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Clinical Features and Prognosis of HLA-B27 Positive and Negative Anterior Uveitis in a Korean Population

Clinical features and prognosis of HLA-B27 positive anterior uveitis (AU) were assessed compared with HLA-B27 negative AU in a Korean population, based on the medical records of AU patients seen at a university hospital. Twenty-seven HLA-B27 negative, idiopathic AU patients (group I) and 55 HLA-B27 positive AU patients (group II) were studied. HLA-B27 positive group was further divided into 29 with associated systemic disease (seronegative spondyloarthropathy) (group IIA) and 26 without associated systemic disease (group IIB). Significantly more severe anterior chamber inflammation in terms of anterior chamber cells (P=0.006) and hypopyon formation (P=0.034) was observed with higher frequency of AU attacks (P=0.007) in the HLA-B27 positive group than in the HLA-B27 negative group. Systemic/periocular steroids were required in significantly more patients in the HLA-B27 positive group than in the HLA-B27 negative group (P=0.015). However, no significant differences were observed for final ocular and visual outcomes between these two groups. Associated systemic disease made no significant difference in the clinical features and prognosis in the HLA-B27 positive AU patients. In conclusion, despite more severe inflammation and a higher recurrence rate, HLA-B27 positive AU shows similar good final ocular and visual outcomes compared to HLA-B27 negative, idiopathic AU in a Korean population.

Key Words : *Uveitis, Anterior; HLA-B27 Antigen; Spondylarthropathies*

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INTRODUCTION

Anterior uveitis (AU) is the most common form of intraocular inflammation, and accounts for 50% to 92% of total uveitis cases in most western countries and 28% to 50% of all uveitis cases in some of the Asian countries, such as Korea, Japan, and India (1). As the second most common AU next to idiopathic HLA-B27 negative AU, HLA-B27 positive AU accounts for 18% to 32% of all AU cases in western countries and 6% to 13% of all AU cases in Asia (2). In a previous hospital-based study, AU accounted for approximately 28.1% of all uveitis cases in Korea (3), and 35% to 47% of AU patients were positive for HLA-B27 in other studies (4, 5).

HLA-B27 positive AU is distinguishable from its HLA-B27 negative counterpart and is characterized by early onset, male preponderance, frequent association with systemic diseases, and a high tendency for recurrence (2, 6). There have been many comparative studies on the prognosis of HLA-B27 positive and negative AU with conflicting results. Some studies revealed more favorable outcomes for HLA-B27 positive AU (7, 8), whereas others reported the opposite (9). In addition, an equal ocular outcome was observed for both HLA-B27 positive and negative groups in some studies (10-14).

This study was performed to assess the clinical features and prognosis of HLA-B27 positive AU compared with HLA-B27 negative AU in a Korean population. In addition, the effects of associated systemic disease on HLA-B27 positive AU were also evaluated.

MATERIALS AND METHODS

This study was a retrospective case-controlled study, and was approved by Institutional Review Board. The medical records of all patients with AU seen at the uveitis service of a university hospital in Korea, between January 1996 and December 2006 were reviewed throughout patients' entire follow-up and those who were tested for the presence of the HLA-B27 allele were included in this study. HLA-B27 typing was conducted for patients who agreed to perform the test after receiving information on the diagnostic, therapeutic, and prognostic significance of HLA-B27 typing. Exclusion criteria were patients with an associated primary uveitic condition (e.g., Fuchs' heterochromic cyclitis or infectious uveitis) and other systemic and/or ocular diseases that are likely to be associated with ocular complications and visual prognosis inde-

pendent of the HLA-B27 antigen (e.g., sarcoidosis, Behcet's disease, proliferative diabetic retinopathy, retinal vascular obstruction, glaucoma not associated with the present AU). Patients were divided into two groups: those with a negative HLA-B27 haplotype who presented with idiopathic AU (group I) and those who were positive for HLA-B27 (group II). Group II was further divided into two subgroups; patients with a systemic disease association (e.g., spondyloarthropathy, inflammatory bowel disease) (group IIA) and those who had no evidence of systemic disease association (group IIB).

