Tire Explosion Injuries to the Upper Extremity

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Objectives:
Although rare, tire explosion injuries to the upper extremity are capable of producing severe soft tissue and bony injuries. While the injuries sustained by the upper extremity during industrial-sized tire explosions have been described in the literature, very little is known about those sustained after small tire explosions in a non-industrial setting.

Methods:
Four patients treated for tire explosion injuries to the upper extremity from 2012 to 2014 were retrospectively reviewed. One patient was injured when a tractor-trailer tire exploded and three sustained injuries from small, non-industrial tire explosions sustained at home. Injury and intra-operative radiographs were used to evaluate bony injuries. Records were reviewed for the presence of soft tissue injuries and compartment syndrome. Time from injury to the operating room (OR), administration of antibiotics, development of post-operative infections, need for return to the OR, and return to baseline function were also evaluated.

Results:
All patients were available for follow-up. All patients sustained multiple open fractures and each patient sustained at least three bony injuries. While not always evident on injury films, every patient sustained at least one, and as many as four, carpometacarpal (CMC) dislocations or fracture-dislocations. Two of the four patients developed compartment syndrome and were treated with fasciotomies. Each patient received antibiotics and a tetanus booster upon arrival at the primary hospital and was taken to the operating room for formal irrigation and debridement within 20 hours from the time of injury. Three of the four patients required a return to the OR for repeat irrigation and debridement and wound closure. Three of the four patients returned to baseline function, while one remains out of work due to functional limitations of the involved upper extremity.

Conclusions:
Although rare, tire explosions are capable of producing severe soft-tissue and bony injuries to the upper extremity. With expeditious administration of antibiotics and tetanus prophylaxis, and formal irrigation and debridement in the operating room within 20 hours from injury, no patient developed a post-operative infection. Patients sustaining these injuries should be carefully evaluated for development of compartment syndrome, as half of the patients in this series required compartment releases. Imaging should be carefully scrutinized for the presence of CMC dislocations or fracture dislocations. While not always evident on injury radiographs, this injury was present in every patient.