

CLINICAL STUDY

Age-related diseases; degenerative aortic valve disease and osteoarthritis

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Abstract: *Objective:* To examine the relationship between degenerative aortic valve disease and osteoarthritis
Background: Degenerative aortic valve disease (DAVD) and osteoarthritis (OA) are age-related degenerative diseases whose pathogenesis involves mechanical stress and local inflammation.

Methods: Forty-four patients with DAVD (Group 1) and 21 controls (Group 2) were included in this study, which was intended to investigate the similarity between the two conditions. The two groups were similar in terms of age, sex, body mass index, a history of hypertension, cholesterol levels, diabetes mellitus and cigarette consumption.
Results: The average age + standard deviation of the DAVD patients were 71.3±7.5, compared to 67.5±10.6 in the control group. In radiological OA analysis, the Lane scale was employed in the lumbar region and the Kellgren-Lawrence scale in the knee joint. Comparison of Groups 1 and 2 revealed no difference in radiological OA in the lumbar region and knee joint.

Conclusion: Our study has shown that there is no relationship between these diseases that increased with age. However, extensive studies examining pathogenic mechanisms are needed (Tab. 2, Ref. 11). Full Text in free PDF www.bmj.sk.

Key words: degenerative aortic valve disease, osteoarthritis, age-related diseases.

Degenerative aortic valve disease (DAVD) is today regarded as the main cause of aortic valve problems. Fibrosis, thickening and spot calcification levels in the aortic valves of 48 % after the age of 85 and 21–26 % after the age of 65 may be observed (1–4). Osteoarthritis (OA) is the most frequently observed cause of arthritis across the world. Prevalence rises to 10 % of men and 20 % of women aged 45–65 and to more than 50 % of women aged 85 and over. Radiological prevalence surveys suggest even higher rates than this, with a possibility of OA being present at X-ray in more than 50 % of people over the age of 65, and almost universally after 85 (5). The aging process is associated with an increasing prevalence of DAVD and degenerative OA, but it is unclear whether these two conditions are related.

This is the first study to investigate a significant correlation between DAVD and OA as assessed using radiological grading.

Materials and methods

The study was performed by the Karadeniz Technical University Medical Faculty Physical Medicine and Rehabilitation

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Department and Cardiology Department, with the approval of the local ethics committee.

Study patients

The patients included in the study consisted of cases with DAVD receiving echocardiography at the Cardiology polyclinic (Group 1) and subjects without DAVD (Group 2). Patients were analysed in terms of lumbar and knee radiological OA levels. Patients with rheumatic and congenital valve problems, calcium and phosphorus metabolism defects, chronic renal insufficiency, Paget's disease, hyperparathyroid and a history of major trauma were excluded.

Risk Factors

The risk factors considered in this study were age, gender, body mass index (BMI), a history of hypertension (HT), cholesterol levels, diabetes mellitus (DM) and a history of cigarette smoking. We described patients as smokers if they reported a daily habit of 10 cigarettes a day or more for at least one year during the previous 10 years. High systolic and diastolic blood pressure (140/90mm/hg) or receiving antihypertensive treatment was used as the criterion for determining hypertension. For hypercholesterolemia, a criterion of a total cholesterol level above 200 mg/dl or the use of a lipid reducing agent during EKO was employed. DM was defined as hyperglycaemia requiring previous or ongoing pharmacological therapy

Echocardiography

All echocardiographic studies were performed using an HP SONOS 5500 machine (Philips Medical Systems, Andover, MA,

Tab. 1. Patient characteristics.

		Group 1* (n=44)	Group 2† (n=21)	<i>p</i>
Gender	Men	16(36.4%)	7(33.3%)	0.813
	Women	28(63.6%)	14(66.7%)	
Age (years)		71.3±7.5	67.5±10.6	0.157
Body mass index (kg/m ²)		28.2±3.09	26.4±3.8	0.052
Smokers (%)		12(27.3%)	5(23.8%)	0.768
Systemic hypertension (%)		32(72.7%)	14(66.7%)	0.618
Diabetes mellitus (%)		11(25%)	6(28.6%)	0.761
Total cholesterol (mg/dl)		195.6±39.7	195.6±37.3	0.999
LDL cholesterol (mg/dl)		131.3±34.1	125.8±30.8	0.533
C-reactive protein		0.6±0.5	0.5±0.4	0.593

Data are presented as the mean value ± SD or number (%) of patients

*Patients with degenerative aortic valve disease

†Subjects without degenerative aortic valve disease

USA) with a 2.5-MHz transducer. Patients were examined in the left lateral recumbent position using standard parasternal short- and long-axis and apical views. The echocardiographic criterion for aortic calcification was taken as the presence of bright echoes located in at least one of the aortic cusps or annulus. Images were recorded on VHS cassette, and two echocardiographers blinded to the patients' clinical and laboratory data interpreted each echocardiographic examination independently. Patients with pure calcification were included in the study, but those with rheumatic valvular disease and bicuspid aortic valve were excluded.

