Functional Visual Improvement After Cataract Surgery in Eyes With Age-Related Macular Degeneration: Results of the Ophthalmic Surgical Outcomes Data Project

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Purpose. To determine if cataract surgery on eyes with AMD confers as much functional visual improvement as surgery on eyes without retinal pathology.

Methods. This is a retrospective analysis of 4924 cataract surgeries from the Veterans Healthcare Administration Ophthalmic Surgical Outcomes Data Project (OSOD). We included cases of eyes with AMD that had both preoperative and postoperative NEI-VFQ-25 questionnaires submitted and compared their outcomes with controls without retinal pathology. We excluded patients with other retinal pathologies (740 patients). The analyses compared changes in visual acuity and overall functional visual improvement and its subscales using *t*-tests, multivariate logistic regressions, and linear regression modeling.

Results. Preoperative and postoperative questionnaires were submitted by 58.3% of AMD and 63.8% of no retinal pathology cases (controls). Analysis of overall score showed that cataract surgery on eyes with AMD led to increased visual function (13.8 ± 2.4 NEI-VFQ units, $P < 0.0001$); however, increases were significantly less when compared with controls (−6.4 ± 2.9 NEI-VFQ units, $P < 0.0001$). Preoperative best-corrected visual acuity (preBCVA) in AMD was predictive of postoperative visual function ($r = -0.38$, $P < 0.0001$). In controls, postoperative visual function was only weakly associated with preBCVA ($r = -0.075$, $P = 0.0002$). Patients with AMD with vision of 20/40 or better had overall outcomes similar to controls (−2.2 ± 4.7 NEI-VFQ units, $P = 0.37$).

Conclusions. Cataract surgery on eyes with AMD offers an increase in functional visual improvement; however, the amount of benefit is associated with the eye's preBCVA. For eyes with preBCVA of 20/40 or greater, the improvement is similar to that of patients without retinal pathology. However, if preBCVA is less than 20/40, the amount of improvement was shown to be significantly less and decreased with decreasing preBCVA.

Keywords: cataract surgery, age-related macular degeneration, visual function, visual acuity

Age-related macular degeneration (AMD) and cataracts are common diseases that frequently coexist and advance together with aging. For patients with cataracts, cataract surgery has been shown to substantially increase functional vision and overall quality of life.[1–18] Due to these benefits, surgeons have expanded this operation to patients with AMD in hopes of conferring similar benefits. Subsequent studies have shown that cataract surgery is safe in AMD patients with no evidence of increased complications or rates of disease advancement (especially conversion to wet AMD) postoperatively.[19–26] Surveying of AMD patients has also demonstrated that cataract surgery leads to an improved quality of life.[27–30] However, when compared with patients without retinal pathology, AMD patients have been found to have worse visual outcomes.[31,32] This study aims to determine, in spite of reported inferior visual results, if cataract surgery on eyes with AMD confers as much functional visual improvement as surgery on eyes without retinal pathology.

Methods

The methods used for data collection of the Ophthalmic Surgical Outcomes Database (OSOD) project have been previously described by Vollman et al.[33] As a brief summary,

