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Outcomes of Combined Cataract and Glaucoma Refractive Surgery

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1. Abstract

Techniques A review diagram survey of patients going through synchronous waterfall extraction with trabeculectomy or glaucoma seepage gadget medical procedure was performed. Whether spherical equivalent of 1.00 to +0.50 D was achieved three to six months after surgery was the primary outcome measure. Among the secondary outcomes were: reduction in intraocular pressure, the size of the cylinder made possible by combined surgery, and individual patient characteristics that might have affected the refractive outcome. The outcomes were compared to those of a control group of patients who had straightforward cataract surgery during the same time period and were of equal age and gender. Out of 36 patients, 43 underwent glaucoma surgery and cataract removal simultaneously. 32 of 43 eyes (74 percent) had a refractive outcome of spherical equivalent between 1.00 and +0.50 D three to six months after surgery. By year, 95% CI, 1.04–1.27, logistic regression analysis revealed a 1.14 increased risk of the refraction being outside this defined refractive range in older patients compared to younger patients. Preoperative best-corrected visual acuity and the type of lens implant utilized had no significant impact on the refractive outcome. In a subset of 22 eyes with accessible preoperative keratometry measures, a mean 1.31 D (SD=0.86; combined surgery caused corneal astigmatism (range, 0.26 to 3.76). In correlation, a matched benchmark group who had waterfall medical procedure alone accomplished target refractive result in 34 of 40 eyes (85%, P=0.001) and had a pattern for less prompted chamber (0.99, SD=0.72, P=0.11).

Conclusions In spite of the possibility of altering preoperative measurements and introducing error into lens selection when employing a combined approach, the majority of patients achieved favorable refractive outcomes. The refractive outcome appears to be the same regardless of the type of glaucoma surgery performed. Patients in the control group who only had cataract surgery had a lower incidence of induced cylinder and a higher percentage of reaching their target refractive goal.

2. Introduction

Although a staged approach of trabeculectomy followed by cataract surgery has demonstrated successful refractive results,[1] a combined approach is frequently indicated when the patient has both moderate glaucoma and an incipient cataract.[2] A simultaneous approach offers the advantages of reduced patient anesthesia and surgery time, as well as potentially less recovery time. The management of coincident cataract and glaucoma is not an uncommon clinical challenge. The overall cost of care for both the patient and the health system may also be reduced by combined surgery. While the refractive outcomes of a combined cataract extraction and glaucoma surgery are still poorly defined,[3] successful pseudophakic rehabilitation is dependent on accurate intraocular lens (IOL) power calculations, regardless of a staged or combined procedure. To date, the majority of the literature on this topic has focused on the efficacy of lowering intraocular pressure (IOP). In a Norrby study,[5] anterior chamber depth, postoperative refraction determination, and preoperative AL measurements were found to be the largest contributors of refractive error, accounting for 35%, 27%, and 17%, respectively, when using such regression analysis formulas. [3,4] Preoperative AL, anterior chamber depth, and keratometry measurements have all been shown to change after glaucoma surgery alone[6–14]. The precision of refractive outcomes in a combined approach requires special consideration. Higher preoperative IOP, postoperative hypotony, and younger age have been identified as factors that decrease AL following glaucoma surgery.[6–9,14]

Additionally, induction of with-the-rule astigmatism has been observed following combined procedures.[7,15] This raises the question of whether combined glaucoma and cataract surgery requires special consideration when selecting IOL implants. On the refractive outcomes of combined trabeculectomy and cataract extraction, Law et al.[16] published a single study. Despite changes in AL and corneal curvature, their study found no significant difference between expected and observed refractive errors. The refractive effects of glaucoma drainage implants and cataract surgery together have not been studied to date. Our study's objective was to examine the factors that may influence refractive outcome and the refractive outcomes of combined cataract extraction with trabeculectomy

or glaucoma drainage device (GDD).

3. Patients and Participants

The study population was approved by the Miami Veterans Affairs Medical Center (VAMC) Institutional Review Board for this retrospective study that was carried out in accordance with the Declaration of Helsinki's principles. Patients who underwent combined cataract extraction, trabeculectomy, or GDD surgery at the Miami VAMC between March 2008 and April 2011 met the inclusion criteria. Due to difficulties in accurately measuring refraction, our study did not include patients whose postoperative best-corrected visual acuity (BCVA) was less than 20/200.

