Original Article

Preferred practice of cataract surgery in brown cataract: A questionnaire-based survey among Indian ophthalmic surgeons

Venugopal Anitha, Aditee Madkaikar[1], Meenakshi Ravindran[2], Mohammed Uduman Siddique[3]

Purpose: To determine the most preferred method of operating brown cataracts among ophthalmologists in India. **Methods:** A cross-sectional, questionnaire-based study was conducted among ophthalmologists all over India through electronic and social media from May 1 to June 15, 2022. All single, voluntary entries within the stipulated time period were accepted for analysis. **Results:** A total of 230 ophthalmologists participated in the study among which 198 (86%) preferred Manual small-incision cataract surgery (mSICS) as the first option. This was preferred due to the high risk of complications associated (40, 33.6%) as well as endothelial damage due to increased Phaco power (53, 47.9%). The majority of the surgeons (162, 70.4%) preferred a superior tunnel for SICS, and 51.7% (119) performed continuous curvilinear capsulorhexis in 100% of their cases. The most common complication encountered was posterior capsular rupture (PCR) (66%), followed by zonular dialysis (ZD) (18.7%), whole bag removal (8.3%), and Descemet's membrane detachment (7%). **Conclusion:** Despite diverse recent new modalities of Femto Laser assisted cataract surgery (FLACS). Phakonit, and Smart Intraocular Lens (IOLs), the majority of ophthalmologists still find the manual small-incision cataract surgery (mSICS) procedure a safe surgery for mature brown cataracts.

Key words: Brown hard cataract, mSICS, surgical complications

Access this article online

Website: www.ijo.in

DOI: 10.4103/ijo.IJO_1555_22

Quick Response Code:

Age-related cataract remains the major cause of treatable blindness throughout the world. In 2020, it was estimated that 15.2 million (12.7–17.9) people aged 50+ years were blind, with an increase of 29.7% in cases of cataract blindness worldwide. The prevalence of unoperated cataracts in the older population is also high in India, and cataract surgeons are continuously operating hard and brunescent cataracts every year.[1] Vashist P *et al*.[2] reported that 58% of the population in North India and 53% of the population in South India of age >60 years have unoperated cataracts. Muhtaseb M *et al*.[3] devised a scoring system based on the risk of intraoperative complications to undergo safe cataract surgery. The author has assigned a high-risk category with >3 point scores for brunescent/mature cataracts. Dandona L *et al*.[4] reported, 40% blindness following cataract surgery in rural areas of Andhra Pradesh. Brown or brunescent cataracts occur most commonly in aged individuals, although they cause poor contrast and color discrimination, the patients ignore early cataract surgery due to many reasons such as the sedentary lifestyle of these patients; lack of awareness, high cost of the surgery, few being comfortable with near vision, and their best-corrected distance visual acuity remaining 6/6 to 6/9 till it matures. Delayed cataract surgery leads to a high incidence of brunescent, hard rocky cataracts that effectuates surgical complications. Notably, operating brown cataracts carry a high risk of intraoperative complications such as posterior capsular rupture (PCR), zonular dialysis (ZD), and endothelial cell loss with a risk of corneal decompensation. Albeit, with increasing cataract surgeries being performed all over the world, a backlog of blindness exists due to cataract surgical complications.[5-7] To achieve good visual and functional outcomes in these cases, it is imperative to evaluate the ideal type of cataract surgery technique (manual small-incision cataract surgery: mSICS or phacoemulsification: Phaco) desired by most of the ophthalmic surgeons for operating brown cataracts with minimal intraoperative and postoperative complications. We did a questionnaire-based survey to assess the most preferred surgical technique for achieving an uneventful postoperative outcome in operating brown cataracts among Indian ophthalmologists.

