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Comparison in clinical features and life impact between juvenile-onset and adult-onset ankylosing spondylitis

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Background/aim: To compare the differences in clinical characteristics and disease impact on life between patients with juvenile-onset ankylosing spondylitis (JoAS) and patients with adult-onset AS (AoAS).

Materials and methods: Demographic and clinical data were collected from 139 AS patients. Disease activity was defined with the Bath Ankylosing Spondylitis Disease Activity Index (BASDAI). Functional status was assessed with the Bath Ankylosing Spondylitis Functional Index (BASFI). Status of quality of life was evaluated with the Ankylosing Spondylitis Quality of Life (ASQoL) questionnaire.

Results: There were 50 patients with JoAS (36.0%) and 89 with AoAS (64.0%). The JoAS group showed more onset with peripheral joints involvement ($P < 0.001$), significant diagnosis delay ($P < 0.001$), worse functional status ($P = 0.002$), and poorer quality of life ($P = 0.002$). Patients with JoAS also showed a significantly lower rate in college education ($P = 0.037$) and marriage ($P = 0.013$). The rate of employment in the JoAS group was lower than that in the AoAS group. Although the difference in employment did not reach a significant level, the JoAS group included more patients who had not been employed since reaching adulthood ($P = 0.015$).

Conclusion: Compared to patients with AoAS, patients with JoAS may need more specific clinical interventions as well as social assistance.

Key words: Adult-onset ankylosing spondylitis, juvenile-onset ankylosing spondylitis, physical function, quality of life

1. Introduction

Ankylosing spondylitis (AS) is a chronic inflammatory disease of the axial spine and may be further complicated by the involvement of peripheral joints. It can lead to significant impairment not only of physical function but also of comprehensive quality of life in certain aspects (1,2). AS occurs predominantly in early adulthood, but can also occur in childhood. When AS occurs at 16 years of age or earlier it is termed JoAS and when it occurs after the age of 16 it is termed AoAS (3). Although JoAS shares certain similar features with AoAS, for example the presence of radiographic sacroiliitis, it may also have some specific clinical characteristics that distinguish it from AoAS (4,5). Most studies reported that JoAS often had a significantly longer diagnosis delay (6,7) compared with AoAS, whereas some other studies did not include a comparison of this aspect (4,8). JoAS has been reported with a higher frequency of peripheral joint involvement, especially the involvement of the hip joint. Although hip joint involvement has been thought to be associated with a worse functional outcome for AS patients (9), discrepancies exist in the comparison of functional status between JoAS and AoAS. The majority of present studies reported that JoAS had worse functional outcomes than AoAS (7,10) while other studies failed to detect differences between JoAS and AoAS (6,11). Moreover, there were also sparse reports that reflected that patients with JoAS might suffer from less functional impairment than those with AoAS (4,12). Radiographical differences between JoAS and AoAS have also been assessed in several studies and JoAS was reported to have caused less severe axial involvement radiographically compared with AoAS (4,13). Overall, most of the studies so far have mainly focused on the differences in aspects of clinical features between JoAS and AoAS. Studies centering on the potential differences between JoAS and AoAS in certain important aspects relating to quality of life, such as educational level, employment status, and marriage status, remain scarce.

Detection of differences is the precondition for the development of specific interventions. So, in this study, we aimed to compare the differences in clinical features as well as several essential factors related with quality of life between JoAS and AoAS.

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2. Materials and methods

2.1. AS patients

All of the included patients were at least 18 years old and met the modified New York classification criteria for AS (14). The local ethics committee approved the study and informed consent was obtained from all participants.

2.2. Questionnaire on demographic characteristics

This questionnaire contains a number of demographic variables, such as current age, sex, educational level, marital status (married, never married, or divorced), and employment (employed, never employed, or loss of employment due to AS).

2.3. Questionnaire on disease characteristics

This questionnaire includes family history, HLA-B27 status, initial symptoms (peripheral or axial), age at onset of AS symptoms (juvenile onset defined at ≤16 years; adult onset defined at >16 years), age at diagnosis of AS, disease activity measured with the Bath Ankylosing Spondylitis Disease Activity Index (BASDAI) (15), functional status measured with the Bath Ankylosing Spondylitis Functional Index (BASFI) (16), and disease-related quality of life measured with the Ankylosing Spondylitis Quality of Life (ASQoL) questionnaire (17). Disease duration was then defined as the interval between the age at the onset of symptoms and the current age. Diagnosis delay was defined as the gap between the age at onset of symptoms and the age at correct AS diagnosis.

2.4. Statistical analysis

Statistical analyses were performed with SPSS 16.0 for Windows. A chi-squared test was used to compare the variables in aspects of family history, HLA-B27 status, sex, and initial symptoms between JoAS and AoAS. Educational level, employment status, and marriage status were also compared by a chi-squared test between the 2 groups. The Mann–Whitney U-test was used to compare the continuous variables as follows: current age, diagnostic delay, BASDAI, BASFI, and ASQoL. The level of significance was set at $P < 0.05$.