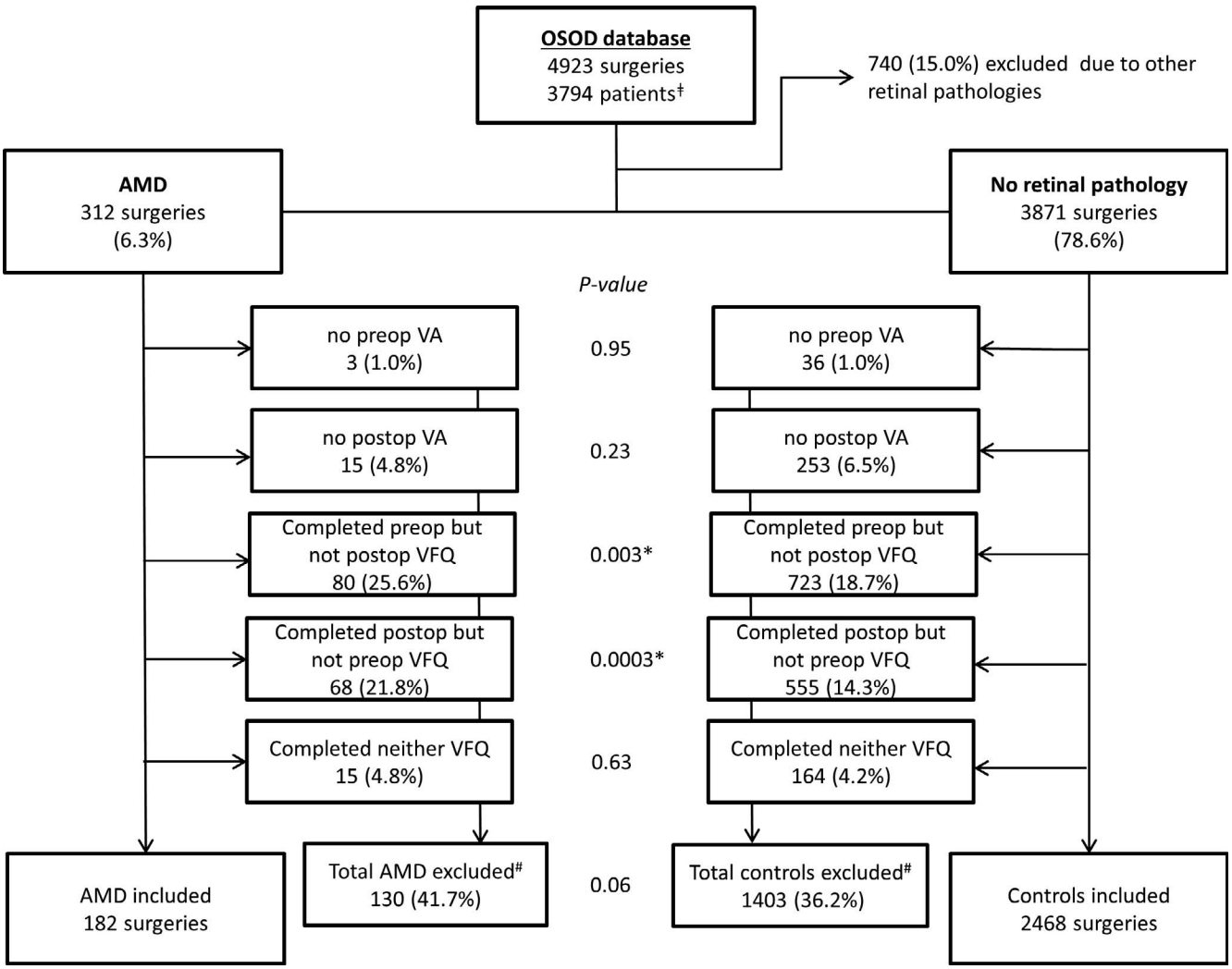

Figure 1. Flowchart of patient inclusion and exclusion from the OSOD database. ‡Some patients had both of their cataract surgeries in the data set. After applying the exclusion criteria, these patients had at least one of their surgeries excluded; therefore, no two eyes from the same patient were in the study's analyses. #The total number of excluded patients is less than the combined numbers from the above subgroups, as some excluded patients met more than one of the exclusion criteria. *P* values designate the statistical significance of the difference between the various exclusion groups. *Statistically significant ($P < 0.05$).

this was a multicenter, retrospective analysis of data previously collected by the Veterans Healthcare Administration for internal quality assessment of cataract surgeries performed from April 2009 to February 2012. The internal review board approved the OSOD project at all five sites. Guidelines set forth by the Health Insurance Portability and Accountability Act and the Declaration of Helsinki were adhered to during all stages of the project. A designated registered nurse for each site was charged with collecting preoperative, intraoperative, and postoperative data on a range of ophthalmic measures, including past medical history, examination findings, and operative findings from the Veterans Affairs electronic medical record. Of note, the decision to proceed with cataract surgery was made at the discretion of the individual surgeon and patient. Patients' assessments of their visual function were measured by the National Eye Institute Visual Function Questionnaire (NEI-VFQ). The NEI-VFQ is a survey developed to assess visual function related to a wide range of visual tasks. The survey's psychometric properties have been studied and found to be both reliable and valid. The survey scores individual sections and the overall survey by weighed averages from 0 to 100. Complete visual disability would be a score of zero and maximum visual function would be 100. The nurses collected these questionnaires preoperatively within 30 to 90 days of surgery and postoperatively after 30 days but within 90 days of surgery.

