Commentary: Changing trends and preferred surgeons' practice for nucleus delivery in manual small-incision cataract surgery—Haven't they changed?

Since the inception of manual small-incision cataract surgery (MSICS) in the late 1980s, it has undergone continuous finer refinements to obtain a perfect post-operative outcome. MSICS is the surgery of choice in developing countries and is used extensively in tertiary eye care centers due to its low cost, less time consumption, and comparable outcomes.[1] One of the critical steps of the MSICS is safe nucleus delivery through the sclerocorneal tunnel safeguarding the capsular bag, iris, and corneal endothelium. The nucleus delivery techniques have undergone continuous changes and evolved over time. The nucleus can be delivered in toto or can be bisected or trisected.[2] However, all these techniques have nearly similar outcomes in experienced hands. The various techniques are as follows:

Blumenthal or anterior chamber maintainer technique

In this technique, a hollow steel tube anterior chamber maintainer (ACM) (0.9 mm outer diameter and 0.65 mm inner diameter) is inserted at one of the side ports, preferably on the temporal side. The steel tube is attached to a balanced salt solution bottle suspended 50–60 cm above eye level. After keratome entry, the nucleus is first engaged in the sclerocorneal tunnel with the help of a lens glide or iris spatula. Furthermore, the nucleus is pushed exteriorly by the hydropressure of ACM, and if required, the nucleus is pulled with the help of a needle.[3]

Irrigating wire vectis method

After the nucleus prolapse in the anterior chamber (AC), a viscoelastic is injected above and below the nucleus. The Vectis is attached to the infusion syringe, and patency is checked. The Vectis is inserted below the nucleus by slightly tilting it down toward the posterior capsule to engage the nucleus. The infusion is initiated, and the nucleus is extracted from the tunnel with hydro- and counter-pressure. The other hand stabilizes the globe either by holding a superior rectus suture or with the help of forceps. The pull of the rectus or slight pressure on the lower lip opens the tunnel, and the nucleus is delivered.[4]

Viscoexpression

Viscoexpression can be assisted with the help of wire Vectis connected to a syringe filled with low-molecular-weight viscoelastic, or the nucleus can be directly delivered with counter-pressure by injecting the viscoelastic in the AC and capsular bag from the syringe.[5]

Ruit technique

In this technique, a 7 mm sclerocorneal tunnel is fashioned, and AC entry is done. The nucleus is prolapsed in the AC, and a viscoelastic is injected around the nucleus. A bimanual irrigating and aspirating Simcoe cannula is inserted below the nucleus, and the nucleus is delivered through the tunnel.[6]

Fish hook technique

In this technique, the superior pole of the nucleus is partially prolapsed in the AC. An adequate viscoelastic is injected in front and behind the nucleus. A 30G needle is bent in the form of a hook and inserted from behind into the substance of the nucleus. The nucleus is engaged, brought out, and delivered through the tunnel.[7]

Phacosandwich technique

In this technique, the nucleus is delivered through the conventional SICS tunnel by sandwiching it between a Sinskey hook and wire Vectis or Sinskey hook and a spatula or a spatula with wire Vectis. The prime requirement for this technique is a bigger incision size. The technique is also helpful even if the tunnel is compromised, like a buttonhole or a premature entry.

Phacofracture technique

In this technique, the nucleus is prolapsed out of the capsular bag using two Kuglen hooks. The nucleus is gently rotated to loosen the cortical adhesions. After filling the AC with the help of a viscoelastic, the solid Vectis is insinuated under the nucleus, the nucleotome is placed above the nucleus, and both the instruments are brought toward each other. This splits the nucleus into two halves. The bisected pieces are then brought into the tunnel with the help of nuclear forceps with 9 mm long jaws one by one. Another modification of this technique is the use of a Sinskey hook, a wire Vectis is used instead of nucleotome, and the solid Vectis and the rest of the technique remain the same.

Manual multiphacofragmentation

In this technique, the nucleus is fragmented into multiple pieces of 2 × 2 mm. The main advantage of this technique is that it can be performed through a clear corneal tunnel of 3.2 mm or 3.5 mm scleral tunnel incisions. This technique is performed using a racket-shaped nucleotome 8 mm long and 2 mm wide. The spatula is placed below the nucleus, and the two instruments are brought toward each other until the nucleus is fragmented into four pieces. The divided pieces are delivered out of the tunnel one by one. The other described techniques for phacofracture are nucleus bisection, trisection, wire loop nucleus fracture, phacosalute, and phacofracture at the tunnel exit.

Delivery by Sinskey hook

Sometimes, the nucleus is stuck at the tunnel site due to adequate or smaller size. The engaged nucleus can be brought out through the tunnel with the help of a Sinskey hook.[8]

In the current article, the authors have described the novel technique of endoexpression as a tribute to Late Dr. KVS Dhaliwal, a well-known figure in Indian ophthalmology.[9] It would not be wise to forget his contribution to Indian ophthalmology. This technique performs the AC entry with a 3.2 mm keratome. Hydrodissection is accomplished through the main tunnel. The nucleus is dialed out of the capsular bag, and complete rotation is achieved. Manual phacofragmentation is performed and then the nuclear fragments are delivered by endoexpression. If a large nucleus is stuck in the tunnel, the nucleus is pushed by the Sinskey hook or through the side port of the surgeon's dominant hand. The AC maintainer helps to form the chamber. Because the nucleus is away from the endothelium, the endothelial cell loss is minimal. The endoexpression technique can also be performed without an AC maintainer using viscoelastic material. The rest of the steps, like cortex removal and IOL implantation, are similar to the conventional MSICS.

The advantages of the endoexpression technique are that this technique can manage all grades of cataract. When there is a mismatch between the size of the nucleus and the incision, this technique is very helpful. This helps by stretching the scleral tunnel's external lip, which can stretch without any damage to the incision. Endoexpression is a helpful technique in small-incision sizes with comfort and ease. It has a learning curve, but if mastered, it can be of real help in complex cases. The COVID-19 pandemic has changed our thinking, and this is an era of research and innovations. We must fully adapt ourselves to the changing needs and think with an innovative intent for better patient care and management.

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