

When do I do combined surgery for Glaucoma?

Indications and Challenges

Dr. Ali Alsheikheh

MD, MSc.opth, “Facharzt”

C.Ophthalmologist & Glaucoma surgeon

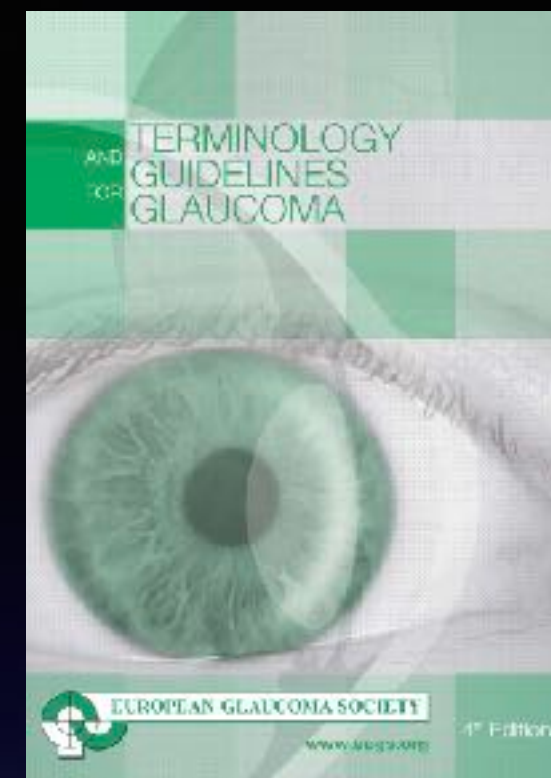
Alnahdha hospital, Oman

No financial disclosure

Agenda

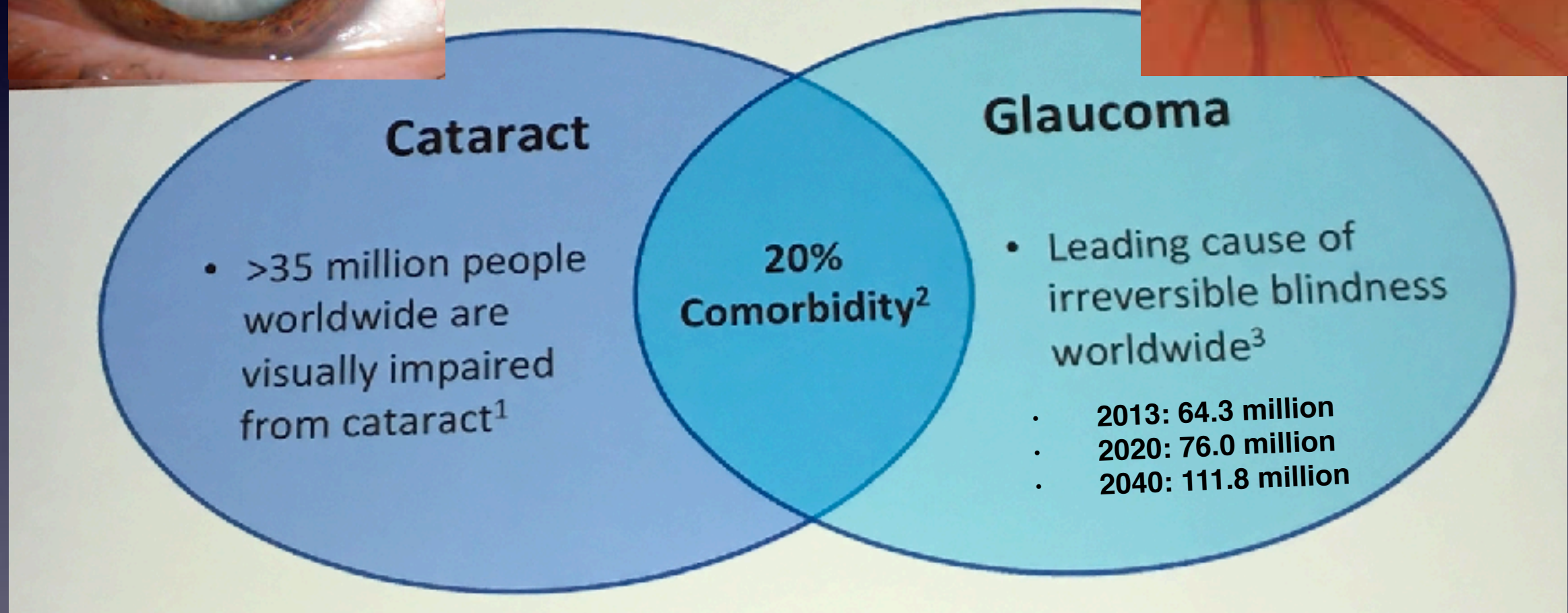
- ❖ **Introduction**
- ❖ **Indications**
- ❖ **Discussion based on statistical studies**
- ❖ **Combined surgery in ANH**
- ❖ **Case Presentation**
- ❖ **Summary**

Introduction



The **goal** of glaucoma treatment is to maintain the patient's **visual function** and related **quality of life**, at a sustainable **cost**.

