

Scooter Injuries: A New Pediatric Morbidity

Myles B. Abbott, MD*‡||; Scott A. Hoffinger, MD§¶; Dao M. Nguyen, MD‡; and Dana L. Weintraub, MD‡

ABSTRACT. *Objective.* To describe types of injuries, mechanisms of injury, and treatment of injuries caused by scooter use in children, and to discuss issues of injury prevention in children who use scooters.

Study Design. Data were collected from 14 children seen by a general pediatrician and an orthopedic surgeon over a 3-month period in the summer of 2000. Detailed histories were obtained from patients and their families, and medical records were reviewed.

Results. Eleven of the 14 patients suffered fractures. The injuries in the other 3 patients were a large abrasion, a laceration, and a septic knee. Half (7) of the children were injured within the first day of riding their scooter, and 13 of the 14 injuries occurred within the first month of scooter use. Only 5 patients used protective gear at the time of their injuries, and those patients were injured in unprotected parts of their bodies.

Conclusions. The popularity of scooters presents a new cause of pediatric injuries and a significant health hazard to children. In our study, most injuries occurred shortly after children began scooter use, and younger children suffered the most severe injuries. Additional studies are needed to determine how scooter-related injuries can be prevented or minimized. *Pediatrics* 2001; 108(1). URL: <http://www.pediatrics.org/cgi/content/full/108/1/e2>; *scooters, injuries.*

ABBREVIATION. CPSC, Consumer Product Safety Commission.

Scooters (Fig 1) present a new cause of pediatric injuries. On September 5, 2000, the United States Consumer Product Safety Commission (CPSC) reported through their National Electronic Injury Surveillance System a 700% rise in unpowered scooter-related emergency department visits during the summer of 2000.¹ In November 2000, the CPSC updated this data, reporting 27 600 emergency department visits for scooter injuries from January to October 2000, 85% of which were in children under 15 years of age.² Most injuries were fractures or dislocations, predominantly in the upper extremities, followed in frequency by lacerations, contusions/abrasions, and strains/sprains. The CPSC reported 2 deaths from scooter injuries: a 6-year-old boy who rode into traffic and was struck by a car and an adult who fell and struck his head.

From *East Bay Pediatrics, Berkeley and Orinda, California; ‡Department of Medicine and §Surgery, Children's Hospital Oakland, Oakland, California; ||Department of Pediatrics and ¶Orthopaedic Surgery, University of California San Francisco School of Medicine, San Francisco, California.

Received for publication Oct 18, 2000; accepted Mar 9, 2001.

Address correspondence to Myles B. Abbott, MD, East Bay Pediatrics, 2999 Regent St, Berkeley, California 94705. E-mail: mabbottmd@aol.com

PEDIATRICS (ISSN 0031 4005). Copyright © 2001 by the American Academy of Pediatrics.

No case-based study describing these injuries has been published. In this article, we describe a group of 14 patients seen during the summer of 2000 in our pediatric and orthopedic practices. The purpose of this study is to describe the types of injuries, mechanisms of injury, and treatment of injuries caused by scooter use in children, and to discuss issues of injury prevention in this population.

STUDY DESIGN

During a 3-month period from July to September 2000, pediatricians in an 8-person private practice in Berkeley and Orinda, California, and an orthopedic surgeon at Children's Hospital Oakland, in Oakland, California, cared for 14 patients who sustained injuries while riding scooters. Only those patients who were seen by the authors for such injuries are described in this study. All patients were treated in the authors' practices, and diagnoses were made by physical examination, imaging studies, and, in 1 patient, by needle aspiration and culture of the knee joint. Detailed histories were obtained from the patients and their families, and the patients' medical records were reviewed. Histories included information about how the injuries occurred; what, if any, protective gear was worn; if adults were supervising the child when the injury occurred; how long the patient had used the scooter (ie, the length of time between their first use of the scooter and the injuries); and if they had a past history of any significant trauma. The authors confirmed history details by follow-up telephone and in-person interviews. We report the injuries sustained and the ages, gender, injury mechanisms, treatment, and preventive considerations in this patient population.

