



Prevalence and mortality rate of arterial aneurysm and dissection in yazd, iran; a cross-sectional study between 2011 and 2017

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Abstract

Objectives: An aneurysm or aortic dissection occurs when the walls of the blood vessels lose their initial strength, resulting in a middle layer gap between elastic and smooth muscle fibers. Approximately 95% of individuals with an aneurysm indicate no symptoms until a rupture occurs, which is life-threatening.

Methods: The current research is a cross-sectional study carried out on 100 patients who were hospitalized in Shahid Sadoughi and Afshar hospitals in Yazd, Iran, with confirmed diagnoses of arterial aneurysm or dissection between 2011 and 2017. Individuals with aneurysms caused by dialysis-related shunts were not included. The study evaluated demographic and clinical factors along with their respective outcomes. Data analysis was performed utilizing SPSS software version 17 through chi-square and Fisher exact tests.

Results: Seventy-one patients (71%) were male, and patients aged over 60 accounted for approximately 53%. Abdominal aortic aneurysm was the most prevalent at 27%. The aneurysm was located in the Femoral artery in 23% of patients and in the ascending aorta artery in 12%. Dissection was diagnosed in 27% of patients, all of which occurred in the aortic artery. Coronary artery disease was reported by 41 patients (60.3%). The distribution of patient outcomes based on the location of the aneurysm and dissection was statistically significant (p value: 0.002).

Conclusions: The characteristics of the arterial aneurysm population in our findings were similar to previous studies. Coronary artery disease was the most prevalent comorbidities, and men's gender was dominant. Also, the abdominal aortic and femoral artery was the most prevalent location of aneurysm.

Keywords: dissection, outcome, death, aortic disease, aortic aneurysm, peripheral artery disease

Introduction

The diseases of the aorta are classified into two categories: aneurysm and aortic dissection (1). An aneurysm or aortic dissection occurs when the walls of the blood vessels lose their initial strength, resulting in a middle layer gap between elastic and smooth muscle fibers, leading to an increase of at least 50% in the artery diameter (2, 3). The occurrence of this condition in the general population is between 4 to 6 per 1,000 individuals, with a higher incidence in individuals over 65, reaching approximately 30 cases per 1,000 people (4). In the United States, about 13,000 people die each year due to aneurysmal causes, contributing to 18th place in global mortality. Mortality from aneurysms is estimated to be between 65 to 90 percent (6). Most individuals with a hereditary predisposition to this disease are in 6th decade of their life, while those with non-genetic causes are in the 7th (2). Risk factors related to aneurysms include genetics, male gender, pregnancy, cardiovascular diseases, hypertension, smoking, hyperlipidemia, obesity, and Marfanism syndromes (5). Aneurysms are classified based on their location, morphology, and the timing of clinical manifestation (4), in which Abdominal aortic aneurysm is the most common type (6). Approximately 95% of individuals with an aneurysm indicate no symptoms until a rupture occurs. A ruptured aneurysm may present with symptoms such as difficulty breathing, chest pain, blood pressure drops, and hemorrhagic shock, which is life-threatening (3). Diagnosis of an aneurysm without symptoms often relies on imaging studies, and its rupture can lead to life-threatening complications affecting adjacent organs (7). Given that patients with arterial aneurysms face significant mortality and morbidity, identifying contributing factors and taking preventive measures can be crucial to mitigate immediate mortality rates. Therefore, we aimed to investigate the prevalence of arterial aneurysms in our urban population, considering predisposing factors, to gather comprehensive information and implement measures to reduce the occurrence and impact of this disease and its associated complications.

