Sudden cardiac arrest during sports

Kjetil Sunde*

Department of Anaesthesiology, Division of Emergencies and Critical Care, Oslo University Hospital, Oslo, Norway

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This editorial refers to ‘Major regional disparities in outcomes after sudden cardiac arrest during sports’1, by E. Marijon et al., on page 3632 and ‘Exercise-related out-of-hospital cardiac arrest in the general population: incidence and prognosis’2, by J. Berdowski et al., on page 3616.

Exercise can trigger an acute cardiac event which may precipitate sudden cardiac arrest (SCA).1 On the other hand, exercise is important for physical fitness and prevention of cardiovascular disease,3 and the medical community should therefore inform the general public of the health benefits of sports and exercise.2 At the same time, the public are exposed to alarmist mass media coverage of athletes or ordinary people collapsing during different sport activities, raising uncertainties, questions, and debate within communities. The worst possible consequence would be that the public abstain from physical exercise. It is therefore of utmost importance to document the current reality of sports-related SCA. In two studies from France and The Netherlands, the incidence and prognosis of exercise-related out-of-hospital cardiac arrest (OHCA) have now been reported.3,4 Different epidemiological characteristics and factors associated with improved survival were explored, analysed, and investigated.

In a 5-year community-based French registry assessing the incidence and outcome of SCA during sports in subjects of 10–75 years old, Marijon and co-workers recorded 820 SCAs, with a mean age of 46 years and a 20:1 predominance of male victims. Half of the SCAs occurred in typical sports facilities. Their major finding was huge regional disparities related to survival. The overall survival at hospital discharge was 16%, varying from 3% in the worst regions up to 44% in the best regions. As in OHCA in general, bystander cardiopulmonary resuscitation (CPR) was a main contributor to the survival differences, with overall frequency 31%; only 15% in the regions with the worst survival and up to 81% in the regions with the best survival. As a consequence, a higher rate of initial shockable rhythm (79%) was present in the regions with good outcome compared with only 29% in regions with low survival.1 Importantly, regions with the best survival had documented well-organized programmes for educating lay people in Basic Life Support (BLS), as well as a long and positive experience with community programmes for the use of automated external defibrillators (AEDs).3

Berdowski et al. documented data for all OHCAs of cardiac origin in persons aged 10–90 years over a 3-year period in the Dutch province North Holland, and found that 143 (6%) arrests were exercise related. They compared outcome in these exercise-related OHCAs with that of the non-exercise-related arrests, as well as outcome among different age groups.4 Exercise-related arrests had a significantly higher survival rate than non-exercise related OHCAs in victims >35 years old (46% vs. 17%, respectively, P < 0.001), but not for victims <35 years old (14% vs. 18%, respectively, P = 0.82).4 No firm conclusion can be drawn for the latter, however, as the numbers are too small, with only seven exercise-related arrests among victims aged <35 years. Among the 143 exercise-related OHCAs, the mean age was 59 years, and 93% were men. The exercise-related arrests were more likely to occur in public places, were more frequently witnessed, had higher rates of bystander CPR, and a shockable initial rhythm, as well as higher use of AEDs and shorter Emergency Medical Services (EMS) response times. These are all known factors associated with better outcome after OHCA,5 but, after adjusting for these variables in the multivariate analysis, exercise-related OHCA was still associated with better outcome, even with good neurological outcome.4

These two papers from western European countries have two important messages that need to be highlighted. First, they both show that sports-related cardiac arrests are rare, 0.5–2.1 per 100 000 person-years5 vs. 35.5 per 100 000 person-years for non-exercise-related OHCA in the Dutch study.4 This information should be used in an attempt to limit the anxiety regarding exercise-related fatal emergencies, thereby encouraging the general public to participate in and recommend exercise at different levels.2 On the other hand, in a previous study, Marijon et al. showed that competitive athletes aged 35 years or younger seem to have a higher risk of SCA than recreational athletes,6 which might influence the debate regarding screening programmes for competitive athletes.7 Secondly, both studies show quite good survival potential for these patients, especially compared with patients with non-exercise-related cardiac arrest.3,4 Exercise-related OHCA was also associated with better outcome than non-exercise-related OHCA in the Dutch study after adjusting for factors

* Corresponding author. Tel: +4722119678, Fax: +4722119634, Email: kjetil.sunde@medisin.uio.no

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previously known to be associated with good outcome. Interestingly, the best regions in the French study, the Côte d’Or region in Burgundy and the Nord region, had a very high bystander CPR rate of 81%, and 43% survival, comparable with the 90% bystander rate and 46% survival in a Dutch region highly dedicated to cardiac arrest, with a long interest and research tradition in cardiac arrest management, as well as early adoption and high use of public AED programmes.8

As in previous publications, both studies clearly demonstrate that early recognition, call for help, and early initiation of bystander CPR improve outcome.3,4 Together with early defibrillation, early and good bystander CPR is the only action during the early phase of resuscitation shown to improve outcome.5 It produces flow to the vital organs, ‘buys time’, and, as in these studies, increases the likelihood of having an initial shockable rhythm when the AED or defibrillator is attached, even more so when the quality of CPR is good.9

Throughout the world, survival rates after OHCA, whether exercise related or not, vary greatly.10 These differences can partly be explained by different definitions of OHCA,10 but are mainly due to the varied overall quality of the local chains of survival (COS) (Figure 1).11 This must be the main reason for the huge disparity in survival across regions in the French study.3 Identifying and improving weak links in the local COS has increased survival in different parts of the world in recent years.12–15 Thus, successful survival (defined as survival with normal or slightly reduced neurological function, independent, back to normal life activities and work) is, besides the aetiology of the arrest, totally dependent on a well-functioning pre- and in-hospital system of care. This means a focused, goal-directed treatment strategy throughout the local COS. It can be compared with a 4 × 100 m relay where all legs from start to end need to work and collaborate optimally for a successful final result. This means optimizing all stages influencing patient outcome: early recognition, initiation of bystander CPR, EMS system activation, good quality BLS, early defibrillation, good quality Advanced Life Support (ALS), goal-directed, standardized, good quality post-resuscitation care, including percutaneous coronary intervention and therapeutic hypothermia, and a rehabilitation plan.

The studies of Marijon et al. and Berdowski et al., documenting parts of this reality in different countries and regions, are important contributors in this respect. If we really want to improve survival, weak areas in our local COS must be identified and challenged. No chain is better than the weakest link. The system and the survival will never be really good if the weak links stay weak. This will only change if the responsible authorities identify and understand the problem, and if providers are willing to focus and train to become even better. Therefore, these two studies should really encourage not only the poor outcome French communities4 to improve their knowledge, skills, and attitudes related to cardiac arrest management, but all communities throughout Europe and the rest of the world. More people should return to a normal life after cardiac arrest whether it is sports related or not. Our patients deserve that we pay attention to this—we have to take the local COS seriously, because this has failed in the majority of places around the world. The Côte d’Or region in Burgundy, the Nord region,7 and the Dutch region8 show the survival potential by addressing and implementing tasks to improve bystanders’ lifesaving behaviour and community-based programmes related to cardiac arrest. Last, but not least, the general population should be encouraged to exercise at different levels, with a health benefit that greatly outweighs the risk of dying due to exercise.

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References


