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Survey of Cataract Surgery at Farabi Eye Hospital, Tehran, Iran between 2000 and 2005

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Abstract

Purpose: To quantitatively evaluate cataract surgeries performed between 2000 and 2005 at Farabi Eye Hospital, Tehran University of Medical Sciences

Methods: This retrospective study aimed at patients who had cataract and underwent surgery at Farabi Eye Hospital, Tehran from 2000 to 2005. One week per season per year was randomly selected after excluding the first two weeks of the Persian Year which coincides with the New Year holiday and no elective surgeries are scheduled. In total, data from 24 weeks in these six years (2000-2005) was collected.

Results: In this study, 3254 records of cataract surgeries were reviewed. The rate of extracapsular cataract extraction (ECCE) decreased from 94% in the year 2000 to 17% in 2005. Phacoemulsification had the highest growth rate; 1.7% in 2000 to 77% in 2005 ($P < 0.001$). The use of foldable lenses rose from 1.3% in 2000 to 77.2% in 2005. The risk of traumatic cataracts was significantly higher in men [Odds ratio (OR)=5.7, 95% confidence interval (CI) 3.3-9.7]. However, senile cataracts were more common in women (OR=2.07, 95% CI 1.6-2.7).

Conclusion: The rate of phacoemulsification increased by 75% Compared to other surgical methods, phacoemulsification has low complication rates and has the advantage of shorter surgical time and faster recovery. Increased popularity of the method is expected to relieve the community of the social and economical burdens of cataract.

Keywords: Cataract, Surgery, Farabi Eye Hospital

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Introduction

Globally, low vision and blindness are one of the most important health issues and many reports emphasize their importance.¹⁻⁹ In line with reducing blindness and vision impairment, the World Health Organization (WHO) and the International Agency for Prevention of Blindness (IAPB) have implemented the global "Vision 2020: Right to Sight" initiative to eliminate preventable blindness by 2020.¹⁰ Cataract, as the leading cause of blindness and vision impairment, is responsible for over 50% of blindness worldwide.^{1,6,7,11-15} The prevalence of cataract is between 2% and 65% in different societies and age ranges.¹⁶⁻¹⁸ According to WHO reports, the number of people who suffer from cataract induced reversible blindness will reach 40 million by 2020 and the need for surgery will increase three folds. The number of cataract surgeries per million population, namely the Cataract Surgical Rate (CSR), is a useful index to evaluate the delivery of eye care services in different conditions and places.¹⁹ CSR varies in different parts of the world, ranging from 5000 in the United States to about 500 in China and 200 in Africa.²⁰ CSR should increase as the need for cataract surgery rises. In India and other Southeast Asian countries, it should reach 3000 by the year 2020, and in countries with fewer elderly, it should reach 2000.²¹ In addition, Vision 2020 stresses on the quality of surgeries to restore sight and improve the quality of life.

Cataract surgery deserves a great attention in Iran, because the relatively young population of the present day will soon age and create a significant increase in the prevalence and backlog of cataract. It is therefore necessary to have valid information and statistics of the present situation of cataract surgery in terms of quantity and quality. The present report is part of a larger survey on cataract surgery in Iran and concerns an analysis of cataract surgeries performed between 2000 and 2005 at one of the largest cataract surgery centers in Iran, Farabi Eye Hospital, which is also one of the major training centers. This would give us a better understanding of the outlook of cataract surgery in Iran.

Methods

Farabi Eye Hospital, the first ophthalmology center in Iran, was established in 1959 in Tehran. With 450 beds, it is also the largest ophthalmology training center in the country. This report is part of the Iranian Survey of Cataract Surgery. The target population of this retrospective study was the people who had undergone cataract surgery at Farabi Eye Hospital from 2000 to 2005.

One week per season was randomly selected after excluding the first two weeks of the Persian Year (March 21st to April 5th) which is the New Year holiday, when no elective surgeries are done. Therefore, 24 weeks (for six years between 2000 and 2005) were selected for this study. All records of patients who had cataract surgery during the selected weeks were retrieved and reviewed for data collection by a trained team. The team members consisted of physicians or 5th year medical students, who had good knowledge of the eye anatomy, different types of cataract, surgical procedures and complications, and were also trained for data extraction. The collected data consisted of the type of surgery, the lens type, postoperative complications, duration of hospitalization, the type of cataract, and the age and gender of the patients.

