Original Article / Özgün Araştırma

Analysis of Patients Who Applied to Our Clinic with Aortic Dissection: A Five-year Experience

Kliniğimize Başvuran Aort Diseksiyonlu Hastaların Analizi: Beş Yıllık Deneyim

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Abstract

Objective: Although acute aort dissection (AAD) is quite difficult to be diagnosed in the emergency department, the mortality of it is very high. Therefore, the purpose of our study is to discuss the evidence of demographic characteristics, clinical, laboratory of the AAD patients who applied to emergency department over mortality.
Materials and Methods: In our research including 73 patients with AAD diagnosed whom admitted to emergency department on January 2010-October 2015. Sex, age, presenting complaints, past medical history, arterial blood pressure, pulse, laboratory tests, transthoracic echocardiography (TTE), thoracoabdominal computerized tomography (CT), mortality and DeBakey type have been recorded on patient information form. Statistical analysis was performed in IBM SPSS Statistics Version 22.0 software package. The comparison between the two groups of data Pearson chi-square, Fisher's exact and chi-square tests were used for statistical analysis of trends. P<0.05 was considered statistically significant.
Results: Fourty seven patients (64.4%) were male and 26 (35.6%) were women. In the background of the patients it was identified hypertension as the most common rate of 68.5%. The most common complaints identified were chest pain (53.4%) and back pain (42.5%). It has been determined 68 (93.1%) patients to whom CT have scanned and 27 out of 42 (64.3%) patients to whom TTE have scanned were found to have AAD. According to the DeBakey classification, 31 (42.5%) were DeBakey type 1, 18 (24.7%) DeBakey type 2 and 24 (32.9%) DeBakey type 3 as the AAD.
Conclusion: Aortic dissection is still a highly mortality disease. The most important condition to reduce the mortality was thought the early diagnosis and the appropriate surgical intervention.

Keywords
Acute aortic dissections, emergency room, mortality, DeBakey classification

Anahtar Kelimeler
Akut aort diseksiyonu, acil servis, mortalite, DeBakey sınıflaması

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Öz

Amaç: Akut aort diseksiyonu (AAD) acil serviste tanısı oldukça zor konulmasına rağmen mortalitesi çok yüksek bir hastalıktır. Bu nedenle, acil tıp kliniğine başvuran AAD tanılı hastaların demografik özellikleri, klinik, laboratuvar ve radyolojik bulgularının mortalite üzerine etkilerini araştırmayı amaçladık.
Gereç ve Yöntemler: Çalışmamızda Ocak 2010 ile Ekim 2015 tarihleri arasında acil tıp kliniğinde AAD tanısı konulan ve çalışmaya dahil edilen 73 hasta geriye dönük incelendi. Yaş, cinsiyet, başvuru şikayetleri, özgeçmişleri, arteriyel kan basınçları, nabız sayısı, istenilen laboratuvar tetkikleri, transtorasik ekokardiyografi (TTE), kontrastlı torakoabdominal bilgisayarlı tomografi (BT) mortalite ve diseksiyon tipi

(DeBakey sınıflaması) tipi daha önceden oluşturulmuş hasta bilgi formuna kayıt edildi. İstatistiksel analizler IBM SPSS Statistics Version 22.0 paket programında yapıldı. Verilerin gruplar arasında karşılaştırılmasında Pearson ki-kare, Fisher'in kesin testi ve ki-kare trend istatistiksel analizleri kullanıldı. P<0,05 istatistiksel olarak anlamlı kabul edildi.

Bulgular: Kırk yedisi (%64,4) erkek, 26'sı (%35,6) kadındı. Hastaların özgeçmişlerinde en sık hipertansiyon (%68,5) saptandı. En sık başvuru şikayetlerinin göğüs ağrısı (%53,4) ve sırt ağrısı (%42,5) olduğu belirlendi. Kontrastlı BT çekilen 73 hastanın 68'inde (%93,1), TTE yapılan 42 hastanın 27'sinde (%64,3) AAD olduğu saptandı. DeBakey sınıflamasına göre 31'i (%42,5) DeBakey tip 1, 18'i (%24,7) DeBakey tip 2 ve 24'ü (%32,9) DeBakey tip 3 AAD olarak tespit edildi.

Sonuç: Aort diseksiyonu halen mortalitesi yüksek bir hastalıktır. Bu hastalara acil serviste erken tanı koyulmalı ve en kısa sürede tedavilerine başlanmalıdır. Çalışmamıza göre, mortaliteyi azaltan en önemli faktörler erken tanı ve uygun cerrahi müdahaledir.