Methods

We conducted a cross-sectional questionnaire-based study among qualified ophthalmologists all over India through the All India Ophthalmological Society (AIOS) to study the preferred method of cataract surgery and surgical steps while operating hard brown cataracts. The preferred mode of communication was via email, but other methods to increase participation like WhatsApp were also utilized. The study was

Cornea, Ocular Surface, Trauma and Refractive Services, [1]Cornea and Refractive Services, [2]Paediatrics and Strabismology and [3]Biostatistics, Aravind Eye Hospital and Postgraduate Institute of Ophthalmology, Tirunelveli, Tamil Nadu, India

Correspondence to: Dr. Venugopal Anitha, Cornea, Ocular Surface, Trauma and Refractive Services, Aravind Eye Hospital and Postgraduate Institute of Ophthalmology, Tirunelveli, Tamil Nadu, India. E-mail: aniths22@ymail.com

Received: 28-Jun-2022 Revision: 02-Sep-2022
Accepted: 03-Sep-2022 Published: 25-Oct-2022

Cite this article as: Anitha V, Madkaikar A, Ravindran M, Siddique MU. Preferred practice of cataract surgery in brown cataract: A questionnaire-based survey among Indian ophthalmic surgeons. Indian J Ophthalmol 2022;70:3893-7.

conducted according to the Declaration of Helsinki and after getting approval from the Institutional Ethics Committee. The questionnaire consisted of 17 questions with multiple choice questions broadly categorized into 2 sub-headings: preferred surgery for brown cataracts (mSICS or Phaco) and preferred surgical steps for successful SICS in brown cataracts. The first sub-heading had a set of 7 questions, whereas the second one had 10 questions, details of which can be studied in the following table/figure. The main mode of communication was by email, but other modes like WhatsApp were also encouraged to boost participation. All participants received the questionnaire from May 1 to June 15, 2022, and three reminders within a 1-week interval were also sent in succession. The survey was closed on the last day and the data obtained from the Google sheets was analyzed with Microsoft Excel for descriptive statistics. The participation was purely voluntary and anonymous. An introductory text preceded the questionnaire explaining the need of the study. All completed questionnaires within the allotted time of study were included for analyses. Only one result per participant was allowed. The study questions were separated into two headings: A. The preferred method of surgery (Phaco or SICS) for brown cataracts [Table 1] and B. Surgical steps preferred for performing successful SICS in brown cataracts [Table 2].

By using Google Forms, data were gathered through a questionnaire. Surgeons' responses were secured, stored, and exported into the Excel format, which was then analyzed using statistical software STATA 14.0 (StataCorp, USA). Descriptive statistics of the surgeon's preference over the method of cataract surgery of brown cataracts were reported.

Table 1: Preferred surgical method for brown cataract by Indian ophthalmologists

Questionnaires	Multiple choice
1. Number of surgical years in ophthalmology:	<5 years, 5–10 years, 5 years
2. Number of SICS surgeries:	<1000, >1000
3. Number of phacoemulsification:	<1000, >1000
4. Type of Phaco machine used:	venture based, peristaltic, combined
5. Preferred surgical method for brown cataract:	Phaco, SICS, can do both but prefer either SICS can do both but prefer Phaco
6. Reason for preferring SICS:	Use of more Phaco power, Increased tunnel burns, Uneventful nucleus delivery through the sclera-corneal tunnel, Low risk of complications, Less stressful.
7. Reason for preferring Phaco:	-Need for large tunnel Better wound healing with corneal incision Preference for foldable IOLs Confidence

Categorical responses were reported using frequencies (*n*) and percentages (%). Continuous variables were presented as mean with standard deviations (SD). Level of confidence in performing SICS and Phaco were graded on a scale of 1 (minimum confidence) to 10 (maximum confidence) in brown cataracts. Grades of scale above 8 were considered the highest level of confidence and were compared between SICS and Phaco using a proportion test.

Results

The results of 230 ophthalmologists who responded to the questionnaires with a varied range of surgical experience were studied. The survey was responded to by 138 (60.0%) female ophthalmologists and 92 (40.0%) male ophthalmologists. The mean age was 42 (6.8) years. The surgical experience was >10 years in 107 (46.5%) ophthalmologists, 5–10 years in 81 (35.2%) and <5 years in 42 (18.3%). Among the surgeons, it was interesting to note that 178 (77.4%) have done >1000 SICS procedures and 52 (22.6%) have performed <1000 SICS procedures. Similarly, 131 (57%) have done >1000 Phaco and 99 (43%) <1000 Phaco. Among the participants who are performing Phaco, 126 (54.8%) have used peristaltic and 79 (34.3%) have used combined machine type (peristaltic and Venturi), but only 25 subjects (10.9%) have used the Venturi machine. From this data, we understand that our study participants have better experience in SICS procedures than Phaco.

