ANIL AGGRAWAL'S
Internet Journal of Forensic Medicine and Toxicology
The world's first online journal devoted entirely to forensic medicine and toxicology · Published 1 January and 1 July

VOL. 11, NO. 1 · JANUARY – JUNE 2010
Downloaded from www.anilaggrawal.com · ISSN 0972-8074 (Online) · https://www.anilaggrawal.com/ij/vol_011_no_001/papers/paper003.html

Psychiatric sequelae in children injured by escalators: An overview and two case reports

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CITE THIS ARTICLE

Myers WC, Roussos-Ross K, Gootam P. Psychiatric sequelae in children injured by escalators: An overview and two case reports. *Anil Aggrawal's Internet Journal of Forensic Medicine and Toxicology* [serial online], 2010; Vol. 11, No. 1 (January – June 2010): [about 21 p]. Available from: https://www.anilaggrawal.com/ij/vol_011_no_001/papers/paper003.html

ABSTRACT

Childhood trauma is a common occurrence. Escalator injuries are a not infrequent cause of this type of injury. Posttraumatic stress symptomatology often results from traumatic experiences in children and adolescents, but the psychiatric outcome from escalator injuries in youth is an understudied area. This article presents two cases of escalator injuries in children. Neither of these young girls had previously experienced serious childhood trauma. Both were seen for forensic examination in the context of personal injury litigation. Their psychiatric sequelae and legal outcomes are presented and discussed. Further studies are needed to explore the psychiatric and medicolegal outcomes of children suffering escalator injuries.

Keywords: child, adolescent, escalator, psychiatric, psychological, trauma, injury

Introduction

Childhood trauma is a common occurrence. It is estimated one-half or more of youth will experience at least one traumatic event by adulthood.[1,2] Only a minority of these children will develop posttraumatic stress disorder.[3] Nonetheless, any degree of PTSD symptomatology raises the

risk in children and adolescents for psychiatric morbidity, developmental disturbances, and impairment in family, academic, and social functioning.

Escalators are ubiquitous in modern societies, yet the psychiatric sequela stemming from escalator injuries in children remain an understudied and over-looked area of research. Given the nature of these injuries, they can often be a cause of significant childhood trauma. The parts of the escalator most commonly involved in injury are the steps, treads, skirt plate, and comb plate. The treads are evenly spaced thin metal ridges with right angles that provide foot support during escalator transportation. The comb plates are located at the ends of the escalator, and they have angled teeth that fit into the grooves between the treads. The skirt plate is the stationary sidewall of the escalator.[4] Escalator injuries normally occur through fall or entrapment. Entrapment injuries have been described as occurring by 3 different mechanisms: 1) entrapment of an extremity between two steps, 2) entrapment between a step and the sidewall or skirt plate, and 3) entrapment between the last step and the comb plate. The injuries that occur are generally of the cutting, tearing or crushing type.[5] The injuries typically occur due to insufficient adult supervision of child riders, improper activity while riding the escalator, or escalator-related mechanical problems.

The U.S. Consumer Product Safety Commission[6] estimated there are about 7,500 escalator injuries requiring hospitalization each year. Seventy-five percent of these injuries were due to falls, another 20 percent occurred when hands, feet or shoes were trapped in escalators. A more recent study found 26,000 such injuries in youth under 19 years of age were treated in emergency rooms between 1990 and 2002.[7] Thus, at least 2000 injuries of this sort occur in children annually, and the data also suggest their prevalence may be growing. Findings further revealed that the majority of escalator injuries were caused by falls and occurred in boys. Overall, the most common injury site was the leg, although in children under five it was the hand. About one-third of injuries were caused by entrapment (29% overall; 37% for children under the age of 5). Amputations and avulsion injuries, when they occurred (about 3% of cases), were likewise highest for children under the age of five years, this also being the age group most likely to be injured in general.

There is a paucity of research regarding the psychiatric impact of escalator injuries in children. PubMed and public search engines using relevant entries like “escalator,” “injury,” and “PTSD,” were unsuccessful in finding any research on the emotional outcome of this form of trauma in youth. This article presents two cases of escalator injuries in children. Neither of these young girls had previously experienced serious childhood trauma. Both were seen for forensic examination in the context of personal injury litigation. Their psychiatric sequelae and legal outcomes are presented and discussed. Their names have been changed and identifying information omitted.

Case 1

Sheila, a 3½ year-old girl, right hand dominant, was riding a down escalator in a department store when her entire left hand became entrapped by the comb plate. Approximately 30 minutes elapsed before she was freed by emergency personnel. She suffered a degloving injury of her entire palm and a comminuted fracture of the distal aspect of the proximal phalanx of the left small finger. Two surgeries were necessary. In the first procedure she underwent debridement of the injured hand areas and reduction and internal fixation of her digit fracture. In the second procedure the internal fixation hardware was removed and debridement of a left palmer eschar was accomplished.

Sheila developed a number of posttraumatic symptoms following her accident. She lost weight, her sleep became poor, and she had nightmares. She was reported to wake up at night in a state of panic-–screaming and diaphoretic. Prior to her accident she had been a good sleeper. She began to have hysterical reactions to minor physical injuries. She also manifested the fear that something bad might happen during routine activities, and she required reassurance from her mother she was safe in order to proceed. Sheila avoided discussing the incident, and when she walked in front of escalators she shielded her eyes with her hand. She perceived her hand as “sick” and “ugly,” and noted that it looked like “hamburger” at the time of the injury.