Cataract and Glaucoma Epidemiology



1- Khairallah M, et al. Invest Ophthalmol Vis Sci. 2015; 56: 6762-9

2- Tseng VL, et al. JAMA. 2012; 308: 493-501

3- Tham YC, et al. Ophthalmology 2014; 121: 2081-90

Indications

Indications:

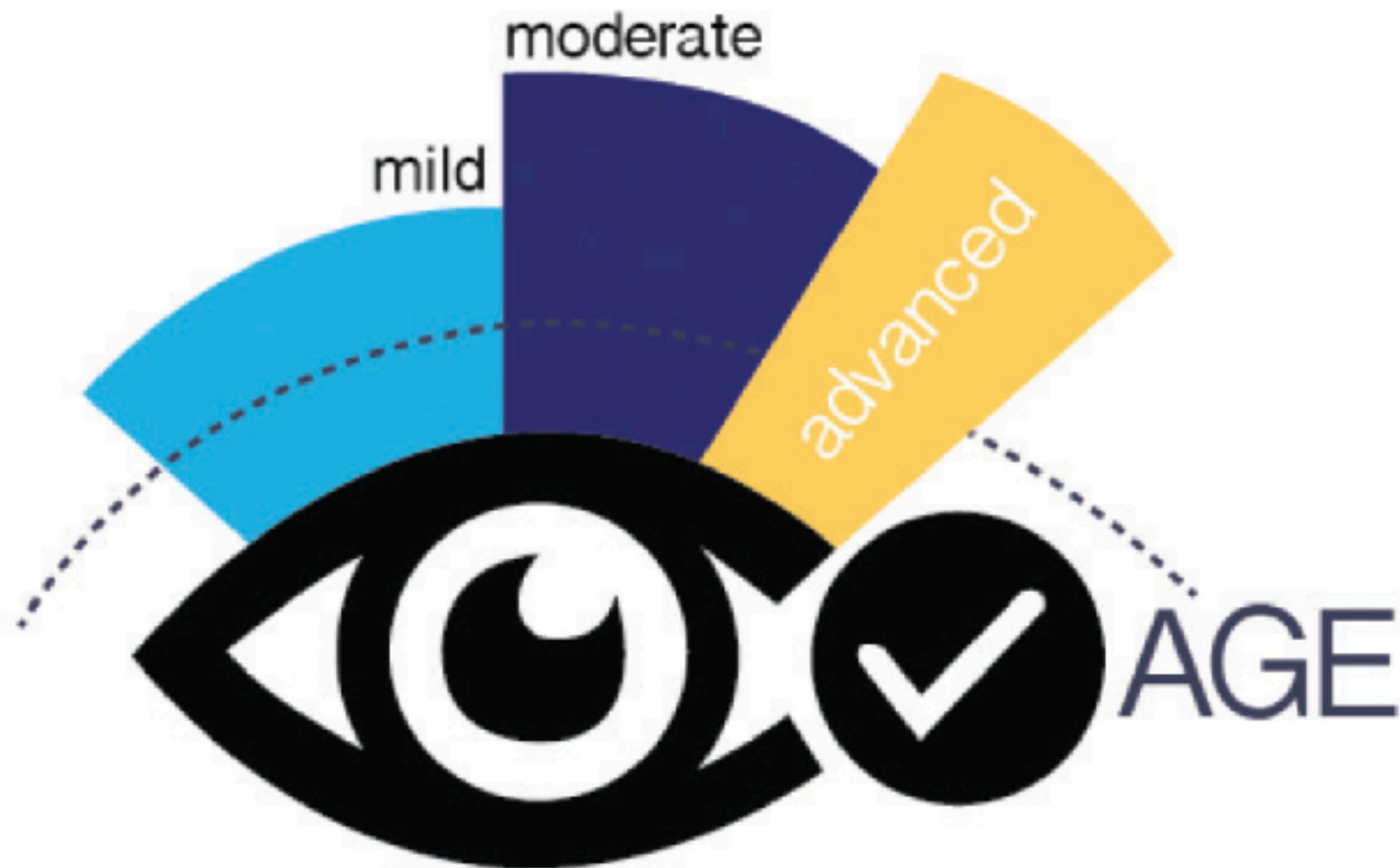
- ❖ **Cataract without glaucoma:** clear indications
- ❖ **Glaucoma with or without cataract:**
 - ➔ Treatment decisions are not clear-cut
 - ➔ We make decisions for the individual, not just according to the numbers but also based on many other aspects of a patient's health status and lifestyle.

