

Factors Associated with Uptake of Second Eye Cataract Surgery amongst Patients Attending University College Hospital, Ibadan, Nigeria

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ABSTRACT

Purpose: To identify the factors affecting the uptake of second eye cataract surgery in patients with bilateral visually significant cataract with a view to making appropriate recommendations for improved uptake.

Methods: This was a cross-sectional and hospital-based study, carried out at the Eye clinic of the University College Hospital (UCH), Ibadan, Nigeria. A total of 427 patients with bilateral age-related cataract, that had undergone cataract surgery in at least one eye, were recruited and administered a questionnaire to identify factors associated with uptake of second eye cataract surgery (SECS), as well as the barriers to uptake. Data was analyzed using IBM-SPSS version 25 and summary statistics are presented using frequency tables, means and rates. Chi-square test was used to test for associations between qualitative variables while Student's T-test was used for quantitative variables.

Results: Only 124 (29.0%) underwent SECS within 2 years of the first eye cataract surgery (FECS) with an average interval of 12 ± 7.4 months. Factors associated with uptake of SECS include having formal education ($p=0.004$) and counselling patients on the benefits of SECS and risk of hypermaturity-related complications ($p<0.001$). While the barriers include insufficient income ($p<0.001$) and telling patients the cataract is not mature ($p=0.003$).

Conclusion: Formal education and counselling patients on the benefits of SECS may improve the uptake of SECS while informing patients that "Cataract is not

mature" may discourage uptake of SECS and should be avoided by ophthalmic professionals after FECS.

Keywords: Cataract, First eye cataract surgery (FECS), Second eye cataract surgery (SECS)

INTRODUCTION

Cataract is still the commonest cause of blindness and severe visual impairment in Nigeria.¹ Currently, surgical removal of the lens and replacement with an artificial intraocular lens is the only available orthodox treatment for cataract. Phacoemulsification, Manual small incision cataract surgery (MSICS) and Extracapsular cataract extraction (ECCE) are the major surgical procedures employed for cataract treatment throughout the world. Other less commonly employed procedures include Intracapsular cataract extraction (ICCE) and Femtosecond laser-assisted cataract surgery.²

Age-related cataract is usually bilateral, even though rate of progression may differ between the two eyes. However, owing to the fear of devastating complications such as endophthalmitis, toxic anterior segment syndrome, surgery is usually carried out on one eye at a time.^{3,4} First eye cataract surgery (FECS), though immensely beneficial,^{3,5,6} does not completely correct all visual impairments, i.e. patients with bilateral visually significant cataract still have vision-related problems following first eye cataract surgery, attributed to the differences in vision between the operated and unoperated eye.^{3,5,7,8} Hence, it is of utmost importance for patients to have prompt second eye cataract surgery in order to optimize vision.

Second eye cataract surgery causes improvement in contrast sensitivity, stereoacuity and binocular function.^{5,7} Increasing Second Eye Cataract Surgery (SECS) rate will also improve cataract surgery rate, thereby reducing the burden of cataract as a cause of blindness and severe visual impairment. There is low uptake of SECS globally, although rates are increasing in Western countries.^{6,8-11} Although there's paucity of data on the SECS rate in our environment, available data, however, suggest an abysmally low rate. Previous studies in our hospitals revealed a SECS rate of 0.9%,¹² in spite of about 25% of patients being bilaterally blind at presentation,¹³ although being a hospital-based retrospective study, this rate may not include patients who had their SECS done in other facilities. This extremely low rate of second eye cataract surgery implies that only a few patients achieve their optimum visual potential. To our knowledge, no previous studies have explored the factors that could be responsible for the abysmally low uptake of SECS in our environment. Hence, it is imperative to carry out such a study, which will identify the factors associated with the uptake of SECS as well as the barriers to it, with a view towards improving the uptake of second eye cataract surgery.

METHODS

The study was a cross-sectional, descriptive hospital-based study, carried out at the Eye Clinic of the University College Hospital (UCH), Ibadan, Nigeria. Patients aged 50 years and above who initially presented with bilateral visually significant age-related cataract, had best corrected visual acuity worse than or equal to 6/18 in both eyes at diagnosis, and who had undergone first eye surgery not more than 2 years prior to recruitment were included. Patients who had visual impairment from other ocular co-morbidities such as glaucoma, diabetic retinopathy, age-related macular degeneration and patients who had a history of uveitis or ocular trauma were excluded. Sample size was calculated using the Leslie Kish formula, and a total of 427 patients was calculated after accounting for a 10% attrition rate.

