

## DEATHS FROM AORTIC ANEURYSMS AND DISSECTIONS AND MORTALITY FROM ENDOVASCULAR REPAIRS IN THE ELDERLY POPULATION

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**Abstract: INTRODUCTION:** Aortic aneurysms and dissections represent vascular conditions with high rates of morbidity and mortality due to fatal consequences, especially in the elderly population. The prevalence and mortality associated with aortic aneurysms and dissections are multifactorial, mainly involving associated comorbidities, such as hypertension, cardiovascular diseases, dyslipidemia and smoking. The advent of endovascular repair techniques, such as endovascular aneurysm repair (EVAR) and endovascular dissection repair (TEVAR), has brought new perspectives for the treatment of these conditions. **OBJECTIVE:** To analyze mortality from aortic aneurysms and dissections and hospital mortality from endovascular repairs in the elderly population. **METHODOLOGY:** This is a descriptive cross-sectional study, based on the survey of data on deaths due to aneurysms and aortic dissections, available in the TABNET/DATASUS Mortality Information System (SIM). **RESULT:** There was an increase in mortality due to aneurysms and aortic dissections in the elderly population, especially from 2021 onwards. In relation to the age group, the population aged 75-79 recorded the highest number of deaths, in addition to the male population being the most affected. Regarding hospital mortality due to endovascular corrections, there was a reduction in deaths throughout the studied period, with endovascular repair of abdominal aortic and iliac aneurysms being the procedure with the highest mortality. **CONCLUSION:** The findings of this study highlight the need for public health interventions aimed at preventing and controlling aortic aneurysms and aortic dissections in the elderly population. Effective strategies could include screening programs for early detection and the promotion of healthy lifestyles.

**Keywords:** *Aneurysm; Aortic Dissection; Endovascular correction.*

## INTRODUCTION

Aortic aneurysms and dissections represent vascular conditions with high rates of morbidity and mortality due to fatal consequences. Aortic aneurysms are permanent dilations of the arterial wall that can occur along any segment of the aorta, requiring an increase of 50% of the normal vascular diameter to characterize the condition<sup>1,2</sup>. While aortic dissections involve a rupture of the media layer, resulting in a progressive separation (dissection) of the aortic tunics, which may trigger, in the long term, a rupture of the vessel<sup>3</sup>.

The prevalence and mortality associated with aortic aneurysms and dissections can be influenced by several factors, including age, gender and associated comorbidities, such as hypertension, cardiovascular diseases, dyslipidemia, smoking, in addition to genetic syndromes. Among these factors, the elderly population is particularly vulnerable in relation to the degenerative factor of arterial walls that occurs with aging, in addition to a higher prevalence of comorbidities<sup>4,5</sup>. The incidence of aortic aneurysms and dissections has increased significantly with age, with the majority of cases occurring in men over 65 years of age, reflecting the importance of screening and appropriate treatment<sup>6,7</sup>.

The advent of endovascular repair techniques, such as endovascular aneurysm repair (EVAR) and endovascular dissection repair (TEVAR), has brought new perspectives for the treatment of these conditions. Both procedures are considered minimally invasive and have become recognized as a safe alternative to conventional surgeries, offering advantages such as shorter recovery times, fewer postoperative complications and lower in-hospital mortality<sup>8,9,10</sup>.

Despite technological advances and improvements in surgical techniques, perioperative mortality for endovascular

repairs can be influenced by several factors, including the patient's clinical condition, the presence of comorbidities, and the complexity of the aneurysm or dissection. In the public health context, the analysis of mortality due to these conditions is essential for the implementation of prevention and screening strategies, in addition to improvements in health services, while the analysis of mortality due to endovascular procedures becomes fundamental for recognizing the efficacy and safety, especially in a heterogeneous population.

## METHODOLOGY

A descriptive cross-sectional study was carried out. The research was based on a survey of data on deaths due to aneurysms and aortic dissections, available in the TABNET/DATASUS Mortality Information System (SIM). Deaths with geographic coverage only in the city of São Paulo were selected, during the period from 2013 to 2023. To select the deaths, the "ICD-10 Category" was selected and ICD I71 (Aneurysm and aortic dissection) was added. The variables "Year of death", "Color/race", "Age Group" and "Sex" were studied at different times.

For the bibliographic basis, research was carried out in periodical articles, from 2013 to 2023, through the database PubMed, Virtual Health Library (BVS), SCIELO and MEDLINE to search for descriptors restricted to the topic, these being: *Aortic aneurysm*, *Aortic rupture*, *Aneurysm*, *Aorta artery*, *Aortic Dissection*, *Dissecting*; *Abdominal Aortic Aneurysm*; *Vascular surgery*; *Thoracic aneurysm*. The descriptors were used in combination with the Boolean operators "AND" and "OR" to better specify the subject covered. In relation to the data analysis plan, absolute and relative frequency was used and, subsequently, graphs and/or tables were constructed to display the results.

