Research Article

Comparison of radiological changes in symphysis pubis and disease activity parameters in male patients with ankylosing spondylitis

Ankilozan spondilitli erkek hastaların simfizis pubisindeki radyolojik değişikliklerle hastalık aktivite parametrelerinin karşılaştırılması

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Abstract

Introduction: To determine the prevalence of involvement of symphysis pubis among male patients with ankylosing spondylitis (AS) and to analyze the relationship among this involvement, demographic data, clinical activity of the disease and radiological findings.

Methods: Overall, 73 male patients diagnosed with AS who visited our clinic for follow-up were included in the study. In this retrospective study, clinical and radiological parameters were collected. In clinical evaluation, vertebral Visual Analog Scale (VAS) score, Bath Ankylosing Spondylitis Disease Activity Index (BASDAI), Bath Ankylosing Spondylitis Metrology Index (BASMI) and Bath Ankylosing Spondylitis Functional Index (BASFI) were used. In AP pelvis radiography, symphysis pubis changes were rated as 0–4. Modified Stoke Ankylosing Spondylitis Spinal Score (M-SASSS) was calculated from the cervical and lumbar lateral radiography images.

Results: Symphysis pubis involvement was radiologically observed in 45 patients (61.7%). The mean age (43.9 ± 12.6) of patients with symphysis pubis involvement was higher than the average (36.9 ± 9.0) of patients without involvement (p = 0.026). Average M-SASSS of patients with symphysis pubis involvement (15.9 ± 11.9) was higher than the average of patients without involvement (8.4 ± 7.4), and there was a significant positive correlation between symphysis pubis involvement and M-SASSS (p=0.002). BASDAI and BASMI averages of patients were not significant (p = 0.973 and p = 0.105, respectively).

Conclusion: Symphysis pubis involvement is a common manifestation of AS and can be used to predict vertebral radiological involvement.

Keywords: Ankylosing Spondylitis, Symphysis Pubis, Modified Stoke Ankylosing Spondylitis Spinal Score

Öz

Giriş: Ankilozan spondilitli (AS) erkek hastalarda simfizis pubis tutulum prevalansını belirlemek ve bu tutulum ile demografik veriler, hastalığın klinik aktivitesi ve radyolojik bulgular arasındaki ilişkiyi incelemektir.

Yöntem: Genel olarak kliniğimize takip için başvuran AS tanılı 73 erkek hasta çalışmaya dahil edildi. Bu retrospektif çalışmada; klinik ve radyolojik parametreler toplandı. Klinik değerlendirmede vertebral Vizüel Analog Skala (VAS) skoru, Bath Ankilozan Spondilit Hastalık Aktivite İndeksi (BASDAI), Bath Ankilozan Spondilit Metroloji İndeksi (BASMİ) ve Bath Ankilozan Spondilit Fonksiyonel İndeksi (BASFI) kullanıldı. AP pelvis radyografisinde simfizis pubis değişiklikleri 0-4 olarak derecelendirildi. Servikal ve lomber lateral grafi görüntülerinden Modifiye Stoke Ankilozan Spondilit Spinal Skoru (M-SASSS) hesaplandı.

Bulgular: Simfizis pubis tutulumu radyolojik olarak 45 hastada (%61,7) görüldü. Simfizis pubis tutulumu olan hastaların ortalama yaşı (43,9 ± 12,6), tutulumu olmayan hastaların ortalamasından (36,9 ± 9,0) daha yüksekti (p = 0,026). Simfizis pubis tutulumu olan hastaların M-SASSS ortalaması (15,9 ± 11,9), tutulumu olmayan hastaların ortalamasından (8,4 ± 7,4) daha yüksekti ve simfizis pubis tutulumu ile M-SASSS arasında anlamlı pozitif korelasyon vardı (p=0,002). Hastaların BASDAI ve BASMI ortalamaları anlamlı değildi (sırasıyla p=0,973 ve p=0,105).

Sonuç: Simfizis pubis tutulumu AS'nin sık görülen bir bulgusudur ve vertebra radyolojik tutulumunu öngörmede kullanılabilir.

Anahtar Kelimeler: Ankilozan Spondilit, Simfizis Pubis, Modifiye Stoke Ankilozan Spondilit Spinal Skoru

Key Points

1. Symphysis pubis involvement is frequently observed in patients with AS.
2. Changes in symphysis pubis are closely related to vertebral involvement.
3. The changes occurring in symphysis pubis can be used to predict vertebral involvement.
4. Degenerative changes, which increase with age, can also affect symphysis pubis.

