Cardiology in the Young

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Factors affecting COVID-19 outcomes in patients with congenital heart disease

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Letter to the Editor

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Haiduc et al attempt to summarise the current literature surrounding the effect of congenital heart disease (CHD) on COVID-19 outcomes.[1] We propose further consideration of the following factors: age, type and severity of CHD, and comorbidities.

This review directly compares studies and case reports of patients with ages ranging from 3 months to 76 years. Discrepancy in ages is important to consider since COVID-19 is known to affect infants less than 1 year of age more severely.[2] This may be due to low T-cell activation, reduced expression of ACE2 in the lungs and other developmental differences.[2] Older patients are likely to have developed more comorbidities which may be the reason for the presentation of worse COVID-19 symptoms, rather than being due to their CHD alone. Literature also shows racial disparities in the severity of COVID-19 which may confound the effect of CHD on outcomes.[3]

Contrary to this review, there is evidence that individual defects such as single ventricular defects are not sufficient cause alone for worse COVID-19 outcomes.[4] Lewis et al reported that out of 53 CHD patients, there appeared to be no correlation between the complexity of the CHD and the subsequent infection-related cardiac decompensation displayed by the patient.[4] This may explain why patients with similar CHDs experience different disease trajectories. Therefore, using only the CHD status is not a sufficient indicator for poor outcomes and markers of symptom progression such as raised cardiac troponins upon admission may prove more useful.[5] This is particularly relevant since CHD patients with infection-induced myocardial injury are at a higher risk of complications.[5] Treatment protocols used to manage infections should also be considered amongst the studies included in the review. For example, Non-steroidal anti-inflammatory drugs use in early infection is thought to be controversial due to reports of causing more complications when administered for respiratory tract infections.[6]

From the studies included in the review, 24% of the patients had comorbidities with the most frequent being genetic conditions, type 2 diabetes mellitus, and chronic kidney disease.[1] Massin et al demonstrates that a significant proportion of children with CHD have associated non-cardiac comorbidities including genetic conditions, with the most common being trisomy 18.[7] These comorbidities make it difficult to assess the direct effect of CHDs on outcomes. Similarly, Agarwal et al show that adults with CHD are twice as likely to have non-cardiac comorbidities compared to their non-CHD counterparts.[8] Additionally, for patients below the age of 40, the more severe the CHD, the higher the risk of developing non-cardiac comorbidities.[8]

In conclusion, in order to determine causality or a significant correlation between COVID-19 prognosis and CHD, this review needs to stratify CHD according to type of defect and severity, whilst controlling for confounders such as age and comorbidities.

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References

1. Haiduc AA, Ogunjimi M, Shammus R, et al. COVID-19 and congenital heart disease: an insight of pathophysiology and associated risks. Cardiol Young 2020; firstview: 1–8.
2. Singh T, Heston SM, Langel SN, et al. Lessons from COVID-19 in children: key hypotheses to guide preventative and therapeutic strategies. Clin Infect Dis 2020; 71: 2006–2013.
3. Best JH, Mohan SV, Kong AM, et al. Baseline demographics and clinical characteristics among 3471 US patients hospitalized with COVID-19 and pulmonary involvement: a retrospective study. Adv Ther 2020; 37: 4981–4995.
4. Lewis MJ, Anderson BR, Fremed M, et al. Impact of coronavirus disease 2019 (COVID-19) on patients with congenital heart disease across the lifespan: the experience of an academic congenital heart disease center in New York City. J Am Heart Assoc 2020; 9: e017580.

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5. Malviya A, Rakesh Y. COVID-19 pandemic and paediatric population with special reference to congenital heart disease. Indian Heart J 2020; 72: 141–144.
6. Robb CT, Goepp M, Rossi AG, Yao C. Non-steroidal anti-inflammatory drugs, prostaglandins, and COVID-19. Br J Pharmacol 2020; 177: 4899–4920.
7. Massin MM, Astadicko I, Dessy H. Noncardiac comorbidities of congenital heart disease in children. Acta Paediatr 2007; 96: 753–755.
8. Agarwal A, Thombley R, Broberg CS, et al. Age and lesion-related comorbidity burden among US adults with congenital heart disease: a population-based study. J Am Heart Assoc 2019; 8: e013450.