Indications: Glaucoma with or without cataract

Age

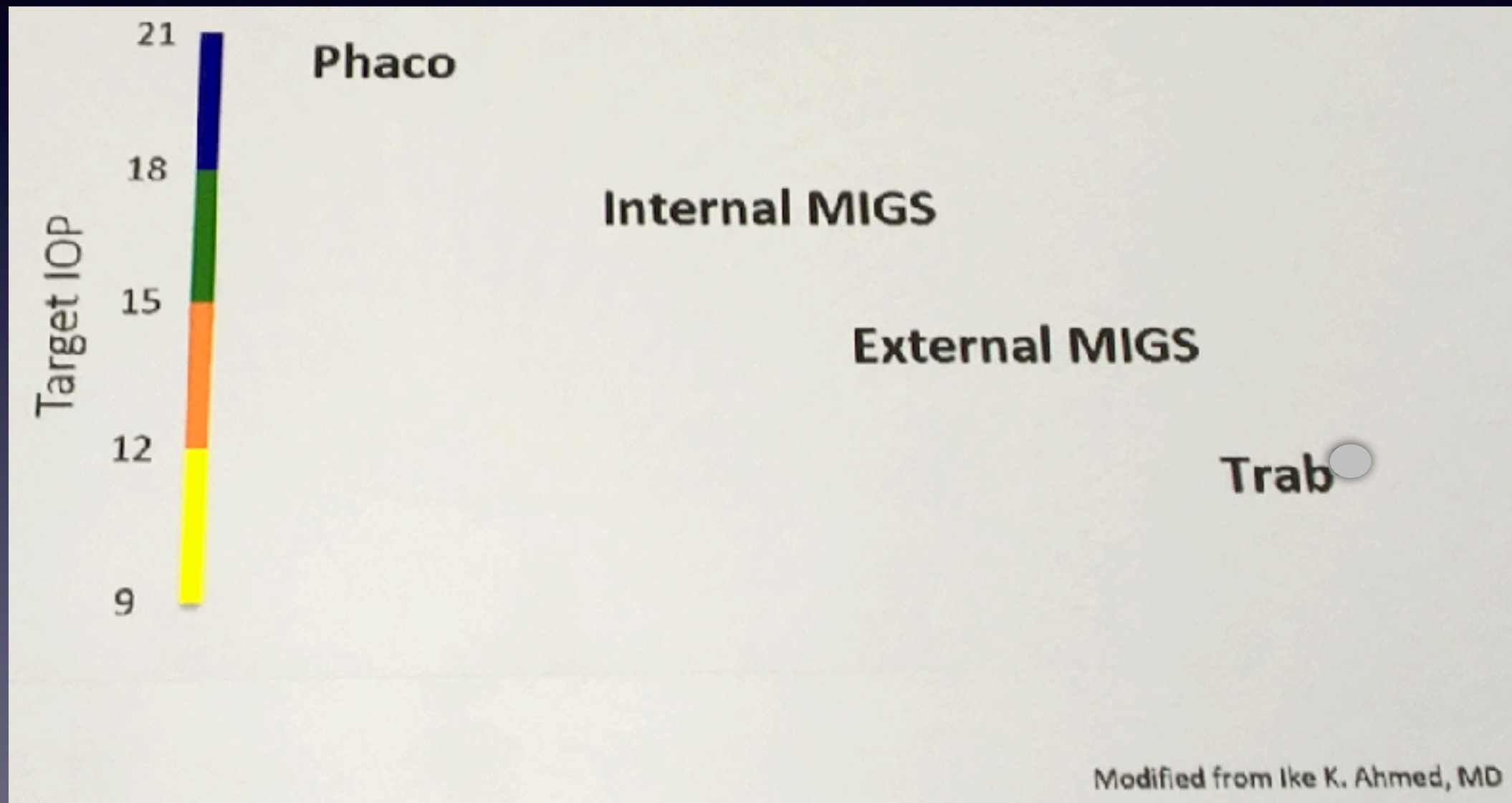
Stage

3 Questions



- Is the pressure at or above goal?
- Does the patient tolerate current medication?
- Is there a cataract?

Positioning the surgical options- Target IOP



Efficacy

Safety

**Glaucoma
surgery**

**Patient
Experience**

**Post-op
recovery**

Cost

Cataract & Glaucoma

Indication for surgery

Cataract

Cataract & Glaucoma

Glaucoma

ACG

OAG

Yes
RFIC

No
RFIC

Cataract
±
AGM?

Cataract
+
-AGM
-SLT
-MIGS

combined
Surgery?

?

1-
Glaucoma
?
2-
Cataract

Cataract & Glaucoma

Indication for surgery

Cataract

Cataract & Glaucoma

Glaucoma

ACG

OAG

Yes
RFIC

No
RFIC

Cataract
±
AGM?

Cataract
+
-AGM
-SLT
-MIGS

combined
Surgery?

?

1-
Glaucoma
?
2-
Cataract

Discussion

based on statistical studies

Trabeculectomy in the 21st century: a multicenter analysis.

Kirwan JF¹, Lockwood AJ², Shah P³, Macleod A⁴, Broadway DC⁵, King AJ⁶, McNaught AI⁷, Agrawal P²; Trabeculectomy Outcomes Group Audit Study Group.

- ❖ **At 2 years, IOP was 12.4±4 mmHg**
- ❖ **IOP ≤21 mmHg and 20% reduction of IOP:**
 - 80% without IOP-lowering medication
 - 87% with AGM
- ❖ **IOP ≤18 mmHg and 20% reduction of IOP:**
 - 78% without IOP-lowering medication
 - 86% with AGM

Trabeculectomy in the 21st century: a multicenter analysis.

Kirwan JF¹, Lockwood AJ², Shah P³, Macleod A⁴, Broadway DC⁵, King AJ⁶, McNaught AI⁷, Agrawal P²; Trabeculectomy Outcomes Group Audit Study Group.

Table 5. Postoperative Interventions

Intervention	No. (%) n=428
Postoperative 5-FU subconjunctival injection	119 (28%)
Bleb needling	71 (17%)
Suture manipulation	184 (43%)
Resuturing for bleb leak or hypotony	30 (7%)
Cataract surgery	111/363 (31%)
Bandage contact lens application	14 (3%)
Vitrectomy	2 (0.5%)
Subconjunctival dexamethasone	4 (1%)
Tissue plasminogen activator injection	2 (0.5%)
Viscoelastic injection	2 (0.5%)
Autologous blood injection	4 (1%)
Intracameral antibiotics	3 (1%)
Compression sutures	1 (0.2%)

Phacotrabeculectomy vs Trabeculectomy (OAG & ACG)



• Meta-Analysis •

Meta-analysis of the efficacy and safety of combined surgery in the management of eyes with coexisting cataract and open angle glaucoma

Nan Jiang, Gui-Qiu Zhao, Jing Lin, Li-Ting Hu, Cheng-Ye Che, Qian Wang, Qiang Xu, Cui Li, Jie Zhang

AIM: To conduct a systematic review and quantitative Meta-analysis of the efficacy and safety of combined surgery for the eyes with coexisting cataract and open angle glaucoma.

Meta-analysis of the efficacy and safety of combined surgery in the management of eyes with coexisting cataract and open angle glaucoma.

