

Evaluation of Combined Extracapsular Cataract Extraction ± Intraocular Lens Implantation and Trabeculectomy

Osama M. Badeeb, MD, FRCSC

*Department of Ophthalmology, Faculty of Medicine
King Abdulaziz University, Jeddah, Saudi Arabia
obadeed@yahoo.com*

Abstract. To evaluate the safety and efficacy of combined surgery on vision and glaucoma control; 62 eyes of 56 patients (35 male, 21 female) who had the operation between May 1985 and April 2000 were reviewed. The mean age and follow-up were 65.4 (range 20-90) years and 13.4 (range 1-60) months, respectively. Visual acuity ranged from light perception to 6/18, with 74.3% of eyes < 6/60. Pre operative intraocular pressure ranged from 10-53mmHg with 56.5% of patients \leq 21mmHg with medication(s). More than 50% of patients had moderate to severe glaucoma. Success was defined as intraocular pressure \leq 21mmHg with or without medication. Visual acuity improved or stayed the same post-operatively; 69.3% of eyes \geq 6/60, and 24.2% \geq 6/9. Mean post-operative intraocular pressure was 17.0 ± 1.9 mmHg with an overall success rate of 98.9%. 44 (71%) eyes did not need medication to control intraocular pressure post-operatively. Complications were hyphema (38.7%), flat anterior chamber (16.1%), and vitreous loss (6.5%); these did not significantly affect the success rate. Many patients did not return for follow-up after 3 months. The procedure was safe and effective and could be the treatment of choice in many developing countries, due to its low cost.

Keywords: Trabeculectomy, Cataract, Combined surgery.

Correspondence & reprint requests to: Dr. Osama M. Badeeb
P.O. Box 512, Jeddah, 21422, Saudi Arabia

Accepted for publication: 18 June 2007. Received: 13 May 2006.

Introduction

Cataract and glaucoma are commonly coexisting disorders in elderly patients. They are often separated as surgical entities, for one requires a wound completely watertight and the other requires a wound that leaks^[1].

Surgical treatment for coincident cataract and glaucoma has a long and controversial history. The usual recommendations in managing patients with poor vision from cataract and well-controlled glaucoma on low doses of well tolerated medications and who have minimal glaucomatous damage is to perform cataract extraction alone. Trabeculectomy alone, followed by cataract extraction at a later date, is recommended for those patients who have uncontrolled intraocular pressure (IOP) on maximum tolerated therapy and laser trabeculoplasty. It is also recommended if it poses an immediate threat to the patient's vision. Combined surgery should be done in patients who fall between the above two groups^[2].

An evidence-based study conducted by the American Academy of Ophthalmology (AAO) showed good evidence that combined operation (phacoemulsification + trabeculectomy lower IOP by approximately 8 mmHg and extra-capsular cataract extraction (ECCE) + trabeculectomy lower IOP by 6 - 8 mmHg) lower IOP more than cataract surgery alone in glaucoma patients on long-term follow-up^[3].

In spite of a wider spread swing toward the use of combined Phaco-trabeculectomy; combined ECCE + trabeculectomy is still widely used in Saudi Arabia and many developing countries due to its low cost.

This retrospective study was conducted to evaluate the safety and efficacy of combined ECCE ± intraocular lens implantation and trabeculectomy on vision and glaucoma control.

Materials and Methods

All patients who underwent combined extracapsular cataract ECCE ± intraocular lens (IOL) implantation and trabeculectomy between May 1985 and April 2000 and had at least one month of follow-up were retrospectively reviewed. A standard collection form was used to record demographic data; pre and post-operative ocular status, IOP, visual

acuity, indications for surgery, intra-operative and post-operative (post-op) complications. Eyes that had previous trabeculectomy were excluded.

