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SPECTRUM OF NEUROMUSCULAR INJURIES IN VICTIMS OF BOMB BLASTS

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ABSTRACT

Introduction: Bomb blast (BB) injuries outside war zones were a rare phenomenon until recently. With the spreading wave of terrorism across the globe, BB related trauma is resurfacing. Explosions can produce unique patterns of neuromuscular injury. No recent data exists categorizing such injuries. **Methods:** Medical records and electrodiagnostic findings of 20 patients with BB related neuromuscular injuries (NMI) were reviewed retrospectively. **Results:** Most common site of injury was the lower extremities (55%) with majority presenting clinically with foot drop (40%) or weakness (30%). 9/17 patients (45%) had associated shrapnel or penetrating trauma. 6/20 patients had associated fractures. The most common finding was of mononeuropathies. **Discussion:** As we re-enter an era of war, we need to recreate awareness of the possible spectrum of NMI. Awareness of such injuries will lead to early identification of nerve trauma and the possibility of reduction in overall disability if treated appropriately soon after the injury.

Key words: Bomb blasts, neuromuscular injuries, mononeuropathies, plexopathies, electromyography/nerve conduction studies

INTRODUCTION

Bomb blast (BB) injuries were a rare phenomenon until recently. It is now becoming a common cause of trauma with the spreading wave of terrorism and war across the globe. Blast injuries in various regions of Pakistan and Afghanistan are an everyday norm and these frequently occur outside war zones. They have the potential to inflict multi-system life threatening injuries on many people simultaneously. The current available data for neuromuscular injuries (NMI) sustained by victims of bomb blasts is next to negligible. We conducted this study to see the spectrum of NMI in such patients, as this type of affliction will increasingly be seen across the world and with proper management the long term effects of these can be minimized.

MATERIALS AND METHODS

We reviewed all the patients who were evaluated in the electromyography laboratory at The Aga Khan University Hospital for BB related injuries; between 2009 and 2014. A cohort of 20 patients was identified. We retrospectively reviewed and analyzed their clinical and electrodiagnostic data. There were no exclusions. This study was approved by the Ethics review committee of the Aga Khan University Hospital.

RESULTS

For the 20 BB victims with NMI, the age ranged from 13 to 70 years (33.9 ± 15.7) and 18 (90%) were men. Majority hailed from Pakistan 16/19 with 3 victims from Afghanistan.75 % (15/17) victims had onset of their symptoms within one month of the inciting event, while such data was missing for 3 patients. The most common site of injury was the lower extremities (11/20; 55%) with majority presenting clinically with foot drop (8/20; 40%) or lower extremity weakness (6/20; 30%). 9/17 patients (45%) had associated shrapnel or penetrating trauma, while 6/20 patients had associated fractures all involving the lower extremity. On electromyography/nerve conduction studies (EMG/NC S), the most common finding was of mononeuropathies either in the upper or lower extremities (Table 1). Other injuries identified included brachial or lumbosacral plexopathy and cervical or lumbosacral radiculopathy (Table 1). 5 (25%) had multiple mononeuropathies, while only 1 (5%) had a normal study. As expected, no evidence of a muscle or neuromuscular junction disorder was identified in these patients, secondary to the inciting event. Of patients who underwent intervention for their injury, 5 had nerve exploration with repair, 2 had nerve grafting with tendon transfer and 1 had

tendon release surgery. Five patients underwent orthopedic intervention (internal or external fixation) prior to identification of nerve injury. Unfortunately most patients were lost to follow-up. Of 3/20 patients who did follow-up post procedure, 1 showed recovery while 2 had no change in their weakness.

DISCUSSION

Wars have been fought since the beginning of recorded history. Throughout time, the casualties of war have transcended all geographical, ethnic and cultural boundaries. Although the methods of warfare have changed, the injuries that result have remained constant over time.[1] Bomb blasts related injuries have become a threat for populations all over the world. The management of casualties by blasts once mainly came under the domain of military doctors, but given the present state of world dynamics any doctor may be called on to manage patients injured in BB. [2] Health-care providers are increasingly faced with the possibility of needing to care for people injured in explosions, but can often, however, feel undertrained for the unique aspects of the patient's presentation and management .8 BB can cause a spectrum of NMI. Primary blast injuries most commonly involve air–fluid interfaces including the ear, lung, and gut. Secondary injuries are penetrating injuries from fragments that are part of the weapon or those that result from explosion and are the leading cause of death and injury. Tertiary blast injuries also result from people being thrown into fixed objects by the wind of explosion. Any body part may be affected, and fractures, traumatic amputations, and open or closed brain injuries occur.[3] In our study, the most common nerve related injury was mononeuropathies. Majority of the patients (13/20; 65%) had associated penetrating shrapnel trauma and/or limb fractures, similar to reports in other studies [4]. While penetrating trauma was directly responsible for nerve injury, we were unable to establish if bone fragments due to fractures or treatment of these fractures (external or internal fixation) were responsible for subsequently identified nerve injury. Most patients were male (90%) in the productive age group (Mean age: 33.9 yrs) since BB tend to occur in crowded areas (markets, educational institutions); ultimately impacting the economic structure of society due to significant disability secondary to nerve injuries. Disability in such patients can be significantly reduced by early identification and intervention of nerve damage [5]. Also a basic education in the mechanisms of blast damage, a methodical approach to resuscitation, and mangled extremity treatment, likely can improve surgical success [6]. However determining whether to perform limb salvage or amputation in the traumatized lower extremity continues to be a difficult problem in the military and civilian sectors [7]. Although symptoms of nerve trauma were identified within a month of the inciting event in most of our patients, evaluation in a tertiary care hospital was delayed by an average of 11.7 months ± 22.09. There is a bias in selection of our patients as our hospital is a private, self paid tertiary care center and patients seeking care here do not represent the general population. In all likelihood, there are victims out there who suffer from far worse nerve injuries then those represented in our sample. Follow-up care was poor, as most patients came from remote areas for a short stay and had difficulty in access to a tertiary care center. As we re-enter an era of war, we need to recreate awareness of the possible spectrum of nerve injuries, affecting civilians and armed forces personnel which will lead to early identification of nerve trauma and the possibility of reduction in overall disability if treated appropriately soon after injury.

ABBREVIATIONS

BB: Bomb blasts
EMG/NCS: Electromyography, Nerve Conduction Studies.
NMI: Neuromuscular injuries

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Table 1: Spectrum and frequency of nerve injuries sustained by bomb blast victims

Nerve injury (n=20)	Frequency	Percentage (%)
Brachial plexopathy	2	10
Lumbosacral plexopathy	1	5
Median	4	20
Ulnar	2	10
Radial	2	10
Axillary	1	5
Sciatic	4	20
Tibial	3	15
Peroneal	4	20
Facial	1	5
Cervical radiculopathy	2	10
Lumbosacral radiculopathy	2	10

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Dr. Dureshahwar Kanwar: Study concept and design, protocol writing, data collection, data analysis, manuscript writing, manuscript review

Dr. Ambreen Iqrar: Study concept and design, data collection, data analysis, manuscript writing, manuscript review

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