Preferred method of surgery (Phaco or SICS) for Brown cataracts

For the desired procedure for operating on patients' eyes with brown cataracts, 8 (3.5%) preferred only Phaco, and 79 (34.3%) preferred only mSICS. Around 143 (62.2%) participants agreed that they can perform both the procedures in brown cataract, but 119 (51.7%) preferred mSICS and 24 (10.4%) preferred Phaco. Among the study participants who preferred to perform SICS for brown cataracts, they were further inquired about the rationale for the same. Seven surgeons (5.9%) felt mSICS to be less stressful, 11 (9.2%) felt that large brown nuclei can be delivered easily through a large-sized scleral incision, 40 (33.6%) felt that excess Phaco energy used to emulsify the brown cataract can damage the endothelial cells, most of them, 57 (47.9%), felt complications are high with Phaco, and 4 (3.4%) felt that excess tunnel burns can lead to poor wound healing [Fig. 1]. Among them who preferred the Phaco procedure (24, 10.4%), for brown cataracts, 6 (25%) made a large incision for delivering brown cataracts was the issue, 6 (25%) were all confident with Phaco and sure of managing intraoperative and postoperative complications, 8 (33.3%) preferred Phaco because the patients have opted for foldable IOLs, and only 4 (16.7%) felt that better corneal wound healing could be achieved with the Phaco procedure [Fig. 2].

Surgical steps preferred for performing successful SICS and Phaco in brown cataracts

We further assessed the preferred steps of SICS in brown cataracts among all the study participants. Around 162 (70.4%) participants preferred only a superior tunnel, 47 (20.4%) preferred temporal, 21 (9.1%) preferred superior-temporal tunnel site for SICS, and 119 (51.7%) were confident of making capsulorhexis in 100% of cases operated per day, 108 (47%) in > 50% of the cases operated per day, and only 3 (1.3%) were

Table 2: Preferred surgical steps for successful mSICS in brown cataracts

Questionnaire	Multiple choice
1. Site of tunnel for SICS:	superior, temporal, supero-temporal
2. Confidence to achieve complete curvilinear capsulorhexis :	<50%, >50%, 100%
3. Preferred instrument for CCC:	bent cystitome, rhexis forceps, other customised instruments
4. Preferred incision for rhexis:	paracentesis, main port
5. Surgery preferred for the following complicated cataracts:	small pupil, zonular dialysis
6. Procedure having maximum complication rate:	Phaco or SICS
7. Step more prone for complication in SICS:	nucleus delivery, cortex wash, other
8. Most commonly encountered complication in SICS:	PCR, ZD, whole bag removal, DMD, nucleus drop
9. Grade your level of confidence in performing SICS for brown cataracts	from 1 to 10 (1 being minimum and10 maximum)
10. Grade your level of confidence in performing phacoemulsification for brown cataracts	from 1 to 10 (1 being minimum and 10 maximum)

