

Blast Injuries in Children and Adolescents

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ABSTRACT

Objective To find out pattern of injuries, treatment provided and outcome of blast injuries in children including adolescents.

Study design Case series.

Place & Duration of study Department of Paediatric Surgery National Institute of Child Health (NICH) Karachi, August and October 2013.

Methodology Demographic data of the blast victims, nature of the blast, treatment received before arrival to NICH, injuries found and treated, complications and outcome in terms of discharge, referred or death was entered into a performa. Descriptive statistics were used to present data.

Results Two incidents occurred during the study period. A total of ten children and adolescents were injured. In incident 1, bomb blast occurred after a football match. The bomb was planted in motorbike and was detonated with remote control. In incident 2 blast occurred when extortionist hurled hand grenade into a clinic of a doctor. Victims received multiple injuries. Of the total three children needed chest intubation in ER after needle thoracocentesis for life threatening tension pneumothorax. A total of five laparotomies and one laparoscopy were performed.

Hollow viscera were involved both due to blast wave and penetrating missile. Small bowel was involved in most (n=4) and colon in two patients. No intraperitoneal breach was found in patient who underwent laparoscopy. One patient lost his eye sight while in one patient was found paraplegic at tertiary survey. No mortality occurred in this series.

Conclusions The pattern of blast injuries were not different from what is reported from other centers. An organized approach using ATLS protocol was found useful in managing victims. Hollow visceral injuries were found in most of the cases.

Key words Terrorists attack, ATLS protocol, Pediatric.

INTRODUCTION:

Blast injuries are common phenomenon in today's deeply divided world.¹ The reasons are multiple but political, ethnic and divide based upon religion, are dominating in the contemporary world. To some it is only a desire to control the world economy which is a modern concept of slavery. Whatever the reason

may be it is the civilian population who gets the brunt of this divide in terms of poverty, hunger and death. Developing countries are facing the threat more than developed world but no region of the world is safe.² Pakistan is one such country where these incidents are frequently reported. A large number of civilians died in the last three decades due to terrorists' attacks.

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Blast injuries are unique as damage to body occurs due to different mechanisms.³ The pattern of injuries also vary according to type of explosive used. Children are less often the victims of bomb blast. The management of children is done on the same lines as that of adults though there are physiological

and anatomical differences between the two.⁴ Guidelines provided by Advanced Trauma Life Support (ATLS) program are useful in managing trauma victims. There is scarce data available in children in relation to blast injuries. This study was aimed at describing the experience of two bomb blast incidents where children were the injured. This is expected to guide those who provide care to the children.

METHODOLOGY:

This was a case series of pediatric patients including adolescents who were injured following bomb blasts and brought to National Institute of Child Health Karachi. The incidents occurred in August and October 2013 in Karachi. All patients were managed in ER according to ATLS protocol. Following initial resuscitation and stabilization of primary life threatening injuries subjects were shifted either to OR or ICU depending upon further treatment required.

Mechanisms of injury, injuries found and managed including surgical intervention done, were recorded. Injuries that required involvement of other specialties and those missed were also noted. Complications during the course of hospital stay and outcome in terms of discharge / death also entered into database. De briefing session was done after 24 hours and one week of the incidence to find out what was missed and how it could be improved. Data was analyzed using descriptive statistics with numbers and percentages.

RESULTS:

A total of 10 children and adolescents were injured in two blast incidents. The age of the patients ranged from 6 year to 16 year. All were nine males and one female in this series. In Incident 1 a blast occurred in a notorious neighborhood of Karachi in the month of Ramadan, the fasting month, at around 01 am after a football match finished. It was a remote controlled bomb planted in a motorbike which was parked outside the stadium. The target of the terrorists was a political figure. Eleven people died and twenty-six were injured. Most of the victims were teenagers.⁵ The dead and injured shifted to a nearby tertiary care hospital from where seven children and adolescents were brought to National Institute of Child Health about 45 minutes following the blast. The treatment given at primary facility was maintenance of IV line and simple covering of wounds.

Two surgical residents on call at NICH started managing the patients according to ATLS protocol

and other team members who were not on duty, were also called in. In two children who were in severe respiratory distress and diagnosed as having tension pneumothorax on clinical ground, chest tube was placed after needle thoracentesis. In one child chest tubes were placed on both sides. IV crystalloid fluids were continued and blood was arranged. Five children were shifted to Surgical ICU and two to OR as they had multiple penetrating wounds all over the body and laparotomy was planned.

In patient 1, who was 16 year old, two penetrating wounds were present in the midline over lumbosacral region. Ball bearings, which were part of planted bomb, were also palpable. At laparotomy a through and through perforation found in cecum. It was primarily repaired. A retroperitoneal non expanding hematoma was also present which was not explored. In patient 2 who was 9 year old at laparotomy for penetrating wound over center of abdomen and left flank, multiple small bowel perforations were found. In this case resection anastomosis of segment of ileum was done at two sites. Patient 3 was a 13 year old in whom chest intubation on right side was already done in ER. He underwent laparotomy for penetrating wounds. In this patient multiple ileal and descending colon perforations were found. Repair of ileal perforations and left transverse colostomy done. A large non expanding retroperitoneal hematoma was not explored.

