

Intraoperative Fundus Examination Using Air Bubble

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Examination of fundus before cataract surgery is crucial to know visual prognosis following it. One can expect full visual recovery following an uneventful cataract surgery in a person with normal fundus findings and no amblyopia. So, fundus examination consists of an essential part of pre operative work up for cataract surgery. But, sometimes it is not possible to visualize the fundus due to dense or mature cataract. In such cases, B scan can give a gross/rough idea about the status of posterior segment e.g presence of RD and posterior staphyloma. But the exact condition of posterior pole becomes clear only after the surgery or after the cataractous lens is removed. So, retinal examination including posterior pole and periphery during cataract surgery can give us a fair idea about the visual prognosis.

There are a few ways to examine the retinal status during surgery like using a Binocular Indirect Ophthalmoscopy (BIOM) wide-angle viewing systems which provides the surgeons with a panoramic view of the fundus with clear visualization generally used for vitreo retinal surgeries.

But these wide angle viewing systems have a high cost and the surgical microscope used for phacoemulsification surgery is usually not mounted by the BIOM system.

Another cheaper method could be using a head mounted IDO and holding a condensing +20 D lens in hand. But this again becomes tedious while operating.

In 1989, Asfour and Nassar described a much simplified and cheaper technique for fundus visualization during vitrectomy in aphakia. They provided a clear view of the fundus during surgery simply by injecting a small air bubble that fills one-half to two-thirds of the anterior chamber¹

Faruq et al in 2017 in a prospective interventional case series of 23 eyes, concluded that the air bubble technique as visualization method for vitrectomy in aphakia is an effective and cheap technique for immediate management of complications of phacoemulsification surgery.²

We demonstrated the same technique of intraoperative fundus examination by performing indirect ophthalmoscopy using air bubble as a condensing lens without any need of specialized microscope or a BIOM wide field viewing system.

While doing indirect ophthalmoscopy, we use a high convex lens of power +13 to +30 D usually +20 D lens and a real, inverted and laterally reversed image is formed between

the lens and the observer. So, in spite of using a condensing high power lens, one can simply inject an air bubble in AC which itself will act as a condensing lens and can examine the fundus intraoperatively.

After the cataractous lens is removed and remaining cortex is aspirated, a single large air bubble is injected into the anterior chamber. This air bubble acts as a condensing lens between the observer and the eye being examined and retina can be visualized. Our patient was a high myope with mature cataract, IOL power calculated being +2.0 D. As the cataract was mature, fundus examination before surgery was not possible. Thus, exact visual prognosis could not be explained to the patient. So, intraoperative fundus examination can prove useful in such cases to explain the prognosis and obtain proper consent (LEGAL IMPORTANCE) from the patient.

After cataract extraction, remaining cortex was aspirated which made the media clear. At this stage a single, large air bubble was injected into AC. This air bubble acts as a condensing lens and after adjusting the focus of microscope, posterior pole was visualized. The fundus showed PPA, macular scar, foster fuchs spots. This much information gave us a fair idea about the visual prognosis after cataract extraction and IOL implantation and helped us obtain the proper consent.

Taking an intra operative consent has a huge legal importance than post operative consent.

Thus, using air bubble can prove a simple, cheaper way of intraoperative fundus examination in cases where pre operative fundus examination is not possible due to dense or mature cataract without the need for costly instruments or specialized microscopes.³

References:

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2. M. M. Faruq et al. Air Bubble Technique for Fundus Visualization during Vitrectomy in Aphakia. J. Ophthalmol, 2017; 4721510.
3. <https://youtu.be/Udop3litnfc>, a video by author on youtube channel "Dr Pankaj Lande"