Ethical approval was obtained from the ethical committee of the University College Hospital, Ibadan, and the study adhered to the Tenets of the Helsinki Declaration. Informed consent was obtained from all participants prior to recruitment, and the study duration was 6 months (September 2021 – March 2022), which was prolonged due to a decline in clinic attendance as a result of the COVID-19 pandemic.

SAMPLING TECHNIQUE

The list of eligible patients was compiled from the clinic and surgery registers of the Ophthalmology department of University College Hospital, Ibadan, and patients were contacted on phone and a clinic appointment was scheduled. All consecutive patients who met the eligibility criteria were then recruited into the study until the sample size was complete.

DATA COLLECTION

A brief explanation of the survey was given to the participants, and consent was obtained. Data of interest obtained from clinical records and participants via the interviewer-administered questionnaire included sociodemographic data, information about the time of surgery (first and second eye), pre- and post-operative best corrected visual acuity, type of surgery, as well as complications.

Other information obtained using the questionnaire included factors responsible for the interval between both surgeries and reasons for not yet undergoing SECS (barriers to SECS).

The barriers of interest were classified into:

Attitudinal barriers:

- Can manage routine work
- Can see with the other eye
- Fear of complications
- Cataract not mature
- Preoccupied with work
- Old age

Barriers related to service delivery, cost and affordability

- Insufficient Income
- Complicated First Eye Surgery
- Admission Logistics and Stress
- Distance/transport system

Difficulty in getting a surgery appointment
Systemic Contraindication
No one to accompany

Each participant underwent a detailed clinical assessment, which included: visual acuity assessment, Pen torch and slit lamp examination of the anterior segment, Applanation tonometry, dilated funduscopy using 90D lens.

STATISTICAL ANALYSIS

Data entry, cleaning and analysis were done using IBM-SPSS version 25. Descriptive statistics such as means, medians, ranges and standard deviations were used to summarize quantitative variables, while categorical variables were summarized using proportions and percentages. A one-way ANOVA test was used to find the difference between means of

some quantitative variables in order to identify the factors associated with a shorter interval between FECS and SECS. A cross-tabulation to compare the frequencies of the barriers in both the FECS and SECS groups was done, using the Chi-square test, to identify the statistically significant barriers. Analyses were carried out at 5% level of statistical significance.

RESULTS

Sociodemographic characteristics of participants

A total of 427 participants completed the study. Males were 212 (49.6%), giving a male-to-female ratio of 1:1.01. The participants' ages ranged between 52 and 108 years, with a mean age of 70.1 ± 8.8 years. Table 1 presents the sociodemographic characteristics of all participants.

Table 1: Sociodemographic characteristics of participants

Variable	Frequency (n=427)	Percentage (%)
Mean Age $\pm$ Standard deviation (years)	70.1 ± 8.79	
Age Categories (years)		
<65	109	25.6
65-74	196	46.0
>74	122	28.4
Gender		
Male	212	49.6
Female	215	50.4
Marital Status		
Married	344	80.6
Widowed	76	17.8
Divorced	3	0.6
Single	2	0.5
Separated	2	0.5
Occupation		
Employed	287	67.4
Retiree	125	29.3
Unemployed	15	3.3
Average Monthly Income		
< 30,000 naira/month	308	72.2
30,000 – 60,000 naira/month	95	22.2
>60,000 naira/month	24	5.6
Average distance from the hospital by road (hours)	1.4 ± 1.32	
Living alone		
Yes	41	9.6
No	386	90.4

Proportion of participants who had undergone second eye cataract surgery

A total of 124 (29.0%) participants had Second Eye Cataract Surgery (SECS) done within two years of First Eye Cataract Surgery (FECS), while 303(71.0%) were yet to have SECS. Of the 303 FECS-only participants, 220 (72.6%) expressed interest in having their SECS done. The average interval between FECS and SECS was 12 ± 7.4 months.

