ESC European Society of Cardiology

European Heart Journal: Acute Cardiovascular Care (2021) **10**, 710–711
doi:10.1093/ehjacc/zuab065

EDITORIAL

Dissecting the epidemiology of aortic dissection

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Received and accepted 8 July 2021; online publish-ahead-of-print 14 August 2021

Acute aortic dissection (AAD) is one of the most devastating cardiovascular diseases with high risk of mortality.[1] Epidemiological data regarding this condition remain scanty. Indeed, the actual incidence of AAD is hard to estimate because of difficulties in diagnosis: a significant proportion of patients may die before medical contact, with low rates of autopsy confirmation.

In large autopsy series,[2] the prevalence of aortic dissection ranged from 0.2% to 0.8%, whereas, population-based studies estimated the annual incidence between 2.5 and 7.2 cases per 100 000.[3–8] Interestingly, this incidence has continuously increased over the years.

While large national registries such as those in Japan[9] or Spain[10] provide substantial data on the management of patients with AAD, they can only display a partial view of the whole natural history, because of the incomplete inclusion of patients deceased prior to medical assistance and diagnosis. Yet, population-based studies including death cases provide a better estimation of the actual epidemiology of AAD.

Table 1 shows the incidence and outcomes of AAD in different population-based studies.[3–8,11]

In this issue, Yamaguchi and colleagues[11] report an AAD incidence as high as 17.6 per 100 000 inhabitants in a population-based study conducted from 2016 to 2018 in the Miyazaki prefecture in Japan. Although the study period was relatively short (3 years) and the geographical area relatively limited, the age-adjusted design had the potential to provide representative data about AAD incidence and mortality in that country.

Interestingly, almost half of patients included (46.8%) were dead at hospital arrival.[9] In contrast to previous studies, the authors used post-mortem non-injected computed tomography (CT) to clarify the causes of deaths as a less complex alternative to full autopsy.[11] The autopsy rate has continuously decreased, and widely vary between countries and hospitals.[12] Two previous Japanese studies have validated the use of non-injected CT scan in such a setting.[13,14] While non-injected CT scan may miss limited aortic lesions (e.g. penetrating ulcer), it is implausible that acute aortic syndromes with limited lesions lead to patient's death without extensive dissection and/or rupture.

Such a high AAD incidence reported by Yamaguchi *et al.*, which represents almost twice the value in previous reports,[11] could be mostly explained by an older mean age of patients (76 years) in the country with the highest life expectancy, and the fact that almost all patients (96.5%) with cardiopulmonary arrest at arrival underwent CT investigation.

Nonetheless, although post-mortem CT scan is of major value to better estimate the AAD incidence, this practice could unfortunately not be generalized to all hospitals and other countries with lower CT penetration rate than in Japan, and the need for resources' rationalization. From this standpoint, this report is unique and of major interest.

Regarding outcome, Yamaguchi *et al.*[11] reported an overall AAD 30-day mortality rate as high as 57%: only one patient out of four survived in case of type A AAD while one out of four died in presence of type B AAD. Overall, the age-adjusted 30-day mortality of AAD per 100 000 inhabitants was 9.9, a rate much higher than that reported in previous studies[3–8] (*Table 1*) that could again be explained by a better capture of pre-hospital deaths. For instance, 60% of type A AAD were in cardiac arrest at hospital arrival.

Although the interval from the symptom onset to arrival at hospital was short, the outcome of AAD was poor. The high incidence and mortality of such a life-threatening condition with limited management alternatives, underline the importance of prevention. Long history of uncontrolled or undiagnosed hypertension and the presence of aortic aneurysm represent the main risk factors associated with AAD, followed by bicuspid aortic valve and genetic connective tissue disorders.[1,2] The prevalence of these predisposing conditions, as well as the prescribed medications, is unknown in Yamaguchi *et al.*[11] report, particularly due to the high percentage of patients who were in cardiac arrest at arrival.

In other reports, the prevalence of hypertension varies from 50% to 90% among patients managed for AAD.[3–8,12] Notably, the prevalence of hypertension is high in Japan, and in a comparative study with the USA, the rates of undiagnosed hypertension are higher in the former.[15]

By revealing all the victims of AAD in their systematic study, Yamaguchi *et al.*[11] should be lauded for these very original data highlighting the even grimmer severity and prognosis of aortic dissection. While efforts should constantly be made to bring these patients as soon as possible to imaging and surgery, the clue of success at a national level would rather be to better identify and manage cardiovascular risk factors, and above all in this case, hypertension.

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Table 1 Incidence and outcomes of acute aortic dissection in different population-based studies

Study	Melvinsdottir et al.[3]	Howard et al.[4]	Smedberg et al.[5]	Yeh et al.[6]	Lee et al.[7]	Dinh et al.[8]	Yamaguchi et al.[11]
Study period	1992–2013	2002–12	2002–16	2005–12	2005–16	2017–18	2016–18
Population	Iceland	Oxfordshire, UK	Sweden	Taiwan	Korea	NSW, Australia	Miyazaki, Japan
Population	Nationwide	Regional	Nationwide	Nationwide	Nationwide	Regional	Regional
N with AAD	153	52	8057	9092	18 565	273	79
Mean age, years	66.9	72	68	64.4	67	NA	76
Incidence, per 10^5 inhabitants	2.53	6	7.2	5.6	3.76	3.47	17.6
Deaths included	Yes	Yes	Yes	No	No	No	Yes
Emergency surgery, %	43.7	36.5	32	38.3	NA	51	30
30-day mortality, %	45.2	55.8	23	17.7	10.8	35.5	74.5

AAD, acute aortic dissection; NA, not assessed.

Conflict of interest: none declared.

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