Materials and Methods

The current study is a cross-sectional study conducted on 100 patients admitted to the Shahid Sadoughi and Afshar hospitals in Yazd, Iran, with documented diagnosis of arterial aneurysm or dissection from

years 2011 to 2017. The study included patients with documented diagnoses of arterial aneurysm or dissection, conveniently chosen. Individuals with dialysis-related shunt as the cause of their aneurysm were excluded. It is noteworthy that pseudoaneurysm samples from the reference study were also included. This study has received ethical approval from the Ethics Committee of Shahid Sadoughi University of Medical Sciences, Yazd, Iran. The ethical principles based on the Helsinki Declaration were considered in this study. The demographic variables included age, gender, and clinical variables such as Background diseases, location of aneurysm, and outcome. In this study, cardiovascular diseases such as myocardial infarction, coronary artery bypass surgery, valvular heart diseases, and hypertension were considered. Chronic diseases such as diabetes, renal diseases, thyroid disorders, and hyperlipidemia were also documented in the clinical records of patients. Age was categorized into three qualitative factors: less than 40, 40 to 60, and more than 60. The anatomical locations of aneurysms included abdominal aortic aneurysm, ascending aortic aneurysm, coronary artery aneurysm, iliac artery aneurysm, aortic root aneurysm, and left ventricular outflow tract pseudoaneurysm. Chronic aortic dissection was also considered, along with pseudoaneurysms of the celiac artery, subclavian artery, and renal artery. The researchers used hospital records to gather the data, including completing a checklist.

Additionally, the researchers attempted to obtain information on the immediate mortality status through personal contact with individuals or their companions using the contact number available in the hospital records. The data were analyzed using SPSS software version 17. Qualitative factors were presented as counts and percentages, while quantitative factors were reported as mean and standard deviation. Ultimately, statistical analyses were performed using Chi-square and Fisher exact tests. A significance level of $P < 0.05$ was considered.

Results

From 100 patients participated in the study, 71 (71%) were male, and 29 (29%) were female. Patients more than 60 years old concluded about 53% of the patients. Abdominal aortic aneurysm with the frequency of 27 patients (27%) was most prevalent. The location of aneurysm in 23 (23%) patients was Femoral artery, and in 12 patients (12%), it was ascending aorta artery.

Table 1. Baseline and clinical characteristics of studied patients

Characteristics	N	%
Gender		
Male	71	71%
Female	29	29%
Age		
<40	15	15%
40-60	32	32%
>60	53	53%
Location of aneurism and dissection		
Abdominal aortic aneurysm	27	27%
Femoral artery pseudoaneurysm	23	23%
Coronary artery aneurysm	3	3%
Ascending aortic aneurysm	12	12%
Iliac artery aneurysm	3	3%
Aortic root aneurysm	3	3%
Celiac artery pseudoaneurysm	1	1%
Pseudoaneurysm of the right subclavian Artery	1	1%
Aortic artery dissection	27	27%
Background diseases (N: 68)		
Coronary artery disease (CAD)	41	41%
Trauma history	1	1%
Chronic disease (CD)	8	8%
CAD and CD	18	18%
Outcome (N: 85)		
Death	38	44.7%
Alive	47	55.3%

Frequency distribution of patient outcomes based on gender showed among 38 patients who died, 26(68.4%) were male and 12 (31.6%) were female. Also, 35(74.5%) alive patients were male and 12 (25.5%) patients were female (p-value: 0.540). A patient with a diagnosis of celiac artery pseudoaneurysm and another one with celiac artery

pseudoaneurysm have died. Among 24 patients with aortic dissection, 10 patients (41.7%) died, and 14 patients (58.3%) were alive. Generally, the frequency distribution of patient's outcome based on the Location of aneurism and dissection was significant (p-value: 0.002). Further information is available in Table 2.