Surgical Technique

The operation was performed under general or local retrobulbar block anesthesia. Bridle suture of 5:0 silk sutures was used to expose the superior limbal area. A fornix based conjunctival flap extending between 3 and 9 o'clock was performed. Cautery of limbus vessels was done. Partial thickness limbal incision with triangular scleral flap (3 × 3 × 3 mm) in the upper temporal area in the right eye and upper nasal area in the left eye was performed. The anterior chamber of eye (A/C) was entered under the scleral flap and viscoelastic material was injected in A/C. If there was inadequate dilatation of the pupil by dilating drops {Cyclogyl (Cyclopentolate 1%), Mydriacyl (Tropicamide 1%), and Mydfrin (Phenylephrine 2.5%)} sphincterectomy or a sector iridectomy was performed. Open caned anterior capsulotomy was performed by cystotome needle. Full thickness limbal incision and expression of nucleus were done. Two interrupted 10:0 nylon sutures were used to close the wound. Irrigation and aspiration of the cortical materials were done by Simcoe needle. Viscoelastic material was injected in A/C and posterior chamber intra-ocular lens (Amiolens) was inserted in the sulcus. Miochol-E (Acetylcholine Chloride) was injected in A/C to constrict the pupil. The trabeculectomy was performed by Hoskins scleral punch under the scleral flap and peripheral iridectomy was done at the same area. The limbal wound, scleral flap, and conjunctival flap were closed by interrupted 10:0 nylon sutures. Gentamicin and Decadron (Dexamethasone) were injected in the inferior fornix. Maxitrol (Neomycin and Polymyxin B sulfates and Dexamethasone) ointment was applied to the eye which was covered by an eye pad and shield.

Post-operatively patients were examined after 24 hours, daily for three to five days, at one week, one-, 3-, 6-, 9-, and 12-months and then every 6-months after that. IOP spike was managed by ocular massage.

Beginning from the first post-op day, all patients received Maxitrol drops q 3 hrs and ointment q hs. The medications were tapered over 4-8 weeks according to clinical judgment. Glaucoma medications were used if IOP >21 mmHg and the eye was not responding to ocular massage.

Absolute success was defined as IOP \leq 21 mmHg without medication, relative success as IOP \leq 21 mmHg with medication, and failure as IOP $>$ 21 mmHg with maximally tolerated medication.

The author performed surgery for 33 eyes, 13 eyes by the training residents, and 16 eyes by other members of the department.

The data was analyzed by GB-Stat v 65 computer statistic program.

Results

Sixty-two eyes of 56 patients who underwent combined surgery were reviewed. 35 patients were male and 21 were female. Six patients had bilateral surgery. The mean age \pm standard deviation (SD) was 65.4 \pm 11.6 (range 20-90) years. The mean follow up \pm SD was 13.4. \pm 15.8 (range 1-60) months.

Twenty-seven (43.6%) eyes had primary open angle glaucoma, 20 (32.3%) eyes had exfoliation glaucoma, and 15 (24.1%) eyes had other types of glaucoma (Table 1).

Table 1. Types of glaucoma.

Type of glaucoma	No. of eyes	Percent (%)
POAG*	27	43.
Exfoliation	20	32.3
Congenital	3	4.8
CACG [†]	4	6.5
Secondary ACG [‡]	3	4.8
Low tension	2	3.2
Uveitic	1	1.6
Phacolytic	1	1.6
NVG [§]	1	1.6

*Primary Open-Angle Glaucoma, [†]Chronic Angle Closure Glaucoma,

[‡]Secondary Angle Closure Glaucoma, [§]Neovascular Glaucoma

The average cup (c) to disc (d) ratio was 0.58. 26 (41.6%) eyes had c/d $>$ 0.7, 16 (25.8%) eyes had c/d 0.5- 0.7, 14 (22.6%) eyes had c/d $<$ 0.5, and in 6 (9.7%) eyes the c/d could not be estimated because of dense cataracts.

All eyes had significant cataract which necessitated cataract surgery, but only two-thirds had glaucoma which necessitated trabeculectomy (Table 2).