A detailed medical and ophthalmologic history taking, a complete blood count, liver function tests, blood urea nitrogen, serum creatinine, urinalysis, C-reactive protein, anti-streptolysin O, rheumatoid factor, antinuclear antibody, serologic tests for toxoplasmosis and syphilis, human immunodeficiency virus test, hepatitis B and C tests, angiotensin-converting enzyme, and chest radiography were performed at the initial visit for each patient. In patients with previous episodes of uveitis, the total number of previous attacks and the age at their first episode were recorded during patient interviews. The ophthalmological examination performed at every visit included best-corrected visual acuity (BCVA), slit-lamp biomicroscopy, tonometry, and indirect ophthalmoscopy; and systemic disease association was documented in every possible case. Fluorescein angiography, optical coherence tomography, and anterior segment and fundus photography were performed when indicated. Patients without prior rheumatologic evaluation at the time of inclusion were referred to a rheumatologist, and medical records were reviewed for patients with a previous rheumatologic follow-up.

The characteristics of the uveitis were analyzed according to the definitions of the Standardization of Uveitis Nomenclature (SUN) Working Group (15). AU was defined by anterior chamber cell grade of $\geq$1+ (graded according to the SUN Working Group grading scheme) of acute onset.

All patients were treated according to the degree of intraocular inflammation (cells in the anterior chamber or vitreous cavity or both) using a stepladder steroid-sparing therapeutic algorithm (16). Most patients initially were treated with topical corticosteroids. Periocular corticosteroids were used for severe, recurrent, or chronic episodes, for cystoid macular edema, and for patients in whom systemic corticosteroids were contraindicated. Long-term topical nonsteroidal anti-inflammatory drugs (NSAIDs) were sometimes used to prevent relapse of inflammation in cases of active inflammation recurrence with attempted topical steroid withdrawal. Short course systemic corticosteroids were given if the inflammation could not be controlled with previous therapy. Systemic immunosuppressive agents were used in patients in whom previous therapeutic strategies had failed. Ophthalmic follow-up was dependent on symptoms.

The distribution of counts was analyzed using chi-square test and Fisher's exact test where appropriate for the determination of statistical significance. For the comparison of mean values, independent t-test and Wilcoxon's rank sum test were used where appropriate. SPSS version 11.0 for Windows (SPSS Inc., Chicago, IL, U.S.A.) was used, and the results were considered to be significant at *P* values of less than 0.05.

RESULTS

Eighty-two Korean patients were included in the present study, and 27 patients (40 eyes) tested HLA-B27 negative and suffered from AU of unknown etiology (group I). Fifty-five HLA-B27 positive patients (88 eyes) (group II) were further divided into 29 (52.7%) patients (47 eyes) with systemic disease association (group IIA) and 26 (47.3%) patients (41 eyes) with no systemic disease association (group IIB). The median follow-up period for all 82 patients was 36.5 months (interquartile range, 16.0-75.3 months).

Clinical features

The general characteristics of the four study groups are summarized in Table 1. There was no obvious male or female predominance in group I (male:female ratio, 1.08:1), whereas there were approximately three times more male patients in group II (male:female ratio, 2.9:1), and this difference between groups I and II was statistically significant (*P*=0.040). Among the two subgroups of the HLA-B27 positive group, group IIA (male:female ratio, 8.7:1) had a significantly high-

Table 1. General characteristics of HLA-B27 positive and negative anterior uveitis

General characteristics	Group I HLA-B27(-) idiopathic	Group II HLA-B27(+) total	Group IIA HLA-B27(+) systemic disease	Group IIB HLA-B27(+) no systemic disease
Follow-up period (months)‡	27 (14-64)	38 (17-85)	32 (12.5-48.5)†	48.5 (30.5-104)†
Number of subjects (eyes)	27 (40)	55 (88)	29 (47)	26 (41)
Male:Female	14:13*	41:14*	26:3†	15:11†
Age of onset (yr) (range)§	34.9±16.1 (10-65)	35.3±12.5 (12-68)	32.0±12.7 (12-68)†	38.8±11.4 (16-61)†
Bilateral‖	48.1% (13/27)	60.0% (33/55)	62.1% (18/29)	57.7% (15/26)