3. Results

3.1. Comparison in demographic and clinical features of JoAS versus AoAS

Of 139 patients, 50 (36.0%) had JoAS and 89 (64.0%) had AoAS. The average age at disease onset of JoAS and AoAS was 13.3 ± 2.3 years and 21.7 ± 4.5 years ($P < 0.001$); the average current age was 27.4 ± 7.6 and 28.8 ± 6.7 ($P = 0.128$); average disease duration was 14.0 ± 8.2 years and 7.1 ± 5.7 years ($P < 0.001$) and average age at diagnosis was 18.5 ± 5.2 years and 24.5 ± 5.7 years ($P < 0.001$) respectively. The study showed that 106 patients knew about their HLA-B27 status: 81 patients were HLA $B27^+$ while 25 patients were HLA $B27^-$. A total of 112 patients provided their family history: 35 patients had a positive family history while 77 had a negative family history. No statistical differences were detected in aspects of sex, HLA-B27 status, or family history between JoAS and AoAS. The JoAS group showed a more frequent onset with peripheral joint involvement than the AoAS group (72.0% vs. 24.7%; $P < 0.001$). Patients with JoAS suffered from more significant diagnosis delays than patients with AoAS (5.32 ± 5.26 vs. 2.85 ± 3.82; $P < 0.001$). The functional status in JoAS was significantly worse than that in AoAS (BASFI: 37.33 ± 23.45 vs. 24.71 ± 16.39; $P = 0.002$). No significant differences were detected in BASDAI between JoAS and AoAS (4.25 ± 2.08 vs. 3.96 ± 1.95; $P = 0.163$) (Table 1).

3.2. Comparison of life impact between JoAS and AoAS

Patients with JoAS showed significantly poorer status of comprehensive quality of life (ASQoL; 8.9 ± 4.6 vs. 6.5 ± 3.2; $P = 0.002$). Patients with JoAS also showed significantly lower rates of higher education compared with patients in the AoAS group (26.0% vs. 43.8%; $P = 0.037$). With the exclusion of 17 current college students, the marriage rate of JoAS patients was significantly lower than that of AoAS patients (31.7% vs. 55.6%; $P = 0.013$) and the rate of employment in the JoAS group was lower than that in the AoAS group (46.3% vs. 59.3%; $P = 0.176$). Although the difference did not reach a significant level, the JoAS group included more patients who had not been employed since they reached adulthood compared with the AoAS group (26.8% vs. 9.9%; $P = 0.015$) (Table 2).

4. Discussion

In our cohort, 36.0% of patients suffered from JoAS, which is significantly higher than that of Caucasians (9%–21%) (7,18) but is lower and closer to the result of a Korean report (41.3%) (8). The majority of previous studies failed to find differences in family history between JoAS and AoAS (4,6,13) while one report reflected that significantly more patients with AoAS had a positive family history (19). In the present study, the rate of positive family history in the AoAS group was slightly higher than that in the JoAS group, but the difference was not significant (28.4% vs. 22.9%; $P = 0.93$). A higher proportion of female patients with JoAS was reported in one study (20), although the difference was not significant ($P = 0.07$). We have not found the differences in sex between JoAS and AoAS ($P = 0.63$) reported in most of the other studies (6,7). In addition, similar to most of the previous studies (4,20), no significant difference in HLA-B27 status was identified between the JoAS group and the AoAS group in this study ($P = 0.72$).

Probably due to the dramatic fluctuation in disease activity between AS remission and AS flare, most of the studies so far have not detected the difference in BASDAI between JoAS and AoAS (4,6). No significant differences

Table 2. Comparison in life impact of JoAS versus AoAS.

	JoAS (n = 50)	AoAS (n = 89)	P
ASQoL (mean ± SD)	8.9 ± 4.6	6.5 ± 3.2	0.002
College education or more, n (%)	13 (26.0)	39 (43.8)	0.037
Married, n (%)	13 (31.7)	45 (55.6)	0.013
Employment, n (%)	19 (46.3)	48 (59.3)	0.176
Never employed, n (%)	11 (26.8)	8 (9.9)	0.015

JoAS: juvenile-onset ankylosing spondylitis
AoAS: adult-onset ankylosing spondylitis
ASQoL: Ankylosing Spondylitis Quality of Life questionnaire
SD: Standard deviation

Table 1. Comparison in demographic and clinical characteristics of JoAS versus AoAS.