## RESULTS

### ANALYSIS OF MORTALITY FROM AORTIC ANEURYSMS AND DISSECTIONS

Between 2013 and 2023, the general population of the city of São Paulo totaled 12,054 deaths due to aneurysms and aortic dissections. Taking into consideration, the total deaths in the elderly population, there were a total of 9,640 records, corresponding to 79.9% of deaths in the general population. In relation to the temporal analysis of the elderly population, there was an increase in general deaths with periods of oscillation of reduction and increase during the studied interval (Figure 1). In the period between 2014 and 2018 there was an increase from 826 to 977 deaths, and from 2021 onwards a gradual increase was evident, reaching 983 deaths in 2023. In 2017, the highest mortality rate occurred, with 990 records, accounting for 10.2% of deaths during the analyzed interval, while the year with the lowest mortality was in 2020, totaling 549 deaths (5.6%). It is important to note that this data only refers to the period 2013 to 2023 and may not reflect the general trend or changes in mortality rates over time. Additionally, the numbers may have been affected by the COVID-19 pandemic and its consequences.

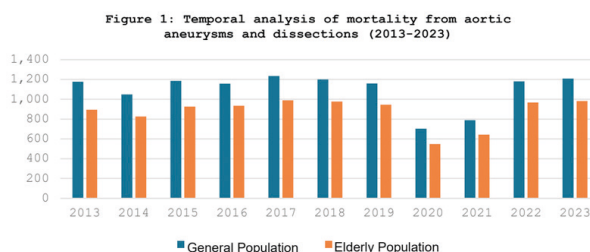


Figure 1: Temporal analysis of mortality from aortic aneurysms and dissections (2013-2023)

In relation to deaths according to color, the white population had the highest mortality,

accounting for 7,142 records (74% of total deaths). Next, the brown population covered 1,461 records (15.1% of total deaths). The black and yellow populations were responsible for the lowest rates, totaling 535 and 385 deaths, respectively. There was a 1% rate of cases with ethnicity/classification not informed (Figure 2).

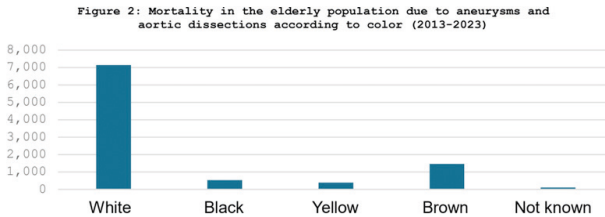


Figure 2: Mortality in the elderly population due to aneurysms and aortic dissections according to color (2013-2023)

According to age group, the highest mortality rate was present in the population between 75-79 years old, totaling 1,808 records (18.7%), followed by the age group between 70-74 years old, with 1,782 deaths (18.4%) and elderly people over 85 years old, with 1,686 deaths (17.4%). The elderly populations with the lowest mortality rates were between 65-69 (17%) and 60-64 (13.2%), respectively.

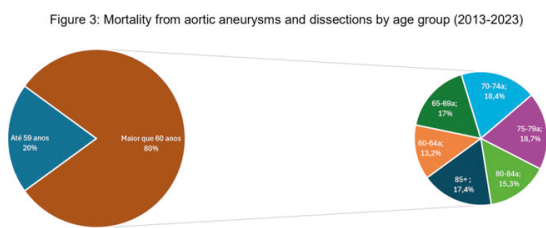


Figure 3: Mortality from aortic aneurysms and dissections by age group (2013-2023)

Regarding sex, the male population was the most affected, accounting for 5,152 (53.4%), while the female population comprised 4,488 (46.5%).

Figure 4: Mortality in the elderly population due to aortic aneurysms and dissections according to sex (2013-2023)

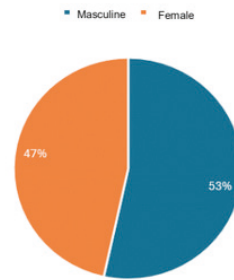


Figure 4: Mortality in the elderly population due to aortic aneurysms and dissections according to sex (2013-2023)

## ANALYSIS OF MORTALITY DUE TO ENDOVASCULAR CORRECTIONS

Regarding the temporal analysis of hospital mortality in the elderly population, a general reduction in deaths was observed, especially from 2015 onwards, the period with the highest incidence of deaths, with 23 records. Regarding the interval of lowest hospital mortality, a progressive reduction was observed from 2020 onwards, reaching the lowest rate of hospital deaths in 2022, with 6 records (Figure 5).

