

Clinical Features of Patients Featuring Cataracts in A Myopia-Endemic Area of Taiwan

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Background: To determine the etiology and morphological features of cataracts in a myopia-endemic area of Taiwan.

Methods: This retrospective case-controlled study comprised 332 patients (440 eyes) who underwent cataract-extraction surgery, 163 patients (220 eyes) constituting the presenile cataract study group, and 169 patients (220 eyes) constituting the senile cataract control group. Each group was divided into idiopathic, diabetic, and highly myopic subgroups. Age, gender, ocular and systemic comorbidities, and the types of cataract featured were recorded and analyzed. For the statistical analysis, χ^2 test was used.

Results: The mean ages of study subjects were 45.5 ± 7.6 years for the presenile and 68.7 ± 8.0 years for the senile cataract groups. We also observed a greater number of cataracts in highly myopic eyes of the presenile group (17.27%) compared to the senile group (0.90%) ($p < 0.0001$). The distribution of cataract types for the 3 presenile cataract subgroups revealed that nuclear sclerosis contributed most to presenile cataracts in highly myopic patients ($p = 0.001$), and correspondingly, the posterior subcapsular opacity contributed most in the idiopathic and diabetic cataract subgroups ($p = 0.001$).

Conclusions: We observed a greater number of cataracts from highly myopic eyes in the presenile group than in the senile group in southern Taiwan, a myopia-endemic area. Nuclear sclerosis contributed most to the presenile cataracts in the highly myopic subgroup.

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Key words: presenile cataracts, high myopia, nuclear sclerosis.

Worldwide, cataracts remain the leading cause of new blindness.^(1,2) Currently, cataract surgery is one of the most-frequently performed surgical procedures.⁽³⁾ Furthermore, it appears that cataracts are being found in ever younger patients in Taiwan, a myopia-endemic area.⁽⁴⁾ Myopia is a serious problem in Taiwan, as a year 1995 study

revealed that the local myopic rate ranged from 12% at the age of 6 years, to 56% at the age of 12, and then to 76% at the age of 15 years. The prevalence of high myopia ($> -6.0D$) at the age of 18 was 20% among girls and 12% for boys.⁽⁵⁾ It was previously reported that some highly myopic patients appear to suffer early cataract development.⁽⁶⁾ Trauma, intraoc-

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ular inflammation, the presence of systemic and/or metabolic disorders such as diabetes mellitus, the use of certain types of medication, ionizing radiation, and electrical-current injury have all been implicated as possible causes of presenile cataracts.⁽⁷⁻⁹⁾ Idiopathic causes have also been identified for a number of presenile cataract patients.⁽⁷⁾ In order to further understand the clinical features of presenile cataracts and the associated role of being highly myopic, we retrospectively reviewed the medical records of patients 54 years of age or younger who had undergone cataract extraction. We also selected the same number of "lesion" eyes for patients aged 55 years or older to represent the control group.

METHODS

Study populations

In Taiwan, individuals aged 54 years and younger must apply to the Bureau of National Health Insurance for financial support for cataract surgery should they undergo such surgery. Thus, the age of 55 years was used to separate the presenile from the senile group in this study. The medical records of all patients aged 54 years or younger (163 patients; 220 eyes) who had undergone cataract surgery at the Chang-Gung Memorial Hospital, Kaohsiung in 2002 were retrospectively reviewed. The same number of eyes of patients aged 55 years or older who had undergone cataract surgery in the same hospital between January 2002 and March 2002 inclusively was randomized from the total pool, and selected as the control group; these eyes were derived from 169 patients. Patients who had undergone previous vitreoretinal procedures or who had suffered from traumatic or congenital cataracts were excluded from study participation. Patient age, gender, eye axial length measurement as conducted by A-scan (Sonomed A-1000 scanner, Sonomed Technology, Chicago, IL, USA), 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. All cases suspected of being associated with steroid-induced cataracts were excluded from this study. The criterion for the selection of highly myopic patients in this study (an axial length of 26.0 mm) was the indication for avoiding any myopic shift.⁽¹⁰⁻¹²⁾

Cataract typing

Subsequent to the dilation of the pupil by eye drops containing 10% phenylephrine and 1% tropicamide, the study-involved ophthalmologist graded eyes for nuclear sclerosis (NS), cortical opacity (CO), posterior subcapsular opacity (PSCO), and the presence of mature cataracts with a slit-lamp biomicroscope. Lens photographs were taken using a Topcon MT-10+SL-8Z camera system (Topcon Manufacturing Corp., Paramus, NJ, USA). This grading was based upon the Lens Opacities Classification System III (LOCS III),⁽¹³⁾ and details of all grade 2 and greater eyes were recorded and included in this study.