4. Information Assortment

All information were gotten through a review diagram survey and went into a standard modernized data set for ensuing examination. The following data were gathered: Pretreatment refractive findings (visual acuity, refractive error, keratometry (K) values, and AL), glaucoma type (open angle, closed angle, or neovascular), preoperative intraocular pressure (IOP), surgical complications, postoperative IOP, and postoperative visual and refractive outcomes are all included. K qualities were gotten utilizing either Pentacam pivoting Scheimpflug imaging gadget (Oculus Optikgeräte GmbH, Wetzlar, Germany), Auto-Keratometer (Topcon Clinical Frameworks, Oakland, NJ), or IOLMaster fractional rationality interferometry biometer (Carl Zeiss Meditec AG, Berlin, Germany). In some eyes, multiple instruments were used to measure K values. AL values were gotten utilizing the IOLMaster incomplete soundness interferometry biometer or contact A-filter with the Eye Cubed ultrasound framework (Ellex, Minneapolis, MN).

5. IOL Model Determination

The specialist chose the IOL in view of consequences of the K and AL estimations with the gadgets talked about above. The surgeons used their discretion to choose which device measurements were best for each patient.

6. Surgical Methods

The Baerveldt (Abbott Laboratories Inc., IL) and Ahmed (New World Medical Inc., CA) GDD surgeries were carried out in the same way that they had been described previously.[17,18] All of the Baerveldt GDD surgeries had the implant placed in the superotemporal or inferonasal quadrants, and all of the implants were placed beneath the respective rectus muscles. 7–0 Vicryl sutures were used to ligate every Baerveldt GDD. As previously mentioned, mitomycin-C (MMC) trabeculectomy was carried out.[17] In all instances, the concentration of MMC was 0.4 mg/mL, and the amount of time required to apply MMC was set at less than four minutes at the surgeon's discretion. A temporal clear cornea approach and standard phacoemulsification methods were used during cataract surgery.

As a age-matched control, forty patients who underwent cataract surgery only with a one-piece acrylic lens implant were chosen. At the same facility, surgeries were carried out at the same time. The cataract's impact on daily activities and its significant impact on vision were indications for surgery. Using standard phacoemulsification techniques, the temporal clear cornea approach was used for all surgeries.

7. Measures of Success

The primary outcome was the achievement of a spherical equivalent (SE) of 1.00 to +0.50 D three to six months after surgery. We did not have preoperative keratometric values or refractive predictions for all patients because this study was retrospective. As a result, the chosen target range served as a substitute indicator of a successful refractive outcome. Optional results measures included: the variation in IOP, the amount of cylinder created by combined surgery, and other factors that could influence refractive outcome (age, type of glaucoma, type of surgery, type of lens implant used, and preoperative BCVA). Applied chamber was determined by a changed methodology framed by Cravy.[15] Preoperative keratometry was performed with robotized gadgets as recently examined. Manual refraction was utilized to postoperatively gauge K qualities. We were able to calculate the applied cylinder, which is the theoretical vector needed to produce the change in astigmatism from the preoperative to the postoperative state, using these substitute values.[15] Statistical Analysis The statistical package SPSS (SPSS Inc., Chicago, IL) was used for all of our analyses. Mean and standard deviation were used to summarize continuous variables; using percentages to represent categorical variables. Strategic relapse examination was utilized to assess which elements anticipated whether a SE of −1.00 to +0.50 D was accomplished. Factors that predicted changes in the cylinder were evaluated using linear regression analysis. The combined surgery group's refractive outcomes were compared to those of the cataract surgery alone group using the Student t test and 2 analyses.

8. Results

Study Population During the specified time frame at this institution, 54 eyes underwent combined cataract and glaucoma surgery. The study then included 43 eyes from 36 patients for the analysis of refractive outcomes. Because it was believed that these patients could not have refraction (and consequently the refractive outcome) adequately tested, a total of 11 cases were ruled out due to preoperative (n=8) or postoperative (n=3) visual acuity of less than 20/200. Macular edema, central retinal artery occlusion, and glaucoma progression, respectively, were the causes of the three excluded patients' postoperative vision loss. Table 1 provides a summary of patient demographics as well as preoperative and postoperative data. Males made up 94% of the patients. 51% of eyes (n=22) had cataract surgery in addition to trabeculectomy, and 49% of eyes (n=21) had GDD surgery as well.

9. Refractive Results

Table 2 sums up the BCVA, refractive results, and change in chamber at 3 to a half year postoperatively. The refractive value was 0.620.71 D, with a range of 2.38 to +1.25 SE; 43) three to six months after surgery. At three to six months, a refractive result with a SE between 1.00 and +0.5 D sphere was achieved in 32 of 43 eyes (74 percent). After combined surgery, the average amount of cylinder induced was 1.310.86 D, with a range of +0.26 to +3.76 D; 22) three to six months after surgery. The preoperative keratometry data that was required to calculate the amount of cylinder induced were missing from 21 of the 43 eyes. In a logistic regression analysis, the type of glaucoma surgery, preoperative BCVA, and type of lens implant had no significant impact on the refractive outcome. There was a 1.14 measurably huge expanded risk for a refractive result outside the characterized range for more established people (by year, 95% CI, 1.04-1.27; P=0.008). Univariate regression analysis revealed that age, preoperative BCVA, type of glaucoma, and type of glaucoma surgery had no effect on predicting cylinder change. However, there was no statistically significant difference (P=0.06) between those with vision 20/50 or better prior to surgery and those with vision less than 20/50 (mean, 0.92).