Statistical analysis

All statistical analyses were done using the SPSS software version 11.5. We present the percentages of the cataract surgeries during these 6 years by age, gender, type of cataract, surgical technique, and complications. The Chi-square test was used to determine the differences in the percentages of surgeries, surgical techniques, types of cataract, and gender of patients between different studied years. We used repeated measures analyses to detect spatial changes during this period. The types of cataracts and intraoperative complications were transformed to binominal variables and then studied using univariate and multivariate logistic regression analyses to detect their correlations with other variables such as age and gender, and the odds ratios (OR) were calculated. In computing the standard error and 95% confidence intervals (CI), the effect of cluster sampling was taken into account and adjusted for.

Results

Total number of cataract surgeries

In this study, 3254 files of patients were reviewed. Table 1 indicates the rate of cataract surgery for each year. The highest number of cataract surgeries (723) was seen in 2004 (22.22%; 95% CI, 20.79-23.69) and lowest number (382) was in 2001 (11.74%; 95% CI, 10.65-12.90).

Type of cataract surgery

Overall, the most common type of surgery was extracapsular cataract extraction (ECCE) (61.53%) and the least common one was intracapsular cataract extraction (ICCE) (0.52%) (Table 1). ECCE decreased from 94% in 2000 to 17% in 2005 (Figure 1). Phacoemulsification showed the highest growth rate by increasing from 1.7% in 2000 to 77% in 2005 (P<0.001).

Table 1. The annual distribution rates of different types of cataract surgeries performed at Farabi Eye Hospital between 2000 and 2005 terms of percentage and 95% confidence interval.

Year	N	ICCE* % (95% CI)	ECCE** % (95% CI)	Phacoemulsification % (95% CI)	Lensectomy % (95% CI)	Total % (95% CI)
2000	457	0.22 (0.01-1.21)	94.53 (92.03-96.43)	1.75 (0.76-3.42)	3.5 (2.01-5.62)	14.04 (12.87-15.29)
2001	382	0.26 (0.01-1.45)	90.03 (86.57-92.84)	3.94 (2.22-6.41)	5.77 (3.65-8.61)	11.74 (10.65-12.9)
2002	481		88.57 (85.38-91.27)	6.44 (4.42-9.02)	4.99 (3.22-7.33)	14.78 (13.58-16.05)
2003	605	0.66 (0.18-1.68)	71.57 (67.79-75.13)	21.16 (17.97-24.63)	6.61 (4.77-8.89)	18.59 (17.27-19.97)
2004	723	0.83 (0.31-1.8)	36.29 (32.77-39.92)	58.31 (54.62-61.94)	4.57 (3.17-6.36)	22.22 (20.8-23.69)
2005	606	0.83 (0.27-1.91)	17.33 (14.4-20.58)	77.06 (73.51-80.35)	4.79 (3.23-6.8)	18.62 (17.3-20)
Total	3254	0.52 (0.3-0.84)	61.53 (59.83-63.21)	32.9 (31.29-34.55)	5.04 (4.32-5.85)	100

*: Intracapsular cataract extraction

** : Extracapsular cataract extraction; Results are expressed as % (95% CI)

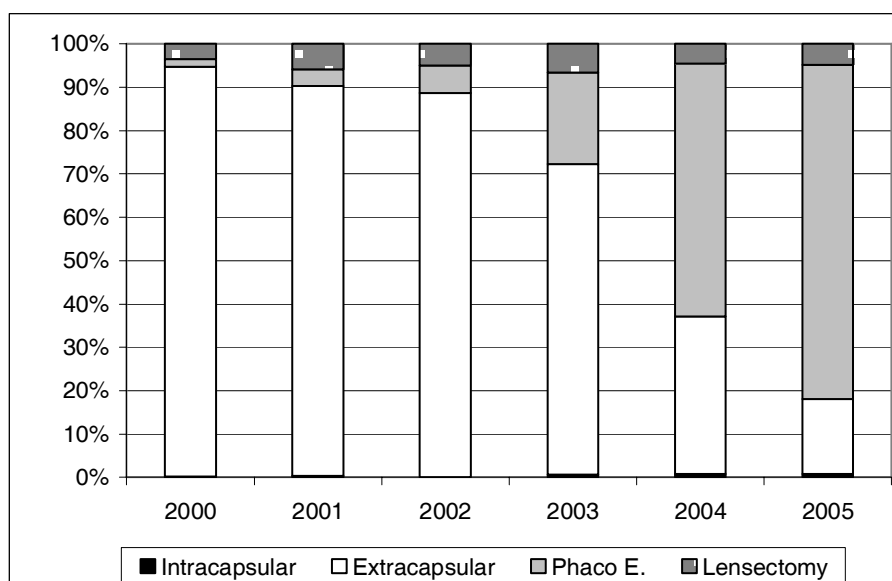


Figure 1. The trend of different kinds of surgeries during the 6-year period

Intraocular lenses

About 93.5% of the intraocular lenses (IOLs) implanted were posterior chamber (PC) IOLs; of these 36.1% were foldable and 63.9% were rigid polymethylmethacrylate (PMMA) lenses. In 1.8% of cases, anterior chamber (AC) IOLs were implanted, whereas in 4.6% no lens was used. Figure 2 shows the trend of using different types of IOLs. The highest growth rate belongs to foldable lenses; 1.3% vs. 77.2% in 2000 and 2005, respectively. The use for AC IOLs was more or less the same.

