Refractive Outcomes of Phacoemulsification in Vitrectomised Eyes - Risk Factors for Refractive Surprise

Dr. Xiaoli Chen, Mr. Andrej Kidess , Queen Elizabeth Hospital Birmingham, Email: xiaolichen@nhs.net



Introduction and Aims

Patients who had previous pars planna vitrectomy (PPV) have high rate of cataract formation. Accurate prediction of phacoemulsification refractive outcomes is challenging in those cases. Refractive outcomes of cataract extraction in vitrectomised patients can result significant refractive variation, either hyperopic or myopic. In this study, we aim to evaluate refractive outcomes of phacoemulsification in this group and analyse the risk factors for refractive surprise.

Methods

Electronic medical records from Queen Elizabeth Hospital Birmingham, UK, between 01/05/2016 and 30/07/2019, were prospectively reviewed.

Inclusive criteria: patients who had uncomplicated phacoemulsification with either combined pars plana vitrectomy (PPV) or previous PPV in the same eye.

Exclusive criteria: history of refractive surgery, complicated cataract surgery, silicone oil in the eye or unsuccessful retinal detachment repair.

Measurement: subjective refraction results were used for analysis. Refractive surprise was defined as post-operative spherical equivalent deviation >1.00D.

Results (1)

Over this 3-year period, 25 eyes from 206 vitrectomised eyes met the inclusion criteria. All eyes had IOL implanted in capsular bag, 20 received a single-piece IOL (MJ 14), and 5 received a three-piece IOL (MA60). Overall, 84% of eyes were within 1.00D and 60% within 0.50D of target refraction postoperatively.

Results (2)

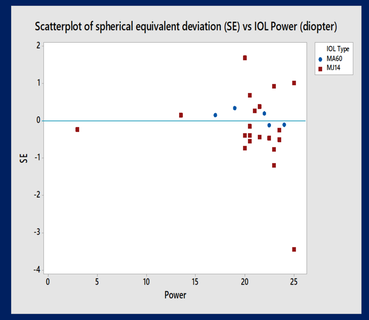
The mean spherical equivalent deviation was -0.16 ± 0.93D (SD). Refractive surprise was identified in 16 % eyes, which all received a single-piece IOL. The spherical equivalent deviation was -1.19D, 1.69D, -3.45D, 1.02D respectively.

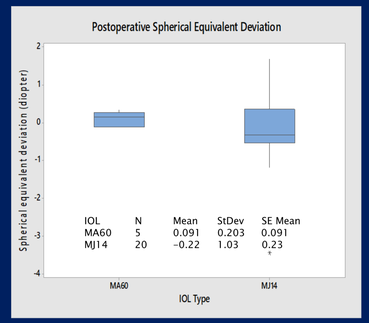
Characteristics of participants in this study (n=25). Subjective refraction was performed at least 6 weeks post cataract surgery.

		Average	StDev
Age (yrs)		68.5	15.81
Gender	Female	17	
	Male	8	
Eye	Right	15	
	Left	10	
Reason for PPV			
	Macular hole	11	
	ERM	9	
	PDR	3	
	Others	2	
Combined surgery		10	
Post-op Spherical equivalent Deviation		-0.16	0.93
Refractive Outcome			
	<0.5D	15	
	0.5-1.0D	6	
	≥ 1.0D	4	
IOL	Single piece	20	
	Three pieces	5	
Biometry	AL	23.45	1.63
	Power	20.62	4.43
	Refractive target	-0.14	0.18
	K1	44.21	1.32
	k2	45.03	1.55

Results (3)

Regression analysis revealed no statistically significant association between age, axial length, K value, IOL power/type, disease category, and refractive prediction error (P >0.05).





Refractive variation appear to be less in three-piece IOL (MA60) group compared to sinlge piece IOL (MJ14) in this study, though the difference is not statistically significant. (P> 0.05, unpaired t- test).

Discussion

- Accurate prediction of refractive outcomes is challenging in vitrectomised eyes due to possible poor fixation in biometry measurement, unstable capsular bag, increased zonular fibre elasticity and change of refractive index (aqueous 1.336 v.s vitreous 1.337);
- Most of studies showed myopic shift on combined or sequential Phaco to PPV (Falkner-Radler 2008, Hamoudi H 2008, Hamoudi & La Cour 2013); Induced myopia more often in ERM than MH (-0.40D), but no significant difference in prediction error comparing different IOLs in previous study (Falkner-Radler 2008);
- For routine cataract surgery, the NHS Benchmark shows 85% eyes have less than 1.00D (79.7%, 83.4% and 87.0% in 3 cycles); 55% have less than 0.50 D prediction error .
- In out study, the refractive outcome of phacoemulsification post vitrectomy has met the benchmark standards of NHS cataract surgery.
  - < 1.00 D 84% v.s 85%
  - < 0.50 D 60% v.s. 55%
- For the first time, our result shows the three-piece IOL in the bag possibly results more accurate and predictive refractive outcome than single piece IOL in this group. Large studies are warranted to evaluate the value of three- piece IOLs in reducing refractive surprise in vitrectomised patients.