*P value for difference between groups I and II <0.05; †P value for difference between groups IIA and IIB <0.05; ‡Values are described as median (interquartile range); §Values are described as mean±standard deviation; ‖Unilateral alternating or bilateral simultaneous.

er male:female ratio than did group IIB (male:female ratio, 1.4:1) (P=0.007). AU started in the 30s on average in all 4 study groups. The age of onset of AU was statistically similar between HLA-B27 negative and positive AU groups (P=0.919), and the age of onset of group IIA was significantly younger than that of group IIB (P=0.015).

HLA-B27 positive AU showed more severe anterior chamber inflammation than its HLA-B27 negative counterpart. The mean grade of anterior chamber cells and the rate of hypopyon formation were significantly higher in the eyes of group II than in those of group I (P=0.006 and 0.034, respectively); hypopyon occurred almost exclusively in HLA-B27 positive eyes (Table 2). The proportions of anterior chamber cells of grade 3 or more and grade 4 were significantly higher in the eyes of the HLA-B27 positive group than in the eyes of the HLA-B27 negative group (P=0.001 and 0.041, respectively) (Fig. 1). In the analysis of the anterior chamber inflammation between the eyes of groups IIA and IIB, there were no statistically significant differences (P>0.05, Table 2, Fig. 1).

A clear distinction of the visual outcome during the active inflammatory stage was observed between HLA-B27 negative and positive groups (Table 2). Approximately four out of five HLA-B27 negative AU eyes (81.5%) had BCVA of 20/40 or better during the active inflammatory stage, whereas approximately two out of three HLA-B27 positive AU eyes (65.7%) had BCVA worse than 20/40. In addition, about one out of three HLA-B27 positive AU eyes (32.8%) had BCVA of 20/200 or worse, whereas less than one out of ten HLA-B27 negative AU eyes (7.4%) had BCVA of 20/200 or worse (P=0.011). The proportion of eyes with BCVA of 20/40 or better was significantly larger in group I than in group II (P<0.001), and the proportion of eyes with BCVA between 20/40 and 20/100 and the proportion of eyes with BCVA between 20/100 and 20/400 were significantly larger in group II than in group I (P=0.031 and 0.030, respectively). In the analysis of the worst BCVA between the eyes

Table 2. Clinical characteristics during active inflammatory stage of HLA-B27 positive and negative anterior uveitis (AU)

General characteristics†	Group I HLA-B27(-) idiopathic	Group II HLA-B27(+) total	Group IIA HLA-B27(+) systemic disease	Group IIB HLA-B27(+) no systemic disease
Anterior chamber inflammation‡				
Cells§	2.66±1.04*	3.25±0.91*	3.42±0.81	3.07±1.02
Fibrin	20.7% (6/29)	26.8% (19/71)	27.8% (10/36)	25.7% (9/35)
Hypopyon	3.5% (1/29)*	21.1% (15/71)*	19.4% (7/36)	22.9% (8/35)
Keratic precipitate	48.8% (14/29)	40.8% (29/71)	38.9% (14/36)	42.9% (15/35)
Worst BCVA during active stage‡				
20/40≤ ≤20/20	81.5% (22/27)*	34.3% (23/67)*	29.4% (10/34)	39.4% (13/33)
20/100≤ <20/40	11.1% (3/27)*	32.8% (22/67)*	38.2% (13/34)	27.3% (9/33)
20/400≤ <20/100	0% (0/27)*	16.4% (11/67)*	17.6% (6/34)	15.2% (5/33)
LP≤ ≤CF	7.4% (2/27)	16.4% (11/67)	14.7% (5/34)	18.2% (6/33)
NLP	0% (0/27)	0% (0/67)	0% (0/34)	0% (0/33)

*P value for difference between groups I and II <0.05; †The eyes whose data in active inflammatory stage were not available (e.g. patients referred after long-term treatment) were excluded in the analysis; ‡Data from the eyes with ocular conditions that could possibly affect the BCVA independently of AU (e.g. pre-existing cataract) were excluded in the analysis; §Values are described as mean±standard deviation.
BCVA, best-corrected visual acuity; LP, light perception; CF, counting fingers; NLP, no light perception.