Introduction

Acute aortic dissection (AAD) is the most dramatic of the life-threatening states. Aortic dissection which is defined as the separation of the media layer of the aorta from the intima layer along the long axis is one of the real cardiovascular emergencies with high mortality and morbidity which requires fast diagnosis and treatment (1). In addition to its sudden emergence, it is also deadly unless proper diagnosis and treatment methods are not applied in a short period of time. Mortality in the first 14 days varies between about 80-90% for DeBakey type 1 and type 2 AADs in case diagnosis cannot be made or only medical treatment is applied. Mortality per hour is indicated as 1-3% during the first two days (2).

There are many etiologic and predisposing factors that result in damage and dissection in the intima and media layers of the aorta. However, there are seven headings which are currently accepted. These are congenital anomalies, medial degenerative disease, hypertension, pregnancy, atherosclerosis, inflammatory diseases and trauma (3). According to the definition by DeBakey and other researchers, dissection is accepted as acute during the first 14 days from its onset, subacute between the 15th day-two months and chronic after two months (4).

Clinical suspicion is undoubtedly the most important step for the diagnosis of aortic dissection which is one of the leading life threatening emergent cardiovascular diseases. Telecardiography is a method that should be used primarily together with anamnesis and physical examination, however its diagnostic specificity is quite low (5).

The classical clinic of aortic dissection is defined typically as; sudden, intensive chest pain that spreads out towards the neck and the chin (6). However, not all patients apply with these predefined complaints; it has been stated that 5-15% of these subjects do not define any pain and those that have pain frequently do not have the classical symptoms (7-9). Diagnosis of the disease is delayed when there are no classical symptoms thus resulting in an increase in mortality (7). Many aortic dissection cases have been reported who have applied with various symptoms and findings but with no pain. These cases generally apply with cardiac or neurological complaints. Congestive heart failure vena cava superior syndrome, paraplegia, syncope, repeating transient ischemic attacks, temporary loss of motor and sense in the legs along with hoarseness are among painless AAD complaints (7,10-15). Atypical presentations may delay the diagnosis of this disease.

The objective of this study was to evaluate the demographic properties, clinical findings and diagnostic parameters for the patients diagnosed with AAD at the emergency clinic of our hospital and to examine the factors accompanying mortality in the accompaniment of relevant literature.

Materials and Methods

Study Design

The study was carried out between January 2010-October 2015 at the İzmir Atatürk Training and Research Hospital Emergency Service with the retrospective examination of the archive records of 82 patients diagnosed with AAD. Trauma patients, patients under the age of 18, and 9 patients for which i.v. contrast thoraco-abdominal tomographies were taken outside the service have been excluded. Ethical council approval was not taken since it was a retrospective study.

Data Acquisition

Age, gender, past medical history of the patients, complaints at the time of application (chest pain, back pain, abdominal pain, syncope, dizziness etc.), pulse and systolic-diastolic blood pressures, whether there is a flap or not in transthoracic echocardiography

(TTE) were recorded. Among the laboratory results, hemoglobin (HGB), mean corpuscular volume (MCV), platelet (PLT), D-Dimer, Troponin I values were recorded. Hemogram; Mindraybc 6800, D-Dimer; Acltop 700, Troponin I were studied via ADVIA Centaur CP devices. Computerized tomography was asked from 68 patients in order to evaluate the existence of the dissection and its localization. The computerized tomography brand we used was Toshiba Aquilion 64-multidetector tomography. Dissection types were classified in accordance with DeBakey classification (DeBakey classification; type 1 dissection; spread out to all the aorta, type 2 dissection; only at the ascending aorta, type 3 dissection; only at the descending aorta). Systolic blood pressure was classified into three groups when evaluating the vital findings of the patients as; low (<90 mmHg), normal (90-139 mmHg), high (≥140 mmHg). Diastolic blood pressure was classified into three groups as; low (<60 mmHg), normal (60-89 mmHg), high (≥90 mmHg). Pulse was classified into three groups as; low (<60/min), normal (60-99/min.), high (≥100/min). HGB value was classified into two groups as; low (<11 g/dL), normal (11-16 g/dL), MCV into three groups as low (<80 fL), normal (80-100 fL), high (>100 fL), PLT into three groups as low (<100 K/µL), normal (100-300 K/µL), high (≥300 K/µL). Troponin I was evaluated as negative (<0.06 ng/mL), positive (≥0.06 ng/mL); D-Dimer as negative (<232 ng/mL), positive (≥232 ng/mL).