Meta-analysis of combined surgery

Table 1 Characteristics of included studies

First author (year)	Country	Design	No. of patients	No. of eyes	Mean age±SD (y)		M/F (n)		Intervention regimen	Follow up (mo)
					Glaucoma surgery	Combined surgery	Glaucoma surgery	Combined surgery		
Bilgin (2014)	Turkey	CCT	49	52	69.6±7.1	66.6±9.5	15/11	12/11	NPDS vs phaco-NPDS	30.9/28.7
Bull (2011)	Germany	RCT	101	101	67.3±9.9	67.3±9.9	-	-	Canaloplasty vs phacocanaloplasty	36/36
Cillino (2004)	Italy	RCT	65	65	68.6±1.7	71.7±2.0	9/8	8/7	NPDS vs phaco-NPDS	24/24
					71.3±1.2	74.6±1.1	8/10	9/6	PT vs phaco-PT	24/24
D'Eliseo (2003)	Italy	RCT	42	42	71.5	79	15/6	8/13	DS vs Phaco-DS	12/12
Ting (2012)	USA	Pro	713	713	68±15	74±9	181/256	104/155	Trabeculectomy vs cataract extraction and trabeculectomy	12/12
Wishart (2003)	England	Pro	151	192	66.9±10.1	78.9±12.3	13/7	23/33	VC vs phaco-VC	36.4/32.2
					67±11.7	77±8.9	21/22	17/18	DS vs phaco-DS	36.3/35.1
Wishart (2002)	UK	Pro	73	101	75.2	75.2	-	-	VC vs phaco-VC	36/36
Parikh (2016)	USA	Retro	753	753	69±11	72±9	-	-	Trabeculectomy vs phaco-trabeculectomy	12/12
Tetz (2015)	Germany	Retro	112	112	63.5±9.9	74.8±9.0	44/38	12/18	Canaloplasty vs phacocanaloplasty	36/36
Salaga-Pylak (2013)	Poland	Retro	122	122	70.8±6.3	70.7±7.0	32/40	12/38	TrabMMC vs phaco-trabMMC	18/18
Chihara (2011)	Japan	Retro	789	789	60.2±17.6	68.7±13.9	-	-	TrabMMC vs phaco-trabMMC	6/6
					60.2±17.6	71.4±9.6			VC vs phaco-VC	
Rotchford (2007)	UK	Retro	63	63	72.8±7.6	79.2±7.5	17/13	16/16	MT vs phaco-MT	43.5/41.8
Marek (2006)	Poland	Retro	35	67	-	-	-	-	DS vs phaco-DS	12/12
Uretmen (2003)	Turkey	Retro	40	40	71.8±7.7	71.1±6.4	10/10	12/8	VC vs phaco-VC	12/12

Meta-analysis of the efficacy and safety of combined surgery in the management of eyes with coexisting cataract and open angle glaucoma.

Meta-analysis of combined surgery

Table 1 Characteristics of included studies

First author (year)	Country	Design	No. of patients	No. of eyes	Mean age±SD (y)		M/F (n)		Intervention regimen	Follow up (mo)
					Glaucoma surgery	Combined surgery	Glaucoma surgery	Combined surgery		
Bilgin (2014)	Turkey	CCT	49	52	69.6±7.1	66.6±9.5	15/11	12/11	NPDS vs phaco-NPDS	30.9/28.7
Bull (2011)	Germany	RCT	101	101	67.3±9.9	67.3±9.9	-	-	Canaloplasty vs phacocanaloplasty	36/36
Cillino (2004)	Italy	RCT	65	65	68.6±1.7	71.7±2.0	9/8	8/7	NPDS vs phaco-NPDS	24/24
					71.3±1.2	74.6±1.1	8/10	9/6	PT vs phaco-PT	24/24
D'Eliseo (2003)	Italy	RCT	42	42	71.5	79	15/6	8/13	DS vs Phaco-DS	12/12
Ting (2012)	USA	Pro	713	713	68±15	74±9	181/256	104/155	Trabeculectomy vs cataract extraction and trabeculectomy	12/12
Wishart (2003)	England	Pro	151	192	66.9±10.1	78.9±12.3	13/7	23/33	VC vs phaco-VC	36.4/32.2
					67±11.7	77±8.9	21/22	17/18	DS vs phaco-DS	36.3/35.1
Wishart (2002)	UK	Pro	73	101	75.2	75.2	-	-	VC vs phaco-VC	36/36
Parikh (2016)	USA	Retro	753	753	69±11	72±9	-	-	Trabeculectomy vs phaco-trabeculectomy	12/12
Tetz (2015)	Germany	Retro	112	112	63.5±9.9	74.8±9.0	44/38	12/18	Canaloplasty vs phacocanaloplasty	36/36
Salaga-Pylak (2013)	Poland	Retro	122	122	70.8±6.3	70.7±7.0	32/40	12/38	TrabMMC vs phaco-trabMMC	18/18
Chihara (2011)	Japan	Retro	789	789	60.2±17.6	68.7±13.9	-	-	TrabMMC vs phaco-trabMMC	6/6
					60.2±17.6	71.4±9.6	-	-	VC vs phaco-VC	
Rotchford (2007)	UK	Retro	63	63	72.8±7.6	79.2±7.5	17/13	16/16	MT vs phaco-MT	43.5/41.8
Marek (2006)	Poland	Retro	35	67	-	-	-	-	DS vs phaco-DS	12/12
Uretmen (2003)	Turkey	Retro	40	40	71.8±7.7	71.1±6.4	10/10	12/8	VC vs phaco-VC	12/12

Meta-analysis of the efficacy and safety of combined surgery in the management of eyes with coexisting cataract and open angle glaucoma.

