

Persistent symptoms in athletes following COVID-19: time to take a breath in the search for answers?

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In the context of treating an athlete with COVID-19, the sports and exercise medicine (SEM) clinician is typically faced with three main challenges—risk, restriction and recovery—or the ‘3Rs’. First, a need to characterise the clinical ‘risk’ of the acute illness and to detect any serious pathology, such as cardiac illness. Second, the inter-related issue of how exercise and sports participation should be modified and if temporary ‘restriction’ in some way is needed. Third, how best to monitor and optimise ‘recovery’ and most importantly what do if an athlete has persistent symptoms.

Over the course of the COVID-19 pandemic, the BJSM has published numerous papers providing robust evidence to support SEM decision-making in each of these areas. These include but are not limited to papers describing the risk of cardiac illness and injury, clinical features of prolonged recovery and decision algorithms when managing return-to-play.¹⁻⁴

CARDIOPULMONARY EXERCISE TESTING FOR PERSISTENT SYMPTOMS?

A welcome addition to the published body of work is the paper by Moulson and colleagues,⁵ providing novel insight regarding the recovery of athletes with persistent symptoms. More precisely, the study addressed a vexing question for many clinicians of how to determine the cause of persistent cardiopulmonary symptoms following COVID-19 in athletic individuals. In this prospectively designed study, with a real-world ‘feel’ in terms of an assessment protocol, the authors evaluated 21 adult young athletes with cardiopulmonary symptoms that persisted longer than 28 days. This is a relevant timepoint; in a general population study of COVID-19, Sudre *et al*⁶

found that approximately 1 in 10 individuals had symptoms lasting this duration, and a similar prevalence was reported in a cohort of Olympic and Paralympic level athletes.² Most SEM clinicians would agree that cardiopulmonary symptoms lasting over a month represent a significant problem for a competitive athlete.

The study by Moulson *et al* employs physiological testing to evaluate the cause of persistent symptoms and specifically utilises cardiopulmonary exercise testing (CPET). In the general population with persistent or long-COVID symptoms, CPET studies have revealed disparate results, with some revealing a high prevalence of hyperventilation±breathing pattern irregularities,⁷ while others highlight issues in peripheral muscular oxygen extraction.⁸ In athletes with persistent cardiopulmonary symptoms, Moulson *et al*⁵ found that CPET results were generally reassuring; despite nearly all subjects developing symptoms during testing, there were no contemporaneous cardiac abnormalities detected.

EVALUATION OF PERSISTENT CARDIOPULMONARY SYMPTOMS

What is the cause of persistent cardiopulmonary symptoms in athletes following COVID-19? An intriguing finding from the Moulson study⁵ is the high prevalence of abnormalities detected on spirometry. Spirometry, a widely available and simple test of pulmonary function, revealed that approximately one-third of the cohort had evidence of airflow obstruction and many had a reduced breathing reserve at peak exercise. In a subgroup, these abnormalities appeared to improve on a repeat test performed on average 5 months later.

For those focused on the pulmonary health of athletes, these findings will stimulate debate and some scrutiny (ie, no pre-COVID spirometry was available) but are worthy of further consideration. In the general population, it is apparent that the main pulmonary insult associated with COVID-19, particularly in those requiring hospital admission, is centred on the lung interstitium or pulmonary–vascular

interface. As such, abnormalities in gas transfer and lung volumes are typically found, and impaired airflow is less commonly seen.⁹ The findings described by Moulson *et al*,⁵ however, suggest that perhaps an alternative perspective is needed in non-hospitalised patients, with mild disease at onset but persisting pulmonary symptoms. The development of asthma-type symptoms, with airway hyper-responsiveness following viral infection, is a recognised phenomenon and targeted treatment, in this context, may enhance recovery. In the general population there remains equipoise regarding the role of asthma-type therapy for SARS-CoV-2 respiratory symptoms. Some studies have reported a favourable impact on disease progression¹⁰ using asthma-type therapy, but this may relate to patient selection based on a certain inflammatory phenotype. It would thus be of interest to evaluate the core additional characteristics of asthma (eg, airway hyper-responsiveness and inflammation) in athletes with persistent ‘unexplained’ post-COVID-19 dyspnoea. Regardless, based on the findings of this study, it would seem clinicians should strongly consider spirometry as part of the investigational work-up of an athlete reporting persistent cardiopulmonary symptoms following COVID-19.

Over the course of the pandemic, our understanding of how SARS-CoV-2 infection impacts individuals and their ability to recover has progressed considerably. Irrespective of whether further outbreaks or new variants of SARS-CoV-2 occur, SEM clinicians will continue to be faced with the challenge of tackling the 3Rs when they assess athletes with an acute respiratory illness. Studies such as that reported by Moulson and colleagues⁵ provide some initial evidence to inform management but leave many questions unanswered and in need of further research.

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