Of the 4923 cataract surgeries in the Veterans Healthcare Administration OSOD, we included cases of eyes with AMD that had both preoperative and postoperative NEI-VFQ-25 questionnaires submitted, as well as documented preoperative and postoperative best-corrected visual acuities (BCVAs). Patients were defined as having AMD if the patient had a history of AMD in the chart and the ophthalmologist assessing the patient preoperatively noted retinal changes consistent with AMD on dilated fundus examination. The extent of AMD was not graded further. No patient was operated on with active wet AMD, but previous treatment for wet AMD was not collected. These cases were compared with controls without retinal pathology. Patients were defined as having retinal pathology by having a history of diabetic retinopathy, macular edema, or retinal detachment, or any of these noted on the preoperative dilated fundus examination. The primary endpoint of this study was to determine if eyes with AMD had as much overall functional visual improvement after cataract

Table 1. Baseline Characteristics

Characteristic	AMD	Control	P
No. in group	182	2468	
Age, y ± 95% CI	77.7 ± 1.2	70.1 ± 0.4	<0.0001*
% Male	97.8%	96.7%	0.4096
Body mass index ± 95% CI	27.7 ± 0.7	29.2 ± 0.2	0.0023*
Diabetes mellitus, %	33.5	36.4	0.4386
Hypertension, %	83.5	78.2	0.0943
Peripheral vascular disease, %	47.8	42.0	0.1245
COPD/asthma/dyspnea at rest, %	23.1	26.9	0.2542
Congestive heart failure	11.0	8.5	0.2506
Dementia/cognitive impairment	5.5	2.8	0.0388*
Anxiety	9.3	14.0	0.0788
Hearing impairment	30.8	21.1	0.0022*
Smoke tobacco	14.3	25.6	0.0006*
>2 drinks of alcohol/d	7.7	11.8	0.0943

CI, confidence interval; COPD, chronic obstructive pulmonary disease.

* Statistically significant difference between groups ($P < 0.05$).

surgery as eyes without retinal pathology. Secondary endpoints included analysis of NEI-VFQ subscales, preoperative and postoperative BCVAs, and correlation between preoperative BCVA (preBCVA) and postoperative visual function.

Data were analyzed using Microsoft 2010 Excel (Microsoft Corporation, Redmond, WA, USA) and R statistical software package (version 2.15.2; R Development Core Team, Vienna, Austria). Statistical evaluation included Student's *t*-test and linear and multivariate logistic regression modeling; *P* values less than 0.05 were considered statistically significant.

Results

From July 2009 to March 2012, 4924 eyes of 3809 patients were included in the OSOD pilot project. A total of 312 (6.34%) eyes were reported to have AMD and 3871 (78.6%) had no retinal pathology. Figure 1 shows the percentages of surgeries excluded from the OSOD database according to the different exclusion criteria. Preoperative and postoperative questionnaires were submitted by 182 (58.3%) of AMD and 2468 (63.8%) of no retinal pathology cases (controls). There was no statistically significant difference in the overall percentage of surgeries excluded between the two groups ($P = 0.056$). However, the AMD group did have a significantly higher percentage of surgeries excluded because either the preoperative or postoperative NEI-VFQ was not completed. Of note, those patients with AMD who were excluded did not demonstrate statistically significant different preoperative or postoperative visual acuities when compared with those included in the study.

Table 2. Postoperative Complications

Characteristic	AMD	Control	P*
No. in group	182	2468	
Cystoid macular edema	5 (2.8%)	54 (2.2%)	0.62
Retained lenticular material	4 (2.2%)	47 (1.9%)	0.78
IOP < 5 mm Hg for > 1 wk	0	7 (0.28%)	0.47
IOP > 25 mm Hg for >1 wk	4 (2.2%)	37 (1.5%)	0.74
Retinal detachment	0	5 (0.20%)	0.54
Endophthalmitis	0	3 (0.12%)	0.64

Percentage of the group with the characteristic noted in parentheses.

* No statistically significant difference between groups (defined as $P < 0.05$). All complications noted within 30 days of surgery.

