

Rates of Posterior Capsule Rupture During Cataract Surgery Among Different Races in Singapore

Fiona M Chan,^{1,2}MBBS (Hons), Ranjana Mathur,^{1,3}MBBS, MMed (Ophth), FRCSEd, Jack JK Ku,^{1,2}MBBS, Ching Chen,⁴MSc, Siew-Pang Chan,⁵MSc, Victor SH Yong,¹FRCSEd, FRCOphth, FAMS (Ophth), Kah-Guan Au Eong,^{1,6-8}MMed (Ophth), FRCS (Edin & Glas), FAMS (Ophth)

Abstract

Introduction: The aim of this study was to determine if racial differences exist in the rate of posterior capsule rupture (PCR) during cataract surgery in Singapore. **Materials and Methods:** All intraoperative complications during cataract surgery were prospectively reported as part of a clinical audit programme. A retrospective review of all patients who sustained a PCR during cataract surgery between July 1995 and December 1998 was performed. **Results:** Of 8230 consecutive eyes which underwent cataract surgery, 6951 (84.5%) were Chinese, 597 (7.3%) were Malay, 524 (6.4%) were Indian, and 158 (1.9%) were of other races. The overall incidence of PCR was 1.9%. The PCR rates were 1.8% [125 of 6951; 95% confidence interval (CI), 1.49 to 2.11] in Chinese, 2.0% (12 of 597; 95% CI, 1.01 to 3.57) in Malay, 2.7% (14 of 524; 95% CI, 1.13 to 3.56) in Indian, and 2.5% (4 of 158; 95% CI, 0.00 to 4.98) in other races. There was no statistical difference between the PCR rates ($P = 0.62$, chi-square test). **Conclusion:** Racial differences in Singapore do not have an effect on the rates of PCR during cataract surgery.

Ann Acad Med Singapore 2006;35:698-700

Key words: Cataract surgery complications, Posterior capsule tear, Racial differences

Introduction

Posterior capsule rupture (PCR) is a potentially serious intraoperative complication of cataract surgery. The anecdotal experience of some surgeons suggests that differences in the anatomy of the eyelids, bony orbit, nasal bridge and other facial features, as well as the globe itself among different races may influence such factors as surgical exposure and “ease” of operation, and hence intraoperative complications. Singapore’s multiracial population provides a unique opportunity to determine if racial differences exist in the rate of PCR during cataract surgery.

Materials and Methods

Between July 1995 and December 1998 at the Eye

Institute, Tan Tock Seng Hospital, Singapore, surgeons were required to prospectively report all intraoperative complications as part of a clinical audit programme. The clinical charts of patients who sustained a PCR during cataract surgery were retrospectively reviewed to gather data on patient demographics.

For univariate analysis, the chi-square test and Mann-Whitney U test were applied for categorical data and continuous data respectively. Subsequently, logistic regression was employed to provide a more complete analysis. All statistical tests were conducted at a 5% level of significance. The data was entered into Excel and Stata 6.0 (Stata Corporation, University East Drive, College Station, TX 77840) for analysis.

¹ The Eye Institute at Tan Tock Seng Hospital, National Healthcare Group, Singapore

² Princess Alexandra Hospital, Brisbane, Australia

³ Singapore National Eye Centre, Singapore

⁴ Office of Quality Management, Tan Tock Seng Hospital, Singapore;

⁵ Health Promotion Board, Singapore

⁶ The Eye Institute at Alexandra Hospital, National Healthcare Group, Singapore

⁷ Department of Ophthalmology, Yong Loo Lin School of Medicine, National University of Singapore, Singapore

⁸ Singapore Eye Research Institute, Singapore

Address for Reprints: Adjunct Associate Professor Kah-Guan Au Eong, The Eye Institute at Alexandra Hospital, Alexandra Hospital, 378 Alexandra Road, Singapore 159964.

Email: Kah_Guan_Au_Eong@alexhosp.com.sg

Results

Of the 8230 eyes that underwent either extracapsular or phacoemulsification cataract surgery during the study period, there were 6951 (84.5%) Chinese, 597 (7.3%) Malays, 524 (6.4%) Indians, and 158 (1.9%) of other races. One hundred and fifty-five eyes were reported to have PCR, giving an overall incidence of 1.9%.

Of the total 8075 cases without PCR, the mean age was 67.5 years (range, 8 months to 102 years; median, 68 years). The mean age of the 155 cases with PCR was 67.5 years (range, 38 years to 91 years; median, 68 years). The Mann-Whitney U test confirmed that there was no significant difference in age profile between those with and without PCR ($P = 0.93$).

Of the cases without PCR, 3791 (47.0%) were male and 4284 (53.1%) were female. Of the 155 eyes with PCR, 85 (54.8%) were male and 70 (45.2%) were female. The rates of PCR were 2.2% in males and 1.6% in females. There was no significant difference ($P = 0.63$), in terms of gender distribution, between those with and without PCR.