Radiological analysis

The grading developed by Lane et al. was used in the radiological analysis of patients' lumbar regions. In this grading, the distance between every disc from Lumbar (L) 1 to 5 was classified separately as 0, 1, 2 or 3 according to the relevant narrowing and osteophytic formations. An average grade was determined for every level of narrowing and osteophytic formation in the disc space (6). The Kellgren-Lawrence scale was used for knee OA grading. The Kellgren-Lawrence grading ranges from 0 to 4 according to knee OA osteophytes and joint space. Data were analysed using SPSS software version 10.0. Numerical values are reported as mean plus or minus SD or as a proportion of the sample size. The Mann-Whitney U- and chi-square tests were used for statistical analysis. In all analyses, a *P* value <0.05 was considered to be statistically significant

Results

The average age of the 44 patients with DAVD (Group 1) was 71.3±7.5, and that of the 21 non-DAVD patients (Group 2) was 67.5±10.6 (mean±SD). The two groups were similar in terms of the determined parameters; age (*p*=0.157), gender (*p*=0.813), BMI (*p*=0.052), a history of HT (*p*=0.618), DM (*p*=0.761), total cholesterol (*p*=0.999), LDL cholesterol (*p*=0.533) and C-reactive protein (*p*=0.593). The characteristics of the study groups are listed in Table 1.

Tab. 2. Group comparisons.

		Group 1(n=44)	Group 2 (n=21)	<i>P</i>
Lumbar disc space grade		Median (min-max)	Median (min-max)	
Lumbar 1–2	Osteophytes	1(0–3)	1(0–3)	0.889
	narrowing	1(0–3)	1(0–3)	0.649
	grade	1(0–2)	1(0–2)	0.674
Lumbar 2–3	osteophytes	1(0–3)	1(0–3)	0.584
	narrowing	1(0–3)	1(0–3)	0.843
	grade	1(0–2)	1(0–2)	0.799
Lumbar 3–4	osteophytes	1(0–3)	1(0–3)	0.785
	narrowing	1(0–3)	1(0–3)	0.515
	grade	1(0–2)	1(0–2)	0.627
Lumbar 4–5	osteophytes	1(0–3)	1(0–3)	0.813
	narrowing	1(0–3)	1(0–3)	0.900
	grade	1(0–2)	1(0–2)	0.844
Lumbar 1–4	grade	1.25(0–2)	1.25(0–2)	0.837
Knee osteoarthritis grade				
Right knee grade		2(0–4)	2(0–4)	0.886

No statistical significance was determined when we compared narrowness and osteophytic formations in the lumbar region disc space. Lumbar region radiological OA examination revealed no statistically significant difference between the groups; L 1–2 grade (*p*=0.674), L 2–3 grade (*p*=0.799), L 3–4 grade (*p*=0.627), L 4–5 grade (*p*=0.844) and L 1–4 grade (*p*=0.837) (Tab. 2). Neither was any correlation determined between the groups at additional right knee radiological examination (*p*=0.886).

Discussion

Aortic stenosis (AS) is currently the most frequent valvulopathy in developed countries and as life expectancy increases, the incidence and prevalence of AS will also rise fundamentally at the expense of the degenerative form. Among the risk factors for DAVD are age, male gender and a history of HT. Another significant risk factor is cholesterol. But the most important risk factor of all is age (doubling for each decade). More than being just a risk factor, age appears to be a precondition for the development of degenerative aortic valve problems (8, 9). The aortic valve is the valve mostly subjected to mechanical stress. Additionally, it has recently been found that so-called chronic degenerative valvular AS is an active process and that histological valve changes are predominantly inflammatory (10).

OA is a common disease of the musculoskeletal system affecting the articular cartilage. It is the most common form of arthritis. Among its risk factors are age, gender, obesity and occupational factors (11). Age is a precondition in both diseases. At the same time, mechanical stress and local inflammation progression play a role in the pathogenesis of both OA and DAVD (10, 12).

We found no studies investigating the correlation between these two conditions in literature. We determined no significant

difference in terms of radiological OA identified in the lumbar region and knee in the groups, which we matched in relation to age, gender, BMI, a history of HT, cholesterol levels, DM and a history of cigarette smoking. These two conditions appear to be independent ones, in which age is a significant risk factor.

Study limitations

We did not use the digitised method to identify DAVD. This could have caused a verification bias and might have affected reproducibility in identifying DAVD. The qualitative “eyeball” method is the one currently adopted in everyday clinical echocardiographic practice. At the same time, no data regarding subjects’ past BMIs were available. Additionally, OA is diagnosed through a combination of clinical history, patient examination, and x-rays. However, radiological examination is insufficient by itself for OA severity.

Conclusion

Our study determined that cases with radiological OA or DAVD were similar to the normal population. However, radiological OA examination on its own does not appear to be sufficient in diagnosing OA. There is a need for molecular, immunohistological and genetic studies to investigate the common mechanisms in the pathologies of the two diseases.

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