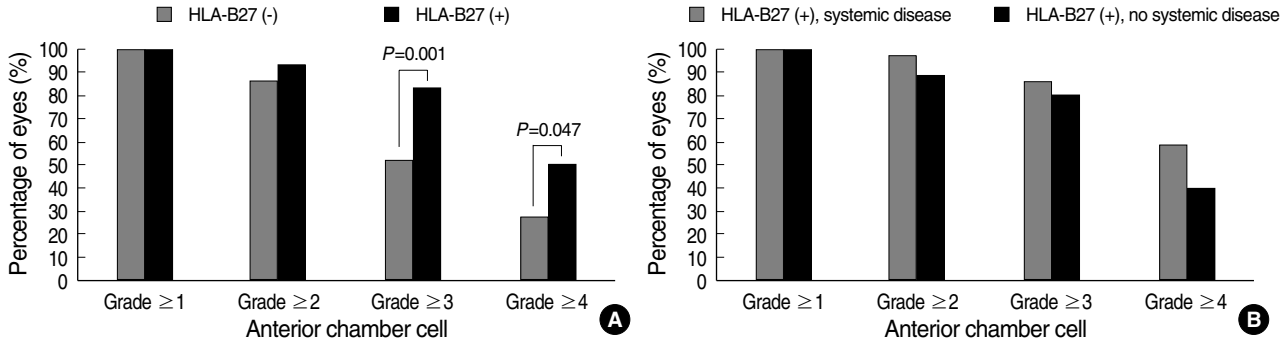

Fig. 1. Anterior chamber cells during the active inflammatory stage. (A) HLA-B27 negative vs. positive anterior uveitis (AU). The proportions of grade 3 or more and grade 4 were significantly higher in the HLA-B27 positive eyes than in the HLA-B27 negative eyes. (B) HLA-B27 positive AU with vs. without systemic disease association. Associated systemic disease made no significant difference in the anterior chamber cells in the HLA-B27 positive AU patients.

of groups IIA and IIB, there were no significant differences in all ranges of visual acuity ($P>0.05$, Table 2).

Systemic or periocular steroids were required in significantly more patients in the HLA-B27 positive group (approximately 4 out of 5 patients) than in the HLA-B27 negative group (approximately 1 out of 2 patients) ($P=0.015$, Table 3). Further analysis revealed that both oral and periocular steroids were used more frequently in HLA-B27 positive patients than in HLA-B27 negative patients ($P=0.032$ and 0.021, respectively). The presence of a systemic disease association made no significant difference in the medical treatment of AU in the HLA-B27 positive group ($P>0.05$, Table 3).

The disease duration and course including the frequency of uveitis attack are summarized in Table 4. Approximately 9 out of 10 study patients (92.6% of group I and 92.7% of group II) had limited (3 months or less) AU with a mean duration of about one month, and approximately 9 out of 10 study patients had repeated episodes of AU (85.2% of group I and 90.9% of group II). There were no significant differences in the proportions of limited/persistent, single/repeated, and chronic cases and in the duration of an episode between HLA-B27 negative and positive AU groups ($P>0.05$), but AU occurred significantly more often in patients with the HLA-B27 haplotype (2.07 attacks/year) than in those without the HLA-B27 haplotype (1.47 attacks/year) ($P=0.007$). No significant differences in the disease duration and course were observed between HLA-B27 positive patients with or without associated systemic disease ($P>0.05$, Table 4).