Introduction

AS is a chronic inflammatory rheumatic disease, it is involved in the axial skeleton causing structural damage and functional limitations [1]. The sacroiliac joints are the characteristic area of involvement in AS. In addition, vertebrae, hip and shoulder joint, symphysis pubis, and enthesis zones are affected [2]. Peripheral joint involvement is less common [1, 2]. In axial vertebrae, AS causes erosion during the early stage and fusion during the late stage. The progression of the disease is ascending; therefore, the first changes are observed in the pelvis and sacroiliac joints [3, 4].

Symphysis pubis is a fibrocartilaginous joint and it does not include synovium [5]. Radiological changes in symphysis pubis may occur in athletes, women who have given multiple births, and in patients with chronic infections, such as tuberculosis [6, 7]. These changes can appear in the form of sclerosis, erosion, destruction, and ankylosis [8]. Rheumatic diseases, especially AS, can cause involvement in the symphysis pubis. In a previous study, changes in symphysis pubis were observed in 47.3% male patients with AS [9]. There are very few studies evaluating the relationship between these changes and clinical disease activity and radiological changes in the vertebrae. Therefore, we aimed to determine symphysis pubis involvement in male patients with AS and demographic, clinical and radiological parameters that may be associated with this involvement.

Methods

Seventy-three male patients presenting to our hospital's physical medicine and rehabilitation clinic were included in the study. The study population was selected from among cases diagnosed with AS on the basis of Modified New York criteria [10], whose treatments were continued at our clinic (2016-2017). Demographic, clinical, and radiological parameters were retrospectively evaluated. The following patients were excluded: female patients (due to birth and hormonal reasons [6]), those with inflammatory rheumatic diseases other than AS, those with a history of symphysis pubis trauma or infection, and those with malignancies or active systemic infection.

Data of the followed-up patients including gender, education status, duration of illness, family history, history of uveitis, year of diagnosis, history of smoking, drugs used, and laboratory results (HLA-B27) were recorded. In clinical evaluation, VAS [11], Bath Ankylosing Spondylitis Functional Index (BASFI) [12], Bath Ankylosing Spondylitis Disease Activity Index (BASDAI) [13], and Bath Ankylosing Spondylitis Metrology Index (BASMI) [14] scores checked during the same visit were used.