Statistical Analysis

All statistical analyses were performed using Statistical Package for the Social Sciences version 17.0 (IBM Corp. Armonk, NY, USA). The categorical data are presented as frequencies and percentages. Normality analysis was done either by Kolmogorov-Smirnov or Shapiro-Wilk tests. The continuous data were non-normally distributed; thus, they are presented as medians with interquartile ranges. Chi-square test or Fisher's exact test (when the expected cell counts were low for chi-square test) were used for the comparison of categorical variables between alive and mortality groups. A p value <0.05 was considered statistically significant.

Results

It was determined as a result of the retrospective analysis of computer records that 82 of the patients who applied to the emergency department during January 2010-October 2015 were diagnosed with aortic dissection. Nine of these patients were excluded since they were diagnosed at another hospital and some of their data were missing.

Of the patients, 47 (64.4%) were male and 26 (35.6%) were female.

When the patients were classified as under 40, between 40-60 and above 60 years of age, the highest ratio was observed in the above 60 years of age with 47.9%.

When the backgrounds of the patients were evaluated, hypertension was observed to be the most frequent disease (68.5%) (Table 1).

When the anamneses of AAD patients were examined, it was observed that the most frequently stated descriptions were chest pain (53.4%), back pain (42.5%) and abdominal pain (11%) (Table 1). However, it was also observed that the patients were also applied to the emergency department with atypical complaints such as loss of strength, waist pain, side pain (Table 1).

Hypertension was determined in 38 (52.1%) patients in systolic blood pressure measurements even though the values of 29 (39.7%) patients were normal. Whereas diastolic blood pressure was at normal limits

Table 1. Distribution of the cases according to gender, age, history and arrival complaint

		n	%
Gender	Male/female	47/26	64.4/35.6
History	Diabetes mellitus	8	11.0
	Coronary disease	12	16.4
	Hypertension	50	68.5
	Other	6	8.2
	Stroke	3	4.1
Arrival complaint	Chest pain	39	53.4
	Abdominal pain	8	11.0
	Waist pain	1	1.4
	Side pain	1	1.4
	Dispne	7	9.6
	Syncope	6	8.2
	Back pain	31	42.5
	Loss of strength	1	1.4
Age	>40	5	6.8
	40-60	33	45.7
	<60	35	47.9

in 50 (68.5%) patients, it was determined to be high in 16 (21.9%) patients. Pulse values were determined to be within normal limits for 58 (79.5%) patients. Median systolic blood pressure was evaluated as 140 (108-165) mmHg, diastolic blood pressure as 72 (60-84,5) mmHg, pulse as 80 (65.5-89.5)/min.

When the laboratory results of the patients were evaluated, median values for HGB, MCV, and PLT were 13 (11-14) g/dL, 85 (81-90) fL, and 207 (174.5-246.5) K/mL, respectively. Highest number of patients were determined to be within normal limits in these three examinations. HGB was within normal limits in 62 (84.9%) patients, MCV in 59 (80.8%) patients and PLT in 65 (89%) patients.

A positive result was determined for 9 (16.7%) of the 55 patients for which Troponin I was examined. A positive result was determined for 21 (84%) of the 25 patients for which D-Dimer was examined (Table 2). Median Troponin I and D-Dimer were 0.014 (0.012-0.043) and 1041 (632.5-2709), respectively.

IV contrast thorax abdominal computerized tomography was applied on 73 patients diagnosed with AAD and 68 (93.1%) were diagnosed with aortic dissection. Flap appearance was observed in 27 (64.3%) of the 42 patients subject to TTE (Table 3).

Type 1 AAD was observed most frequently according to DeBakey classification in the patients included in our study (Table 3).

It was determined that 22 (37.8%) of the 73 patients monitored by the cardiovascular surgery department of our faculty were exitus.

No statistically significant difference in mortality rates was determined between the groups regarding age, sex, vital signs and laboratory parameters except the diastolic blood pressure (Table 4). There was a statistically significant difference in mortality rates between the groups regarding three diastolic blood pressure groups (p=0.03). When the three groups were compared in pairs, this difference was between low and normal diastolic blood pressure groups (p=0.003).