Statistical analysis

The prevalence of cataracts among the presenile and senile groups was calculated with respect to gender, age, and etiology. The prevalences of cataract types as categorized according to the 3 etiology subgroups were also calculated. For a patient presenting with 2 or more types of cataract (mixed-type opacity), the prevalence of such cataracts was calculated such that both cataracts were treated as independent types and the statistics added to a single relevant type group. For example, a mixed NS with PSCO type was configured as 1 cataract belonging to the NS and 1 to the PSCO cataract type. The χ^2 test was used to determine differences in cataract prevalences among the 3 cataract etiologies.

RESULTS

Differences between the presenile and senile cataract groups

For this study, there were 163 patients (220 eyes) in the presenile group who ranged in age from 24 to 54 (mean, 45.5 ± 7.6) years inclusively, with 120 eyes derived from 80 male patients. Further, the senile group included 169 patients (220 eyes) who ranged in age from 56 to 90 (mean, 68.7 ± 8.0) years inclusively, with 98 eyes derived from 73 male patients. The difference in the number of eyes between the 3 different cataract-etiology distribution subgroups for the presenile and senile study groups (Table 1, χ^2 test) proved to be statistically significant ($p < 0.0001$). Following this, a comparison of cataract subgroups by etiology between the presenile and senile cataract groups was conducted. We

Table 1. Distribution of 3 Etiology Cataract Subgroups for the Presenile and Senile Cataract Groups

No. of eyes	Presenile cataracts	Senile cataracts	<i>p</i> value
Idiopathic	120 (54.55%)	153 (69.55%)	0.001
Diabetic	62 (28.18%)	65 (29.55%)	0.752
Highly myopic	38 (17.27%)	2 (0.90%)	< 0.0001
Total number	220 (100%)	220 (100%)	

observed a significantly greater number of highly myopic patients within the presenile cataract group as compared to the senile cataract group ($p < 0.0001$). In contrast, we noted a significantly smaller number of idiopathic cataract patients in the presenile cataract group compared to the senile cataract group ($p = 0.001$), although we observed no significant difference in the number of diabetic patients between these 2 groups ($p = 0.752$).

Features of presenile cataracts

The details of opacity types classified into the 3 different etiology subgroups for presenile cataracts are summarized in Table 2. The corresponding distribution reveals that a significantly greater case rate of cataracts of the NS type was observed for the highly myopic subgroup, and the PSCO type for the idiopathic and diabetic subgroups (χ^2 test: $p = 0.001$).

Table 2. Distribution of Opacity Types for the 3 Etiology Cataract Subgroups of the Presenile Cataract Group

No. of each type	Idiopathic	Diabetic	Highly myopic	<i>p</i> value
CO	10 (6.76%)	2 (2.53%)	4 (7.27%)	0.36
NS	42 (28.38%)	24 (30.38%)	31 (56.36%)	0.001
PSCO	91 (61.48%)	48 (60.76%)	18 (32.73%)	0.001
Mature	5 (3.38%)	5 (6.33%)	2 (3.64%)	
No. of eyes	148 (100%)	79 (100%)	55 (100%)	

Abbreviation: CO: cortical opacity; NS: nuclear sclerosis; PSCO: posterior subcapsular opacity.

DISCUSSION

A year 1989 Japanese study reported by Kogure

et al. reported that at the first admission for cataract surgery, the mean age of patients was 68.3 years for males and 70.0 years for females, with the corresponding age for the second admission being 73.3 years for males and 73.7 years for females.^(14,15) From our study, the mean age of the presenile cataract group was 45.5 ± 7.6 years and, correspondingly, it was 68.7 ± 8.0 years for members of the senile cataract group. The personal risk factors for cataracts include age, gender, ethnic group, certain environmental factors, and possibly a number of as-yet unknown genetic factors.⁽¹⁶⁾ Reported environmental factors include smoking, and exposure to UV light.⁽¹⁶⁾ Some reports have indicated that prolonged use of glucocorticoids is a significant risk factor for the development of posterior subcapsular cataracts.^(17,18) In our study, the case number of steroid-induced cataract patients was somewhat small for the presenile group, thus accordingly, the risk factors for such a condition were neglected in this study. Idiopathy, diabetes, and high myopia were considered to be the principal causes of cataracts in this study, and their potential risks were calculated. As shown in Table 1, a greater number of highly myopic patients was observed in the presenile cataract group than in the senile cataract group ($p < 0.0001$).