Table 3 Percentage IOP decline from baseline comparing glaucoma surgery with combined glaucoma/cataract surgery

Trails	Glaucoma surgery		Combined glaucoma/cataract surgery		WMD (fixed) (95%CI)
	No. of eyes	IOPR% [Mean (SD)]	No. of eyes	IOPR% [Mean (SD)]	
Deep sclerectomy vs combined deep sclerectomy with phacoemulsification^a					
Bilgin (2014)	26	37.87 (18.85)	23	38.7 (29.76)	0.83 (-13.33, 14.99)
Cillino (2004)	17	41.06 (8.36)	15	41.04 (7.20)	-0.02 (-5.41, 5.37)
D'Eliseo (2003)	21	35.34 (12.4)	21	42.44 (12.58)	7.10 (-0.45, 14.65)
Wishart (2003)	52	40.99 (19.32)	35	38.02 (23.26)	-2.97 (-12.29, 6.35)
Marek (2006)	21	29.59 (17.73)	23	41.39 (13.63)	11.80 (2.39, 21.21)
Total	137		117		2.85 (-0.69, 6.39)
Canaloplasty vs phaco-canaloplasty^b					
Tetz (2015)	82	33.76 (16.93)	30	42.13 (19.63)	-8.37 (-16.29, -0.45)
Bull (2011)	82	32.61 (17.22)	16	42.39 (21.58)	-9.78 (-20.99, 1.43)
Wishart (2003)	27	35.63 (28.61)	78	30.83 (19.56)	-4.80 (-16.43, 6.83)
Wishart (2002)	26	35.38 (22.52)	75	33.89 (17.57)	1.49 (-8.04, 11.02)
Uretmen (2003)	20	34.45 (20.49)	20	38.4 (24.95)	-3.95 (-18.10, 10.20)
Total	237		219		-3.78 (-8.38, 0.81)
Trabeculotomy vs combined trabeculotomy with phacoemulsification^c					
Parikh (2016)	255	26.73 (27.94)	498	21.32 (25.74)	5.41 (1.30, 9.52)
Salaga-Pylak (2013)	72	-4.55 (31.37)	50	-13.79 (29.65)	9.24 (-1.72, 20.20)
Ting (2012)	450	34.12 (26.83)	263	21.61 (23.63)	12.51 (8.73, 16.29)
Chihara (2011)	145	52.04 (24.19)	116	24.07 (16.22)	27.97 (23.05, 32.89)
Rotchford (2007)	37	45.12 (28.88)	37	42.98 (18.97)	2.14 (-8.99, 13.27)
Cillino (2004)	18	47.04 (7.29)	15	36.30 (6.94)	10.74 (5.87, 15.61)
Total	977		979		12.65 (10.56, 14.74)

Meta-analysis of the efficacy and safety of combined surgery in the management of eyes with coexisting cataract and open angle glaucoma.

Table 4 Subgroup analysis estimating the effect of trial design on percentage IOP decline

Subgroup	No. of studies	WMD (fixed) (95%CI)	Heterogeneity			Overall effect	
			Chi ²	<i>P</i>	<i>I</i> ² (%)	<i>Z</i>	<i>P</i>
Deep sclerectomy vs combined deep sclerectomy with phacoemulsification							
All trials	5	2.85 (-0.69, 6.39)	7.35	0.12	46	1.58	0.12
RCTs	3	-2.25 (-6.44, 1.95)	2.30	0.32	13	1.05	0.29
Pro	1	2.97 (-6.35, 12.29)	-	-	-	0.62	0.53
Retro	1	-11.80 (-21.21, -2.39)	-	-	-	2.46	0.01
Canaloplasty vs phaco-canaloplasty							
All trials	5	-3.78 (-8.38, 0.81)	5.66	0.23	29	1.61	0.11
RCTs	1	-9.78 (-20.99, 1.43)	-	-	-	1.71	0.09
Pro	2	2.82 (-4.55, 10.19)	0.19	0.67	0	0.75	0.45
Retro	2	-7.31 (-14.23, -0.40)	0.29	0.59	0	2.07	0.04
Trabeculotomy vs combined trabeculotomy with phacoemulsification							
All trials	6	12.65 (10.56, 14.74)	53.56	<0.00001	91	11.87	<0.00001
RCTs	1	10.74 (5.87, 15.61)	-	-	-	4.33	<0.00001
Pro	1	12.51 (8.73, 16.29)	-	-	-	6.48	<0.00001
Retro	4	13.42 (10.50, 16.35)	52.70	<0.00001	94	9	<0.00001

Meta-analysis of the efficacy and safety of combined surgery in the management of eyes with coexisting cataract and open angle glaucoma.

Table 5 Subgroup analysis estimating the effect of trial design on percentage of the number of glaucoma medications reduction

Subgroup	No. of studies	WMD (fixed) (95%CI)	Heterogeneity			Overall effect	
			Chi ²	<i>P</i>	<i>I</i> ² (%)	<i>Z</i>	<i>P</i>
Canaloplasty vs phaco-canaloplasty							
All trials (Retro)	2	-12.87 (-29.65, 3.91)	3.17	0.07	68	1.5	0.13
Trabeculotomy vs combined trabeculotomy with phacoemulsification							
All trials (Retro)	3	1.55 (-5.06, 8.16)	9.46	0.002	89	0.46	0.65

Meta-analysis of the efficacy and safety of combined surgery in the management of eyes with coexisting cataract and open angle glaucoma.