	JoAS (n = 50)	AoAS (n = 89)	P
Female sex, n (%)	9 (18.0)	24 (27.0)	0.233
Current age (mean ± SD, years)	27.4 ± 7.6	28.8 ± 6.7	0.128
Age at symptom onset (mean ± SD, years)	13.3 ± 2.3	21.7 ± 4.5	< 0.001
Age at diagnosis (mean ± SD, years)	18.5 ± 5.2	24.5 ± 5.7	< 0.001
Disease duration (mean ± SD, years)	14.0 ± 8.2	7.1 ± 5.7	< 0.001
Delay in diagnosis (mean ± SD, years)	5.32 ± 5.26	2.85 ± 3.82	< 0.001
HLA-B27^{+}, n (%)	39 (78.0)	42 (75.0)	0.716
Family history of AS, n (%)	12 (28.6)	23 (32.9)	0.636
Peripheral pattern at disease onset, n (%)	36 (72.0)	22 (24.7)	< 0.001
BASFI (mean ± SD)	37.3 ± 23.5	24.7 ± 16.4	0.002
BASDAI (mean ± SD)	4.3 ± 2.1	3.9 ± 1.6	0.163

JoAS: juvenile-onset ankylosing spondylitis
AoAS: adult-onset ankylosing spondylitis
BASDAI: Bath Ankylosing Apondylitis Disease Activity Index
BASFI: Bath Ankylosing Apondylitis Functional Index
SD: Standard deviation
HLA: human leukocyte antigen

were detected in BASDAI between JoAS and AoAS (4.25 ± 2.08 vs. 3.96 ± 1.95; P = 0.163) in the present study either. Radiographic sacroiliitis is a mandatory item in the modified New York criteria of AS, which has long been regarded as one of the most common reasons for the diagnosis delay of AS (21). With respect to patients with JoAS, this indispensable item might act as more of an obstruction to early diagnosis of AS (5,7). It has been consistently reported that JoAS patients experience a more frequent onset of peripheral joint involvement (6) and a significantly late onset, and less severe, axial involvement (19). Patients with JoAS in our cohort also showed a more frequent onset of peripheral joint involvement than patients with AoAS (P < 0.001). Although patients with JoAS in this study were often correctly diagnosed with AS at a significantly younger age compared with patients with AoAS (18.5 ± 5.2 vs. 24.5 ± 5.7; P < 0.001), they were still more likely to suffer from longer diagnosis delays than patients with AoAS (5.32 ± 5.26 vs. 2.85 ± 3.82; P < 0.001). Functional status in JoAS was significantly worse than that in AoAS (BASFI: 37.33 ± 23.45 vs. 24.71 ± 16.39; P = 0.002). As mentioned above, this result is consistent with most of the previous studies (7,10) while inconsistent with some other studies that showed either no differences at all (6) or contrary results (4). Differing study designs may have contributed to these discrepancies.

So far, most of the studies focused solely on the differences in clinical characteristics between JoAS and

AoAS while the potential differences in the disease's impact on life received relatively little attention (6). Educational level has been reported as an important factor that affects the comprehensive quality of life in AS patients (22). A high level of education also helps opens up more opportunities for employment (23). However, this may actually be a vicious cycle. Different educational levels can affect AS patients' quality of life in different areas. Different types of AS, namely JoAS and AoAS, may also affect patients' access to education to a certain extent. With an early onset of AS symptom, patients with JoAS may be more likely to drop out of school before university or college. In this study, patients with JoAS showed a significantly lower rate of receiving higher education (P = 0.037). This result implies that certain supporting measures will benefit patients with JoAS, significantly helping them to continue with school until they enter university or college. Employment status can affect not only patients' economic burdens but also their psychosocial status, which are all essential parts of a comprehensive quality of life (24–26). In our cohort, the rate of employment in the JoAS group was lower than that in the AoAS group (47.6% vs. 59.8%). Although the difference did not reach a significant level, the JoAS group included more patients who had not been employed since they reached the age of adulthood (P = 0.015). It indicates that certain interventions of occupational guidance as well as occupational training may benefit AS patients substantially, especially patients with JoAS. Marriage is no doubt an important part of life. Nevertheless, it is reported that AS patients may have low marriage rates and high rates of divorce (27). Patients with JoAS, however, may be facing an even worse marital situation. In the present study, patients with JoAS showed significantly lower rates of getting married (P = 0.013) compared with patients with AoAS. The good news may be that only 1 patient in all of the 139 participants experienced divorce, which is inconsistent with a previous report (27). This might be partly related to the traditional Chinese approach towards marriage and family. It should be noted that simple marriage guidance may not help AS patients fully enough. Psychological interventions may be also necessary. Moreover, the improvement of educational level and employment status may also play a role in marital status. Further study of this aspect is warranted.

There are certain limitations in this study. First, participants were representative of patients living in urban centers with more access to a higher quality of AS treatment, more opportunities to get a college education, and more job opportunities. AS patients in rural and remote areas might be facing an even more severe reality and that warrants further investigation. Second, since this is a retrospective study, there might be a recall bias in questioning patients about the date of symptom onset and date of diagnosis. However, this bias may exist in most of the patients and thus dilute the deviation effect.

In conclusion, early diagnosis of JoAS is an even more severe challenge compared with AoAS and specific diagnosing criteria for JoAS are warranted. Patients with JoAS showed worse functional status than patients with AoAS and more aggressive treatment may be needed for JoAS. Certain interventions to counteract the disease's impact on the quality of life of AS patients are required, especially for patients with JoAS.

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