Table 2. Frequency distribution of outcome base on characteristics

Characteristics	Outcome (N, %)		P value
	death	Alive	
Gender (N: 85)			0.540
Male	26 (68.4%)	35 (74.5%)	
Female	12 (31.6%)	12 (25.5%)	
Location of aneurism and dissection			0.002
Abdominal aortic aneurysm	19 (76%)	6 (24%)	
Femoral artery Pseudoaneurysm	4 (24.2%)	14 (75.3%)	
Coronary artery aneurysm	0	3 (100%)	
Ascending aortic aneurysm	3 (33.3%)	6 (66.7%)	
Iliac artery aneurysm	1 (50%)	1 (50%)	
Aortic root aneurysm	0	2 (100%)	
Left ventricular aneurysm	1 (100%)	0	
Celiac artery Pseudoaneurysm	1 (100%)	0	
Pseudoaneurysm of right subclavian artery	0	1 (100%)	
Aortic dissection	10 (41.7%)	14 (58.3%)	
Background diseases (N:68)			0.812
Coronary artery disease (CAD)	20 (48.7%)	21 (51.3%)	
Trauma history	0	1 (100%)	
Chronic disease (CD)	3 (37.5%)	5 (62.5%)	
CAD and CD	7 (38.9%)	11 (61.1%)	

Discussion

Most part of the patients were male and aged more than 60 years old. Aneurysm of the abdominal aortic and femoral artery was the most prevalent location of aneurysm. Also, two of every three patients with abdominal aortic aneurysm died. About half of the patients had previous coronary artery disease. Death was mentioned in 44% of all patients. Most of the patients were over 60 years old; similarly, in the study by Wang et al., 78% of the patients were over 65 years old (8). In addition, Adachi et al. Scott et al. showed that this frequency is higher at ages over 65 years (9, 10). In this study, most deaths were related to abdominal aortic aneurysms, where 76% of these patients died. In a review study that assessed the mortality rate of patients with aortic aneurysm, the mortality rate following this type of aneurysm was reported to be 62% (11). In a study by Parkinson et al., the mortality rate of patients with abdominal aortic aneurysms was reported as 19%. However, the current study examined the mortality rate of patients with elective referral for abdominal aortic aneurysm (12). In a 2010 study in Brazil, similar to the present study, the highest mortality rate was associated with abdominal aortic aneurysm. However, unlike the present study, the mortality rate varied significantly by gender (13). Chen et al.'s study revealed that 60% of aortic aneurysm symptoms were of the abdominal

aortic aneurysm type. The reported percentages in the current study were generally categorized by the types of aortic and non-aortic aneurysms, resulting in lower reported figures. Nonetheless, akin to Chen et al.'s study, the highest frequency was linked to abdominal aortic aneurysms. Chen et al.'s study also indicated that mortality rates differed based on the location of the aortic aneurysm (14). In the present study, the frequency of men surpassed that of women. Grandi et al.'s study on patients with thoracoabdominal aneurysms also showed a higher frequency of men compared to women (15). Gaudino et al.'s study on candidates for surgery for descending aortic aneurysms similarly found a significantly higher frequency of men (16). In another study conducted by Wang et al., the frequency of aortic aneurysm in men was twice that of women (8). In the molecular-based studies conducted by Aliawadi et al.

The study reported that this difference in the frequency of aneurysms according to gender is due to an estrogen-mediated reduction in matrix metalloproteinase-9 production (17). Although the mortality rate of men was higher in the present study, this difference was not significant. In contrast, in another study conducted by Nicolini et al. the mortality of aortic aneurysm was significantly higher in women than in men (17).

In the study by Chen et al., the frequency of CAD was similar to the current research in patients with arterial aneurysms (14). In Wang et al.'s study, CAD and hypertension were identified as the primary risk factors for aortic aneurysm, aligning with the present study (8). Considering the study's limitations, smoking and the diameter of the aneurysm arteries were not taken into account. Some studies categorize aneurysms into small and large types. Additionally, the treatment of patients should be factored in; research indicates varying outcomes for patients with aortic aneurysms based on the treatment approach (18).

