

Mutilating Hand Injuries in Children



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KEYWORDS

• Hand injury • Child • Mutilating • Replantation • Revascularization • Trauma • Burns

KEY POINTS

- Mutilating hand injuries in children are significant because of the actual tissue injury and the significant psychological impact they have on the patient and family.
- Management of these injuries requires significant surgical skill as well as a well-planned and well-executed treatment protocol.
- This article discusses the etiology, incidence, and treatment of mutilating hand injuries in a child.
- The relevant literature has been reviewed and appropriate treatment guidelines have been provided.

INTRODUCTION

Children are naturally curious! Anything and everything within hand's reach will be probed. This renders the upper extremity and particularly the hand vulnerable to injury. In addition, it is but natural for a human being to thrust out one's hands as a means of protection from a fall or as a means of shielding oneself from approaching danger. This in turn further increases the risk of injury.¹

EPIDEMIOLOGY

An exhaustive analysis of injuries in children between the ages of 0 and 19 years was conducted by the Centers for Disease Control and Prevention, evaluating data between 2001 and 2006.² This revealed an average of 11,272 nonfatal injuries per 100,000 population with a majority of them occurring in males (58%). An interesting finding of the study was that these injuries demonstrated 2 peaks in age incidence. The first peak was between 1 and 4 years of age and the second between 15 and 19 years of age—with the lowest incidence being in children under the age of 1 year. This apparently skewed incidence of nonfatal

injuries in children seems to follow characteristic phases in the interaction of a developing child with the external environment. A child between the ages of 1 and 4 years is just making his or her first foray into the new world. It is this child who is most inquisitive and hence most likely to probe and investigate every unfamiliar object and thus get injured. In a similar manner, children between the ages of 15 and 19 years are typically leaving the protected confines of their homes for the first time and venturing out on their own. These behavior patterns render children more vulnerable to injuries and are further exemplified by the type of injury sustained. Fortunately, there has been a slow but steady decrease in the incidence of nonfatal injuries over time. Studies have revealed that a total of 14,475 nonfatal injuries were reported in 2000 and that number decreased to 11,392 in 2013, a total decrease of 22% over a 13-year period.³

Our institution has seen a steady decrease in the number of mutilating injuries seen in children over the years. Between 1970 and 1979, we performed 60 replants in 41 children.⁴ A subsequent study looked at data over a 15-year period from 1973 to 1988 and found that a total of 62 pediatric

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amputations were seen in our practice but only 32 digits in 29 patients were found replantable.⁵ Over the last decade, replantations and revascularizations in children have dwindled to single digits each year in our institution, although the adult numbers have remained constant at around a 100 patients. This fortunate decrease in the incidence of severe mutilating injuries in children can be attributed to significant improvements in safety features in toys, furniture, and other household goods, compounded by an increase in awareness among the general public.

ETIOLOGY

Mutilating hand injuries in children are as a result of direct trauma to the hand. Broadly, these injuries can be placed under 3 categories: accidental, nonaccidental (abuse) and self-mutilation. Accidental injuries are by far the commonest cause of injury and in turn may be divided into those caused by direct trauma and those owing to burns. Explosions, which by nature can cause devastating injuries, present with a combination of injury patterns and have elements of both direct trauma and burns. The report from the Centers for Disease Control on Prevention on injuries in children found that overall, falls were the commonest reason for injuries in children between the ages of 1 and 4 years; in contrast, being struck by an object was the commonest reason for injury in children between 15 and 19 years.² However, mutilating hand injuries in our experience have shown a slightly different pattern of causation compared with the general pattern of upper extremity injuries. In younger children, the commonest reason for amputation of a digit has been a crush injury, with the hand most often caught in something that shuts (door, window, car door, lid of a heavy box, etc) or caught in a folding piece of equipment (stroller, folding chair, etc). Explosions and motor vehicle accidents seem to be the commonest causes for mutilating hand injuries in the older child. Explosions are unique in that they not only cause severe injuries, but also have components of both trauma and burns, thus rendering their care that much more challenging.

Nonaccidental injuries are uncommon but need to be kept in mind while evaluating any child with injuries. These types of injuries are more likely to be present on the cheeks, necks, genitals, and so on, and less likely to involve exposed areas such as the upper extremity.⁶ In our experience, severe nonaccidental injuries of the upper extremity are more likely to be burns than any form of direct trauma. It is incumbent on the treating physician to be acutely aware of the possibility of

these injuries and, if suspected, take appropriate measures to safeguard and protect the well-being of the child. This can involve immediate steps, such as separating the child from the offending adult, as well as long-term measures, such as notifying appropriate childhood protective and social service organizations.

Self-mutilating disorders are rare but can be devastating for the affected patient as well as parents. The best-known condition in this group is Lesch–Nyhan syndrome. This is inherited as an X-linked recessive condition and is caused by the deficiency of hypoxanthine guanine phosphoribosyl transferase. Features include mental retardation, hyperuricemia, and a tendency to self-mutilate. Patients are known to chew off various parts of their body, especially their digits (**Fig. 1**). Owing to the severity of mental retardation, continued tendency to self-mutilate as well as limited life expectancy, Lesch–Nyhan syndrome is one of the few mutilating conditions of the hand in a child where reconstructive procedures are contraindicated. Management is limited to controlling infection and revision amputation of affected digits.

Preservation, Care, and Transportation of Amputated Parts

It is imperative that amputated parts be preserved appropriately and transported rapidly to a center with microsurgical capability. Our center, which pioneered the repair of digital vessels under the late Harold Kleinert, has over the last 6 decades ensured that all emergency rooms within our catchment area are furnished with kits for this very purpose (**Fig. 2**). These comprehensive kits contain all material

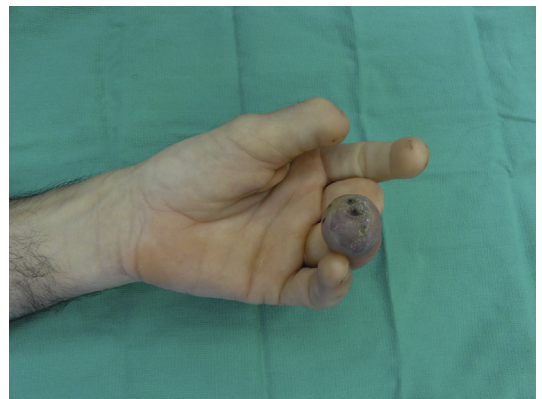


Fig. 1. A patient with Lesch–Nyan syndrome demonstrating multiple amputated digits owing to self-mutilation. The most recent injury is the infected long finger where recent bite marks are clearly visible over the tip. (Courtesy of KleinertKutz Hand Care Center, Louisville, KY; with permission.)

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