RESULTS

Fourteen patients sustained scooter-related injuries. Their ages, sex, and type of injury are presented in Table 1. The patients ranged in age from 5 to 14 years; 9 were boys and 5 were girls. Eleven patients presented with fractures, and 5 of these patients had 2 or more fractures. Of these fractures, 7 involved the upper extremities, 4 the lower extremities, and 1 was a skull fracture. The other 3 patients presented with an abrasion, a laceration, and a septic knee, respectively.

Table 2 describes both the causes of the injuries that led to the injuries and how the injuries were treated. Eight of the 14 patients stated 2 or more reasons for their injuries. The most common reasons reported were going too fast (9), striking an object on the pavement (7), and inability to brake (4). Four patients required inpatient hospitalization. Eleven patients required casts. Of these, 1 required closed reduction of a distal radius fracture and 2 needed open reduction and internal fixation of distal radius and ulna fractures. A third patient in this group had intramedullary rods placed to stabilize the displaced, severely comminuted (fragmented) fracture of his proximal femur. One patient sustained an open, depressed skull fracture that required emergent neu-

Fig 1. Five-year-old girl and 7-year-old boy riding scooters.



rosurgical elevation and repair of the skull. Another patient developed a *Staphylococcus aureus* infection of the knee joint after trauma to the knee in a fall from his scooter. The diagnosis was made by needle aspiration of the knee joint with confirmation by culture. He was treated with parenteral antibiotics for 2 weeks. The child with the knee laceration required 8 stitches, and a child with the 25 cm abrasion to his leg had frequent debridements and dressing changes.

Potential preventive measures were examined (Table 3). Five patients were wearing protective gear at the time of their injuries, but were not protected against the injury sustained. Four patients were supervised by an adult at the time of the injuries. All but 1 patient had been using their scooter for 1 month or less; 7 of the injuries occurred on the patients' first day of use. Four patients had a history of previous fractures.

DISCUSSION

Injuries are commonly seen in pediatric practice, and over the last few years many articles have been published about bicycle, skateboard, rollerblade, and in-line skating injuries in children.³⁻⁸ Preventive measures, primarily use of protective gear, have helped reduce the incidence and severity of these injuries.^{9,10} A new type of scooter, which has been marketed and sold in the last year, has led to a marked increase in scooter-related pediatric injuries. These scooters are foot-propelled, kick-powered devices that have small in-line skate wheels connected to a narrow footrest. At the front of the footrest is an upright post with handlebars at the top. Most scooters are made of aluminum, weigh <10 pounds, and can be folded into a small, compact carrying unit. It is estimated that 5 million of these scooters will be sold in the United States this year, at a price ranging between \$80 and \$120 per scooter.

We describe 14 patients who sustained significant morbidity from scooter injuries during the summer of 2000. Most of the injuries were fractures. Four

patients required hospitalization and 7 underwent surgical procedures. All were 14 years old or younger, and most were male. All of these injuries occurred with the same kind of scooter, the Razor, made by JD Corporation. Most were also inexperienced scooter users. The younger the patient, the more serious the injuries. In our group, 2 of the youngest patients sustained the most severe injuries. The most commonly reported mechanism of injury was speeding, ie, moving too fast to maintain control. Neither adult supervision nor protective gear was effective in preventing these injuries.

The cornerstone to pediatric practice is prevention, and we analyzed protective factors that might have prevented the risk of injury. Although our sample was small, protective gear, parental supervision, and absence of a past history of trauma had no preventive impact. It has been speculated that protective gear will reduce the risk of scooter injuries, but this is questionable. Protective gear did protect against the area it covered (eg, there were no wrist fractures among the children who were wearing wrist guards), but scooter injuries expose so much of the body to injury that a child would need to wear full-body protective gear. This is exemplified by the patient who was wearing 4 different kinds of protective devices, but still sustained a fracture of the distal tibia—an area not covered by any of his protective gear.