Types of cataract

Details of types of cataracts operated in the total period and in each year are summarized

in table 2. Out of all cases, 91.6% (95% CI, 90.6-92.5%) were senile, while congenital type comprised 1.6% (95% CI, 1.2-2.03%). Chi-square test showed a significant difference in types of cataracts in different years (P=0.045). Data showed that the rate of operated senile cataracts declined from 94.7% in 2000 to 90.0% in 2005 (P=0.049). Meanwhile, traumatic cataracts increased from 1.8% to 4.6% (P=0.039) and congenital cataracts declined from 1.1% to 0.7% (P=0.026). Developmental cataracts rose from 2.0% to 3.5%, however, the difference was not statistically significant between different years (P=0.737).

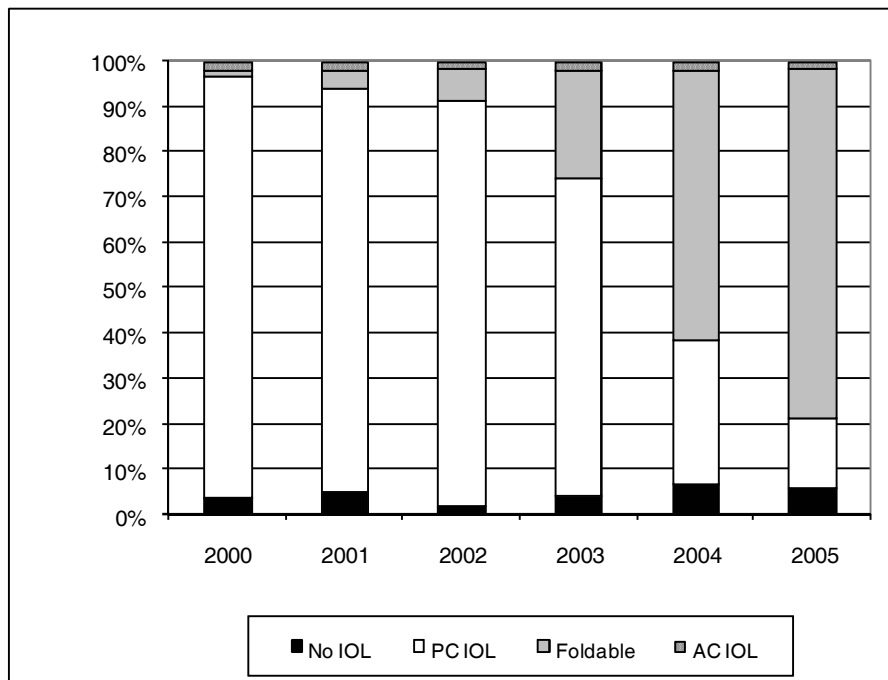


Figure 2. The trend of using different types of lenses between 2000 and 2005

Table 2. The yearly distribution rates of types of cataracts operated at Farabi Eye Hospital during 2000-2005

Type of cataract	2000 %	2001 %	2002 %	2003 %	2004 %	2005 %	Total %
Senile	94.75	90	93.33	90.55	91.26	90.43	91.62
Developmental	1.97	3.42	2.92	2.99	3.47	3.47	3.08
Traumatic	1.75	2.89	2.71	4.48	2.5	4.62	3.23
Congenital	1.09	3.16	1.04	1.66	2.22	0.66	1.6
Other	0.44	0.53		0.33	0.55	0.83	0.46
Total	100	100	100	100	100	100	100

Intraoperative complications

During these years, 4.5% (95% CI, 3.8-5.2) of cases had intraoperative complications. The secular change for intraoperative complications in these years was not statistically significant ($P=0.734$).

Of all surgeries, 0.4% had one complication, 4.0% had two, and about 0.1% had 3 intraoperative complications. The most common complications were vitreous loss and posterior capsular rupture without vitreous loss which occurred in 4.21% and 3.9% of cases, respectively. Table 3 shows complications in relation with different types of surgeries. There was a significant correlation between ICCE and complications ($P<0.001$).