Ocular complications and final visual outcomes

The ocular complications and final visual outcomes in the four study groups are described in Table 5. The most common ocular complication observed in both HLA-B27 negative and positive groups was increased intraocular pressure (IOP) (40.0% and 27.3%, respectively). However, there were no significant differences in the proportions of eyes with cataract, cystoid macular edema, increased IOP, secondary glaucoma, or posterior synechia between HLA-B27 negative and positive AU groups and between HLA-B27 positive AU groups with or without systemic disease ($P>0.05$).

Group I and II (and group IIA and IIB also) showed similar good final visual outcomes (Table 5). Over 90% of eyes in each study group had final BCVA of 20/40 or better, and

Table 3. Medical treatment of HLA-B27 positive and negative anterior uveitis

Therapeutic agents	Group I HLA-B27(-) idiopathic (n=27)	Group II HLA-B27(+) total (n=55)	Group IIA HLA-B27(+) systemic disease (n=29)	Group IIB HLA-B27(+) no systemic disease (n=26)
Topical steroids	100% (27/27)	100% (55/55)	100% (29/29)	100% (26/26)
Topical NSAIDs	11.1% (3/27)	16.4% (9/55)	13.8% (4/29)	19.2% (5/26)
Systemic or periocular steroids	51.9% (14/27)*	78.2% (43/55)*	79.3% (23/29)	76.9% (20/26)
Oral steroids	44.4% (12/27)*	69.1% (38/55)*	69.0% (20/29)	69.2% (18/26)
High-dose intravenous steroids	3.7% (1/27)	3.6% (2/55)	3.4% (1/29)	3.8% (1/26)
Periocular steroids	14.8% (4/27)*	40.0% (22/55)*	34.5% (10/29)	46.1% (12/26)
Systemic immunosuppressive agents (methotrexate or cyclosporin)	7.4% (2/27)	5.5% (3/55)	6.9% (2/29)	3.8% (1/26)

*P value for difference between groups I and II <0.05.
NSAID, non-steroidal anti-inflammatory drug.

Table 4. Disease duration and recurrence of HLA-B27 positive and negative anterior uveitis

Disease duration/ Recurrence†	Group I HLA-B27(-) idiopathic (n=27)	Group II HLA-B27(+) total (n=55)	Group IIA HLA-B27(+) systemic disease (n=29)	Group IIB HLA-B27(+) no systemic disease (n=26)
Limited:Persistent	92.6%:7.4% (25:2)	92.7%:7.3% (51:4)	93.1%:6.9% (27:2)	92.3%:7.7% (24:2)
Duration of an episode (days)‡	33 (14-68)	35 (26-53)	34 (20-53)	37.5 (28-50)
Single:Repeated	14.8%:85.2% (4:23)	9.1%:90.9% (5:50)	13.8%:86.2% (4:25)	3.8%:96.2% (1:25)
Chronic	11.1% (3/27)	14.5% (8/55)	17.2% (5/29)	11.5% (3/26)
Attack per patient per year‡	1.47 (0.84-3.00)*	2.07 (1.50-3.33)*	2.07 (1.48-4.26)	2.05 (1.53-3.26)

*P value for difference between groups I and II <0.05; †The characteristics of uveitis were analyzed according to definitions of the Standardization of Uveitis Nomenclature (SUN) Working Group. Limited: ≤3 months duration, persistent: >3 months duration, Repeated: episodes separated by periods of inactivity (grade 0 cells in the anterior chamber) without treatment irrespective of the interval between episodes. Chronic: relapsing episodes in <3 months after discontinuing treatment; ‡Values are described median (interquartile range).