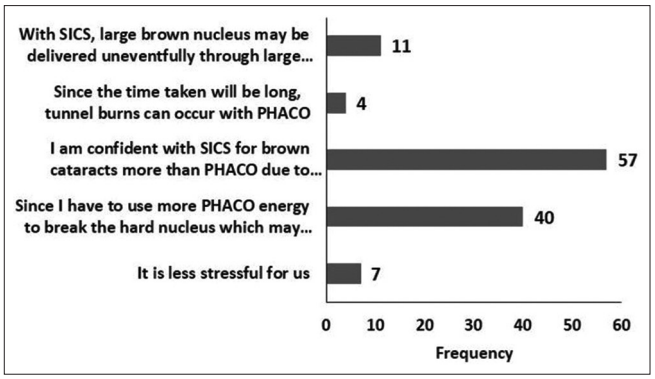

Figure 1: Bar chart describes the preference of mSICS for brown cataracts

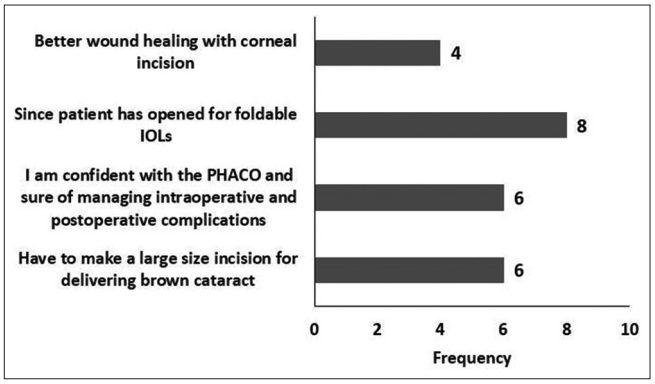

Figure 2: Bar chart describes the preference of Phaco for brown cataracts

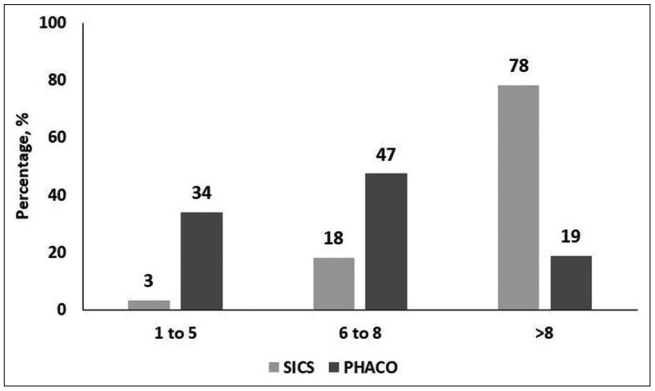

Figure 3: Grade of level of confidence in performing surgeries (mSICS or Phaco) on a scale of 1–10 in brown cataract (1 being minimum confidence; 10 maximum confidence)

not confident, that is, <50% of cases. Most of them use bent cystitome 209 (90.9%), 16 (6.9%) used rhexis forceps, and other customized instruments were used by 5 (2.2%) surgeons. A total of 123 (53.5%) preferred to do rhexis through the main incision, and 107 (46.5%) preferred through side port incision. Most of them felt that brown cataracts operated with mSICS (142, 61.7%) procedure had maximum complication compared to Phaco (88, 38.3%). The step of nucleus delivery in SICS was prone to complication in 100 (43.5%) surgeons, similarly, nucleus chopping in Phaco was prone to complication in 159 (69.1%) surgeons. The complications during cortex wash were also more common in SICS (58, 25.2%) than in Phaco (25, 10.9%). Most of the surgeons felt that in mSICS, the most frequently encountered complication was PCR (152, 66%), the next commonly faced complication was ZD in 43 (18.7%) surgeons, Descemet's membrane detachment in 16 (7%), and whole bag removal among 19 (8.3%) surgeons. Overall, the level of confidence is high with mSICS (180, 78.3%) compared to Phaco (43, 18.7%, $P < 0.001$) shown in Fig. 3.

Discussion

According to World Bank Data in 2022, the current life expectancy for India is 70.19 years, a 0.33% increase from 2021. Henceforth, the proportion of cataract patients would also rise over the next 20 years.[8] Age-related brown nuclear cataract is more frequently seen in the Indian population due to varied reasons such as exposure to UV light, invalid reasons for postponing surgery, and inadequate access to healthcare.[2] In the year 2000, 8.2 million persons were blind due to cataracts, 3.5 million underwent cataract surgery, 0.7 million were blind from complications of cataract surgery, and 0.6 million had visual impairment due to aphakia.[4] Many population-based surveys in India, also reported the persistence of blindness and severe visual impairment even after cataract surgery due to its high failure rates. Operating on dense brown cataracts, pseudoexfoliation syndrome, complicated cataracts following uveitis, and traumatic cataracts poses a surgical challenge even for an experienced surgeon due to high susceptibility to intraoperative complications, such as zonular weakness, endothelial damage, and PCR.[5]