Age and gender

Of all studied records, 1643 (49.5%) were belonged to males, 1608 (48.4%) were females, and 2.1% were not specified. Mean age of the subjects was 62.15 ± 16.7 years (range, one month old to 104 years old). The age distribution showed that 25% were 55 years or younger, 50% were 67 years or younger, 75% were 73 years old or younger, and 5% were over 81 years old. Table 4 summarizes the age and gender distribution of participants. The mean age of male patients was significantly lower than that of female patients at the time of surgery (60.96 ± 17.88 vs. 63.4 ± 15.2 years, $P<0.001$). The trend of cataract surgery in men and women was not significantly different during this period ($P=0.512$).

Table 3. The distribution of complications based on the type of surgery

Complications	ICCE*	ECCE**	Phaco E.	Lenectomy	Total
	% (95% CI)	% (95% CI)	% (95% CI)	% (95% CI)	% (95% CI)
Posterior capsule rupture		4.45 (3.59-5.45)	3.55 (2.53-4.84)	1.83 (0.38-5.25)	3.9 (3.3-4.7)
Suprachoroidal hemorrhage		0.05 (0-0.28)	0.09 (0-0.52)		0.06 (0.01-0.22)
Choroidal effusion	11.76 (1.46-36.44)	0.05 (0-0.28)			0.09 (0.02-0.26)
Vitrous loss	23.5 (1.0-46.0)	4.30 (3.4-5.2)	3.80 (2.70-5.0)	3.00 (0.4-5.7)	4.21 (3.5-4.9)
Nucleus drop			0.09 (0-0.52)		0.03 (0.001-0.17)
IOL drop		0.15 (0.03-0.44)			0.09 (0.02-0.26)
Total	35.29 (9.97-60.62)	4.65 (3.72-5.57)	3.83 (2.68-4.98)	3.66 (0.75-6.56)	4.49 (3.78-5.2)

*: Intracapsular cataract extraction

**: Extracapsular cataract extraction

Table 4. The distribution of age and gender in the study population

Age (years)	Male		Female		Total	
	n	%	n	%	n	%
10>	39.00	1.20	27.00	0.83	66.00	2.03
11-40	164.00	5.05	84.00	2.58	248.00	7.63
41-50	180.00	5.54	151.00	4.65	331.00	10.18
51-60	232.00	7.14	268.00	8.25	500.00	15.38
61-70	458.00	14.09	520.00	16.00	978.00	30.09
71-80	474.00	14.58	476.00	14.65	950.00	29.23
80<	95.00	2.92	82.00	2.52	177.00	5.45
Total	1642.00	50.52	1608.00	49.48	3250.00	100.00

Mean age of subjects declined from 63.7 ± 15.4 years in 2000 to 61.2 ± 16.5 years in 2005. In the 1642 male patients, the type of cataract was age-related in 89% (n=1462), developmental in 3.2% (n=52), traumatic in 5.4% (n=89), and congenital in 1.8% (n=29). These figures in females were 94.4% (1512), 3.0% (n=48), 1.0% (n=16) and 1.4% (n=22), respectively. There were other types of cataract in 10 males and 4 females. The odds of traumatic cataract was significantly higher in men [OR=5.7; 95% CI, 3.3-9.7] while senile cataract was more common in women (OR=2.07; 95% CI, 1.6-2.7). Inter-gender differences were not significant for other types of cataract.

Types of surgeries did not differ significantly between men and women. The mean age of patients who underwent ECCE was 65.5 years; this was significantly different from that in other surgeries which was about 56 years. Those who underwent lensectomy had a mean age of 18.7 years, which was significantly lower than those in other surgeries.

Discussion

Cataract is age-related in over 85% of cases^{22,23} and its consequent visual impairment affects people's socioeconomic status. Since cataract surgery restores vision and IOLs improve visual acuity (VA),²⁴ it is the solution to battle cataract blindness or visual impairment and their social consequences. As Iran's population is aging, avoiding these consequences requires an increase in cataract surgeries not only in terms of quantity CSR, but also quality, accessibility, and equality. The CSR could serve as a valuable indicator of the amount of services in this regard. However, the quality of these services also depends on proper techniques, appropriately selected IOLs and accurate power calculations, and postoperative care.

The present report is part of the larger Iranian Survey of Cataract Surgery and concerns Farabi Eye Hospital which is the oldest and largest eye care center in Iran. This study aimed to determine the status of cataract surgery during 2000-2005 in terms of number and technique of surgery, use of IOLs, surgical complications, and type of cataract.