Of the 155 cases with PCR, 125 were Chinese, 12 were Malay, 14 were Indian, and 4 were of other races. The PCR rates were therefore 1.8% [125 of 6951; 95% confidence interval (CI), 1.49 to 2.11] in Chinese, 2.0% (12 of 597; 95% CI, 1.01 to 3.57) in Malays, 2.7% (14 of 524; 95% CI, 1.13 to 3.56) in Indians, and 2.5% (4 of 158; 95% CI, 0.00 to 4.98) in other races. The differences in PCR rates among the different races were not statistically significant ($P = 0.62$, chi-square test). Using the PCR rate of Chinese as the baseline, the odds of having PCR is 1.28 (95% CI, 0.70 to 2.33) for Malays, 1.31 (95% CI, 0.75 to 2.29) for Indians, and 1.42 (95% CI, 0.52 to 3.89) for other races.

Using the logistic regression model, we coded race as a 3-category variable, with Chinese as the baseline. There was no significant racial difference (all $P > 0.30$) for PCR rates after adjusting for age and gender. The model provided a good fit to the data, as confirmed by the Hosmer-Lemeshow test ($P = 0.94$). Ideally, our data should have been analysed by a generalised estimating equation (GEE) framework. However, we treated all eyes independently in our analysis in view of the few repeated cases (<0.1%).

Discussion

The influence of race and ethnicity on the incidence and prevalence of particular diseases is well documented. Race has an important influence on certain ocular conditions such as myopia¹ and primary angle-closure glaucoma.² Primary open angle glaucoma is much more prevalent in American blacks.³

The anecdotal experience of some surgeons suggests that eyes of certain races are “more difficult to operate on”. This may be because of particular features of eyelids (e.g., puffy

eyelids, small palpebral fissures), bony orbit (e.g., prominent superior orbital ridge, deep-set eye) and other facial characteristics (e.g., prominent nose bridge). An international anthropometric study of facial morphology confirms the great variation of orbital regions between North American whites as compared with Asians and Middle Eastern races. Nose heights and widths contrast greatly.⁴ These features may influence such factors as surgical exposure and the approach to the eye, and thus the “ease” of operation. A shallow orbit and flatter nose would provide much easier access to the eye for cataract surgery compared to a prominent nasal bridge and brow, where surgical instrument positions would require steeper angles of entry into the eye. This would in turn affect the manoeuvrability of the instruments. Hence, racial variations can conceivably influence surgical complications.

To our knowledge, there are no published studies investigating if racial differences influence the rates of PCR during cataract surgery. Singapore’s multiracial population provided an ideal opportunity to evaluate this. Patients who undergo cataract surgery are mostly first-generation immigrants from China (Fujian and Guangdong provinces), Malaysia, southern India and Indonesia.⁵

Various rates of PCR, ranging from 1% to 4.4%, have been reported in different studies.^{6,7} The figures vary depending on the type of cataract surgery performed and the experience of the surgeons. The incidence of PCR in our series of 1.9% is comparable to other studies. However, our study did not reveal any statistically significant difference in the PCR rates among the different races in Singapore ($P = 0.62$).

Confounding factors such as the type and maturity of the cataract, and the prevalence and severity of coexisting ocular pathology, such as myopia, may have some influence on the technical difficulty of the operation and hence, intraoperative complications. Myopia is more prevalent in Chinese as compared with Malays and Indians.¹ Cataract surgery in patients with myopia may encounter intraoperative difficulties because of deep anterior chambers and trampolining of the lens due to less vitreous support.

It has been established that different rates of cataract extraction exist among different races in Singapore. Between 1991 and 1996, cataract surgery was performed most commonly on Indians, followed by Chinese, and then Malays. In fact, after controlling for age and sex, Indians and Chinese had operative rates 1.67 times and 1.56 times higher than those of Malays respectively.⁵ Reasons given by the author for this included varying thresholds to undergo cataract surgery, and varying predispositions to cataract development among the different races. Also, there are lower cataract risk factors, such as diabetes and angle-closure glaucoma, in Malay persons.⁵ Thus indirectly, the

type and maturity of cataract operated on may vary between races.

In conclusion, although racial factors play an important role in many disease processes, our study showed that they do not have an effect on the rates of PCR during cataract surgery.

REFERENCES

1. Au Eong KG, Tay TH, Lim MK. Race, culture and myopia in 110,236 young Singaporean males. *Singapore Med J* 1993;34:29-32.
 2. Seah SK, Foster PJ, Chew PT, Jap A, Oen F, Fam HB, et al. Incidence of acute primary angle-closure glaucoma in Singapore. *Arch Ophthalmol* 1997;115:1436-40.
 3. Racette L, Wilson MR, Zangwill LM, Weinreb RN, Sample PA. Primary open-angle glaucoma in blacks: a review. *Surv Ophthalmol* 2003;48:295-313.
 4. Farkas LG, Katic MJ, Forrest CR, Alt KW, Bagic I, Baltadjiev G, et al. International anthropometric study of facial morphology in various ethnic groups/races. *J Craniofac Surg* 2005;16:615-46.
 5. Wong TY. Cataract extraction rates among Chinese, Malays, and Indians in Singapore. *Arch Ophthalmol* 2001;119:727-32.
 6. Osher RH, Cionni RJ. The torn posterior capsule: its intraoperative behaviour, surgical management, and long-term consequences. *J Cataract Refract Surg* 1990;16:490-4.
 7. Desai P, Minassian DC, Reidy A. National cataract surgery survey 1997-98: a report of the results of the clinical outcomes. *Br J Ophthalmol* 1999;83:1336-40.
-