Radiological evaluations were performed by the same radiologist. Radiological data of the last 6 months were considered. Radiological changes in symphysis pubis as well as cervical and lumbar lateral radiography scans were examined. Changes in the symphysis pubis were rated between 0 and 4 points. Numerical evaluation was as follows; 0: no damage, 1: fine irregularity and/or subchondral sclerosis, 2: erosion, 3: partial ankylosis, and 4: total ankylosis (Figure 1).
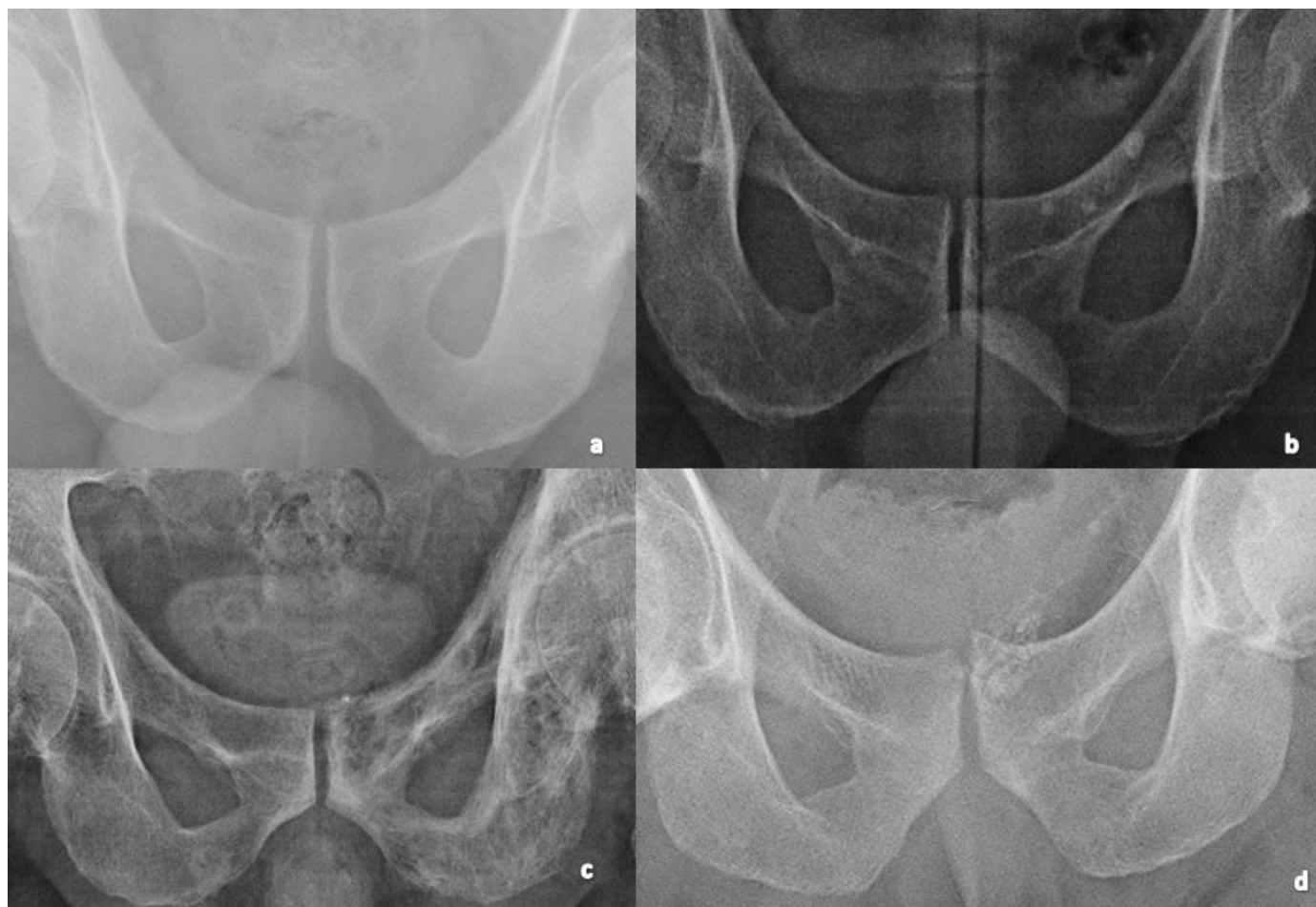
Figure 1. Radiographic changes in the symphysis pubis in patients with ankylosing spondylitis include (a) 0: no damage (b) 1: fine irregularity and/or subchondral sclerosis (c) erosion, and (d) partial ankylosis.

Modified Stoke Ankylosing Spondylitis Spinal Score (M-SASSS) was calculated by the evaluation of cervical and lumbar vertebrae lateral radiography scans. When calculating the M-SASSS score, only the changes in the anterior regions of the vertebrae between the lumbar region bottom T12–top S1 and cervical region bottom C2–top T1 were scored. In the scoring performed between 0 and 3, the scores were evaluated as follows; 0: normal, 1: fine irregularity and/or subchondral sclerosis, 2: non-bridged syndesmophytes, and 3: bridged syndesmophytes. Total M-SASSS scores ranging between 0 and 72 were achieved [15].

Ethical approval
The study was approved by the ethics committee of Canakkale Onsekiz Mart University (29.09.2017, No: 2017-15).

Statistical analysis
Data were analyzed using SPSS Package Program (SPSS Inc., Chicago, IL, USA) 20.0 version. The compatibility of variables with normal distribution was evaluated using Kolmogorov–Smirnov test and Shapiro–Wilk test. Number, percentage, mean, standard deviation, median, minimum, and maximum were used in the presentation of descriptive data. Chi-square test was used for the analysis of categorical data. Mann–Whitney's U test was used to compare variables. Spearman's correlation test was used to evaluate the correlation between the data. Correlation coefficient was evaluated as follows; 0000–0.24: weak, 0.25–0.49: medium level, 0.50–0.74: strong, and 0.75–1.00: very strong correlation. P values of < 0.05 were considered for statistical significance.