Table 5. Ocular complications and final best-corrected visual acuity (BCVA) in remission of HLA-B27 positive and negative anterior uveitis (AU)

Parameters	Group I HLA-B27(-) idiopathic	Group II HLA-B27(+) total	Group IIA HLA-B27(+) systemic disease	Group IIB HLA-B27(+) no systemic disease
Ocular complications				
Cataract formation (≥grade 2)	15.0% (6/40)	5.7% (5/88)	6.4% (3/47)	4.9% (2/41)
Cystoid macular edema	2.5% (1/40)	9.1% (8/88)	6.4% (3/47)	12.2% (5/41)
IOP (>21 mmHg)	40.0% (16/40)	27.3% (24/88)	19.1% (9/47)	36.6% (15/41)
Secondary glaucoma	10.0% (4/40)	2.3% (2/88)	2.1% (1/47)	2.4% (1/41)
Posterior synechia	12.5% (5/40)	22.7% (20/88)	21.3% (10/47)	24.4% (10/41)
Final BCVA in remission†				
20/40≤ ≤20/20	97.2% (35/36)	95.4% (83/87)	93.5% (43/46)	97.6% (40/41)
20/100≤ <20/40	2.8% (1/36)	3.4% (3/87)	4.3% (2/46)	2.4% (1/41)
20/400≤ <20/100	0% (0/36)	0% (0/87)	0% (0/46)	0% (0/41)
LP≤ ≤CF	0% (0/36)	1.1% (1/87)	2.2% (1/46)	0% (0/41)
NLP	0% (0/36)	0% (0/87)	0% (0/46)	0% (0/41)
Number of legally blind eyes†	0% (0/36)	1.1% (1/87)	2.2% (1/46)	0% (0/41)

*Data from the eyes with ocular conditions that could possibly affect the BCVA independently of AU (e.g. pre-existing cataract) were excluded in the analysis; †BCVA 20/200 or worse.
IOP, intraocular pressure; LP, light perception; CF, counting fingers; NLP, no light perception.

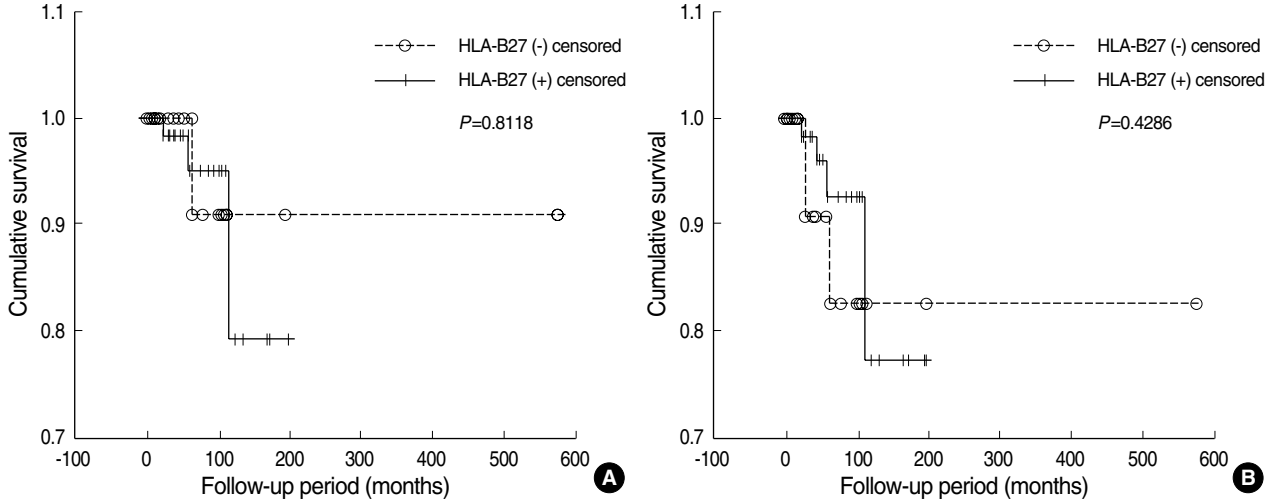

Fig. 2. Kaplan-Meier curves showing cumulative survival of eyes with a potential best-corrected visual acuity of (A) ≥20/40 and (B) ≥20/32 in HLA-B27 negative vs. positive anterior uveitis patients. *P* values were calculated by log rank test.