Meta-analysis of combined surgery

Table 6 Complete success and qualified success comparing trabeculotomy with combined trabeculotomy with phacoemulsification

Trial	Studies (<i>n</i>)	Success rate, <i>n/N</i>		OR (95%CI)	Heterogeneity			Overall effect	
		Trabeculotomy	Phaco-trabe		Chi ²	<i>P</i>	<i>I</i> ² (%)	<i>Z</i>	<i>P</i>
Complete success (≤ 21 mm Hg)									
All trials	2	36/55	33/52	1.13 (0.51, 2.53)	0.17	0.68	0	0.30	0.77
RCT	1	10/18	7/15	1.43 (0.36, 5.66)	-	-	-	0.51	0.61
Retro	1	26/37	26/37	1.00 (0.37, 2.71)	-	-	-	0	1.00
Qualified success (≤ 21 mm Hg)									
All trials	2	47/55	48/52	0.48 (0.14, 1.72)	0.02	0.88	0	1.13	0.26
RCT	1	16/18	14/15	0.57 (0.05, 7.00)	-	-	-	0.44	0.66
Retro	1	31/37	34/37	0.46 (0.10, 1.98)	-	-	-	1.05	0.29

Meta-analysis of the efficacy and safety of combined surgery in the management of eyes with coexisting cataract and open angle glaucoma.

Table 7 Subgroup analysis evaluating frequency of postoperative complications in study group

Adverse events	Studies (<i>n</i>)	Crude event rate, <i>n</i>		OR (95%CI)	Heterogeneity			Overall effect	
		Glaucoma surgery	Combined cataract/ glaucoma surgery		Chi ²	<i>P</i>	<i>I</i> ² (%)	<i>Z</i>	<i>P</i>
Deep sclerectomy vs combined deep sclerectomy with phacoemulsification									
Shallow/flat anterior chamber	2	1/69	0/50	2.21 (0.09, 55.42)	-	-	-	0.48	0.63
Hyphema	2	5/69	3/50	1.22 (0.28, 5.38)	-	-	-	0.27	0.79
Choroid detachment	2	3/69	1/50	2.23 (0.22, 22.06)	-	-	-	0.68	0.49
Trabeculotomy vs combined trabeculotomy with phacoemulsification									
Hyphema	2	25/103	24/120	1.28 (0.68, 2.42)	-	-	-	0.77	0.44
Hypotony	2	43/103	45/120	1.19 (0.70, 2.05)	-	-	-	0.65	0.52
Choroid detachment	2	5/103	5/120	1.17 (0.33, 4.17)	-	-	-	0.25	0.80

Meta-analysis of the efficacy and safety of combined surgery in the management of eyes with coexisting cataract and open angle glaucoma.

- **CONCLUSION: Compared with trabeculotomy plus phacoemulsification, trabeculectomy alone is more effective in lowering IOP and the number of glaucoma medications, while the two surgeries can not demonstrate statistical differences in the complete success rate, qualified success rate, or incidence of adverse incidents.**

Chin Med J (Engl). 2012 Apr;125(8):1429-33.

Comparison of combined phacotrabeculectomy with trabeculectomy only in the treatment of primary angle-closure glaucoma.

Wang M¹, Fang M, Bai YJ, Zhang WZ, Lin MK, Liu BQ, Hao YT, Ling YL, Zhuo YH, Ge J.

CONCLUSION: Phacotrabeculectomy and trabeculectomy treatments exhibit similar IOP reduction, successful rates, and complications when it comes to treating PACG patients with coexisting cataract, although additional surgery intervention may be needed for a few cases with cataract and complications after trabeculectomy.

Chin Med J (Engl). 2012 Apr;125(8):1429-33.

Comparison of combined phacotrabeculectomy with trabeculectomy only in the treatment of primary angle-closure glaucoma.

Wang M¹, Fang M, Bai YJ, Zhang WZ, Lin MK, Liu BQ, Hao YT, Ling YL, Zhuo YH, Ge J.

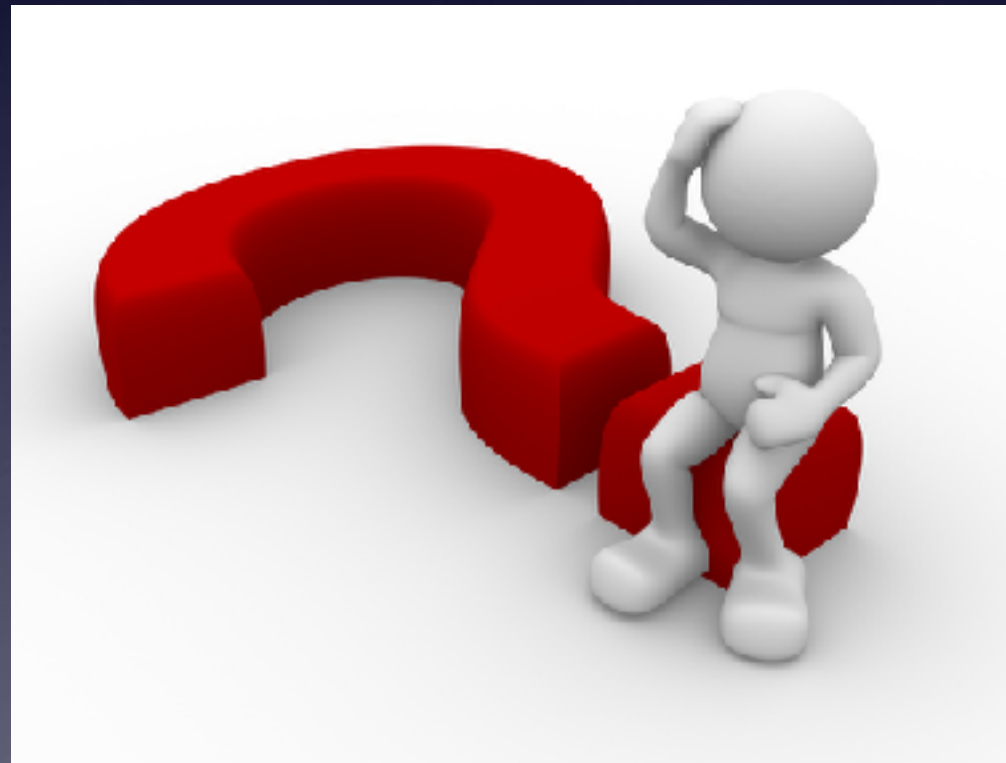
CONCLUSION: Phacotrabeculectomy and trabeculectomy treatments exhibit similar IOP reduction, successful rates, and complications when it comes to treating PACG patients with coexisting cataract, although additional surgery intervention may be needed for a few cases with cataract and complications after trabeculectomy.

