Research Article

Clinical Characteristics of Presenile Cataract: Change over 10 Years in Southern Taiwan

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Purpose. The purpose of this study is to investigate the clinical characteristics of presenile cataract and compare that to ten years ago in southern Taiwan.

Methods. The subjects who received cataract surgeries aged 30 to 54 years were recruited in Kaohsiung Chang Gung Memorial Hospital during September 2015 and August 2016. Patients with uveitis or those who received combined cataract surgeries were excluded. Retrospective chart review was performed in this study.

Results. A total number of 2439 cataract surgeries were performed, and 302 (12.38%) eyes were having presenile cataract. Mean age was 47.55 ± 5.64 years old, and mean axial length was 26.00 ± 2.89 mm. Among 302 presenile cataract eyes, the leading cause was high myopia (defined as mean axial length ≥ 26 mm, 47.02%), followed by diabetes mellitus (26.82%). In types of lens opacity analysis, 67.55% of the patients were nuclear sclerosis dominant. Compared to the previous study 10 years ago, the leading cause of presenile cataract changed from idiopathy to high myopia, whereas the lens opacity types changed from posterior subcapsular opacity dominant to nuclear sclerosis dominant.

Conclusions. High myopia has become the most important clinical characteristic associated with presenile cataract in a myopia epidemic area, and the most common type of lens opacity was nuclear sclerosis. With the increasing prevalence of high myopia, we should pay more attention to the management of presenile cataracts in high myopes to avoid complications.

1. Introduction

Worldwide, cataract remains the leading cause of blindness and the second leading cause of moderate and severe vision impairment [1]. Nearly half of visual impairment is attributed to cataract in Taiwan [2], which is much higher than the rest of the world. The risk factors of cataract formation may be multifactorial, including age, genetic factors, cigarette smoking, sunlight exposure, diabetes mellitus (DM), hypertension, steroid use, and systemic medications [3, 4]. Among them, age is still the single most important risk factor for cataract. It appears that cataract is being found in younger patients in Taiwan [5]. Few studies have investigated the risk factors for presenile cataracts [6–9]. Praveen et al. showed that the risk factors associated with cataract in young individuals were atopy, idiopathy, high myopia, steroid usage, sunlight exposure, and DM in India [6]. Atiya Rahman et al. found that idiopathy, DM, high myopia, and smoking contributed to presenile cataract in Pakistan [7]. Park et al. pointed out that DM and hypertension were associated with young age cataract in Korea [8]. Our previous study reported that the main etiologies of presenile cataract were idiopathy, DM, and high myopia [9]. We believe that it is worth investigating presenile cataract in myopia epidemic countries as younger age of cataract surgery was performed.

In Taiwan, patients less than 55 years old who need cataract surgery receive medical claims reviewed by National Health Insurance. In order to understand the clinical features of presenile cataract, we reviewed the medical records and compared them to our previous study ten years ago. Identifying the frequency and changes of these risk factors will allow...
for better management of presenile cataract in the future and could help avoid younger onset age of cataract.

2. Patients and Methods

2.1. Study Populations. This retrospective chart review comprised of consecutive patients aged less than 55 years old who received cataract surgery after medical claims reviewed by National Health Insurance during September 2015 and August 2016 at a single tertiary medical center in Kaohsiung Chang Gung Memorial Hospital in Taiwan. An institutional review board (IRB)/Ethics Committee approval was obtained from the Committee of Medical Ethics and Human Experiments of Chang Gung Memorial Hospital (CGMH, Taiwan, IRB No. 201601279B0), and the tenets of the Declaration of Helsinki were followed. The IRB waived the requirement for informed consent.

In our previous study, the medical records of all patients aged 54 years or younger (163 patients) who had undergone cataract surgery at the Chang Gung Memorial Hospital, Kaohsiung, were retrospectively reviewed [9]. Patients who had undergone previous vitreoretinal procedures or who had suffered from congenital cataracts were excluded from study participation. All cases suspected of being associated with steroid-induced cataracts were also excluded from this study. Patient age, gender, eye axial length (AXL) measurement, ocular and systemic comorbidities, and the type of cataract were recorded. Each group was divided into idiopathic, diabetic, and highly myopic subgroups based on the etiology of each specific cataract.

2.2. Grading of Lens Opacity and AXL Measurement. Those who had congenital cataracts, severe trauma (eyeball rupture), refractory uveitis, and combined vitreoretinal surgeries were excluded. After pupil dilatation, the eyes were graded at the slit lamp using the Lens Opacities Classification System III by experienced ophthalmologists for nuclear sclerosis (NS), cortical opacity (CO), posterior subcapsular opacity (PSCO), and mature cataracts. Standard lens photographs were taken using a Haag-Streit BX 900 Photo Slit Lamp. The AXL was measured in each eye using partial coherence interferometry (IOLMaster, Carl Zeiss Meditec AG). The criterion for the selection of high myopic eyes was AXL ≥ 26 mm or more to avoid myopic shift. Patient age, gender, lens opacity type, AXL, myopia diopter, ocular surgery history, steroid usage, trauma, and systemic disease including DM and hypertension were recorded.

2.3. Statistical Analysis. Statistical significance was defined as P < 0.05. Student’s t-test and analysis of variance were used in the analysis. All data analyses were performed using JMP software (version 9.0.0; SAS Institute, Cary, NC).

