EDITORIAL COMMENTARY

Ventricular arrhythmias during electronic gaming: Sudden victory and sudden death

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In the past 20 years, there has been remarkable growth in electronic gaming, especially in sponsored, competitive play. Termed “eSports,” competitions involve both individual players as well as multiplayer teams. The societal footprint of eSports is striking—there are more than 170 collegiate-level eSports organizations, with competitions broadcast nationally on ESPN and TBS, as well via multiple online streaming services (eg, Twitch, YouTube). The financial stakes are equally impressive: the global eSports market was valued at $1.38 billion in 2022, with aggregate prize pools for single competitions as high as $40 million. Championship contests are played to sold-out arenas typically reserved for A-list performers, complete with cheering fans, exuberant play-by-play shoutcasters, and coordinated light and pyrotechnic displays.

Given the similarities between this environment and the typical stresses of traditional competitive athletics, it is reasonable to assume that a certain subset of eSports “athletes” may be at risk for cardiovascular complications during competitive play. In a study reported in this issue of Heart Rhythm Journal, Lawley et al2 highlight how electronic gaming may rarely precipitate life-threatening arrhythmias or sudden cardiac death in patients with an underlying proarrhythmic condition. Reports from 22 total pediatric patients were gathered, all with either a history of life-threatening arrhythmia or syncope with associated palpitations while playing a video game. Reported events included “palpitations +/- chest pain,” “presyncope, syncope with return of consciousness, cardiac arrest,” and 4 patients with sudden death. The most common underlying proarrhythmic conditions were catecholaminergic polymorphic ventricular tachycardia (CPVT) and congenital long QT syndrome (LQTS) types 1 and 2. CPVT frequently manifests as ventricular ectopy at predictable rates of tachycardia and can occur during activity or strong emotion, but also during rest or sleep.3 As studies have shown an association between accelerated heart rate and competitive video gameplay,4 the high prevalence of CPVT makes sense in this case series and systematic review. Triggers of life-threatening arrhythmia in LQTS can include exercise or emotional stress, which could explain its prevalence in this study.

A growing number of studies have sought to determine whether video gameplay affects cardiovascular health. It is important to classify video gameplay as active vs sedentary because some games require physical movement or exercise whereas others do not. Yet this distinction is complicated by the fact that certain games intended to be played in a sedentary position, such as first-person shooter, have been shown to elevate heart rates in adults to an average of 80 bpm above baseline.4 Additionally, competitive video gameplay has been shown in several studies to evoke significant hemodynamic changes similar to exercise.4 The article by Lawley et al2 describes the mechanism for cardiac arrhythmia in children during electronic gaming as involving adrenergic stimulation related to strong emotions, although this is not completely understood. Even during eSports that are expected to be sedentary, physical activity still can contribute to events. Of note, 2 episodes in the study occurred during physical activity such as jumping after a win/loss or fighting over a game control with a sibling, which the study interpreted as syncope provoked by exercise.

In general, appropriate cardiac screening may be warranted for any adult or child with syncope, presyncope, or palpitations during electronic gameplay. We agree that guidance on playing war games or other eSports should be given to parents with a child who has a known proarrhythmic condition, especially those conditions that are inducible by stress or exercise. However, as noted earlier, even games during which play is expected to be sedentary may evoke significant emotional and hemodynamic responses when played competitively. These individuals may be at potential risk for arrhythmia or syncope while playing certain high-intensity eSports as the case series demonstrates, but the overall incidence is not known. Shared decision-making regarding the risk and reward of these activities should include the children, their parents, and providers, with important consideration of the child’s quality of life. Because cardiac events have not been compared directly between those

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occurring during video gameplay and those occurring during sports, it is difficult to make any claims as to whether eSports are a safer alternative to traditional athletics. Indeed, diagnoses such as CPVT and LQTS have guideline recommendations to limit or avoid competitive sports or strenuous exercise and stressful environments, but the guidelines recently have been evaluated with regard to return to play on medical therapy.

In the study, antiarrhythmic pharmacologic therapy was provided to the surviving patients with CPVT according to established recommendations, and 4–6 children had recurrent events during electronic gaming while taking a beta-blocker. Lawley et al. refer to a study by Ostby et al. that demonstrated a similar risk of events in patients with CPVT who are athletes (14%) vs nonathletes (14%) while on antiarrhythmic therapy. Therefore, Lawley et al endorse that although antiarrhythmic therapy may possibly make athletics acceptable for patients with CPVT, their own case series event rate of 66% during eSports while on antiarrhythmic therapy raises uncertainty as to whether video gamers are offered a similar pharmacologic benefit as athletes. The sample sizes of both studies were too small to ascertain whether there was a statistically significant difference in antiarrhythmic therapy efficacy between athletes and video gamers with CPVT. Thus, the currently accepted therapies for CPVT, such as monotherapy or combined use of beta-blockers, flecanide, ICD therapy, or surgical cardiac denervation, should remain therapeutic options in patients with CPVT as indicated, especially for athletes and video gamers.

We commend the researchers for documenting the genetic details of most individuals (18/22), and 15 cases had “potentially relevant genetic variants.” It would be helpful for future studies to include additional case details of arrhythmia and syncopal events that may be of interest, such as consumption of caffeine, energy drink, or other stimulants, whether prescribed or illicit during gameplay, or any family history of sudden cardiac arrest or death. Several studies have shown no arrhythmogenic association with caffeine alone in the general population, but whether there may be an association in predisposed individuals, such as those with CPVT, for which caffeine theoretically may affect calcium flux modulation is unknown. Perhaps more importantly, studies have linked energy drink consumption to ventricular arrhythmias and QT prolongation compared to a caffeine-only control group. Future work also should consider including details of gaming at the time of an event, such as the duration of play, time of day, any physical exertion, type (and even title) of game, and competitiveness of play (ie, higher stakes against peers).

Although physicians have long recognized exertional syncope as an ominous finding in young patients with respect to risk of sudden death, this study suggests that, in the modern era, “exertion” should be understood to encompass activities outside of traditional competitive athletics. Appropriate counseling regarding the risks of intense video gameplay should be targeted toward children with a proarrhythmic cardiac diagnosis and any child with a history of exertional syncope of undetermined etiology. Furthermore, any future screening programs aimed at identifying athletes at risk for malignant arrhythmias should encompass athletes being considered for participation in eSports. Although the appropriateness of such screening programs is outside the scope of this study, it certainly suggests that eSports competitors should be treated similar to traditional athletes with respect to sudden death risk stratification.

References