Factors associated with uptake of SECS

In order to determine the factors associated with uptake of SECS, a comparison of sociodemographic and clinical characteristics of the two groups of participants was done. A greater proportion of the participants with formal education underwent SECS as compared with those without formal education (32.0% versus 20.4%) (Table 2). This difference was statistically significant ($p = 0.004$).

Table 2: Comparison of demographic features between First Eye Cataract Surgery (FECS) only and Second Eye Cataract Surgery (SECS) groups

Sociodemographic characteristics	FECS only(n=303) Number (%)	SECS (n=124) Number (%)	P value
Gender:			
Male	143(67.5)	69(32.5)	0.113
Female	160(74.4)	55(25.6)	
Age (mean age in years)	70.3±8.9	69.4± 8.4	0.893
Age in Category(years)			
<65	77(70.6%)	32(29.4%)	0.973
65-74	141(71.9%)	56(28.1%)	
>74	85(70.2%)	36 (29.8%)	
Level of education			
No formal education	86(79.6)	22(20.4)	0.004
Formal	217(68.0)	102(32.0)	
Occupation			
Employed	204(71.1)	83(28.9)	0.994
Retiree	89(71.2)	36(28.8)	
Unemployed	10(66.7)	5(33.3)	
Living Alone			
Yes	34(82.9)	7(17.1)	0.076
No	269(69.7)	117(30.3)	
Average Monthly Income			
<30,000 naira/month	224(72.7)	84(27.3)	0.061
30,000 - 60,000 naira/month	67(70.5)	28(29.5)	
>60,000 naira/month	12(50.0)	12(50.0)	

Table 3: Comparison of clinical characteristics between First Eye Cataract Surgery (FECS) only and Second Eye Cataract Surgery (SECS) groups

Clinical Characteristics	FECS only (n=303) Number (%)	SECS (n=124) Number (%)	Total(n=427) Number (%)	P value
Systemic co-morbidities:				
No systemic co-morbidity	202(71.4)	81(28.6)	283(100.0)	0.163
Hypertension	77(72.0)	30(28.0)	107(100.0)	
Diabetes	10(66.7)	5(33.3)	15(100.0)	
Both hypertension and diabetes	11(78.6)	3(21.4)	14(100.0)	
Others (Peptic ulcer disease, Asthma)	3(37.5)	5(62.5)	8(100.0)	
Pre-operative BCVA in other eye as at time of FECS				
6/18	100 (74.6)	34 (25.4)	134(100.0)	0.425
<6/18 – 6/60	97(70.3)	41(29.7)	138(100.0)	
<6/60 – HM	92(70.2)	39(29.8)	131(100.0)	
LP	7(53.8)	6(46.2)	13(100.0)	
Missing data	7(63.6)	4(36.4)	11(100.0)	
Told about the benefits of second eye surgery				
Yes	209(65.5)	110(34.5)	319(100.0)	<0.001
No	94 (87.0)	14 (13.0)	108(100.0)	
Aware that hypermature cataract predisposes to complications				
Yes	131(58.7)	92(41.3)	223(100.0)	<0.001
No	172(84.3)	32(15.7)	204(100.0)	
Portal of entry for first eye surgery				
Walk-in	223(70.6)	93(29.4)	316(100.0)	0.058
Clinic referral	42(63.6)	24(36.4)	66(100.0)	
Outreach	38(84.4)	7(15.6)	45(100.0)	
Source of funds for first eye surgery				
1. Self	85(64.9)	46(35.1)	131(100.0)	<0.001
2. Family	157 (70.1)	67(29.9)	224(100.0)	
3. Sponsorship	57(93.4)	4(6.6)	61(100.0)	
4. Insurance	04(36.4)	7(63.6)	11(100.0)	
Satisfaction with the outcome of first eye surgery				
Satisfied	274(72.4)	111(27.6)	385(100.0)	0.801
Indifferent	11(64.7)	6(35.3)	17(100.0)	
Unsatisfied	18(72.0)	7(28.0)	25(100.0)	
Type of Surgery done (first Eye)				
ECCE + PCIOL	74(71.8)	29(28.2)	103(100.0)	0.662
SICS + PCIOL	214(70.9)	87(29.1)	301(100.0)	
ECCE Only	3(75.0)	1(25.0)	4(100.0)	
SICS Only	11(64.7)	6(35.3)	17(100.0)	
PHACO + PCIOL	1(50.0)	1(50.0)	2(100.0)	