Figure 5: Temporal analysis of hospital mortality in the elderly population due to endovascular repairs of aortic aneurysm/dissection (2013-2023)

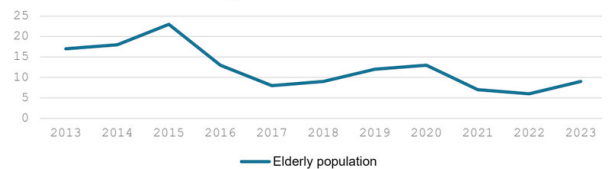


Figure 5: Temporal analysis of hospital mortality in the elderly population due to endovascular repairs of aortic aneurysm/ dissection (2013-2023)

Regarding the type of endovascular correction, the correction of aneurysm/ dissection of the abdominal aorta and iliac artery was the procedure that covered the highest number of hospital deaths, totaling 49.6% of total deaths, and in 2015, the year of higher incidence, the same procedure was responsible for 56.5% of deaths that year. In

relation to abdominal aortic aneurysm repair/dissection, it was the procedure with the highest hospital mortality in five different years during the decade studied, corresponding to a rate of 42.8% of total deaths. Thoracic aortic aneurysm repair/dissection had the lowest death rate, totaling 7.5% of total deaths (Figure 6).

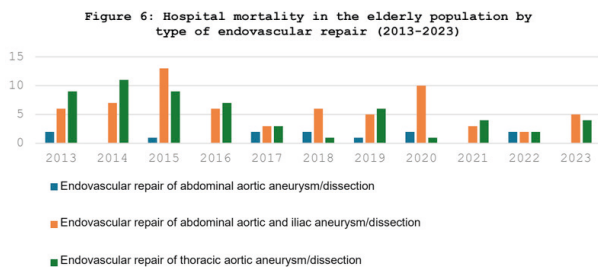


Figure 6: Hospital mortality in the elderly population by type of endovascular repair (2013-2023)

Regarding gender, hospital mortality predominated in the male population, corresponding to a rate of 64.4% of total deaths, while the female population comprised 35.5% of deaths due to endovascular corrections (Figure 7).

Men	Women
87	48

Figure 7: Mortality due to endovascular repairs of aortic aneurysms/dissections by sex (2013-2023)

## DISCUSSION

In the temporal analysis, an increase in deaths over the decade in aortic aneurysms and dissections was evidenced over the decade, which is associated with several factors, mainly due to the growth of the elderly population, as well as an expansion of the population group with comorbidities that may predispose to these conditions. Furthermore, the expansion of the use of imaging methods for diagnosis and screening, such as ultrasound, computed tomography,

tomography angiography and angiography in dissections, may have contributed to greater detection of these conditions. Furthermore, lifestyle is also related to an increase in cardiovascular risk factors, such as sedentary lifestyle, dyslipidemia and smoking, which, in turn, increase the risk of aneurysms and aortic dissections<sup>4,5,11</sup>.

Regarding the age group, there was a higher mortality observed in the age group of 75-79 years, which is in line with the existing literature, which identifies advanced age as one of the main risk factors for the development of aortic aneurysms and dissections. of aorta. From a pathophysiological point of view, aging is related to an increase in arterial stiffness and a greater likelihood of developing atherosclerosis, factors that contribute to the fragility of the aortic wall, predisposing it to dissections and aneurysms. This result reinforces the importance of tracking and monitoring programs aimed at this specific age group, aiming for early detection and preventive intervention<sup>2,5,6,12,13,14</sup>.

In relation to sex, the results showed a greater involvement of the male population, in agreement with the literature. Factors such as a higher prevalence of hypertension and a less healthy lifestyle may explain this greater vulnerability among men<sup>12,13,15,16</sup>.

The higher mortality observed in the white population reflects a specific trend, since the population in the city of São Paulo is considered highly heterogeneous. This data may be related to differences in access to health care, through a greater number of diagnoses and interventions in the white population, therefore, it is important to consider the possibility of underreporting or less frequent diagnosis in other racial populations due to barriers in access to health care. health care. Despite this, the literature also contains isolated cases of higher mortality in the white population within a heterogeneous population<sup>17</sup>.



Regarding hospital mortality due to endovascular corrections in the elderly population, the analysis reveals a trend towards a general reduction in deaths in all types of endovascular corrections throughout the studied interval, mainly attributed to advances in surgical techniques, with safer and more effective techniques, and better perioperative management<sup>18,19,20</sup>. Furthermore, the predominance of mortality in the male population was consistent with the trends observed in mortality from aneurysms and aortic dissections in the present study, diverging from the literature, which shows a greater number of complications and mortality in the female population<sup>21</sup>.

## CONCLUSION

The results of this study indicate a significant increase in the number of deaths due to aortic aneurysms and aortic dissections in the elderly population of the city of São Paulo over the last decade. This growing trend can be attributed to several factors, including the aging of the population, changes in diagnostic and treatment patterns, and possible variations in the incidence of these events over time. While in hospital mortality due to endovascular corrections, a reduction was observed in the elderly population, attributed to advances in surgical techniques and mainly better perioperative management. The findings of this study highlight the need for public health interventions aimed at preventing and controlling aortic aneurysms and aortic dissections in the elderly population. Effective strategies could include screening programs for early detection and the promotion of healthy lifestyles.

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