The reported prevalences of the 3 types of lens opacities (NS, CO, and PSCO) appear to vary for different countries⁽¹⁶⁾ and also for different individual ages.^(4,7) The prevalence of nuclear opacity was greater for a specific African subpopulation (Kongwa, Tanzania) than for African-derived populations in Salisbury and Barbados.⁽¹⁹⁾ The cataracts of the cortical and nuclear opacity subtype were the most-commonly observed forms affecting a Victorian subpopulation as observed in a year 1999 Australian study.⁽²⁰⁾ In Peitou, a city of northern Taiwan, nuclear opacity was the most-prevalent type of cataract seen.⁽³⁾ The prevalences of different lens opacities also appear to vary by different cataract etiologies.⁽¹⁶⁾ In 1999, McCarty et al. found that the risk of cortical cataracts increased nearly 3-fold with a duration of diabetes exceeding 5 years, and this observation held true for all age categories, apart from their oldest age category which was 80 years.⁽²⁰⁾ In 2003, Chen and co-authors found that PSCO was the most-frequently observed lesion for diabetic individuals in a population in Peitou, Taiwan. From our study, we also observed that the greatest rate of

PSCO appeared among diabetes sufferers. In our study, the cohort in Kaohsiung (southern Taiwan) was separated into either a presenile or senile group. For the presenile group (Table 2), nuclear opacity appeared to be the most-prevalent type of the highly myopic cataract subgroup ($p = 0.001$), whereas the PSCO cataract classification constituted the most-prevalent type for the idiopathic and diabetic cataract subgroups ($p = 0.001$). People suffering from diabetes are at an increased risk of suffering from cataracts, particularly cortical and probably also PSC cataracts.⁽¹⁶⁾

High myopia has been suggested to be associated with cataracts, and a fairly strong relationship between myopia and cataracts was alluded to previously.⁽²¹⁾ In 1980, O'Donnell and Maumenee first described nuclear sclerotic cataracts as a cause of visual loss for patients suffering from axial myopia.⁽⁶⁾ In 2003, Chen et al. found that for Taiwanese cataract patients younger than 45 years, axial myopia was strongly associated with the formation of nuclear sclerosis, and that patients who featured an axial length of > 27.0 mm experienced the greatest risk of suffering from cataracts.⁽⁴⁾ In contrast in the 2002 Blue Mountains Eye Study conducted in eastern Australia, Younan et al. found that eyes featuring high myopia ($-6.0D$) were at an increased risk of suffering from PSC cataracts.⁽²¹⁾ The presenile cataract patients studied herein revealed that nuclear sclerosis was the most-frequently observed type in the highly myopic subgroup, an observation similar to the results of a 2003 study conducted by Chen et al.⁽⁴⁾ The high prevalence of myopia in Taiwan might partially explain the difference.

In summary, herein we observed a larger number of highly myopic patients in the presenile group than in the senile group. More than half (56.4%) of the presenile cataracts in the highly myopic subgroup were due to nuclear sclerosis. Therefore nuclear sclerosis contributed most to presenile cataracts in highly myopic patients, whereas the PSCO type of cataract was prevalent in patients of the idiopathic and diabetic cataract subgroups.

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臺灣地區特有之近視並合併白內障患者之臨床特徵

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背景： 找出臺灣南部地區特有之近視並合併白內障患者之病因及型態特徵。

方法： 共有 332 位接受過白內障摘除手術之患者 (計 440 隻眼睛) 的病歷被分析，其中 163 位 (220 隻眼睛) 為早發型白內障，另 169 位 (220 隻眼睛) 為老年型白內障患者。這二個族群分別再區分為不明原因、糖尿病、及高度近視相關之三類。年齡、性別、其他眼病、全身性疾病、及白內障型態皆予以記錄並運用 χ^2 test 分析。

結果： 平均年齡方面，早發型為 45.5 ± 7.6 歲，老年型則為 68.7 ± 8.0 歲。在早發型患者中高度近視之比例較老年型患者有意義的偏高。在白內障型態方面，早發型患者間，高度近視族群以核硬化型為主，不明原因及糖尿病族群以後囊下混濁型為主。

結論： 在南臺灣特有之近視地區，早發型白內障患者中高度近視之比例較老年型患者為高而且主要以核硬化型態為主。

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關鍵字： 早發型白內障，高度近視，核硬化。

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