The construction of these new scooters may be contributing to the rise in injuries, as their light weight enhances speed and their narrow, small wheels make them difficult for children to control. We identified 3 additional contributing factors:

1. When riding the scooter, the rider's weight is positioned forward near the front wheel. Leaning on the handlebars to make a turn increases the risk of tipping over forward.
2. Pushing the scooter requires 1 foot on the footrest and the "push" foot on the ground. Should the scooter lean too far away from the push foot to-

TABLE 1. Scooter Injuries By Age, Sex and Type of Injury

Patient	Age in Years	Sex	Type of Injury
1	5	M	Proximal comminuted femur fracture; subgaleal hematoma
2	7	M	Lateral and medial malleolus fractures
3	8	M	Open depressed skull fracture; open distal radius and ulna fractures
4	9	F	Knee laceration
5	9	M	Supracondylar elbow fracture
6	10	F	Bilateral distal radius fractures
7	10	M	Patella fracture
8	10	F	Distal tibia fracture
9	11	M	<i>Staphylococcus aureus</i> septic knee joint
10	12	M	Distal radius and ulna fractures
11	13	M	Proximal second, third, and fourth phalanx hand fractures
12	14	F	Distal radius fractures
13	14	M	Leg and knee abrasion (25-cm long)
14	14	F	Proximal fifth phalanx hand fractures

TABLE 2. Mechanism of Injury and Treatment

Patient	Mechanism(s) of Injury*	Treatment
1	1, 3, 4	Hospitalized; intramedullary rods; cast
2	1, 2	Cast
3	1, 3, 5	Hospitalized; emergent neurosurgery; **ORIF of arm; cast; parenteral antibiotics
4	2	8 stitches
5	1, 2	Cast
6	2	Casts, both wrists
7	5	Knee surgery; cast
8	1	Cast
9	1, 2	Hospitalized; parenteral antibiotics
10	1, 6	Hospitalized; **ORIF of arm; cast
11	2	Cast
12	1, 3	Closed reduction; cast
13	2	Debridement; topical antibiotics
14	1, 3	Cast

* Mechanism of injury: 1, going too fast; 2, struck object on pavement; 3, inability to brake; 4, struck by a car; 5, collision with obstacle; 6, stunt riding.

** ORIF indicates open reduction, internal fixation.

ward the opposite side of the body, the foot on the footrest stays where it is and cannot stabilize or stop the scooter from tipping over.

- The scooter's wheels are small and close together, compounding the scooter's instability if it hits even a small obstacle on the street (eg, a pebble, stone, or crack in the pavement).

This study is a descriptive case series, the most common study design for newly emergent public health problems. We did not calculate incidence rates

TABLE 3. Preventive Measures

Patient	Wearing Protective Gear	Adult Supervision	Length of Scooter Use	Past History of Trauma
1	No	No	2 h	No
2	Yes*	No	<1 mo	No
3	No	No	1 mo	No
4	No	No	1–2 h	No
5	Yes†	No	1 d	No
6	Yes†	Yes	1 h	Fractured wrist
7	No	Yes	3–4 wk	No
8	Yes‡	Yes	1 d	No
9	No	No	3 wk	Fractured arm
10	No	No	1 mo	No
11	Yes†	No	1st h	Fractured clavicle
12	No	No	1st h	No
13	No	Yes	3 mo	No
14	No	No	2nd d	Fractured finger

* Wearing helmet and wrist guards.

† Wearing helmet.

‡ Wearing helmet, wrist guards, knee and elbow pads.

in the local population because of a lack of comprehensive case ascertainment, nor did we attempt to calculate the incidence per scooter hour. However, scooters have become a new source of morbidity in children throughout the United States. Increased sales and continuing popularity of scooters portend a continuation of this trend. At present, our best recommendation is that all children should wear protective gear, especially helmets, while riding scooters. Further pediatric studies are necessary to determine what additional steps can be taken to prevent scooter-related injuries.