Table 2. Blood pressure, pulse rate, hemoglobin, mean corpuscular volume, platelet, Troponin and D-dimer findings of the patients

		Number of patients	Patient percentage	Mean ± SD	Min-Max
Systolic Blood Pressure	Low (<90 mmHg) Normal (90-140 mmHg) High (>140 mmHg)	6 36 31	8.2 49.3 42.5	138.19±37.45	50-220
Diastolic Blood Pressure	Low (<60 mmHg) Normal (60-90 mmHg) High (>90 mmHg)	7 57 9	9.6 78.1 12.3	74.01±17.44	30-120
Pulse Rate	Low (<60/minute) Normal (60-100/minute) High (>100/minute)	7 58 8	9.6 79.5 11.0	80.18±17.66	46-128
HGB	Low (<11 g/dL) Normal (11-16 g/dL)	11 62	15.1 84.9	12.42±1.93	8-17
MCV	Low (<80 fL) Normal (80-100 fL) High (>100 fL)	13 59 1	17.8 80.8 1.7	84.95±6.78	66-104
PLT	Low (<100 K/mL) Normal (100-300 K/mL) High (400 K/mL)	1 65 6	1,4 90.3 8.3	216.46±70.24	95-495
Troponin	Negative (<0.06 ng/mL) Positive (>0.06 ng/mL)	6 49	10.9 89.1	0.36±1.68	0-12
D-Dimer	Negative (<232 ng/mL) Positive (>232 ng/dL)	4 21	16.0 84.0	2066.74±2342.44	0.6-8761

HGB: Hemoglobin, MCV: Mean corpuscular volume , PLT: Platelet, SD: Standard deviation, Min: Minimum, Max: Maximum

Discussion

AAD is a condition that has high mortality and morbidity risks which requires fast diagnosis and treatment. It is not difficult to diagnose in case of a suspicion (16). However, aortic dissection does not come to mind during the first evaluation when there are no typical aortic dissection symptoms thereby increasing the time between the onset of the symptoms and diagnosis thus increasing the mortality rate (7). Mortality rate increases by 1% for each hour during the 48 hours following the onset of the symptoms when treatment is not started (10).

AAD is observed more frequently in males in comparison with females (17). This ratio was determined as 7 for our country during a study carried out by Yıldırım et al. (17) and the result obtained in our study was in accordance with the relevant literature with a value of 1.8.

A review of data of 464 patients from the International Registry of AAD reported a mean age at presentation of 63 years, with almost male predominance (65%) (18,19).

The most important predisposing factor for AAD is hypertension. Hypertension results in both mechanical and metabolic load for aorta. It has been determined in many studies carried out that AAD is observed more frequently in individuals with malign hypertension (3,20-22). Hypertension was observed in the history of 50 (68.5%) patients included in our study.

Chest pain was described as the most frequent complaint for aortic dissection. Spittell et al. (8) reported that the most common symptom was sudden onset of severe chest pain (74%) who had

Table 3. Contrast enhanced thoracoabdominal computerized tomography findings of the patients, flap appearance in echocardiography and distribution according to DeBakey classification

		Number of examined patients	Number of AAD detected patients	%
CT finding		73	68	91.3
Flap appearance in TTE		42	27	64.3
DeBakey	Type 1	31		42.5
	Type 2	18		24.7
	Type 3	24		32.9

AAD: Acute aortic dissection, CT: Computed tomography, TTE: Transthoracic echocardiography

Table 4. Mortality rates of patients according to gender, hemoglobin, mean corpuscular volume, platelet, D-dimer and Troponin I values

		Number of patients	Mortality	Percentage	p
Male		47	15	31.9	>0.05
Female		26	7	26.9	>0.05
HGB	Low (<11 g/dL)	11	3	27.3	>0.05
	Normal (11-16 g/dL)	62	19	30.6	>0.05
MCV	Low (<80 fL)	13	1	7.7	>0.05
	Normal (80-100 fL)	59	20	33.9	0.024
	High (>100 fL)	1	1	100.0	>0.05
PLT	Low (<100 K/µL)	1	1	100.0	>0.05
	Normal (100-300 K/uL)	65	18	27.7	>0.05
	High (>300 K/µL)	6	2	33.3	>0.05
Troponin I (n=55)	Negative (<0.06 ng/mL)	6	1	16.7	>0.05
	Positive (>0.06 ng/mL)	49	16	32.7	>0.05
D-Dimer (n=25)	Negative (<232 ng/mL)	4	0	0	>0.05
	Positive (>232 ng/mL)	21	7	33.3	>0.05

HGB: Hemoglobin, MCV: Mean corpuscular volume, PLT: Platelet

studied the symptoms of patients with AAD in their studies. Armstrong et al. (9) reported the incidence of patients describing chest pain alone as 41%, and found the rate of those describing chest and/or back pain as 72%. In our study, it was determined that chest pain (53.4%) and back pain (42.5%) were the most common complaints. Similarly, in the study of Yeşilaras et al. (22), it was found that back pain (40.7%) and chest pain (36.2%) were the most common complaints.

