69:1793-800.

This is an open access journal, and articles are distributed under the terms of the Creative Commons Attribution-NonCommercial-ShareAlike 4.0 License, which allows others to remix, tweak, and build upon the work non-commercially, as long as appropriate credit is given and the new creations are licensed under the identical terms.

Access this article online	
<b>Quick Response Code:</b>	<b>Website:</b> www.ijo.in
	<b>DOI:</b> 10.4103/ijo.IJO_488_21

**Cite this article as:** Kumar A, Balaji V, Shaikh N. Commentary: Three-dimensional heads up display assisted surgery – A leap into the future. *Indian J Ophthalmol* 2021;69:1801.