

The COVID-19 Pandemic and Acute Aortic Dissection: an unintended consequence?

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Abstract

The COVID-19 pandemic has had a profound impact on healthcare worldwide. Emergency presentations to hospital unrelated to COVID-19 have generally, significantly reduced. At our centre we have observed a substantial surge in the number of patients presenting with type A Aortic dissection (TAD). Despite having the warmest April on record, we have performed 8 TAD repairs, more than in any single month over the last decade. On histopathological examination there is no evidence of a direct link between the COVID-19 virus. We hypothesise that this surge relates to exacerbation of hypertension due to the substantial increase in mental health problems observed, associated with the pandemic and the ‘lock-down’ required to control the spread of the virus.

During these unprecedented times we have seen a significant reduction in emergency medical attendance for non-COVID-19 associated illness. Despite this general trend, there has been a substantial increase in the incidence of acute type A aortic dissection (TAD) at our centre.

We have performed 8 TAD repairs in April 2020. This is more than in any single month during the last decade. The mean number of TAD repairs in April over the previous 10 years was 2.1 (Table 1). Furthermore, several additional patients referred were transferred elsewhere due to our intensive care capacity.

The seasonal variation in TAD incidence is well documented, with a significantly greater occurrence during winter, peaking in January as we observe in our own data (Table 1)¹. The pathophysiological mechanism behind this is thought to be the influence of lower climatic temperatures raising arterial blood pressure through increased sympathetic activity exacerbating hypertension – one of the key aetiological factors for TAD¹. In the UK, April 2020 has been the warmest since records began and from this, we would have expected a drop in the usual incidence of TAD for this time of year.

A recent report has suggested an association between regional influenza activity and higher admission rates for TAD, although the pathophysiological explanation for this remains unclear and direct evidence of influenza in aortic tissue has not been previously examined in the context of aortic dissection². Histopathological assessment of the resected aortas of patients in our series has not identified any evidence of an aortitis or suggestion of a direct link with COVID-19. Furthermore, none of our TAD patients have been symptomatic of COVID-19 at the time of presentation, nor had they history of having had the disease. They may, however, have been asymptomatic carriers.

This surge in TAD may in fact be associated with increased psychological stress associated with the COVID-19 pandemic. The UK population has been subjected to a “lock-down” with social isolation since March 23rd. With the lock-down came increasing unemployment, potential financial difficulties and uncertainty together with an existential threat to life, which has undoubtedly caused a prolonged period of increased

stress. As early as towards the end of March 2020 mental health experts warned of a “second pandemic” of acute stress disorders, post-traumatic stress disorder, emotional disturbance, sleep disorders, depressive syndromes and eventually suicides³. Indeed, this has become a reality. A review of the impact of COVID-19 on mental health in China, revealed an incidence of anxiety and depression in as many as 35% of survey respondents⁴.

A recent report from New York has observed a 76.5% reduction in incidence of TAD during the pandemic⁵. However, they report a significant increase in ‘at-home’ deaths over this period and postulate that patients may be fearful of seeking medical attention during the pandemic and that there has actually not been a true decline in incidence of TAD. In sharp contrast to healthcare in the USA, the National Health Service in the UK is publicly funded, and this may well be responsible for our differing experiences of TAD presenting to hospital.

It is widely recognised that stressful events can incite the development of a TAD by acute exacerbations of hypertension, and the prolonged state of heightened anxiety associated with the COVID-19 pandemic may have tipped the balance for many patients.

At the same time, it has been reported that general practitioner appointments in the UK have fallen by at least 30% over this period. It is not difficult to see how a combination of increased mental stress and reduced health care provisions might lead to an increase of episodes of poorly controlled hypertension and subsequently in the incidence of TAD.

We aim to highlight the increased incidence of this life-threatening disease during the current pandemic as a reminder to the medical community of this important, but often delayed, diagnosis.

References

- [1] Manfredini R, Boari B, Gallerani M, Salmi R, Bossone E, Distant A, et al. Chronobiology of rupture and dissection of aortic aneurysms. *J Vasc Surg* 2004;40:382–8. doi:10.1016/j.jvs.2004.04.019.
- [2] Ashur C, Norton E, Farhat L, Conlon A, Willer C, Froehlich JB, et al. Higher admission rates and in-hospital mortality for acute type A aortic dissection during Influenza season: a single center experience. *Sci Rep* 2020;10:4723–6. doi:10.1038/s41598-020-61717-5.
- [3] Choi KR, Heilemann MV, Fauer A, Mead M. A Second Pandemic: Mental Health Spillover From the Novel Coronavirus (COVID-19). *J Am Psychiatr Nurses Assoc* 2020;1078390320919803. doi:10.1177/1078390320919803.
- [4] Huang Y, Zhao N. Chinese mental health burden during the COVID-19 pandemic. *Asian J Psychiatr*. 2020 Apr 14;51:102052. doi: 10.1016/j.ajp.2020.102052
- [5] El-Hamamsy I, Brinster DR, DeRose JJ, Girardi LN, Hisamoto K, Imam MN et al. The COVID-19 Pandemic and Acute Aortic Dissections in New York: A Matter of Public Health, *JACC* (2020), doi:<https://doi.org/10.1016/j.jacc.2020.05.022>.

Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	D
3.4 ±1.5	2.8 ±1.7	2.7 ±1.8	2.1 ±1.4	2.5 ±1.6	1.6 ±1.3	1.5 ±1.5	2.0 ±0.9	2.2 ±1.3	3.2 ±1.6	3.3 ±1.7	3.

Table 1. Mean (± standard deviation) number of TAD repairs performed each month at our centre over the last 10-year period April 2010 – March 2020.