3. Results

During September 2015 and August 2016, a total number of 2439 cataract surgeries were performed and 302 (12.38%) eyes were having presenile cataract which were recruited into our study. 51.33% were male and 48.67% were female (Table 1). The mean age was 47.6 ± 5.6 years old, and the mean AXL was 26.00 ± 2.89 mm. Among 302 presenile cataract eyes, the leading cause was high myopia (defined as AXL ≥ 26 mm, 47.02%), followed by DM (26.82%), ocular surgery history (26.16%), and hypertension (21.52%). In types of lens opacity analysis, 67.55% of patients were NS dominant and 25.17% of patients were PSCO dominant. Among the patients with high myopia, 88.03% were NS dominant. Of the patients with DM, 54.32% were NS dominant (Figure 1). Compared to the previous study 10 years ago, the leading risk factor of presenile cataract changed from DM to high myopia (Figure 2), whereas the lens opacity types changed from PSCO dominant to NS dominant (Figure 1).

The age of performing cataract surgery among those patients with DM without panretina photocoagulation (PRP), those patients with DM post-PRP, or those patients with DM post-PRP and vitrectomy (trans-pars plana vitrectomy, TPPV) was not significantly different (P = 0.557). The severity of DM did not get younger in age for receiving cataract surgery.

There were 14 patients that received laser-assisted in situ keratomileusis (LASIK) before cataract surgery. 12 of them were having high myopia. There was no significant difference in age and AXL between patients with and without LASIK before cataract surgery in myopia patients.

| Table 1: Patient demographics. |
|-----------------------------|
| Factor | N  | %  |
|-----------------------------|
| Male | 155 | 51.3% |
| Female | 147 | 48.7% |
| Axial length (AXL) | | |
| <26 mm | 160 | 53.0% |
| ≥26 mm (high myopia) | 142 | 47.0% |
| Diabetes mellitus (DM) | 81 | 26.8% |
| Without PRP | 27 | 33.3% |
| Post-PRP only | 28 | 34.6% |
| Post-PRP and TPPV | 26 | 32.1% |
| Hypertension | 65 | 21.5% |
| Other systemic disease | 56 | 18.5% |
| Ocular surgery | 79 | 26.2% |
| Post-TPPV | 60 | 76.0% |
| Post-LASIK | 14 | 17.7% |
| Post-SE | 3 | 3.8% |
| Others | 2 | 2.5% |
| Ocular trauma history | 18 | 6.0% |
| Steroid usage | 5 | 1.7% |
| Lens type | | |
| NS | 204 | 67.6% |
| PSCO | 76 | 25.2% |
| CO | 8 | 2.7% |
| Mature | 14 | 4.6% |

**PRP: panretinal photocoagulation; TPPV: trans-pars plana vitrectomy; LASIK: laser-assisted in situ keratomileusis; SE: scleral buckle; NS: nuclear sclerosis; PSCO: posterior subcapsular opacity; CO: cortical opacity.**
In high myopia patients, there was also no significant difference in age and AXL between patients with and without LASIK before cataract surgery (Table 3).

### Table 2: Age and axial length (AXL) difference between eyes with/without LASIK in myopia patients.

|                     | Myopia patients post LASIK (N = 14) | Myopia patients without LASIK (N = 177) | \( P \) value |
|---------------------|-------------------------------------|----------------------------------------|---------------|
| Age                 | 47.5 ± 1.5                          | 47.1 ± 0.4                             | 0.786         |
| AXL                 | 28.57 ± 0.67                        | 27.43 ± 0.19                          | 0.104         |

*LASIK: laser-assisted in situ keratomileusis.

(Table 2). In high myopia patients, there was also no significant difference in age and AXL between patients with and without LASIK before cataract surgery (Table 3).

### 4. Discussion

The prevalence of myopia is increasing and has become an important issue in public health [10, 11]. In Taiwan, the prevalence of myopia is 84% in high school students and approximately 24% of the myopic population become high myopes as adults [12]. One of the complications of myopia is presenile cataract. Even though presenile cataract in high myopes can be treated through cataract surgery, high myopia is a significant risk factor for intraoperative complications such as posterior capsule rupture and development of retinal detachment or after-cataract after cataract surgery [13–22]. The increasing prevalence of high myopia explained why high myopia became the leading cause of presenile cataract in this study, whereas it was the third cause 10 years ago. Thus, myopia control for high myopia prevention will become more important in the future.

The reason why myopia leads to early-onset cataract is still not well-understood. We hypothesize that it may be caused by vitreous microtrauma to the lens, whereas high myopia leads to vitreous liquefaction and zonula...
Our study showed that there was no significant difference in age and AXL between patients with and without LASIK before cataract surgery, both in myopia patients and high myopia patients. The difference between our study and that of Iijima et al. is that our study group is younger than 55 years old and had less study cases. Further studies are needed to investigate whether or not cataract development will occur at an earlier age in a post-LASIK population.

5. Conclusion

In conclusion, high myopia has become the most important clinical characteristic associated with presenile cataract, and the most common type of lens opacity was nuclear sclerosis in our study. With the increasing prevalence of high myopia, we should pay more attention in managing presenile cataract in high myopes to avoid further complications.

Data Availability

The data used to support the findings of this study are included within the article.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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