Pre-operatively 35 (56.5%) eyes had IOP \leq 21 mmHg, 17 (27.4%) eyes had IOP 22-30 mmHg, and 10 (16.1%) eyes had IOP $>$ 30 mmHg on medications.

Table 2. Indications of surgery.

Indications of operation	No. of eyes (%)
Cataract + Control IOP on min. med.	21 (33.9)
Cataract + Uncontrolled IOP on max. tolerated med.	15 (24.2)
Cataract + Poor compliance	11 (17.7)
Cataract + Control IOP on max. tolerated med.	8 (12.9)
Cataract + Severe glaucoma damage of optic nerve	7 (11.3)

Post-op mean IOP \pm SD over 60-months follow-up was 17.0 ± 1.9 mmHg and the overall success rate was 98.9% (67.7% absolute success, and 30.4% relative success) and 6.2% failure rate. Four eyes were considered as failures and had to have a repeat trabeculectomy with 5 Fluorouracil injections. One of the 4 eyes had exfoliation glaucoma and failed combined surgery (absolute failure) within the first month post-op due to vitreous loss. The second eye with exfoliation glaucoma had controlled IOP for about one year without medication and then with medication, later had to have a repeat trabeculectomy due to uncontrolled IOP on maximum tolerated medication. This eye had hyphema and flat A/C within the first week post-op. The third eye had primary open-angle glaucoma (POAG) and controlled IOP without and then with medication. However, because of poor compliance and severe glaucoma damage of the optic nerve, this eye had to have a repeat trabeculectomy 2.5 years post-op. The fourth eye had POAG, that had complicated combined operation (vitreous loss and hyphema). The IOP was controlled without medication for 6 months but at nine month post-op, the IOP became out of control, in spite of maximum tolerated medication. The patient was offered trabeculectomy but he refused. Many patients were lost on follow-up (Table 3).

Table 3. Outcome of combined surgery over 5 years follow-up.

Time (month)	No. of eyes present	Mean IOP \pm SD mmHg	Absolute success no. of eyes (%)	Relative success no. of eyes (%)	Overall success rate no. of eyes (%)	Failure rate no. of eyes (%)
1	62	13.9 \pm 8.2	56 (90.3%)	5 (8.1%)	61 (98.4%)	1(1.6%)*
3	45	14.5 \pm 5.9	40 (88.9%)	5 (11.1%)	45 (100%)	
6	29	15.5 \pm 6.3	21 (72.4%)	8 (27.6%)	29 (100%)	
9	19	15.5 \pm 4.4	12 (63.2%)	6 (31.6%)	18 (94.7%)	1(5.3%) [†]
12	15	17.4 \pm 7.2	9 (60.0%)	5 (33.3%)	14 (93.3%)	1(6.7%) [‡]
18	17	15.8 \pm 4.4	11 (64.7%)	6 (35.3%)	17 (100%)	
24	11	16.5 \pm 4.8	8 (72.7%)	3 (27.3%)	11 (100%)	
30	9	18.3 \pm 5.8	5 (55.6%)	3 (33.3%)	8 (88.9%)	1(11.1%) [§]
36	7	18.0 \pm 5.2	3 (42.9%)	4 (57.1%)	7 (100%)	
42	5	19.0 \pm 4.8	1 (20.0%)	4 (80.0%)	5 (100%)	
48	2	20.7 \pm 2.9	1 (50.0%)	1 (50.0%)	2 (100%)	
54	1	18.0	1 (100%)		1 (100%)	
60	1	18.0	1 (100%)		1 (100%)	

*Eye had vitreous loss and uncontrolled IOP immediately post-op.

[†]Eye had vitreous loss and uncontrolled IOP on maximum tolerated medication and refuse trabeculectomy.

[‡]Eye had trabeculectomy due to uncontrolled IOP on maximum tolerated medication.

