

How to Perform Manual Small-Incision Cataract Surgery

By Praveen Dhanapal, MBBS, and Dayakar Yadalla, MS, FRCS
Edited by Sharon Fekrat, MD, and Ingrid U. Scott, MD, MPH

Eighteen million people worldwide are functionally blind due to untreated cataract.¹ In countries that have huge backlogs of patients with unoperated cataracts, bilateral mature cataracts constitute a significant proportion of the total cataract surgery workload. In these countries, there is a need for an alternative to phacoemulsification that is cost-effective, scientifically sound and efficient. This led to the advent of a sutureless technique: MSICS, which has been shown to give results comparable to phaco in terms of rapid visual rehabilitation. Although it's a relatively new technique, MSICS is gaining popularity in many countries by virtue of its ability to manage difficult cataracts very safely. This technique can also be combined with trabeculectomy.

How Is MSICS Performed?

Construction of a small, self-sealing sclerocorneal tunnel for delivering the cataractous lens is the central principle in MSICS, and the procedure can be done with either a temporal or a superior incision, whichever is more convenient. The temporal site is best suited for deep sockets where the maneuverability through the superior site would be difficult.

The instruments that are required for construction of the sclerocorneal tunnel are 1) Westcott scissors, 2) cautery, 3) Bard-Parker knife with #15 blade, 4) Castroviejo calipers, 5) crescent blade and 6) 45-degree-angled, 3.2-mm microkeratome.

The tunnel has six aspects: size (i.e., the length of the tunnel), shape (style), location, depth, width and entry place into the anterior chamber.²

The steps of the technique described below pertain to the right eye.

Anesthesia. MSICS can be performed under peribulbar, retrobulbar, sub-Tenon's or topical anesthesia. However, topical anesthesia is discouraged for difficult situations.

Creating a sclerocorneal tunnel. After attaining adequate mydriasis, a superior rectus bridle suture is placed. A fornix-based conjunctival flap is created, and hemostasis is achieved with bipolar diathermy cautery.

A curvilinear partial-thickness scleral incision is made 3 mm posterior to the limbus. Several kinds of incisions have been described, including the straight, frown, smile and chevron. The incision is smaller for a soft cataract and larger for a dense, hard cataract. Usually, the incision is 6 to 7 mm long for a cortical cataract and 7 to 8 mm long for a hard cataract (such as 4+ nuclear sclerosis). The depth should be approximately 0.3 mm.

This incision is made by advancing the crescent knife into the sclera and slowly cutting on either side, making room for the crescent knife. Adequate depth is judged by visibility of the

knife (i.e., the crescent should be just visible through the sclera, Fig. 1). The heel of the crescent should be flat on the globe during dissection, ensuring uniform depth of the tunnel.

Once the limbus is reached, the tunnel is converted to a flap by forward and backward motion, cutting the tissue while coming out. On either side of the tunnel, scleral pockets are created. This helps to accommodate the nucleus during delivery. The width of the tunnel (i.e., the distance between the scleral incision and the inner corneal incision at the level of Descemet membrane) should be 4 mm (Fig. 2). The tunnel is trapezoidal, as the inner corneal incision is 25 percent larger than the scleral incision.

Creating a paracentesis. A paracentesis is made at the 9 o'clock position using a 24-gauge, 15-degree lancet tip blade. The lens capsule is stained with trypan blue injected through the side port under an air bubble to protect the corneal endothelium. It is desirable to wait for 30 seconds for adequate staining of the capsule. Then the trypan blue is washed out of the eye using balanced salt solution. The anterior chamber is deepened by injecting a viscoelastic.

Making the internal corneal incision. The keratome is advanced through the tunnel carefully, then tilted downward and slowly advanced to extend the tunnel into the anterior chamber. The keratome is now moved forward and laterally, creating an internal incision parallel to the limbus. The internal incision is extended on both sides.

Capsulorhexis and nucleus delivery. A continuous curvilinear capsulorhexis is made using a cystotome or a rhexis forceps. A large rhexis is preferred for easier prolapse of the nucleus.

Multiple small hydrodissections facilitate prolapse of the nucleus into the anterior chamber and minimize the aspiration of residual cortex. The nucleus can largely be prolapsed with hydrostatic force created by injecting BSS in the bag during hydrodissection. Any unprolapsed portion of the nucleus can be captured using a Sinskey hook as one would use a tire iron.

The nucleus is delivered with an irrigating lens loop. The globe is stabilized and the irrigating lens loop is introduced through the tunnel and positioned between the iris and the nucleus. The nucleus is engaged in the lens loop and slowly withdrawn from the anterior chamber while the posterior lip of the tunnel is depressed. (Fig. 3). It should be noted that depressing the posterior lip opens the tunnel, and lifting the anterior lip closes the tunnel. Once the nucleus gets engaged in the tunnel, BSS is injected steadily. The hydrostatic pressure within the anterior chamber facilitates the delivery of the nucleus.

Residual cortex aspiration and implantation of a posterior chamber IOL. The residual cortex is aspirated using a Simcoe cannula, and the subincisional cortex is aspirated through the paracentesis port. The anterior chamber is washed with BSS, and viscoelastic is injected into the anterior chamber. A posterior chamber IOL is implanted in the bag through the tunnel and dialed in. Viscoelastic is aspirated and washed out with a Simcoe cannula.

Sealing the paracentesis port. The paracentesis port is sealed by hydrating the stroma. This is done by injecting BSS steadily into the corners of the incision.

Once the port site is sealed, the anterior chamber deepens, and the globe becomes firm. The tunnel is then checked for integrity. Finally, the conjunctiva is apposed gently by bipolar diathermy cautery.

Does MSICS Work?

Several studies have been conducted to compare phacoemulsification and MSICS. Recently, a prospective, randomized clinical trial conducted in Nepal concluded that both techniques achieve excellent surgical outcomes with low complication rates.³ The study also showed that MSICS is significantly faster, less expensive and less technology-dependent than phacoemulsification. Although phaco offers faster recovery time, MSICS may be the more appropriate surgical procedure for the treatment of advanced cataracts in many countries.