Conclusion

References

1. Takada M, Yamagishi K, Tamakoshi A, et al. Height and Mortality from Aortic Aneurysm and Dissection. *J Atheroscler Thromb*. 2022;29(8):1166-1175.
2. Faiza Z, Sharman T. Thoracic Aorta Aneurysm. *Treasure Island (FL): StatPearls Publishing*. 2023.
3. Senser EM, Misra S, Henkin S. Thoracic Aortic Aneurysm: A Clinical Review. *Cardiol Clin*. 2021;39(4):505-515.
4. Gawinecka J, Schonrath F, von Eckardstein A. Acute aortic dissection: pathogenesis, risk factors and diagnosis. *Swiss Med Wkly*. 2017;147:w14489.
5. Zhou Z, Cecchi AC, Prakash SK, et al. Risk Factors for Thoracic Aortic Dissection. *Genes (Basel)*. 2022;13(10):1814.
6. Koba A, Yamagishi K, Sairenchi T, et al. Risk Factors for Mortality From Aortic Aneurysm and Dissection: Results From a 26-Year Follow-Up of a Community-Based Population. *J Am Heart Assoc*. 2023;12(8): e027045.
7. Aoki H. Challenges in thoracic aortic aneurysm and dissection. *J Thorac Dis*. 2018;10:S4140-S4143.
8. Wang SW, Huang YB, Huang JW, et al. Epidemiology, Clinical Features, and Prescribing Patterns of Aortic Aneurysm in Asian Population From 2005 to 2011. *Medicine (Baltimore)*. 2015;94(41):e1716.
9. Ashton HA, Buxton MJ, Day NE, et al. The Multicentre Aneurysm Screening Study (MASS) into the effect of abdominal aortic aneurysm screening on mortality in men: a randomised controlled trial. *Lancet*. 2002;360(9345):1531-9.
10. Adachi K, Iwasawa T, Ono T. Screening for abdominal aortic aneurysms during a basic medical checkup in residents of a Japanese rural community. *Surg Today*. 2000;30(7):594-9.
11. Kim H, Kim J, Choe YH, et al. The Prognostic Impact of Coronary Artery Disease and Aortic Aneurysm: Insights From CT Protocol for Simultaneous Evaluation of Coronary Artery and Aorta. *J Korean Med Sci*. 2023;38(45):e379.
12. Parkinson F, Ferguson S, Lewis P, et al. Rupture rates of untreated large abdominal aortic aneurysms in patients unfit for elective repair. *J Vasc Surg*. 2015;61(6):1606-12.
13. Santo AH, Puech-Leao P, Krutman M. Trends in aortic aneurysm-and dissection-related mortality in the state of Sao Paulo, Brazil, 1985-2009: multiple-cause-of-death analysis. *BMC Public Health*. 2012;12:859.
14. Chen Q, Chen Q, Ye Y, et al. Characteristics and Prognosis of Abdominal or Thoracic Aortic Aneurysm Patients Admitted to Intensive Care Units After Surgical Treatment: A Multicenter Retrospective Observational Study. *Int J Gen Med*. 2021;14:475-486.
15. Grandi A, Carta N, Cambiaghi T, et al. Sex-Related Anatomical Feasibility Differences in Endovascular Repair of Thoracoabdominal Aortic Aneurysms With a Multibranch Stent-Graft. *J Endovasc Ther*. 2021;28(2):283-294.
16. Gaudino M, Lau C, Munjal M, et al. Open repair of ruptured descending thoracic and thoracoabdominal aortic aneurysms. *J Thorac Cardiovasc Surg*. 2015;150(4):814-21.
17. Nicolini F, Vezzani A, Corradi F, et al. Gender differences in outcomes after aortic aneurysm surgery should foster further research to improve screening and prevention programmes. *Eur J Prev Cardiol*. 2018;25(1):32-41.
18. Louzada ACS, da Silva MFA, Portugal MFC, et al. Epidemiology of Abdominal Aortic Aneurysm Repair in Brazil from 2008 to 2019 and Comprehensive Review of Nationwide Statistics Across the World. *World J Surg*. 2022;46(6):1485-1492.

The characteristics of the arterial aneurysm population in our findings were similar to previous studies. CAD was the most prevalent comorbidities, and men's gender was dominant. Also, the abdominal aortic and femoral artery was the most prevalent location of aneurysm.

Conflicts of Interest

None

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