Contrary to our expectations, the number of cataract surgeries was nearly the same in different years, except for a rise in 2004. Considering the increase in mean age of Iranians,²⁵ we expected to find the highest rate of cataract surgery in 2005, the lowest in 2000, and an even rise throughout these years. This unexpected trend can be attributed to different reasons, the most important of which is training highly skilled specialists. In addition, the expansion of public and private eye clinics, and increased coverage of insurance companies have contributed to a decreased load of patients at Farabi Eye Hospital.

Mean age of cataract patients admitted to Farabi Eye Hospital was 62.15 years; women were on average 3 years older than men. This finding is consistent with this fact that cataract develops at an earlier age in developing countries.^{17,26,27}

Table 1 shows that the use of the phacoemulsification technique increased from 1.75% in 2000 to 77% in 2005, while the rate of ECCE decreased at the same period. The increased popularity of phacoemulsification at Farabi Eye Hospital is similar to that in other eye care centers and even faster than some other developing countries. Phacoemulsification is the preferred technique in most countries because of less induced astigmatism, faster visual rehabilitation, and fewer complications such as suprachoroidal hemorrhage. However, need for expensive foldable lenses, hi-tech surgical equipment, and highly skilled specialists have caused obstacles in some parts of the world. Fortunately, phaco machines, surgical instruments, and foldable lenses are produced in Iran, and more importantly, specialists and residents receive training to perform the procedure. Nonetheless, ICCE or ECCE are preferred for situations like corneal opacity or lens subluxation; this explains the rate of these methods seen in 2005. The use of rigid PMMA lenses declined in the study period, while foldable lenses have enjoyed a rise from 1.7% to 77.0%. This growth was quite expected because phacoemulsification has been done with foldable IOL implantation and therefore, their growth patterns are similar.

The present study, like previous ones, showed that senile cataract is the most common type of cataract.^{28,29} About 92% of

cataracts in the present study were age-related. Although this figure varies in different reports, on average it seems to be around 85%. These findings show that a higher proportion of patients operated at Farabi Eye Hospital had age-related cataract, and fewer had other types of cataracts. The trend of cataract type from 2000 to 2005 showed a statistically significant 4% decrease in the rate of age-related cataracts admitted to this hospital, while we expected to see an increase because of a relatively older population.

Since Farabi Eye Hospital is an important referral site with 400 to 600 emergency admissions per day. It is assumed that more difficult cataract cases are referred to this center. As demonstrated in table 2, there was an increase in the rate of traumatic and pediatric cataract surgeries during the studied years. This probably contributed to the reduced rate of surgeries for patients with age-related cataract.

Overall, 4.5% of surgeries had complications, which is lower than that of reported from other parts of the world. The Blindness Prevention Project found the rate of cataract surgery complications to be 6% and some articles reported them as high as 19%.^{30,31} The most commonly reported intraoperative complication was vitreous loss, which can be reduced through proper supervision and surgeon's experience.³²⁻³⁵ In the present study, vitreous loss was seen in 4.21% of surgeries, which is lower than that in other parts of the world. A study in an educational hospital in India reported 7.63% vitreous loss in 2095 surgeries.³³ Pearson et al studied vitreous loss as the one of most important intraoperative complications and reported a decrease from 10.3% to 3.2% over three years.^{32,36} Our findings showed that 4.3% of ECCE surgeries had vitreous loss. In case of phacoemulsification, vitreous loss and posterior capsule disruption were the most

common complications with rates of 3.8% and 3.6%, respectively. Bhagat reported rates of 5.4% and 6.7% for these two complications with phacoemulsification in 719 patients.³⁷ Overall, the rates of complications associated with cataract surgery at Farabi Eye Hospital show promising results and indicate that surgeons have been able to manage surgeries quite well.

The present report provides valuable information concerning the situation of cataract surgery at Farabi Eye Hospital between the years of 2000 and 2005. However, certain limitations of the study did not allow us to provide more details about the quality of the surgeries at this center. The study lacked certain preoperative and/or postoperative data such as VA and refraction, and therefore we can not comment on the accuracy of implanted IOL power choice. Other variables that could have been helpful in this study were patients' history of diabetes, systemic disease, and even degree of lens opacification.

Conclusion

The results of our study indicated that the rate of phacoemulsification has increased by 75%, and we expect it to rise to 100% unless there are contraindications for a given case. Compared to other surgical methods, phacoemulsification has lower complication rates and has the advantage of shorter surgical time and faster recovery. Increased popularity of the method is expected to relieve the community of the social and economical burdens of cataract.

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