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COMMOTIO CORDIS – OR HOW RARE CAN SUDDEN DEATH BE IN YOUNG PEOPLE

Commotio Cordis (CC), meaning "agitation of the heart" in Latin, was first described in 1707 by Giovanni Maria Lancisi. Early cases include a French report in 1876 where a man died from chest trauma during a workplace accident, and a British report (dating from 1898) of a 13-year-old boy who died after being struck by a cricket ball. While early cases often involved workplace accidents, from the 1970s onward, sudden cardiac death in young athletes became more common. Although it is a rare cause of sudden death in young individuals, CC has gained public attention due to recent media coverage of such cases. It refers to sudden cardiac arrest resulting from direct trauma to the precordium, causing ventricular fibrillation (VF) or ventricular tachycardia (VT). CC is the third leading cause of sudden cardiac death in young athletes, with more than 75% of cases occurring during sports activities. Quick cardiopulmonary resuscitation (CPR) and defibrillation are critical for survival, underscoring the importance of increasing awareness among coaches, trainers, and medical personnel, and ensuring access to automated external defibrillators (AEDs) in public places.

CC typically occurs in competitive sports rather than in recreational activities and is caused by a nonpenetrating, mechanical, blunt impact trauma to the anterior chest wall, which disrupts the heart's electrical conduction system and leads to cardiac arrest. Fewer than 20 cases are reported in the U.S. annually. Over the past decade, survival rates from CC have improved to 58% due to better CPR efforts and increased awareness. Experimental studies on animals have identified four key factors that influence whether blunt trauma leads to CC: (1) location, (2) timing, (3) projectile structure, and (4) velocity. Trauma must occur directly over the anatomic position of the heart, as CC cases outside this area have not been reported. Timing is critical, with impacts during a 15 ms window of ventricular repolarization in the cardiac cycle (the downward slope of the T wave) being most likely to cause VF. This results from the activation of stretch-sensitive K+ ATP channels due to increased left ventricular pressure after trauma.

Key words: AEDs; trauma; sudden cardiac arrest

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Hard, small, sphere-shaped projectiles are most likely to cause VF, particularly at speeds of around 40 miles per hour. Faster projectiles (over 50 miles/h) are more likely to cause structural damage rather than arrhythmias. Management of CC involves early recognition of cardiac arrest, rapid use of an AED, and initiation of high-quality CPR. Since CC typically causes VF or VT, AED use is vital. In swine models, 94% of VF episodes were terminated with a single AED shock, with a 100% survival rate when shocks were applied within 1 minute of trauma. However, survival dropped to 46% if AED use was delayed to 4 minutes. The rise in survival rates being linked to quicker response times, improved AED access, and increased first responder training at sporting events. The American Heart Association recommends making AEDs easily accessible at all organized sports events within 5 minutes of collapse. Efforts to improve AED distribution, accessibility at sporting events, and public training to do CPR and to use AEDs are key factors to improve survival in young athletes.

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