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Letter to Editor

Pattern of injuries in deaths due to bomb explosion

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Sir

Acts of terrorism, recent catastrophes, and disasters have created an urgent need for new classifications to characterize, report, and analyze injuries, sequelae of injuries and deaths associated with these events¹. The aim of this letter is to provide a detailed analysis of the autopsy findings of victims of the Varanasi courtyard bombings in 2007, and emphasize the importance of scene investigation and autopsy procedure for deaths due to terrorist bombings.

Nine deaths during bomb blast incident reported from various police stations of Varanasi and surrounding areas were examined in detail in our departmental mortuary. The ethical consent for this report was obtained from the review board at BHU. All of the victims were male in age group between 21 years and 60 years. All these victims suffered from tissue penetration either by spherical pellets (i.e. ball bearings) or molten metallic pieces of bicycles as intense heat energy liberated from explosion. Multiple penetrating wounds of about 4 to 5 mm in diameter, surrounded by a blackish ring of de-epithelialized dermis resembling the entrance wounds of bullets were seen on the body surfaces of the victims. Skin lacerations were present in all the victims. Skull fracture and brain lacerations were observed in three cases. Cervical vertebrae fracture and dislocation at the level C₂-C₃ along with rupture of spinal cord occurred in one case. Lungs were lacerated in two cases and in one case, heart was lacerated. The abdominal cavity was filled with about 1.5 to 2.5 litres of blood. Liver was lacerated in three victims. The liver was found to be most commonly injured organ. Upper limbs were spared in all cases but lower limbs were injured in 2 cases having traumatic fracture of tibia and fibula of right side. During autopsy metallic materials i.e. steel balls (ball

bearings) were recovered from four cases and molten metallic pieces of bicycles acting as splinters from five cases. Out of the nine victims with bodily injuries, one died instantaneously and the remaining died either on the way to hospital or in the hospital. Hemorrhage was the commonest cause of death (5 victims), followed by coma in 3 cases.

Teare² stated that ball bearings from terrorist bombs produce entrance wounds remarkably similar to those caused by bullets. This may be a source of confusion to both surgeons and pathologist. In one case, there were seven entrance wounds and five exit wounds with only two ball bearings being recovered from the body. One had lodged in the anterior abdominal wall, and the other in the body of the fifth lumbar vertebrae. In shooting, there is generally some aim taken which gives some expected direction of fire, but in terrorist bomb explosions the direction of flight of objects such as ball bearings is random. **Mayo et al³** reported in 91 victims of terrorist bombing, 20 died on the scene, and among the survivors, all the 32 severely injured suffered tissue penetration by the spherical pellets. In our study, head injuries were seen in 3 cases, either alone or in combination with abdominal region. Thoracic injuries were seen in 2 victims. Abdominal injuries were present in 3 cases. Lower limbs were injured in 2 deceased. **Yavuz et al⁴** in their study reported that there were fractures of the several bones in majority of the cases.

In our study various foreign materials were removed from corpses of 9 cases. Metallic ball-bearings (pellets) were recovered from 4 victims and molten metallic pieces of bicycles which were used for planting bombs were recovered from 5 cases. **Mayo et al³** reported that projectiles like steel balls, nails, screws and nuts packed around the explosive causes secondary blast injuries and the wounds reflect their velocity and shape. Multiple penetrations

of such pellets result in increased mortality and devastating injuries, and such were encountered in many suicide bombing incidents. In our study multiple traumas were seen in 3 cases. In a study conducted in Paris reported multiple traumas in 47% cases and Polytrauma was frequent with bombings⁵ In the present study shock and hemorrhage was the commonest cause of death of victims i.e. in 5 cases, followed by coma in 3 cases and instantaneous death in 1 deceased. But, **Yavuz et al**⁴ reported head injuries as the leading cause of deaths due to bomb explosions. Foreign materials removed from the corpses are very important in determining the attribution of the events and types of the bomb; also radiology is important for postmortem identification. A thorough understanding of detonation and blast dynamics by the treating teams is required to better correlate the injury patterns presented. Help in preserving the

scene of crime so that Forensic Experts can come to the conclusion easily as terrorist violence is criminal and requires an expert forensic investigation.

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