BCVA- best corrected visual acuity

ECCE -extracapsular cataract extraction

PCIOL- posterior chamber intraocular lens implant

SICS- small incision cataract surgery

PHACO- phacoemulsification

A greater proportion of the participants who reported that they were told about the benefits of SECS had SECS compared with those who were not told about these benefits ($p < 0.001$) (Table 3). Similarly, those who were aware of hypermaturity-related complications had SECS compared with those who were not aware of these complications ($p < 0.001$) (Table 3). Also, 63.6% of participants who paid for their FECS

through insurance had SECS, while only 6.6% of those who were sponsored for FECS had SECS ($p = 0.003$) (Table 3).

Multivariate analysis of factors associated with the uptake of SECS

None of the variables was statistically significantly associated with uptake of SECS on multivariate analysis (Table 4).

Table 4: Multivariate analysis of factors associated with uptake of Second Eye Cataract Surgery

Factor	Odds Ratio	95% C.I	P-Value
Level of Education			
No formal Education	Ref		
Formal Education	1.444	0.567 – 3.677	0.440
Being told about the benefits of second eye surgery			
Yes	1.626	0.418 – 6.322	0.483
No	Ref		
Being aware of hypermaturity-related complications?			
Yes	Ref		
No	0.940	0.349 – 2.532	0.902
Who paid for the first eye surgery:			
1. Self	0.611	0.118 – 3.169	0.558
2. Family	1.338	0.259 – 6.917	0.728
3. Sponsorship	0.302	0.019 – 4.818	0.397
4. Insurance	Ref		

Barriers to uptake of SECS

Both groups of participants identified barriers to SECS (the SECS group identified these barriers as responsible for the interval between surgeries), and participants were allowed to give multiple reasons. Further analysis showed that the FECS-only group had more barriers than the SECS group (average of 2.3 vs. 1.8 per participant, respectively), as shown in Table 5. Barriers that were significantly more commonly reported by the FECS-only group were “Cataract not mature” ($p = 0.003$) and “Insufficient income” ($p < 0.001$).

DISCUSSION

The SECS rate in this study was 29% with an average interval of 12 ± 7.4 months between FECS and SECS. Although this represents a significant improvement in SECS rate as compared with a previous study from the same hospital¹², it is still low with a prolonged interval

between the two surgeries as compared with rates in the Western world.^{8,14-16} This study, therefore, sought to identify the factors that could be responsible for the low and frequently delayed uptake of SECS.

Factors associated with uptake of SECS included:

- Level of education: One-third of participants with formal education had SECS compared with one-fifth of those without formal education. This implies that having formal education may be associated with improved uptake of SECS. This may also be related to the increased need for binocular vision by those with formal education.
- Awareness about the benefits of second eye cataract surgery: 35% of participants who were counselled about the benefits of cataract surgery had SECS, while only 13% of those who were not counselled had it

Table 5: Comparison of barriers between First Eye Cataract Surgery only and Second Eye Cataract Surgery groups

BARRIERS	FECS(n = 303) Number (%)	SECS (n = 124) Number (%)	P Value
Attitudinal Barriers			
Can manage routine work	52 (72.2)	20 (27.8)	0.887
Can see with other eye	76 (76.0)	24 (24.0)	0.257
Fear of complications	44 (80.0)	11 (20.0)	0.151
Cataract not mature	56 (58.3)	40 (41.7)	0.003
Preoccupied with work	18 (78.3)	5 (21.7)	0.489
Old age	18 (85.7)	3 (14.3)	0.146
Barriers related to service delivery, cost and affordability			
Insufficient Income	208 (82.2)	45 (17.8)	<0.001
Complicated First Eye Surgery	21 (72.4)	8 (27.6)	0.524
Admission Logistics and Stress	87 (74.4)	30 (25.6)	0.403
Distance/transport system	60 (78.9)	16 (21.1)	0.096
Difficulty in getting surgery appointment	14 (63.6)	8 (36.4)	0.472
Systemic Contraindication	28 (71.8)	11 (28.2)	0.534
No one to accompany	14 (73.7)	5 (26.3)	0.510

done. This suggests that counselling and educating patients about the benefits of having SECS could improve the uptake of SECS, which should be included in the preoperative counselling session.