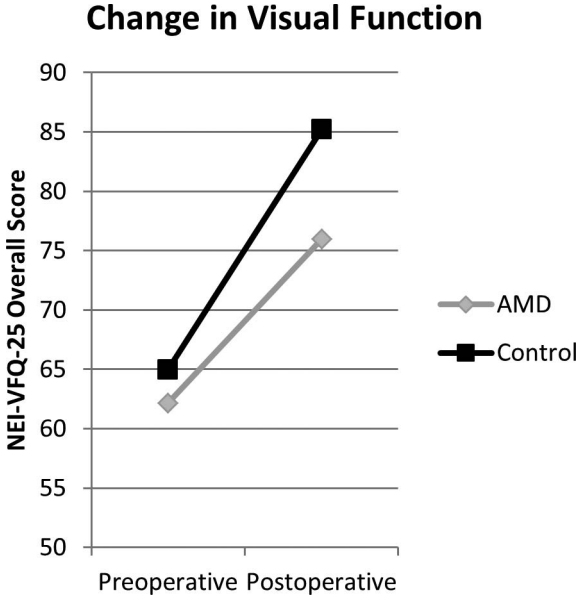

Figure 2. Preoperative and postoperative NEI-VFQ-25 scores for AMD and control eyes.

Table 1 compares the baseline characteristics. Of note, for those baseline characteristics that showed a statistical difference, a multiple linear regression model of postoperative visual acuity was performed. This analysis found that none of these characteristics independently showed a statistically significant correlation to the postoperative visual acuity. Table 2 compares the postoperative complications. Having AMD led to no higher risk of postoperative CME or other complications in the 30 days after surgery.

Analysis of the NEI-VFQ scores (Fig. 2) shows no statistically significant difference in overall visual function preoperatively between the groups (–2.80 ± 2.96, $P = 0.068$). Postoperatively, AMD eyes show a significant increase in visual function (+13.8 ± 2.43, $P < 0.0001$); however, this increase is significantly less when compared with eyes without retinal pathology (–6.42 ± 2.93, $P < 0.0001$).

Analysis of BCVA (logMAR) both preoperatively and postoperatively reflected those seen for the NEI-VFQ (Fig. 3). Preoperative visual acuity was not significantly different from controls (difference of 0.055 ± 0.09, $P = 0.201$). Postoperatively, visual acuity significantly improved (–0.38 ± 0.05, $P < 0.0001$) but markedly less than that experienced by the control eyes (difference of 0.22 ± 0.08, $P < 0.0001$).

When plotting preBCVA against its postoperative visual function, a stronger correlation was noted for eyes with AMD. Preoperative BCVA in AMD was predictive of postoperative visual function ($r = –0.38$, $P < 0.0001$). In controls, postoperative visual function was more weakly associated with preBCVA ($r = –0.075$, $P = 0.0002$).

Dividing the groups into categories based on preBCVA (Table 3) showed that AMD patients with vision of 20/40 or better had similar changes in BCVA (difference of 0.04 ± 0.03, $P = 0.008$) and overall visual function outcomes similar to controls (difference of –2.2 ± 4.7, $P = 0.37$). For AMD eyes with vision less than 20/40, both postoperative BCVA and visual function outcomes were inferior compared with controls. Of note, all eyes had no statistically significant difference in preBCVA and NEI-VFQ except for eyes with preBCVA greater than 1.0. For preBCVA greater than 1.0, AMD

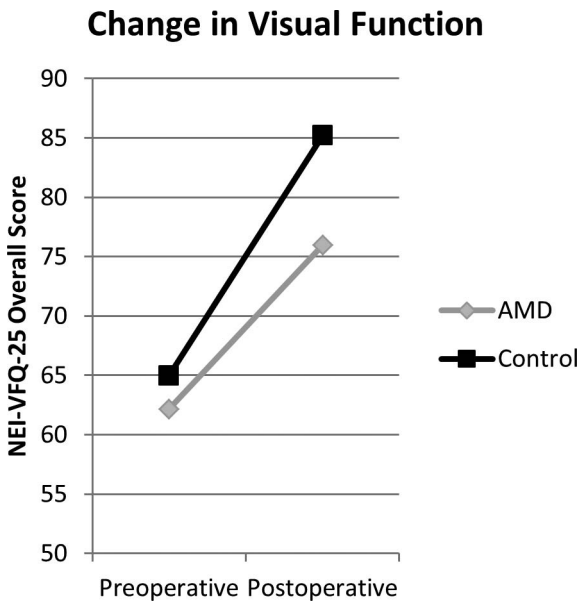

Figure 3. Preoperative and postoperative BCVA (logMAR) for AMD and control eyes.

eyes had similar preBCVA (difference of −0.19 ± 0.36, $P = 0.30$) but preoperative NEI-VFQ scores were significantly lower (difference of −10.6 ± 9.5, $P = 0.03$).