86.1% (31/36), 82.8% (72/87), 89.1% (41/46), and 75.6% (31/41) of the eyes in groups I, II, IIA, and IIB, respectively, had final BCVA of 20/20. There were no significant differences in the mean logMAR (logarithm of the minimum angle of resolution) BCVA between the eyes of groups I and II and between the eyes of groups IIA and IIB (light perception was assigned the logMAR equivalent 2.70) (P=0.687 and 0.161, respectively). Fig. 2 shows the Kaplan-Meier survival curves of eyes with a potential BCVA of ≥20/40 and ≥20/32 in HLA-B27 negative versus positive AU patients, and there was no significant difference between HLA-B27 negative and positive AU patients (P=0.8118 and 0.4286, respectively; by log rank test). There was only one legally blind eye (BCVA of 20/200 or worse) with final BCVA of light perception among all study eyes. This patient, who had ankylosing spondylitis and the HLA-B27 haplotype, had his first AU occurrence in the left eye when he was 24 yr old, and he had secondary chronic angle closure glaucoma after recurrent AU episodes. Glaucoma implant surgery and a penetrating keratoplasty were performed in his left eye, but his BCVA eventually decreased to light perception.

DISCUSSION

Many studies have been reported on the clinical features and prognosis of HLA-B27 positive AU (7-14, 17, 18). However, the ocular complications and visual outcomes of HLA-

B27 positive AU compared to HLA-B27 negative AU continue to be controversial. As mentioned in an earlier report (2), some of the conflicting findings may result from differences in the follow-up period and in the inclusion and diagnostic criteria used in various studies. Evaluation of the effect of the HLA-B27 haplotype on the ocular and visual prognosis of AU in patients with HLA-B27 positive AU compared to the HLA-B27 negative AU group is complicated by the heterogeneity of the HLA-B27 negative AU group (2). That is, inclusion of distinct uveitic entities, which are likely to be associated with ocular complications and visual prognosis independent of the HLA-B27 antigen (such as sarcoidosis and Behcet's disease), may make it difficult to evaluate the effect of the HLA-B27 antigen on the complications and outcomes of AU. In the present study, only idiopathic cases of HLA-B27 negative AU were included to minimize potential confounding factors, similarly to a previous report (9). In addition, the effects of associated systemic disease on HLA-B27 positive AU were also evaluated by further dividing the HLA-B27 positive AU group into two subgroups: patients with a systemic disease association and those who had no evidence of systemic disease association.

The clinical features of HLA-B27 positive AU in this study are generally similar to those in previously published reports from other Western (7-12, 14, 17) and Asian countries (13, 18). The common characteristics include an increased frequency among male patients and a significant association with HLA-B27-related systemic disease as well as a significant cellular reaction in the anterior chamber with hypopyon requiring more aggressive treatment and with a higher frequency of recurrent attacks. In terms of the ocular complications and final visual outcomes, for which there have been conflicting results reported, the present study revealed no significant difference in the overall outcome between the HLA-B27 negative and positive groups. A previous study with less favorable outcomes for HLA-B27 positive AU was conducted on patients seen between 1982 and 1993 (9). Therapeutic strategies for HLA-B27 positive AU have somewhat changed, and more intensive treatment is now given to HLA-B27 positive AU patients. This more aggressive treatment for HLA-B27 positive AU may explain the similar overall outcomes between HLA-B27 negative and positive groups in the current study, which reviewed AU patients treated between 1996 and 2006.

In terms of the effect of the systemic disease association on the HLA-B27 positive AU, our study showed no significant difference in the ocular complications and final visual outcomes between HLA-B27 positive AU patients with systemic disease (group IIA) and those with no systemic disease (group IIB). This finding is in accord with the results of earlier reports (9, 16). One of the earlier reports revealed that the mean recurrence rate of inflammation was higher in HLA-B27 positive patients with systemic disease (3.6 attacks) than in those with no systemic disease (5.2 attacks) (9). However, another report showed that there was no significant difference in the mean frequency of attacks between HLA-B27 positive AU patients with systemic disease (0.8 attacks/year) and those with no systemic disease (0.7 attacks/year) (16), and our study results were consistent with the latter one with the median frequency of attacks of 2.07 and 2.05 attacks/year in groups IIA and IIB, respectively.