similar IOP reduction, successful rates, and complications

Cataract surgery after Trabeculectomy



Trabeculectomy after Cataract surgery



Trabeculectomy for open-angle glaucoma in phakic eyes vs in pseudophakic eyes after phacoemulsification: a prospective clinical cohort study.

Takahara Y¹, Inatani M¹, Ogata-Iwao M², Kawai M³, Inoue T², Iwao K², Tanihara H².

OBJECTIVE: To determine the effect of previous phacoemulsification on surgical success of trabeculectomy with mitomycin C for open-angle glaucoma.

Trabeculectomy for open-angle glaucoma in phakic eyes vs in pseudophakic eyes after phacoemulsification: a prospective clinical cohort study.

Takahara Y¹, Inatani M¹, Ogata-Iwao M², Kawai M³, Inoue T², Iwao K², Tanihara H².

Criterion	Success at 1 Y in PHAKIC	Success at 1 Y in PSEUDOPHAKIC	P
A: IOP 21 mm Hg or higher	95%	74%	0.02
B: IOP 18 mm Hg or higher	84%	62%	0.04
C: IOP 15 mm Hg or higher	67%	53%	0.1

- ❖ No significant difference between groups:
 - ➔ in postoperative complications
 - ➔ or in the number of postoperative AGM
 - ➔ or the number of laser suture lysis procedures.

Trabeculectomy for open-angle glaucoma in phakic eyes vs in pseudophakic eyes after phacoemulsification: a prospective clinical cohort study.

Takahara Y¹, Inatani M¹, Ogata-Iwao M², Kawai M³, Inoue T², Iwao K², Tanihara H².

CONCLUSIONS:

- ➔ Among patients with OAG, trabeculectomy with mitomycin C in **pseudophakic eyes** after phacoemulsification for target IOP of less than 21 mm Hg or less than 18 mm Hg is **less successful** compared with that in phakic eyes.
- ➔ No significant difference between phakic and pseudophakic eyes was observed for secondary outcome measures other than IOP.

Graefes Arch Clin Exp Ophthalmol. 2010 Feb;248(2):249-56. doi: 10.1007/s00417-009-1185-4. Epub 2009 Oct 16.

Corneal endothelial cell loss after trabeculectomy or after phacoemulsification, IOL implantation and trabeculectomy in 1 or 2 steps.

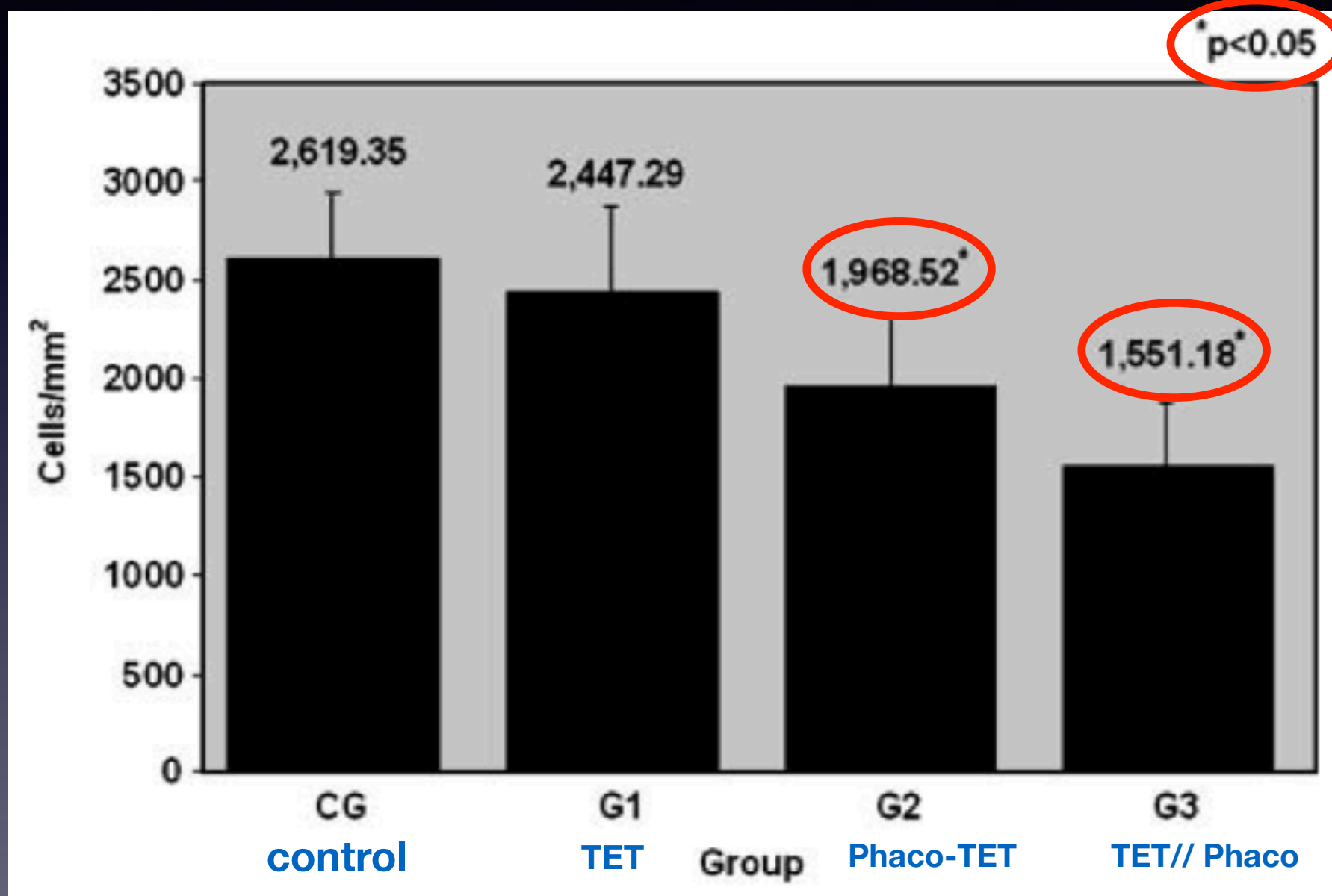
Soro-Martínez MI¹, Villegas-Pérez MP, Sobrado-Calvo P, Ruiz-Gómez JM, Miralles de Imperial Mora-Figueroa J.