The NEI-VFQ subscale analysis showed that in every visual function category, AMD eyes had a statistically significant increase. In most categories, AMD patients report preoperative scores equivalent to controls (Table 4). However, postoperatively the improvement observed is mostly less than that of controls.

Discussion

Multiple studies have shown that cataract surgery leads to a significant increase in visual function quality.[1–18] This study corroborates previous studies showing that this same effect is seen in patients with AMD.[27–30] Although these patients are statistically similar preoperatively (in BCVA, overall visual function, and most visual function subscales) to the controls, their postoperative BCVA and overall visual function were 41% and 32% less than the control patients, respectively. For BCVA, this discrepancy is approximately equal to a two-line difference on the Snellen chart.

However, subanalyses of the data categorized based on preBCVA gives a more graduated picture. For AMD patients with BCVA of 20/40 or more, the data suggest that the patient can expect to have postoperative visual function and BCVA similar to patients without retinal pathology. Clinically, this makes sense, as AMD patients with this level of vision likely have minimal retinal pathology. However, as the preBCVA decreases, a wider disparity progressively develops between the two groups. This widening gap in functional vision likely reflects worsening degrees of AMD. This picture is further illustrated by the stronger negative correlation seen between preBCVA and functional vision in AMD eyes. On the other side, eyes without retinal pathology would likely attribute most of their visual deficiency to the obstructing cataract. With its replacement, there is minimal difference in postoperative BCVA and overall functional vision.

The study is limited by a few factors. Analysis of those excluded show that a significantly higher number of AMD surgeries did not have either the preoperative or postoperative questionnaires completed. Although the ratio of those not completed preoperatively to those postoperatively is similar to the controls, the overall higher percentage is concerning. However, this discrepancy does not seem to be related to preoperative or postoperative visual acuity, as this group's acuities are not significantly different from those in the included group. Also, although AMD was diagnosed by an ophthalmologist on dilated fundus examination, no further categorization of the AMD was recorded. We know that no patients had active wet AMD at the time of cataract surgery, but it is uncertain what percentage may have had it in the past. Finally, given that this is a Department of Veterans Affairs population, the overwhelming majority of patients in both groups were male. Although no studies suggest a difference in cataract surgery outcomes between men and women, the outcomes of this study should be applied to women with caution.

Table 4. Difference in NEI-VFQ Subscale Score Between AMD and Control

NEI-VFQ Category	Preoperative Difference	Overall Difference
General vision	−3.6 ± 2.8 (0.01)	−6.9 ± 3.5 (0.0001)
Ocular pain	0.3 ± 3.5 (0.86)	−2.9 ± 3.7 (0.12)
Near activities	−4.7 ± 3.7 (0.01)	−8.3 ± 4.0 (<0.0001)
Distance activities	−3.4 ± 3.9 (0.09)	−7.2 ± 4.0 (0.0005)
Social functioning	−2.8 ± 3.7 (0.14)	−5.1 ± 3.8 (0.008)
Mental health	1.8 ± 4.2 (0.40)	−12.0 ± 4.3 (<0.0001)
Role difficulties	−2.5 ± 4.4 (0.27)	−8.7 ± 5.0 (0.0006)
Dependency	−6.5 ± 4.5 (0.004)	−5.4 ± 4.4 (0.01)
Driving	−4.0 ± 4.6 (0.08)	−0.1 ± 4.8 (0.96)
Driving with added item	−3.0 ± 4.5 (0.19)	−2.0 ± 2.4 (0.41)
Color vision	−6.7 ± 3.9 (0.0008)	0.5 ± 3.8 (0.80)
Peripheral vision	−1.6 ± 4.1 (0.43)	−5.7 ± 4.3 (0.009)

Preoperative difference and overall difference reported as difference between AMD and control means ± 95% CI with P value given in parentheses. Statistically significant for $P < 0.05$.