Previous reports on the clinical characteristics of HLA-B27 positive AU in Asian countries are scarce, and no comparative study on the clinical characteristics of HLA-B27 positive and negative AUs in Korean populations has been reported in the international ophthalmic literature. In an earlier report (18), Chinese AU patients with the HLA-B27 haplotype had a generally good visual prognosis with 90.3% of the affected eyes having a visual acuity better than 20/40, although 66.8% of patients had recurrent uveitis episodes and 31.4% and 14.3% of the affected eyes had posterior synechiae and cataract, respectively. In another report from Thailand (13), clinical features of HLA-B27 positive and negative acute AU were similar to those reported in Western countries with no significant differences in the visual outcomes between HLA-B27 positive and negative groups. In contrast to most prior Western reports that noted a larger proportion of increased IOP in the HLA-B27 positive group than in the HLA-B27 negative group (9, 12), however, the proportion of cases with increased IOP was significantly higher in HLA-B27 negative group than in HLA-B27 positive group. In the current study, an increased IOP (>21 mmHg) and secondary glaucoma were more common in the HLA-B27 negative patients (40.0% and 10.0%, respectively) than in the HLA-B27 positive patients (27.3% and 2.3%, respectively), although there were no statistically significant differences (P=0.150 and 0.076, respectively). The explanation for this finding is unclear. The increased IOP may be attributed to the AU itself and/or the steroid treatment for AU. In addition, the etiology of HLA-B27 negative AU in Asia might include more cases of various viral infections (often associated with increased IOP) as suggested in a previous study (13).

Previous studies on the clinical characteristics and prognosis of HLA-B27 positive and/or negative AU in Korean patients were published in a domestic ophthalmologic journal (19, 20). Lee et al. (19) recruited 32 AU patients from 462 HLA-B27 positive spondyloarthropathy patients; the clinical characteristics of HLA-B27 positive AU were similar to this study except for the prominent unilateral involvement (31/32, 96.8%) and no occurrence of hypopyon (0/32, 0%). However, the follow-up period for the 32 AU patients was not mentioned and therefore these differences might be due to a shorter follow-up. Another study by Kim et al. (20) also demonstrated similar results. However, patients with posterior uveitis were included (4/27 eyes) making the group more heterogeneous. A comparative study between HLA-B27 positive and negative AU patients (5) showed more severe inflammation in the anterior chamber and more aggressive

treatment in HLA-B27 positive AU compared to HLA-B27 negative AU, and the final visual outcomes were similar between the two groups. However, the number of subjects was relatively small (16 in HLA-B27 positive group and 18 in HLA-B27 negative group). The current study analyzed the largest data set to date available on Korean patients with HLA-B27 positive and negative AU. In addition, we compared the subgroups of HLA-B27 positive AU with or without systemic disease.

The significance of our results may partly be limited by referral bias as this study was based at a university hospital (tertiary referral center) with more complicated and severe cases. Thus, the clinical features of both HLA-B27 negative and positive AUs would generally have a better prognosis than is described in this study, as pointed out in a previous report (2). In addition, our results are also subject to selection bias because HLA-B27 typing was conducted only for patients who agreed to perform the test after receiving information on the diagnostic, therapeutic, and prognostic significance of HLA-B27 typing.

In conclusion, the ocular and visual outcomes of HLA-B27 positive AU patients in Korea are generally good and show no significant difference from those of HLA-B27 negative AU. The more aggressive treatment for significantly severer and recurrent anterior chamber inflammation in HLA-B27 positive AU is a feasible explanation for these findings. No significant differences in clinical characteristics, medical treatment, disease duration and course, and final ocular and visual outcomes were observed between the HLA-B27 positive AUs with or without associated systemic disease.

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