Patient 4 was 12 year old boy with left eye chemosis, lacerated upper eye lid and nasal bone fracture. He also had bleeding wound over left side of neck. He initially had chest intubation on both the sides due to tension pneumothorax in ER. He also underwent laparotomy for penetrating abdominal wounds and found to have multiple small bowel perforations for which resection and anastomosis was done. For other superficial wound suturing and dressing were done.

Patient 5 was 11 year old. He had multiple pellets palpable over anterior abdominal wall. As this child was hemodynamically stable and signs of peritonitis were not present laparoscopy was done. It did not show any penetrating peritoneal wound. Patient 6 and 7 though clinically stable had multiple wounds all over the body. In a 6 year old male there was right orbital swelling. Infraorbital hematoma and conjunctival hemorrhage. There was large wound over nose with exposed facial bones and cartilages. Wound toilet and suturing were done.

Incident 2 happened when extortionists hurled a homemade hand grenade into clinic of a doctor.

Three children aged 3, 4 and 7 year were brought within half an hour to NICH. ATLS protocol was used. One patient needed right sided tube thoracostomy for tension pneumothorax. This child after initial resuscitation underwent laparotomy for penetrating abdominal wound. Seven perforations at a distance of 0.5 – 1cm, were found in jejunum and ileum which were repaired. Second child after initial resuscitation subjected to laparotomy due to clinical signs of peritonitis. This patient had a small perforation in the ileum which was repaired. Third child had superficial wounds which were washed, sutured and dressed.

All patients received standard postoperative care. At tertiary survey an adolescent of incident 1, found paraplegic. He was referred to neurosurgery unit after discharge. The child with eye injury on later examination by an ophthalmologist found to have no vision in his injured eye. No mortality occurred in this series.

DISCUSSION:

ATLS protocol provides a universal language and facilitates management of the trauma victims. Initial assessment and resuscitation by priority is done and those whose needs are greatest, dealt with early.⁶ Same was done during management of these patients at NICH. The breathing problem was not identified in other tertiary care facility from where patients were referred. It was quite fortunate that children survived en route. No trauma victim should be transferred to another facility if primary survey is not completed satisfactorily and life threatening injuries are addressed. Another issue identified was the transfer of the patients without information. Prior information facilitates the management as resources can be mobilized both in terms of presence of healthcare providers and supplies that shall be needed in the treatment of the patients.⁷

This study revealed severity of injuries as a result of bomb blast in pediatric age group and adolescents. Injuries resulted from different mechanisms including blast waves, and secondary missiles (ball bearings, pellets etc).⁸ Blast waves usually cause hollow viscera injuries including lungs, bowel and tympanic membrane.⁹ Three (30%) children in this series required immediate needle thoracostomy followed by chest intubation in primary survey, to address life threatening breathing issue. Blast lung is a dangerous injury. It may require gentle ventilator support for a prolonged period of time.¹⁰ Though three of the children in this series had tension pneumothorax but none suffered from this condition. After surgery they were able to maintain airway and

breathing and ventilator support was not required.

Blast injuries due to terrorist attack are different from other traumatic injuries because of their severity.¹¹ It is associated with more hollow visceral injuries as reported in a study from Israel. Same was observed in this series. Both small and large bowel perforations were found but ileum was involved in most of the cases. Primary repair was opted of gut perforation except in a patient with fecal contamination where colostomy was also added. Surprisingly solid abdominal viscera were not injured.

In trauma setting it is not uncommon to miss some of the non life threatening injuries.¹² There are many reasons for this happening. Firstly, trauma providers are overwhelmed with the number of casualties. The priority is identification and management of life threatening injuries. Secondary survey is thus either not performed completely or patient may not be in a condition to concentrate while being examined. In this study similar situation was faced. Paraplegia in one child was identified in a tertiary survey after major laparotomy was completed and patient recovered from anesthesia. In other child who lost his eye sight, major intra ocular injury was suspected during initial examination. Missed ocular injuries are not uncommon. They have been reported in all age groups in trauma setting.¹³

Another important issue was the safety of healthcare providers during course of treatment of blast injury victims. Violent behavior and manhandling of doctors and paramedical staff has been reported from Pakistan. This severely affects the level of care provided to trauma victims. Many reasons can be found in local context.¹⁴ However it was noted during the management of first incident where a political party leader was involved that visits of government officials created law and order situation. Safety measures at hospitals in such circumstances must be kept up front.

Psychological and physical rehabilitation of trauma victims and their families has not gained much attention in Pakistani context. Dedicated services must be made available in public sector hospitals to address these issues. There are studies where it has been shown that trauma victims suffer severe emotional set back and may find difficult to cope up with daily routines.¹⁵

With increasing political divide terrorist activities are expected to continue for a long time to come. Its solution lies in a comprehensive dialogue between rival factions. Till that happens civilian population

will face the increasing threat to their life. Emergency preparedness to deal with such incidences at pre hospital and hospital level, is therefore emphasized. An effective rapid response rescue teams in collaboration with trauma teams in ER of all the designated trauma hospitals can go a long way to improve survival of trauma victims.

CONCLUSIONS:

Hollow visceral injuries were commonly found following bomb blasts. Tension pneumothorax should be suspected and dealt with during primary survey as it is a life threatening condition. Missed injuries are not uncommon and high index of suspicion must be kept in mind.

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