When Our Beer, Chocolates, Waffles and Denial No Longer Suffice – Medical Responses to the March 2016 Brussels Suicide Bombings

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EDITORIAL

In sharp contrast with the shock, denial, grief and indignation among ordinary citizens, airport personnel, travelers and health workers, terrorist attacks such as the recent Brussels suicide bombings in the heart of the European Union and NATO, had long been expected by specialized national and international law enforcement agencies. Apart from the economic and mental impact on our entire society and values, any individual regardless of age, gender, race, religion, citizenship, profession, or social status may get personally hurt. Between 2007 and 2013 the world saw a 73% increase in terrorist attacks, incidents per year increasing (P<0.01) [1]. According to a 2015 study by Edwards et al., the Global Terrorist Database (DTB) identified 58,095 terrorist explosions worldwide, of which 5.08% were suicide bombings [1]. Mean casualty statistics per incident showed that suicide incidents caused 1.14 deaths and 3.45 wounded, while suicide bombings caused 10.16 and 24.16 (P<0.05). The same study showed that the kill-to-wounded ratio was statistically significantly higher (P<0.05) in suicide attacks (1:1.3) than in non-suicide attacks (1:1.24) [1].

Belgian emergency plans to deal with the medical consequences of disasters had been in existence for quite some time. However, most of these plans were crafted in mind all kinds of accidents rather than willfully may them. The differences are not to be underestimated. The principles of Advanced Life Support emphasize that medical personnel should ensure their own safety before administering emergency medical help to victims. In many accidents this is a relatively simple task. However, in the case of bomb explosions and terrorist attacks this is a complex task that often far exceeds merely estimating the integrity of a building’s structure and stability. Instead, it is often virtually impossible to know whether further bombs are hidden programmed to soon execute their lethal task, or whether terrorists carrying firearms are still at large waiting to make more victims. In this way, incidentally present medically qualified people and initially arriving emergency personnel are facing a daunting task.

The March 22 suicide bombings at Brussels airport and the Maalbeek subway station located near the city’s political center were carried out using Triacetone Triperoxide (TATP), popularly sometimes referred to as “the mother of Satan”. TATP is an unstable explosive that was also used in the 2005 London tube attacks and the November 2015 Paris attacks. Suitcases were used as non-suspect carriers of the explosive devices, which equally contained metal screws, ball bearings, carpenter-style nails and bolts.

Those victims who found themselves being in the closest proximity to the blast died immediately or very soon after the explosions. As expected [2], the other victims experienced injuries roughly inversely proportional to their distance from the blast epicenter. Victims suffered primarily from burns caused by the fireball that accompanied the explosion. Those in relative proximity who happened to inhale during that same moment also ended up with airway burns. Virtually all victims had shrapnel wounds, some of them had screws, bolts and metal waste stuck in their abdomen, thorax, heads, eye balls and extremities; many of them had multiple and complex fractures. These kinds of attacks cause mass casualties [3] who may require both on-scene and in-hospital triage to maximize survival rates and to conserve limited resources. Thirty-two people died on the scene and 270 wounded, of whom several were critically injured requiring immediate life-saving surgery, were transported to university teaching hospitals in Brussels and surroundings and to a number or regional hospitals. In this way victims eventually became distributed over 28 domestic and 4 foreign (two in France, two in the United States) hospitals.

The primary (i.e., the explosion-induced pressure wave gradients causing ruptured eardrums, pulmonary contusions and mild traumatic brain injury (mTBI)), tertiary (i.e., caused by the blast force-induced physical displacement of the victim) and quaternary (all other indirect blast-related trauma, such as...
smoke inhalation) [4] injury pattern created by the bombings at the Brussels airport was not entirely identical to the one observed following the Maalbeek subway station bombings, despite the similarity in explosive material used. This is because the subway explosion took place in a confined space (CS), i.e. in a subway car that had already entered a tunnel as compared to the relatively open space (OS) inside the airport’s departure hall. The subway blast wave likely was channeled by the tunnel and subway carriages’ shape hence contributing to the number of traumatic lower-limb amputations, as was also observed in the London subway bombings [5]. Meta-analysis has shown that the majority (61%) of terrorist attacks tend to take place in CS while 24% occur in OS. Though the number of fatalities per terrorist incident are similar [1], the number of injuries was significantly higher in OS explosions (192.7 ± 141.2 [SD]) [1] when compared to CS explosions (79.20 ± 59.8 [SD]) [1]. Nearly 25% of victims with traumatic amputations survived the London bombings [2], but final statistics for the Brussels bombings that would allow a detailed comparison will not be available for some time.

Countries such as Israel, who have extensive experience with terrorist attacks, over the years have developed and improved triage protocols and initial management algorithms to deal with stable, unstable and in extremis patients [6,7,8] as the complex mechanism of injury observed in bombing injuries requires a particular treatment approach [9]. Initial pre-hospital evaluation should focus on the identification and control of potentially life-threatening conditions, including aggressive pre-hospital extremity exsanguination control.

People with medical backgrounds who incidentally might have been at or near the scene for private reasons, would encounter serious difficulties in applying life-saving help unless they were in possession of, or had immediate access to specialized medical materials, including: hemostatic dressings, Windlass or combat tourniquets, hemostatic dressings and bandages, etc. Having to rely on improvisation using nonmedical materials can be frustrating, and experimental research has shown that without a windlass, improvised tourniquets failed to stop bleeding in 99% of the tests; even with a windlass, improvised tourniquets failed to stop bleeding in 32% of tests (P<0.0001) [10]. Further extremity exsanguination control will be necessary during transportation to the hospital, where early operative evaluation should focus on the identification and control of potentially life-threatening conditions, including aggressive pre-hospital extremity exsanguination control.

Given the complexity and extent of the medical and economic resources required to effectively respond to terrorist disasters, improving prevention is paramount, not simply in terms of law enforcement, but in terms of socio-economic understanding [11,12]. Seventy-five percent of lone-actor terrorists have a university education, 8% of them even hold a PhD, yet 40% are unemployed [13]. Understanding what is happening there and precisely what triggers and feeds the radicalization of youngsters with fairly normal antecedents and, what on paper by nonminority members is often perceived as a “potentially successful professional future” will be key to this process rather than denial or believing that beer, chocolates and waffles would suffice.

CONFLICT OF INTEREST

The author previously trained as a medical officer at the Royal School of Medical Services (KSMD) of the Belgian Army, at the time still housed in the Leopoldskazerne in Ghent, Belgium.

REFERENCES