Results
The mean age of 73 patients was 41.2 ± 11.8 years, mean duration of the disease was 14.7 ± 9.7 years, and the average duration of treatment was 8.7 ± 6.5 years. A total of 31 patients (42.5%) had normal weight and 42 (52.5%) were overweight. Symphysis pubis involvement was radiologically observed in 45 patients (61.7%). Other demographic data of patients are shown in Table1 **(Table 1).**

Table 1. Sociodemographic characteristics and habits of patients

Variables		Number (n)	Percentage (%)
Smoking	Yes	16	21.9
	No	57	78.1
Family history	Yes	19	26.0
	No	54	74.0
Medication use	NSAII	25	34.2
	Anti-TNF	48	65.8
Uveitis	Yes	13	17.8
	No	60	82.2
HLA B27 +	Positive	56	76.7
	Negative	17	23.3
S. Pubis involvement	Stage 0	28	38.3
	Stage 1	27	37.0
	Stage 2	8	11.0
	Stage 3	10	13.7

%: Column percentage, NSAIDs: non-steroidal anti-inflammatory drug, TNF: tumor necrosis factor

When patients with and without symphysis pubis involvement radiologically were compared; there was no difference in Body Mass Index (BMI), smoking, family history, uveitis history, HLA-B27 positivity, and medication use (p>0.05; **Table 2**). No difference was observed between the groups in terms of duration of the disease and duration of treatment (p>0.05). For all patients, the average BASFI, BASDAI, BASMI, and M-SASSS scores were 2.6 ± 2.5, 3.1 ± 2.2, 2.1 ± 2.2, and 13.0 ± 11.0, respectively.

The mean age and M-SASSS of those who had symphysis pubis involvement were higher than those without involvement, with significant difference (p=0.026 and p=0.002, respectively). BASDAI and BASMI scores of those who had symphysis pubis involvement were higher than those without the involvement. However, the difference was not statistically significant (p=0.973 and p=0.105, respectively). BASFI score was similar in both groups (Table 3).

Table 2. Comparison of characteristics between the groups according to symphysis pubis involvement

Variables	Symphysis pubis involvement	Yes (n = 45) n (%)	No (n = 28) n (%)	p value
BMI	Normal	19 (61.3)	12 (38.7)	1.000
	Overweight	26 (61.9)	16 (38.1)	
Family history	Yes	9 (47.4)	10 (52.6)	0.225
	No	36 (66.7)	18 (33.3)	
Medication	NSAII	15 (60)	10 (40.0)	1.000
	Anti-TNF	30 (62.5)	18 (37.5)	
Uveitis history	Yes	8 (61.5)	5 (38.5)	0.993
	No	37 (61.7)	23 (38.3)	
HLA B27	Positive	33 (58.9)	23 (41.1)	0.561
	Negative	12 (70.6)	5 (29.4)	
Smoking	Yes	36 (63.2)	21 (36.8)	0.833
	No	9 (56.2)	7 (43.8)	

%: Row percentage, NSAIDs: non-steroidal anti-inflammatory drug, TNF: tumor necrosis factor

Table 3. Comparison of clinical and radiological parameters of groups according to symphysis pubis involvement

Variables	Symphysis Pubis involvement (n = 45)		No pubis involvement (n = 28)		P value
	Mean ± SD	Median	Mean ± SD	Median	
Age	43.9 ± 12.6	43.0 (22-75)	36.9 ± 9.0	38 (16.0-53.0)	**0.026**
Duration of illness	15.9 ± 10.7	15 (0.5-50.0)	12.7 ± 7.3	12.5 (0.8-28.0)	0.304
Duration of treatment	9.8 ± 7.4	8 (0.3-35.0)	6.9 ± 4.3	7.0 (0.5-17.0)	0.146
BASFI	2.5 ± 2.3	1.7 (0.0-7.3)	2.8 ± 2.7	1.5 (0.0-7.5)	0.820
BASDAI	3.2 ± 2.3	2.6 (0.1-8.4)	3.1 ± 2.0	2.6 (0.3-6.7)	0.973
BASMI	2.3 ± 2.1	2.0 (0.0-8.0)	1.7 ± 2.3	1.0 (0.0-8.0)	0.105
M-SASSS	15.9 ± 11.9	10.0 (3-41)	8.4 ± 7.4	6.5 (1.0-29.0)	**0.002**

SD: standard deviation, p: Mann–Whitney's U test, BASFI: Bath Ankylosing Spondylitis Functional Index, BASDAI: Bath Ankylosing Spondylitis Disease Activity Index, BASMI: Bath Ankylosing Spondylitis Mobility Index, M-SASSS: Modified Stoke Ankylosing Spondylitis Spinal Score

Discussion

In AS, symphysis pubis involvement can occur at all stages of the disease. According to the results of our study, symphysis pubis involvement was detected in 61.7% of male patients with AS. In previous studies evaluating symphysis pubis involvement in patients with AS, various radiological staging methods were used, and different results were obtained.