On the Child Behavior Checklist, Sheila had borderline clinical elevations on the Withdrawn, Somatic Complaints, and Aggressive Behavior scales, and corresponding symptoms endorsed by the mother included Sheila being isolative, shy, underactive, sad, tired, having pain complaints, arguing, being mean, demanding attention, exhibiting aggressive behaviors, screaming, and showing mood lability. The forensic child psychiatric evaluation, conducted one year after her accident, concluded she suffered from Posttraumatic Stress Disorder that was caused by her escalator injury. The settlement agreement between the plaintiff and defendant in this case was confidential.

Case 2

Connie, a 5-year-old girl, right hand dominant, was riding a down escalator in a department store when her shoe came off. As she tried to retrieve her shoe, her right hand became trapped in the comb plate. The mother attempted to remove her daughters’ hand without success by lifting the comb plate, but fortunately the escalator had stopped. Rescue workers freed her hand after roughly 30 minutes of entrapment. Connie suffered a degloving injury to the dorsum of her hand and three of her fingers were amputated from the trauma. Surgical interventions involved debridement, skin grafts, and cosmetic/functionality procedures. Many months of hand rehabilitation therapy followed. Eventually she was able to use her injured hand for the majority of daily tasks.

In the aftermath, Connie developed several PTSD symptoms, although she did not formally meet criteria for a formal diagnosis. She had nightmares several times a week, and they sometimes caused her to wake up screaming. She could only be consoled afterward by going into her mother’s room. Interpersonally, she became emotional, irritable, short-tempered with her siblings, and easily frustrated. Questions about her hand made her uncomfortable. At school her trajectory of grades decreased, although not to the point of jeopardizing her promotion to the next grade.

Her Composite IQ was in the middle of the average range according to the Kaufman Brief Intelligence Test. Her performance on the Wide Range Achievement Test--3 did not support the presence of a learning disability. On the Child Behavior Checklist--Parent Report, she had borderline clinical elevations on the Externalizing scale and the Anxious/Depressed and Aggressive Behavior narrow band scales. On the Teacher Report Form, she had borderline clinical elevations on the Total Problems and Externalizing scales, and a clinical elevation on the Internalizing scale. On the narrow band scales she had a clinical elevation on the Anxious/Depressed scale and a borderline clinical elevation on the Aggressive Behavior scale. No depressive symptoms were noted on the Children’s Depression Inventory--Short Form. The forensic child psychiatric evaluation, conducted 2.5 years after her accident, concluded her PTSD symptoms were best categorized as an Anxiety Disorder, Not Otherwise Specified, and this condition was opined to have been caused by

her escalator injury. The case went to trial and the jury found for the plaintiff; the award was in excess of 10 million dollars.

Discussion

The literature contains a number of articles addressing the psychiatric outcomes of various children traumas, such as burns, disfiguring injuries, dog bites, and lawn mower accidents to name a few; with PTSD being a commonly described sequelae. [8,9,10,11] On the contrary, the psychiatric implications of escalator-related injuries, both in children and adults, appear to be a virtually unstudied area. To our knowledge, this is the first article to address psychic injury in children secondary to escalator trauma. Given that 2000 or more children are injured riding escalators each year, further inquiry appears warranted to investigate how this particular form of trauma manifests psychologically in children. It is expected that a substantial number of these child victims will suffer serious psychopathology as a result of their traumatic escalator experiences.

In the two personal injury cases at hand, we are limited in any conclusions that might be drawn given the small N. Additionally, both victims were girls, and female children may be more susceptible to the development of PTSD than boys.[12] However, there are several commonalities in these cases that are worth noting. First, both of these girls were injured by hand entrapment under the comb plate, an injury pathway more common in the youngest of children.[7] Second, they each were entrapped for approximately 30 minutes, sustained serious physical injuries to their hands, required multiple surgeries, and likely underwent a substantial loss of body integrity. All of these factors would be expected to heighten the likelihood of the development of PTSD. Third, and not unexpectedly, each of them continued to have marked PTSD symptoms one and 2.5 years post-injury respectively. Perhaps a contributing factor to the extent and persistence of their symptoms was the fact that both were entrapped for a prolonged period of time in a public setting with gaping crowds gathered. It is thought that traumatized children who perceive parental reactions of fear or horror to the trauma -- and this would presumably apply to child victims observing similar emotional reactions in other observers as well -- may be more likely to develop psychopathology.[8]

From a medicolegal perspective, the diagnosis of PTSD has blossomed over the past twenty or so years, and it has had a dramatic impact on civil and criminal jurisprudence.[13] The stage for this development was set when the legal system began allowing compensation for the psychiatric component of physical injuries.[14] Forensic mental health evaluators are increasingly being consulted by attorneys to evaluate adult and child trauma victims for psychic injury.[15] While studies on child trauma vary widely on what percent of injured children will develop posttraumatic stress syndromes, and various individual, family, and trauma variables will ultimately shape this outcome, a generally cited range for the development of PTSD is 25-33%.[8] In child escalator trauma, particularly in cases involving physical injury and entrapment, the chance of serious PTSD symptoms resulting is estimated to be substantial.

Further studies are needed to explore the psychiatric and medicolegal outcomes of children suffering escalator injuries. Areas for investigation might include incidence rates of resultant psychopathology in larger samples, best practices for assessment, diagnosis, and treatment interventions, and outcome studies.

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