[§]Eye had trabeculectomy due to poor compliance.

There is no statistically significant difference ($P=0.87$) between eyes having POAG and those having exfoliation glaucoma regarding failure rate.

No significant different of success rates of eyes done by the author, residents, and other members of the department (98%, 100%, and 97%, respectively).

IOP spikes (> 30 mmHg) were seen in 10 (16%) eyes on day one post-op. 5 eyes had exfoliation glaucoma, 4 eyes had POAG, and one eye had uveitic glaucoma. All eyes responded to massage except one that absolutely failed due to vitreous loss.

Pre-op visual acuity ranged from perception of light to 6/18, with 74.3% of eyes $< 6/60$. On final post-op follow-up, 43 (69.4%) eyes had

visual acuity better than 6/60 and none of the patients had any loss of vision from pre-op level (Table 4).

Table 4. Visual acuity pre-and post-op.

Visual acuity	Pre-op	Post-op
	No. of eyes (%)	No. of eyes (%)
LP	4 (6.5)	1 (1.6)
HM	14 (22.6)	2 (3.2)
CF	28 (45.2)	16 (25.8)
6/60-6/36	11 (17.7)	16 (25.8)
6/24-6/12	2 (3.2)	12 (19.4)
6/9-6/6	0 (0)	15 (24.2)
No record	3 (4.8)	

Pre-operatively, all eyes were on glaucoma medications. Post-operatively, 44 (71%) eyes did not need any medications to control IOP (Table 5).

Table 5. Patients on anti glaucoma medications pre- and post-op.

No. of glaucoma medications	No. of patients (%)	
	Pre-op	Post-op
0	0 (0.0%)	44 (71.0%)
1	24 (38.7%)	10 (16.1%)
2	31 (50.0%)	4 (6.5%)
3	6 (9.7%)	4 (6.5%)
4	1 (1.6%)	0

Complications were divided according to the time of occurrence as intra-op and post-op. Intra-op complications were present in 9 (14.5%) eyes and post-op in 38 (61.3%) eyes (Table 6). Post-op, hyphema was the most frequent complication and it occurred in 24 (38.7%) eyes during recovery from general anesthesia and resolved spontaneously within a few days. Complications related to trabeculectomy, flat A/C and choroidal detachment resolved spontaneously with conservative treatment of its etiology. Cycloplegic drops, aqueous suppressors and

large bandage contact lens were used to treat over-filtration, which was the main cause of flat anterior chamber and choroidal detachment. Vitreous loss, which was related to ECCE, was treated by anterior vitrectomy.

Table 6. Complications.

Complication	No. of eyes (%)
<u>Intra-op:</u>	
Vitreous loss*	4 (6.5%)
Subconjunctival hemorrhage*	3 (4.8%)
Hyphema*	2 (3.2%)
<u>Post-op:</u>	
Hyphema*	24 (38.7%)
Flat A/C*	10 (16.1%)
Choroidal detachment*	3 (4.8%)
Vitreous hemorrhage+ CME*	1 (1.6%)

*CME= Cystoid macular edema

Discussion

Combined procedure was the treatment of choice in the Ophthalmology Department, since 1985, for one or more of the following reasons: (a) patient was either a visitor from a poor neighboring country or citizen coming from a rural area, and having difficulties buying or finding glaucoma medications at home; (b) poor compliance for using medications or returning for follow-up; (c) severe glaucomatous optic nerve damage which can progress dramatically with IOP spike that may occur post cataract extraction alone; and (d) patient's resistance to multiple operations. Combined surgery was performed on all eyes, including eyes that had adequate IOP control on medical therapy. Storr-Paulsen *et al.* extended the indication for combined surgery, to include social and psychological factors like compliance, inability to attend sufficient medical care or unacceptable medication^[4].