Nowadays, most of the ophthalmic surgeons have access to Phaco machines, femto-assisted cataract surgery platforms apart from the conventional mSICS.[9] Each surgical technique has its own advantages and disadvantages based on the density of the cataract and associated comorbidities. The goal of successful cataract surgery in dense brown cataracts is to remove the lens while minimizing endothelial damage, avoiding wound burn and intraoperative complications, and minimizing postoperative inflammation.[10] We performed a survey to identify the preferred and safe surgical technique (Phaco or mSICS) opted by Indian ophthalmic surgeons for operating on brown cataracts. This may add value to the problem statement of reducing surgical complications in such challenging situations.

According to many previous studies, the surgeons' experience and volume of surgeries done were correlated with the surgical outcomes. Among our respondents, 81.7% (188) had >5 years of surgical experience, 7.4% (178) have done >1000 mSICS procedures, and 57% (131) have done >1000 Phaco surgeries. Hence, most of our respondents were experienced cataract surgeons and thus eliminating the issue of surgical experience in both techniques as a complicating factor in statistical analysis. Albeit, 77.4% (178) have had better experience with mSICS, only 34.3% (79) preferred only mSICS for brown cataracts and 51.7% (119) preferred mSICS compared to Phaco (10.4%). Most of them felt that complications are high with Phaco, 57 (47.9%) and 40 (33.6%) felt excess Phaco energy can damage the endothelial cells. Because Phaco energy is not always adequate to fragment extremely dense hard nuclei, it is always safe to convert to mSICS in such difficult scenarios. In a randomized controlled trial done by Bourne *et al*.,[11] while operating hard brown cataracts (45/433), severe endothelial cell loss occurred in Phaco (52.6%) compared to extracapsular cataract extraction (ECCE) (23.1%), and ECCE should be preferred. The conversion rate to ECCE while performing Phaco for brown cataracts was 20% (n = 8), as noted in a study done by Enany HA *et al*.[12] The author also compared other clinical and visual outcomes of Phaco (n = 40) and mSICS (n = 40) in hard brown cataracts. The visual outcome on the first postoperative day was high in the mSICS group (52.5%) compared to the Phaco group (22.5%) due to corneal edema. The complications such as PCR and vitreous loss were high in the Phaco group (12.5%) vs. mSICS (5%). Singh *et al*.[6] also reported a high incidence of thermal injury to the corneal tunnel in brunescent cataracts undergoing Phaco. Bhargava *et al*. compared the efficacy and safety of mSICS and Phaco in patients with complicated cataracts following and reported mSICS to be a safe and effective alternative to Phaco, with no significant difference in complications and final CDVA outcomes. Our respondents felt that cortex aspiration and nucleus delivery are critical steps for complication in mSICS and have to be carefully done to prevent PCR. Similarly, nucleus chopping is the rate-limiting step in Phaco while operating on brown hard cataracts. Mencucci *et al*. have found that the endothelial cell loss in standard Phaco surgery is approximately 4% to 25%; however, the mean rate of endothelial cell loss is greater in eyes with hard nuclei and can be as high as 42% at the final follow-up. The high rate of complications and endothelial damage associated with the Phaco procedure alleviates the surgeons in selecting it for operating brown hard cataracts.[13-15]

Nowadays, an increasing number of ophthalmic surgeons are having access to femto-assisted cataract surgery platforms to minimize the Phaco time, intraocular manipulations, and thus endothelial damage. However, it is limited by the depth of optical penetration of the laser in optically dense cataracts.[10] Even though mSICS is a conventional procedure of performing cataract extraction, requiring large-sized scleral tunnels with a risk of high astigmatism, it is considered as a safe and effective alternative to Phaco in operating brown cataracts by most of our study respondents. Overall, the level of confidence is high with mSICS compared to Phaco (180; 78.3%) vs. (43; 18.7%) in such scenarios. India is predominantly a rural country with 65.07% in 2020, according to the World Bank collection of development indicators. Thence, mSICS is the better solution for managing a high volume of cataracts at a low cost with equally good visual outcomes compared to Phaco. The preferred surgical steps by our respondents for brown cataracts were the same, such as superior tunnel and capsulorhexis as for the other types of cataracts.