Abstract

BACKGROUND: To assess endothelial cell damage after glaucoma surgery and combined glaucoma and cataract surgery in one or two steps using confocal biomicroscopy.

Corneal endothelial cell loss after trabeculectomy or after phacoemulsification, IOL implantation and trabeculectomy in 1 or 2 steps.

Soro-Martínez MI¹, Villegas-Pérez MP, Sobrado-Calvo P, Ruiz-Gómez JM, Miralles de Imperial Mora-Figueroa J.



CONCLUSIONS: Combined trabeculectomy, phacoemulsification and intraocular lens implantation causes more endothelial cell damage than trabeculectomy alone, and the two-step combined procedure causes more damage to the endothelium than the one-step combined procedure.

Cataract & Glaucoma

Indication for surgery

Cataract

Cataract & Glaucoma

Glaucoma

ACG

OAG

Yes
RFIC

No
RFIC

Cataract
±
AGM?

Cataract
+
-AGM
-SLT
-MIGS

combined
Surgery?

1-
Glaucoma
?
2-
Cataract

Combined surgery in ANH

Combined Surgery in ANH

- ❖ 45 eyes (37 patients).
- ❖ **Combined surgery** from 8/2015 - 5/2018 (Glaucoma 3 unit).
- ❖ **Eye:** 24 right , 21 left
- ❖ **Gender:** 21 Male, 16 Female
- ❖ **Age:** 63.4 ± 9.7 years (41- 80)
- ❖ **Fu:** 17.0 ± 9.9 months (4- 33)
- ❖ **CDR:** 0.8 ± 0.16

When do I do combined surgery for Glaucoma?



Combined Surgery in ANH

	BCVA	IOP (mmHg)	AGM
Pre-Op	0.21 ± 0.18	22.3 ± 5.8	3.1 ± 1.2
Post- OP	0.45 ± 0.3	14.9 ± 3.0	0.9 ± 1.0
P value	<0.001	<0.001	<0.001

Summary

Summary

- ❖ Combined surgery (Phacotrabeculectomy) is a good indication in patients who had significant cataract and need low target pressure.
- ❖ No operation is indicated for all glaucomatous patient with cataract but still phacotrabeculectomy is a good indication for our patients

References

- 1- Khairallah M, et al. Number of People Blind or Visually Impaired by Cataract Worldwide and in World Regions, 1990 to 2010. *Invest Ophthalmol Vis Sci*. 2015; 56: 6762-9
- 2- Tseng VL, et al. Risk of fractures following cataract surgery in Medicare beneficiaries. *JAMA*. 2012; 308: 493-501
- 3- Tham YC, et al. Global prevalence of glaucoma and projections of glaucoma burden through 2040: a systematic review and meta-analysis. *Ophthalmology* 2014; 121: 2081-90
- 4- Kirwan JF, et al. Trabeculectomy in the 21st century: a multicenter analysis. *Ophthalmology*. 2013. Dec;120(12):2532-2539.
- 5- Jiang N, et al. Meta-analysis of the efficacy and safety of combined surgery in the management of eyes with coexisting cataract and open angle glaucoma. *Int J Ophthalmol*. 2018 Feb 18;11(2):279-286.
- 6- Wang M, et al. Comparison of combined phacotrabeculectomy with trabeculectomy only in the treatment of primary angle-closure glaucoma. [Chinese Medical Journal](#) [01 Apr 2012, 125(8):1429-1433]
- 7- Husain R. et al. Cataract Surgery After Trabeculectomy The Effect on Trabeculectomy Function. *Arch Ophthalmol*. 2012;130(2):165-170
- 8- Takihara Y, et al. Trabeculectomy for open-angle glaucoma in phakic eyes vs in pseudophakic eyes after phacoemulsification: a prospective clinical cohort study. *JAMA Ophthalmol*. 2014 Jan;132(1):69-76.
- 9- Soro-Martínez MI. et al, Corneal endothelial cell loss after trabeculectomy or after phacoemulsification, IOL implantation and trabeculectomy in 1 or 2 steps. *Graefes Arch Clin Exp Ophthalmol*. 2010 Feb;248(2):249-56.