Table 3. Comparison of Postoperative BCVA and Overall NEI-VFQ Score

	No. (AMD/Control)	preBCVA ≤ 0.3 58/992	0.3 < preBCVA ≤ 0.6 72/924	0.6 < preBCVA ≤ 1.0 30/294	preBCVA > 1.0 22/258
postBCVA	AMD	0.06 ± 0.02	0.19 ± 0.04	0.45 ± 0.17	1.35 ± 0.38
	Control	0.02 ± 0.01	0.05 ± 0.01	0.09 ± 0.03	0.21 ± 0.06
	Difference	0.04 ± 0.03 ($P = 0.008$)	0.13 ± 0.04 ($P < 0.0001$)	0.35 ± 0.10 ($P < 0.0001$)	1.34 ± 0.37 ($P < 0.0001$)
NEI-VFQ	AMD	84.2 ± 4.0	77.0 ± 4.9	72.6 ± 7.4	55.6 ± 12.5
	Control	86.0 ± 0.9	85.2 ± 1.0	85.1 ± 1.9	82.2 ± 2.4
	Difference	−1.8 ± 3.8 ($P = 0.35$)	−8.2 ± 3.9 ($P < 0.0001$)	−12.4 ± 6.2 ($P < 0.0001$)	−26.7 ± 8.8 ($P < 0.0001$)

Best-corrected visual acuity reported as mean logMAR ± 95% CI. National Eye Institute Visual Function Questionnaire reported as mean score ± 95% CI. P values given for difference between the AMD and control values. Statistically significant for $P < 0.05$. postBCVA, postoperative BCVA.

This study substantiates previous studies' results and adds a different piece of information to the body of evidence exploring the benefits of cataract surgery in patients with AMD. Our results agree with those of previous studies looking at improvements in BCVA and functional visual improvement. Also, our results give a reference for cataract surgeons and AMD patients to base expectations of both the absolute and relative benefits of undergoing cataract surgery with AMD.

