Commentary: Endoexpression technique of nucleus delivery in manual small-incision cataract surgery

Manual small-incision cataract surgery (MSICS) is a viable alternative to phacoemulsification in developing countries like India.[1] In phacoemulsification, the cost of instrumentation makes the surgery expensive and unaffordable to economically necessitous patients. However, every eye deserves the best, irrespective of differences. MSICS involves creating a sclerocorneal tunnel that self-seals without any application of sutures. Expression of the nucleus is a critical part of the procedure to obtain the best visual outcome.[2] As the nucleus prolapses into the anterior chamber, followed by expression by various methods, there is a very high risk of corneal endothelial damage.[2] Hence, the critical part of expression is the construction of a tunnel. Every surgeon should have a basic understanding of wound dynamics to obtain an uneventful nucleus expression. Scleral tissues have an unorganized collagen tissue which is advantageous to the cornea in terms of its stretchability. On the contrary, the cornea is made up of organized collagen with less malleability.[3] Therefore, the sclerocorneal tunnel should be funnel-shaped, with a smaller length on the scleral side and a larger corneal lip depending upon the density of the nucleus.[4] In this way, the nucleus can be delivered without causing any damage to the corneal endothelium. The corneal endothelium is one of the most critical components of the cornea for maintaining transparency. It is not reproducible, which makes it quite vulnerable to being lost permanently. Corneal clarity correlates with the success of the procedure. Accordingly, we need to be extremely careful and critically judgmental while wheeling the nucleus out. The delivery of the nucleus can be broadly classified into the "push" and "pull" technique. The pull technique is the most popular technique that is performed by a majority of surgeons worldwide. This technique is usually performed using a dispersive viscoelastic which completely coats the endothelium, preventing any form of damage while pulling either with the help of irrigating Vectis or with a curved hook, which is popularly termed as the "fish-hook" technique.[5] The pull technique can also be performed using the anterior chamber (AC) maintainer, in which the lower lip of the tunnel is pressed to pull the nucleus out. However, with the advent of phacoemulsification, the demand to reduce incision size in MSICS is necessary to obtain a comparable visual outcome.[6] Nevertheless, the biggest challenge remains the delivery of the nucleus. The nucleus diameter varies from 6 mm to 12 mm. To remove the large nucleus from a small-incision, fragmentation is necessary. Fragmentation, as described by various authors, can be performed using a snare or miLOOP, in which a metallic thread is used to crack the nucleus into either two or three pieces.[7,8] However, during this maneuver, the endothelium should be well protected using a viscoelastic. After cracking the nucleus, individual pieces can be removed using forceps. Manual fragmentation of the nucleus helps in reducing the size of the incision, eventually inducing less surgically induced astigmatism. On the contrary, the push technique is performed by pushing the nucleus through a side port using a curved 26G needle or a Sinskey hook while keeping the AC maintained using the AC maintainer. As described in the current article, endoexpression of the nucleus through the main port using a Sinskey hook by pushing the nucleus through the main incision. Three main points should be considered before attempting this procedure. First, the surgeon needs to understand the science behind this technique. Here, the surgeon engages the nucleus in the corneal lip, which needs to be locked properly into the wound so that it does not disengage and cause unnecessary endothelial rubbing. For this purpose, the size of the internal corneal lip should be directly proportional to the density of the nucleus, which means that the larger the size of the nucleus, the larger must be the size of the internal lip. Second, the bottle height of the AC maintainer needs to be at least 80 cm to keep the AC full, helping to create a fluid barrier between the nucleus and the corneal endothelium. The third most important point is the depth of tunnel creation; the superficial scleral lip needs to be at least 50% of the scleral thickness to prevent any form of damage to the scleral incision. A superficial scleral lip may shear while it stretches during the process of exteriorization of the nucleus, which may eventually cause wound leak and abnormal wound healing. Conversely, a deeper scleral lip of greater than 90% of the scleral thickness may cause inadequate or insufficient stretching of the wound for nucleus delivery. Hence, it is indispensable to have a superficial scleral lip with a depth between 50% and 75%.[9] In addition, appropriate wound construction requires proper instrumentation with a special emphasis on the crescent, which should be of adequate sharpness to prevent any eventful surprise. To conclude, the endoexpression of the nucleus in manual SICS is a powerful technique; however, like any other surgery, it is an art that needs to be mastered by watching multiple videos and with appropriate guidance from the masters.

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