Scott et al. divided symphysis pubis involvement into five stages (0-5) according to the sclerosis-erosion degree and total ankylosis existence. In six of 40 patients with AS, no involvement was detected, whereas 34 (85%) had varying degrees of symphysis pubis involvement [7]. In another study including 68 patients with AS, two of which were female and 66 were male, symphysis pubis involvement was divided into four degrees as follows: minimal irregularity, apparent irregularity, repair, and ankylosis. In this study, grade 3 and 4 symphysis pubis involvement were more prevalent among patients with a disease duration of > 15 years [8]. In a study involving 222 male patients using Modified New York criteria, symphysis pubis was graded similarly to the staging of sacroiliitis and divided into five stages. Symphysis pubis involvement was noted in 47% patients [9]. Upon observing that most of the patients in this study had symphysis pubis involvement at stages 1 and 2 levels, it was thought that this staging detects early-stage radiological changes better. Therefore, we used the same staging method in our study. In our study, we did not have any patient with stage 4 (total ankylosis) involvement. This may be due to the fact that our patients were under active treatment and therefore had low disease activity. In our study, the average age of patients with symphysis pubis involvement was higher than the average age of those without involvement, and this difference was statistically significant. This result may lead to the idea that degenerative changes, which increase with age, can also affect symphysis pubis. However, different results were obtained in various studies. Koo et al. did not find any correlation between symphysis pubis changes and age [9], but in the studies of Wanders et al. [16] and Kormano et al. [17], there was a statistically significant relationship between symphysis pubis changes and age.

One of the most important results of our study was the radiological involvement of symphysis pubis being correlated with vertebral radiological evaluation (M-SASSS). M-SASSS is more sensitive in showing radiological progression of AS compared to Bath Ankylosing Spondylitis Radiology Index (BASRI) and Stoke Ankylosing Spondylitis Spinal Score (SASSS) [16]. Our conclusion suggests that the changes occurring in symphysis pubis can be used to predict vertebral involvement. It is easier and more practical to evaluate symphysis pubis involvement than indexes used to determine vertebral involvement of the disease. Therefore, evaluation of symphysis pubis involvement should be performed in each patient. Only male patients included in our study provided the exclusion of the changes that may occur in symphysis pubis due to pregnancy, birth, and hormonal reasons in female patients and enabled acquiring a more objective evaluation.

There are limited studies comparing the radiological changes in symphysis pubis and radiological changes in vertebrae and BASDAI, BASFI, and BASMI disease evaluation indexes. In our study, we found a medium-level correlation between M-SASSS scores and BASFI, and a strong correlation between M-SASSS scores and BASMI. High M-SASSS scores lead to increased vertebral changes and increased restriction of movement. Therefore, BASFI and BASMI scores were expected to be high. We found BASDAI and BASMI scores of patients with symphysis pubis involvement higher than those of patients without the involvement. However, the difference did not reach statistically significant levels. Use of effective therapeutic agents such as anti-TNF may have suppressed the disease activity. In addition, a subjective assessment method based entirely on the verbal reporting of the patient (BASDAI), may have been suppressed due to the fact that patients were actively receiving treatment. Moreover, the limited role of symphysis pubis in the patient's mobility may have influenced these results.

The strongest aspect of our study was that, in the radiological evaluation of the vertebrae, we used M-SASSS, which is more sensitive than SASSS in showing disease progression. Furthermore, our study became stronger with the addition of clinical follow-up parameters (BASDAI, BASFI and BASMI).

Limitations

The limitation of our study is the retrospective evaluation. Additionally, our patients being those undergoing active treatment and having relatively low disease activity may have affected the results. An evaluation of newly diagnosed patients could have provided more objective findings. In the future, there is need for studies that use radiographic changes as well as MR images to evaluate the early findings in symphysis pubis and axial vertebra, the active inflammatory lesions, enthesitis and that compare these with clinical parameters.

Conclusion

Symphysis pubis involvement is frequently observed in patients with AS. Changes in symphysis pubis are closely related to vertebral involvement. Therefore, we believe that the changes that occur in symphysis pubis can be used to predict vertebral involvement. Although symphysis pubis changes did not appear to be associated with clinical parameters, we believe that, for the clarification of this, there is need for prospective studies with larger patient groups in which the radiological evaluations are performed with more detailed and different imaging methods and in which the disease activity level is evaluated together with laboratory parameters.

Conflict of interest: The authors declare that they have no conflict of interest.

Author Contributions		Author Initials
SCD	Study Conception and Design	AB, MR, HR
AD	Acquisition of Data	AB, MR
AID	Analysis and Interpretation of Data	AB, MR
DM	Drafting of Manuscript	AB, HR
CR	Critical Revision	MR, HR

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