REFERENCES

- US Consumer Product Safety Commission. CPSC reports as scooter sales skyrocket, injuries soar. Available at: <http://www.cpsc.gov/cpscpub/prerele/prhtml00/00178.html>. Accessed September 5, 2000
- Centers for Disease Control. Scooter-related injuries—United States, 1998–2000. *MMWR Morb Mortal Wkly Rep.* 2000;149:1108–1110
- Rivara FP, Thompson DC, Thompson RS. Epidemiology of bicycle injuries and risk factors for serious injury. *Inj Prev.* 1997;9:110–114
- Fountain JL, Meyers MC. Skateboarding injuries. *Sports Med.* 1996;22:360–366
- Hassan I, Dorani BJ. Rollerblading and skateboarding injuries in children in northeast England. *J Inj Emerg Med.* 1999;16:348–350
- Heller DR, Routley V, Chambers S. Rollerblading injuries in young people. *J Paediatr Child Health.* 1996;32:35–38
- Orenstein JB. Injuries and small-wheel skates. *Ann Emerg Med.* 1996;27:204–209
- Osberg JS, Schneps SE, DiScala C, Li G. Skateboarding: more dangerous than roller skating or in-line skating. *Arch of Pediatr Adolesc Med.* 1998;152:985–991
- Thompson RS, Rivara FP, Thompson DC. A case-control study of the effectiveness of bicycle helmets. *N Engl J Med.* 1989;320:1361–1367
- Schieber RA, Branche-Dorsey CM, Ryan GW, Rutherford GW, Stevens JA, O'Neil J. Risk factors for injuries from in-line skating and the effectiveness of safety gear. *N Engl J Med.* 1996;335:1630–1635

Scooter Injuries: A New Pediatric Morbidity

Myles B. Abbott, Scott A. Hoffinger, Dao M. Nguyen and Dana L. Weintraub

Pediatrics 2001;108:e2

DOI: 10.1542/peds.108.1.e2

Updated Information & Services

including high resolution figures, can be found at:
<http://pediatrics.aappublications.org/content/108/1/e2>

References

This article cites 9 articles, 0 of which you can access for free at:
<http://pediatrics.aappublications.org/content/108/1/e2#BIBL>

Subspecialty Collections

This article, along with others on similar topics, appears in the following collection(s):
Administration/Practice Management
http://www.aappublications.org/cgi/collection/administration:practice_management_sub

Permissions & Licensing

Information about reproducing this article in parts (figures, tables) or in its entirety can be found online at:
<http://www.aappublications.org/site/misc/Permissions.xhtml>

Reprints

Information about ordering reprints can be found online:
<http://www.aappublications.org/site/misc/reprints.xhtml>

American Academy of Pediatrics

DEDICATED TO THE HEALTH OF ALL CHILDREN™



PEDIATRICS®

OFFICIAL JOURNAL OF THE AMERICAN ACADEMY OF PEDIATRICS

Scooter Injuries: A New Pediatric Morbidity

Myles B. Abbott, Scott A. Hoffinger, Dao M. Nguyen and Dana L. Weintraub

Pediatrics 2001;108:e2

DOI: 10.1542/peds.108.1.e2

The online version of this article, along with updated information and services, is located on the World Wide Web at:

<http://pediatrics.aappublications.org/content/108/1/e2>

Pediatrics is the official journal of the American Academy of Pediatrics. A monthly publication, it has been published continuously since 1948. Pediatrics is owned, published, and trademarked by the American Academy of Pediatrics, 141 Northwest Point Boulevard, Elk Grove Village, Illinois, 60007. Copyright © 2001 by the American Academy of Pediatrics. All rights reserved. Print ISSN: 1073-0397.

American Academy of Pediatrics

DEDICATED TO THE HEALTH OF ALL CHILDREN™