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References

1. Brown GC, Brown MM, Menezes A, Busbee BG, Lieske HB, Lieske PA. Cataract surgery cost utility revisited in 2012: a new economic paradigm. *Ophthalmology*. 2013;120:2367–2376.
2. Chandrasekaran S, Wang JJ, Rochtchina E, Mitchell P. Change in health-related quality of life after cataract surgery in a population-based sample. *Eye (Lond)*. 2008;22:479–484.
3. Hejcmanová D, Langrová H, Bytton L, Hejcmanová M. Changes of visual function and visual ability in daily life following cataract surgery. *Acta Medica (Hradec Králove)*. 2003;46:189–194.
4. Lee BS, Munoz BE, West SK, Gower EW. Functional improvement after one- and two-eye cataract surgery in the Salisbury Eye Evaluation. *Ophthalmology*. 2013;120:949–955.
5. Chang-Godinich A, Ou RJ, Koch DD. Functional improvement after phacoemulsification cataract surgery. *J Cataract Refract Surg*. 1999;25:1226–1231.
6. Pomberg ML, Miller KM. Functional visual outcomes of cataract extraction in monocular versus binocular patients. *Am J Ophthalmol*. 2004;138:125–132.
7. Amesbury EC, Grossberg AL, Hong DM, Miller KM. Functional visual outcomes of cataract surgery in patients with 20/20 or better preoperative visual acuity. *J Cataract Refract Surg*. 2009;35:1505–1508.
8. Durmus B, Emre S, Cankaya C, Baysal O, Altay Z. Gain in visual acuity after cataract surgery improves postural stability and mobility. *Bratisl Lek Listy*. 2011;112:701–705.
9. Desai P, Reidy A, Minassian DC, Vafidis G, Bolger J. Gains from cataract surgery: visual function and quality of life. *Br J Ophthalmol*. 1996;80:868–873.
10. Owsley C, McGwin G Jr, Scilley K, Meek GC, Seker D, Dyer A. Impact of cataract surgery on health-related quality of life in nursing home residents. *Br J Ophthalmol*. 2007;91:1359–1363.
11. Mönestam E, Wachmeister L. Impact of cataract surgery on the visual ability of the very old. *Am J Ophthalmol*. 2004;137:145–155.
12. Mönestam E, Wachtmeister L. Impact of cataract surgery on visual acuity and subjective functional outcomes: a population-based study in Sweden. *Eye (Lond)*. 1999;13:711–719.
13. Ayaki M, Muramatsu M, Negishi K, Tsubota K. Improvements in sleep quality and gait speed after cataract surgery. *Rejuvenation Res*. 2013;16:35–42.
14. Mamidipudi PR, Vasavada AR, Merchant SV, Namboodiri V, Ravilla TD. Quality-of-life and visual function assessment after phacoemulsification in an urban Indian population. *J Cataract Refract Surg*. 2003;29:1143–1151.
15. Polack S, Eusebio C, Mathenge W, et al. The impact of cataract surgery on health related quality of life in Kenya, the Philippines, and Bangladesh. *Ophthalmic Epidemiol*. 2010;17:387–399.
16. Lamoureux EL, Fenwick E, Pesudovs K, Tan D. The impact of cataract surgery on quality of life. *Curr Opin Ophthalmol*. 2011;22:19–27.
17. To KG, Meuleners LB, Fraser ML, et al. The impact of cataract surgery on vision-related quality of life for bilateral cataract patients in Ho Chi Minh City, Vietnam: a prospective study. *Health Qual Life Outcomes*. 2014;12:16.
18. Brenner MH, Curbow B, Javitt JC, Legro MW, Sommer A. Vision change and quality of life in the elderly. Response to cataract surgery and treatment of other chronic ocular conditions. *Arch Ophthalmol*. 1993;111:680–685.
19. Hooper CY, Lamoureux EL, Lim L, et al. Cataract surgery in high-risk age-related macular degeneration: a randomized controlled trial. *Clin Experiment Ophthalmol*. 2009;37:570–576.
20. Rosenfeld PJ, Shapiro H, Ehrlich JS, Wong P; MARINA and ANCHOR Study Groups. Cataract surgery in ranibizumab-treated patients with neovascular age-related macular degeneration from the phase 3 ANCHOR and MARINA trials. *Am J Ophthalmol*. 2011;152:793–798.
21. Tabandeh H, Chaudhry NA, Boyer DS, Kon-Jara VA, Flynn HW Jr. Outcomes of cataract surgery in patients with neovascular age-related macular degeneration in the era of anti-vascular endothelial growth factor therapy. *J Cataract Refract Surg*. 2012;38:677–682.
22. Muzyka-Wozniak M. Phacoemulsification in eyes with neovascular AMD treated with anti-VEGF injections. *Eur J Ophthalmol*. 2011;21:766–770.
23. Dong LM, Stark WJ, Jefferys JL, et al. Progression of age-related macular degeneration after cataract surgery. *Arch Ophthalmol*. 2009;127:1412–1419.
24. Chew EY, Sperduto RD, Milton RC, et al. Risk of advanced age-related macular degeneration after cataract surgery in the Age-Related Eye Disease Study: AREDS report 25. *Ophthalmology*. 2009;116:297–303.
25. Casparis H, Lindsley K, Kuo IC, Sikder S, Bressler NB. Surgery for cataracts in people with age-related macular degeneration. *Cochrane Database Syst Rev*. 2012;6:CD006757.
26. Forooghian F, Agrón E, Clemons TE, Ferris FL III, Chew EY; Age-Related Eye Disease Study Research Group. Visual acuity outcomes after cataract surgery in patients with age-related macular degeneration: age-related eye disease study report no. 27. *Ophthalmology*. 2009;116:2093–2100.
27. Lundström M, Brege KG, Florén I, Lundh B, Stenevi U, Thorburn W. Cataract surgery and quality of life in patients with age related macular degeneration. *Br J Ophthalmol*. 2002;86:1330–1335.
28. Armbrecht AM, Findlay C, Aspinall PA, Hill AR, Dhillon B. Cataract surgery in patients with age-related macular degeneration: one-year outcomes. *J Cataract Refract Surg*. 2003;29:686–693.
29. Lamoureux EL, Hooper CY, Lim L, et al. Impact of cataract surgery on quality of life in patients with early age-related macular degeneration. *Optom Vis Sci*. 2007;84:683–688.
30. Armbrecht AM, Findlay C, Kaushal S, Aspinall P, Hill AR, Dhillon B. Is cataract surgery justified in patients with age related macular degeneration? A visual function and quality of life assessment. *Br J Ophthalmol*. 2000;84:1343–1348.
31. Mönestam E, Lundqvist B. Long-term visual outcome after cataract surgery: comparison of healthy eyes and eyes with age-related macular degeneration. *J Cataract Refract Surg*. 2012;38:409–414.
32. Kuo IC, Broman AT, Massof RW, Park W. The impact of cataract surgery on patients from a low-vision clinic. *Can J Ophthalmol*. 2011;46:391–398.e1.
33. Vollman DE, Gonzalez-Gonzalez LA, Chomsky A, Daly MK, Baze E, Lawrence M. Intraoperative floppy iris and prevalence of intraoperative complications: results from ophthalmic surgery outcomes database. *Am J Ophthalmol*. 2014;157:1130–1135.e1.

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