Conclusion

mSICS is considered safe and effective and is preferred over Phaco for operating hard brown cataracts, even by experienced Indian cataract surgeons. Hence, all cataract surgeons must master Phaco and mSICS procedures to handle such challenging scenarios.

Financial support and sponsorship

Nil.

Conflicts of interest

There are no conflicts of interest.

References

1. Thylefors B, Négrel AD, Pararajasegaram R, Dadzie KY. Global data on blindness. Bull World Health Organ 1995;73:115–21.
2. Vashist P, Talwar B, Gogoi M, Maraini G, Camparini M, Ravindran RD, *et al*. Prevalence of cataract in an older population in India: The India study of age-related eye disease. Ophthalmology 2011;118:272-278.e1-2.
3. Muhtaseb M, Kalhoro A, Ionides A. A system for preoperative stratification of cataract patients according to risk of intraoperative complications: A prospective analysis of 1441 cases. Br J Ophthalmol 2004;88:1242–6.
4. Dandona L, Dandona R, Naduvilath TJ, McCarty CA, Mandal P, Srinivas M, *et al*. Population-based assessment of the outcome of cataract surgery in an urban population in southern India. Am J Ophthalmol 1999;127:650–8.
5. Dada T, Sharma N, Vajpayee RB, Dada VK. Conversion from phacoemulsification to extracapsular cataract extraction: Incidence, risk factors, and visual outcome. J Cataract Refract Surg 1998;24:1521–4.
6. Singh R, Vasavada AR, Janaswamy G. Phacoemulsification of brunescent and black cataracts. J Cataract Refract Surg 2001;27:1762–9.
7. Foster GJL, Allen QB, Ayres BD, Devgan U, Hoffman RS, Khandelwal SS, *et al*. Phacoemulsification of the rock-hard dense nuclear cataract: Options and recommendations. J Cataract Refract Surg 2018;44:905–16.
8. United Nations Population Division, World Population Prospects: 2019 Revision. Available from: https://www.macrotrends.net/countries/IND/india/life-expectancy.
9. Gogate PM, Kulkarni SR, Krishnaiah S, Deshpande RD, Joshi SA,

Palimkar A, *et al*. Safety and efficacy of phacoemulsification compared with manual small-incision cataract surgery by a randomized controlled clinical trial: Six-week results. Ophthalmology 2005;112:869–74.

10. Nagy ZZ, Takacs AI, Filkorn T, Kránitz K, Gyenes A, Juhász É, *et al*. Complications of femtosecond laser-assisted cataract surgery. J Cataract Refract Surg 2014;40:20-8.
11. Bourne RRA, Minassian DC, Dart JKG, Rosen P, Kaushal S, Wingate N. Effect of cataract surgery on the corneal endothelium: Modern phacoemulsification compared with extracapsular cataract surgery. Ophthalmology 2004;111:679–85.
12. Enany HA. Phacoemulsification versus manual small incision cataract surgery in hard nuclear cataracts. Delta J Ophthalmol 2018;19:92-8.
13. Mencucci R, Ponchietti C, Virgili G, Giansanti F, Menchini U. Corneal endothelial damage after cataract surgery: Microincision versus standard technique. J Cataract Refract Surg 2006;32:1351–4.
14. Bhargava R, Kumar P, Sharma SK, Kumar M, Kaur A. Phacoemulsification versus small incision cataract surgery in patients with uveitis. Int J Ophthalmol 2015;8:965–70.
15. Riaz Y, de Silva SR, Evans JR. Manual small incision cataract surgery (MSICS) with posterior chamber intraocular lens versus phacoemulsification with posterior chamber intraocular lens for age-related cataract. Cochrane Database Syst Rev 2013:10;CD008813.