The study judged glaucoma control, as other reports, in terms of IOP control. Post-op IOP was controlled in 98.9% of this present study eyes; 67.7% achieved that without medications. Other studies showed overall IOP control rates of 90 to 100% and IOP control of all medications in 53

to 86% of eyes^[1-5]. Unfortunately one-third of the eyes went out of IOP control and had to have glaucoma medication post-op. Mitomycin-C was found to improve IOP control in patients undergoing combined procedures^[6,7]. In the meantime, this study is learning the effect of adding mitomycin-C to phaco- and ECCE-trabeculectomy procedures. The preliminary results of this ongoing study are showing an improvement in the absolute success rates.

The complication rates were comparable to other combined procedure studies^[1-4,5]. However, all studies, including this present one, have shown increased complications in comparison with standard ECCE. These complications did not significantly jeopardize the success rate of the combined operation and were outweighed by (a) the advantages of combining the two operations into one procedure; (b) no cases of visual loss; (c) a low rate of IOP spikes; and (d) elimination or reduction of post-op anti-glaucoma medication.

Cataract surgery in eyes that have pseudoexfoliation was reported to be associated with a high risk of complications^[8]. This was not our observation or Shastri *et al.*^[9] findings. This study's early failure was mainly due to cataract extraction complications.

Combined surgery reduced the frequency and magnitude of IOP spikes, but it did not eliminate this complication^[10]. IOP spikes occurred in 16% of this study's eyes in comparison to 62% in McGuigan *et al.* study^[11]. It could be related to the measures we used to prevent shallow A/C and over - filtration, such as leaving the viscoelastic material in A/C and/or tight closure of the scleral flap of the trabeculectomy, or to surgical complications.

About 69.3% of this study's patients had significant improvement in visual acuity and none had worsening of vision from pre-op level. The visual acuity results in these patients do not compare favorably with other published series. 30% of these eyes achieved 6/12 (20/40) or better in comparison to more than 70% from other studies^[1-4,11-13]. This was due to the presence of ocular abnormalities: solar keratopathy (which is very common in this area); severe glaucomatous optic nerve atrophy; diabetic retinopathy; or macular scar; and not related to the procedure.

This study, as previously reported^[12], has shown that intraocular lens implantation does not jeopardize the filtration surgery, but led to early visual rehabilitation.

There was no statistically significant difference in success rate between eyes done by the author and those done by residents ($p = 0.59$) and other members of the departments ($p = 0.45$). This indicates that the procedure can easily be learned and performed by residents and should be included in their surgical training.

The pitfalls inherent in this study were the short duration of follow-up in most of the cases, which make it difficult to assess the long-term results of the procedure. Bobrow has shown that combined ECCE and lens implantation with trabeculectomy is beneficial in the long-term control of IOP and in prevention of visual field loss^[13].

Conclusion

The reasonably good results of this study are important in developing countries where phacoemulsification is still not universally available because of its high cost. Lack of compliance, lack of access to expensive medications, and rural settings in developing countries make combined surgery the treatment of choice for coincident cataract and glaucoma. This procedure is safe, effective, and easy to be learned by residents. The success rate may improve by adding mitomycin-C to the procedure.

References

- [1] **Percival SP.** Glaucoma triple procedure of extracapsular cataract extraction, posterior chamber lens implantation and trabeculectomy. *Br J Ophthalmol* 1985; 69(2): 99-102.
- [2] **Samuelson TW.** Management of coincident cataract and glaucoma. *Curr Opin Ophthalmol* 1998; 9(1): 33-38.
- [3] **Friedman DS, Jampel HD, Lubomski LH, Kempen JH, Quigley H, Congdon N, Levkovitch-Verbin H, Robinson KA, Bass EB.** Surgical strategies for coexisting glaucoma and cataract. An evidence-based update. *Ophthalmology* 2002; 109(10): 1902-1913.
- [4] **Storr-Paulsen A, Perriard A, Vangsted P.** Indications and efficacy of combined trabeculectomy and extracapsular cataract extraction with intraocular lens implantation in cataract patients with coexisting open angle glaucoma. *Acta Ophthalmol Scand* 1995; 73(3): 273-276.
- [5] **McCartney DL, Memmen JE, Stark WJ, Quigley HA, Maumenee AE, Gottsch JD, Bernitsky DA, Wong SK.** The efficacy and safety of combined trabeculectomy, and