9.1 Examination With the Benchmark Group

A sum of 40 eyes that went through just waterfall medical procedure filled in as the benchmark group for refractive result examination. Age, sex, and operated eye characteristics of the 40-person control population were comparable. 75% (n=30) of cataract patients had vision between 20/50 and 20/150, which was significantly worse than the preoperative BCVA of patients undergoing combined surgery (P=0.004). Table 2 shows that the control group had more precise final refractive targets and better final visual outcomes (P=0.005). The SE after medical procedure was less nearsighted in the benchmark group, with a mean of −0.09±0.63 (P<0.005). The control group also had less cylinder change, but this was not statistically significant. The following were the secondary outcomes of the IOP: 217.9 mm Hg before surgery, 146.14 mm Hg at one month, and 12.444.30 mm Hg at three to six months after surgery. At three to six months after surgery, 72% of patients (31/43) achieved a successful IOP reduction of 15% with or without drops. A decrease of ≥20% was seen in 67% (29/43) patients.

9.2. Consequences of surgery included:

Hypotony, hyphema, tube displacement, bleb leak, choroidal effusion, flat anterior chamber, retained lens cortex, capsular rent, and corneal decompensation are the other conditions that can occur. Except for the capsular rent and corneal decompensation, these initial complications had resolved by the third postoperative month. Six eyes (11 percent, n=54) lost sight by less than two lines.

10. Discussion

Currently, no studies have looked at the refractive effects of GDD surgery and combined cataract extraction. The only information on the refractive outcomes of a cataract extraction and trabeculectomy combined is provided by the study by Law and colleagues. Despite an alteration in AL and corneal curvature, they reported that the difference in mean refractive error between the combined operation group (0.22) and the cataract operation only group (0.29) was not statistically significant (P=0.80).[16] Although the study by Law and colleagues provided insight into the effects of combined cataract surgery and trabeculectomy on ocular dimensions, it provided limited insight into refractive error. The number of individual patients who achieve the target SE, which is calculated using IOL power calculations, and the factors that determine whether a patient achieves acceptable refractive outcomes should also be important measures of success in refractive outcomes. In addition, it merits investigation into the possibility of applying these findings to GDD surgery performed in conjunction with cataract extraction.Despite the possibility of alteration in preoperative measurements and the introduction of error into lens selection when using a combined approach, 74% of patients in this study achieved favorable refractive outcomes. At three to six months after surgery, the majority of patients who fell outside of the target range were in the “1.0” category (10 of 11). There was a significant difference between the combined surgery group and the control group, with the combined surgery group being approximately 0.5 D more myopic. The fact that AL decreases after trabeculectomy and GDD is consistent with the tendency for a patient to be myopic.[14] The amount of cylinder induced by combined surgery was 1.310.86 D, which was slightly higher than the 0.44 mean induced astigmatism reported by Law et al.[16]. Although the induced astigmatism was not statistically significant, it was also lower in the control group when compared to the combined surgery group.

While looking at factors impacting refractive results, just more seasoned age was viewed as measurably critical in expanding the gamble of a poor refractive result at 3 to a half year postoperative development. In the control group, there was no correlation between this and the refractive outcome. Although the exact cause is unknown, difficulty in subjective refraction and other comorbidities may indicate a worse outcome at an older age. The outcome measure did not differ based on the type of glaucoma surgery that was performed. 77% of combined trabeculectomy (17 of 22) and 71% of combined GDD (15 of 21) were within the acceptable range three to six months after surgery. When comparing GDD to trabeculectomy, logistic regression analysis revealed no increased risk of adverse outcomes at three to six months. It is essential to acknowledge this study’s limitations. Although it has not been demonstrated that sex affects the outcomes of cataract or glaucoma surgeries, the fact that the majority of the study participants were men may limit its applicability to the general population. Moreover, because of the review idea of the review, we didn’t have total records on all patients including missing preoperative keratometry data. As a result, only a small percentage of our patients allowed us to calculate induced astigmatism. In conclusion, regardless of the type of glaucoma surgery performed, most patients who have both cataract extraction and glaucoma surgery can achieve acceptable refractive outcomes. The only caveat was that getting older increases the likelihood of having a bad refractive outcome, so this should be taken into account and talked about before surgery. Other influencing factors will be easier to decipher in future prospective studies with larger sample sizes.

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