- c. Awareness about hypermaturity-related cataract complications: Similarly, more participants who were aware of hyper maturity related complications had SECS compared to those who weren't aware. Such information should also be included in the preoperative counseling of patients with bilateral visually significant cataracts.
- d. Health Insurance cover: Two-thirds of participants who paid for FECS through insurance cover had SECS, while less than a tenth of those who were sponsored for their FECS had SECS. Having insurance coverage obviates cost as a barrier. It is therefore recommended that more patients be enrolled in insurance schemes to improve the uptake of SECS. Sponsorship opportunities, on the other hand, are severely limited, and so patients with more severe visual needs, such as the bilaterally blind, are usually prioritized. Hence, those in need of second eye surgery may not get the opportunity through sponsorship programs. Encouraging more cataract

surgery sponsors may contribute substantially towards improving the uptake of SECS.

Although there is paucity of studies carried out to identify the factors associated with uptake of SECS, nonetheless, our findings are at variance with that of Castels et al¹⁷ in the UK, who identified worse visual acuity in the second eye and younger age as being strongly associated with both eyes cataract surgery. In our study, there were no statistically significant differences in these factors between the FECS-only and the SECS group. This may be related to the barriers faced by our patients, as discussed below.

Barriers to uptake of SECS

This study revealed that participants in both groups had barriers to SECS. However, the barriers were more for the FECS-only group than the SECS group, with an average of 2.3 vs 1.9 barriers per participant. Further analysis revealed the barriers listed below were statistically significantly more common in the FECS only group. These findings, though consistent with the findings of Malik et al,¹⁸ are at variance with those from studies identifying barriers to cataract surgery in

general, which identified attitudinal and service delivery factors as the main barriers to surgery.¹⁹ Hence, Malik *et al*¹⁸ opined that “possibly, where the second eye surgery was concerned, our patients faced multiple, interrelated barriers, or their barriers were other than the ones we tested”

- a. Cataract not mature: This study identified this as the only attitudinal barrier that reached statistical significance, $p < 0.001$. Studies have shown that telling a patient the cataract is not ready for surgery is a major barrier, as such patients may never return, only to present when complications ensue.¹⁹ Patient education on the need for cataract surgery as soon as the visual threshold is surpassed, as well as a regular schedule of follow-up, has been advocated so as not to lose such patients to follow-up.
- b. Insufficient income: Over 80% of participants who identified insufficient income as a barrier did not undergo SECS. This suggests that the cost of surgery, which has been identified as a barrier to FECS, is also a barrier to SECS. It is therefore not surprising that our study identified insurance cover as a factor associated with uptake of SECS.
- c. Other barriers that did not reach statistical significance include attitudinal barriers, such as being able to see with the other eye and can manage routine work may be related to the age group of the study population being elderly and mainly retirees with reduced need for binocular vision. Worthy of mention are barriers related to service delivery, cost and affordability, such as admission logistics and stress, as mentioned by about a quarter of the participants. This is likely related to the administrative bottlenecks associated with payment and admission protocol in a federal teaching hospital such as UCH, Ibadan, as against the practice of “cataract surgery pack” where the patient simply pays for all needed consumables at once. Therefore, ensuring ease of admission and surgery logistics could improve the uptake of SECS.

Limitations

Being a hospital-based cross-sectional study with a retrospective component, recall bias and missing records could have affected the outcome of this study. Also, the factors associated with uptake of SECS and the barriers identified may be different from the findings of a community-based study.

CONCLUSION

This study has revealed that having formal education could be associated with uptake of SECS, while counseling patients on the benefits of SECS and the risk of hyper maturity related complications may help improve uptake. This study further revealed that messaging that cataract surgery should be delayed until the cataract is “mature” may inadvertently discourage uptake of SECS; hence, proper patient education is advocated. Cost is also a barrier to SECS. We therefore recommend more insurance cover, sponsorship opportunities and discounts on SECS to improve uptake of surgery.

Conflict of Interest: None to declare

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