- cataract extraction and intraocular lens implantation. *Ophthalmology* 1988; **95**(6): 754-763.
- [6] **Joos KM, Bueche MJ, Palmberg PF, Feuer WJ, Grajewski AL.** One-year follow-up results of combined mitomycin C trabeculectomy and extracapsular cataract extraction. *Ophthalmology* 1995; **102**(1): 76-83.
- [7] **Shin DH, Iskander NG, Ahee JA, Singal IP, Kim C, Hughes BA, Eliassi-Rad B, Kim YY.** Long-term filtration and visual field outcomes after primary glaucoma triple procedure with and without mitomycin-C. *Ophthalmology* 2002; **109**(9): 1607-1611.
- [8] **Alfaiate M, Leite E, Mira J, Cunha-Vaz, JG.** Prevalence and surgical complications of pseudoexfoliation syndrome in Portuguese patients with senile cataract. *J Cataract Refract Surg* 1996; **22**(7): 972-976.
- [9] **Shastri L, Vasavada A.** Phacoemulsification in Indian eyes with pseudoexfoliation syndrome. *J Cataract Refract Surg* 2001; **27**(10): 1629-1637.
- [10] **Krupin T, Feitl ME, Bishop KI.** Postoperative intraocular pressure rise in open-angle glaucoma patients after cataract or combined cataract-filtration surgery. *Ophthalmology* 1989; **96**(5): 579-584.
- [11] **McGuigan LJ, Gottsch J, Stark WJ, Maumenee AE, Quigley HA.** Extracapsular cataract extraction and posterior chamber lens implantation in eyes with preexisting glaucoma. *Arch Ophthalmol* 1986; **104**(9): 1301-1308.
- [12] **Neumann R, Zalish M, Oliver M.** Effect of intraocular lens implantation on combined extracapsular cataract extraction with trabeculectomy: a comparative study. *Br J Ophthalmol* 1988; **72**(10): 741-745.
- [13] **Bobrow J.** Prospective inpatient comparison of extracapsular cataract extraction and lens implantation with and without trabeculectomy. *Am J Ophthalmol* 2000; **129**(3): 291-296.

تقييم عملية إزالة الماء الأبيض (بطريقة خارج الكبسول)، مع/أو بدون وضع عدسة داخل العين، مع عملية إزالة الماء الأزرق (بطريقة التربيق)

أسامة محمد باديب

قسم العيون، كلية الطب، جامعة الملك عبدالعزيز

جدة - المملكة العربية السعودية

المستخلص. تمت دراسة ٦٢ عيناً من ٥٦ مريضاً أجريت لهم هذه العملية في الفترة ما بين عام ١٩٨٥-٢٠٠٠م، وكان متوسط أعمارهم ٦٥,٤ سنة، ومتوسط فترة المتابعة ١٣,٤ شهراً. أظهرت الدراسة أن النظر تحسن، أو بقي على نفس المستوى بعد العملية، ونسبة نجاح العملية كانت ٩٨,٩٪، و٧١٪ من العيون لم تحتج إلى أدوية لعلاج الماء الأزرق بعد العملية. بالنسبة إلى مضاعفات العملية، فقد كانت نزيف داخل العين (٣٨,٧٪)، انحسار في الغرفة الأمامية (١٦,١٪)، وفقدان في الجسم الزجاجي (٦,٥٪)، وهذه المضاعفات لم تؤثر سلباً على نتيجة العملية. هذه العملية أدت إلى تحسن البصر والسيطرة على الماء الأزرق.