In our study, it was determined that syncope developed in 8.2% of the patients. The most important reasons for having syncope in patients with AAD are aortic rupture, acute hemopericardium leading to cardiac tamponade, and acute neurological complications, and the in-hospital mortality of patients with this complaint is high (23). The fact that patients do not define pain is a factor that makes aortic dissection diagnosis difficult and delays the treatment of the patient. The reported painless aortic dissection rate in the literature ranges between 5-15% (7,11,12,14). Recent studies revealed that indicators of the inflammatory reaction white blood cells, PLTc and D-dimer level, are closely associated with clinical outcomes in aortic events (24-30). D-dimer and PLT values along with clinical outcomes were statistically insignificant in our study.

Ecocardiography is a non-invasive examination that should definitely be applied on these patients. Sensitivity of dissection with respect to the anatomic localization of dissection was 35-80% and selectivity was 39-96% in dissection diagnosis (31,32). This might indicate left ventricle function as well as aortic insufficiency, existence of flap and thrombus in the aorta, pericardial effusion and ventricle wall anomalies. The existence of flap supports the diagnosis in type 1 and type 2 patients; however, its lack does not negate the diagnosis. It is important to examine whether there is aortic valve manifestation and insufficiency or not. It is especially required for the planning of the treatment to give aortic valve replacement decision. TTE was applied on only 42 (57.5%) of the AAD patients in our study and AAD was determined only in 27 (64.2%).

Transesophageal echocardiography (TEE) is an examination method that is frequently used recently and its diagnostic accuracy is about 100% (33,34). It was determined that the TEE method with a sensitivity of (99%) and specificity of (98%) especially in proximal dissections is not used during emergency conditions (31). TEE is not applied in our clinic as well under emergency conditions.

Contrast enhanced computerized thoracoabdominal angiography was applied on 73 patients and was classified into three main groups according to DeBakey classification. Accordingly, 31 (42.5%) of 73 patients were DeBakey type 1, 18 (24.7%) were DeBakey type 2 and 24 (32.9%) were DeBakey type 3 AAD. In accordance with our results, it is put forth in the relevant literature that the ratio of DeBakey type and type 2 dissections to all dissections is 2/3, whereas the ratio of type 3 dissections is 1/3 (35-37).

Treatment of type 1 and type 2 dissections is surgery without a doubt. There is no difference between surgical treatment and medical treatment for acute type 3 dissections excluding complicated cases (38). If there is no compelling cause in acute type 3 dissections (mesenteric or renal nutritional disorder, extremity ischemia, risk of rupture), medical treatment should be preferred since surgical treatment has no superiority over medical treatment in the short period (38). Surgery was not applied on 17 such patients with no compelling causes and they were discharged after medical follow up decision.

Despite improvements in diagnosis, management, and surgical or endovascular repair techniques, AAD remains a catastrophic event that still carries a high in-hospital mortality rate. In this analysis of 360 consecutive patients who had AAD, the overall hospital mortality rate was 21.4%, which was within the range (between 20% and 30%) obtained from other recent single-centre studies (39,40). In our study, 22 of our patients (30.1%) were exitus. It has been determined in a study carried out by Hirst et al. (35) on patients aged 70 and above with distal type, malperfusion complication and rupture AAD patients that mortality is higher.

Variables such as age, gender, systolic and diastolic blood pressures, pulse rates, laboratory examinations (MCV, PLT, HGB, D-Dimer, Troponin I), dissection types which were thought to be effective on the mortalities of the patients included in our study were evaluated via statistical tests. It was determined that these variables made no statistically significant difference (except the diastolic blood pressure) on the mortality rate.

Study Limitations

Our limitation had several limitations. One of these was that our study was single centered, another was that it was retrospective and the final limitation was that our records were insufficient for a more comprehensive study.

Conclusion

The fact that aortic dissection is still a disease with a high mortality rate requires that the patients should be evaluated rapidly after they apply to the emergency department as well as early diagnosis and treatment application. Satisfactory results were not obtained in our study regarding the survival of our patients based on the routine laboratory examinations used in the emergency department and vital findings. It may be a proper approach to wait for the laboratory findings for imaging examinations in case of a suspicion.

Ethics

Ethics Committee Approval: Retrospective study.

Informed Consent: Retrospective study.

Peer-review: Externally and internally peer-reviewed.

Authorship Contributions

Concept: Z.K., M.B.A., P.Y.A., F.E.T., Design: Z.K., M.B.A., G.C.Y., Data Collection or Processing: Z.K., M.B.A., U.P., S.B., Analysis or Interpretation: M.B.A., P.Y.A., F.E.T., G.C.Y., Literature Search: Z.K., M.B.A., U.P., S.B.

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