

## Commentary: 3D heads-up surgeries: Backing our backs, and necks!

The field of ophthalmic surgery went through colossal changes in the past few decades with multiple new innovations and improvements. The advances made in biomedical technology have led to an increasing number of microsurgeries performed across different surgical specialties. Conventional microsurgery with binocular analog microscopes has its own set of challenges. In an attempt to overcome them, development of three-dimensional (3D) display systems has been groundbreaking in the field of microsurgery, especially ophthalmic surgery.

The 3D display systems are showing ever more promising results in the field of ophthalmology, both for anterior and posterior segment surgeons. Heads-up surgery using 3D display screens has been increasingly accepted due to its advantages in terms of resolution at high magnification, depth perception, ergonomics, surgical teaching, and coordination.

Asani *et al.*<sup>[1]</sup> compared conventional microscope with 3D visualization system for rhegmatogenous retinal detachment surgeries and found that on par results can be obtained with 3D heads-up system as a conventional microscope.

These results are similar to those of recent reports from a team of four French surgeons who completed the same satisfactory questionnaire. The authors preferred 3D system for macular surgeries than conventional microscopes.<sup>[2]</sup>

These satisfactory questionnaires also showed a clear improvement in ergonomics, comfort, and a reduction in muscular pain for the users. Back and neck pain are frequently detected among ophthalmologists, especially among surgeons. Indeed, 50.6% and 31.8% of ophthalmologists participating in a national study in the UK reported back and neck pain, respectively.<sup>[3]</sup> The rate of reported neck and back pain among Indian ophthalmologists was 70%.<sup>[4]</sup> The use of the operating microscopes by surgeons and neck flexion during a slit-lamp examination for long periods may contribute to neck and back pain.<sup>[4]</sup> It was also noted that higher workloads were associated with a higher rate of neck pain in ophthalmologists.<sup>[5]</sup> The consequences may be limited by correct eyepiece positioning or the use of a heads-up visualization system.

In this cross-sectional study conducted at the operating room of a tertiary eye care center, equipped with ARTEVO 800 3D surgical microscope and display monitor, the authors analyzed 15 surgeries for variables that may be utilized for optimization of 3D heads-up surgeries (3D-HUS) for achieving better ergonomics among ophthalmic surgeons.

The ergonomics was assessed by quantifying the neck and eye strain of the surgeon and assistant by way of scoring as per Borg's CR-10 scale, before and after surgeries.

The study concluded that the various parameters affecting 3D image quality and neck and eye strain were chair height, viewing tilt angle, eye centration, monitor distance, laterality of the eye, and room illumination. These parameters will be of immense help to the new users of the ARTEVO 800 setup

and 3D users, in general, till everyone can find the setting that best suits them.

The author of this commentary, being one of the earliest users of the 3D surgical system in India, has considerable experience and feels that 3D system has definitely helped him ergonomically and in the other features described above.

A multicenter study involving multiple surgeons and diverse types of surgeries will definitely be of use in setting up preferred usage settings and ultimately aid all the users of 3D viewing systems to get the best out of the technology available and help the surgeons to back their backs, and necks too!

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