

Electric Scooter-Associated Orthopaedic Injuries Cause Long Absence from Work, Regret, and are Emerging as a Major Cause of Hip Fractures in Young Individuals: A Comprehensive Study from a Regional Trauma Center in a Densely Populated Urban Setting

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INTRODUCTION:

In recent years, stand-up electric scooters (e-scooter) emerged rapidly as environmental, economic, and easy-to-operate transportation tools that changed urban traffic trends, also known as motorized scooter. On the other hand, articles from around the globe increasingly reported on the severity and frequency of e-scooter-related orthopaedic injuries. However, most of these studies reported on a relatively low number of patients, resulting potentially in a narrower overview of the actual injury scale.

Although recent studies set some recommendations on the use of protective gear; other factors may be related to these injuries, such as inexperience, inattentiveness, or unlawful driving in terms of location, speed, or age. Moreover, follow-up data would have been helpful in more thoroughly understanding the impact of these injuries. However, a clinical follow-up analysis was sparse in the literature.

Lastly, data from previous studies reported a high percentage (10%) of hip fractures in young adults related to e-scooter injury. As young traumatic hip fractures are uncommon and devastating injuries, an up-to-date etiological investigation is of interest in this age group to understand the causal effect of e-scooters comparatively.

This study aimed to give a full spectrum of orthopaedic injuries associated with electric scooter (e-scooter) use and analyze related factors, report on follow-up data from the patient's perspective, and make a comparative etiological analysis of young adult hip fractures.

METHODS: A total of 851 consecutive patients were admitted to the Emergency Department following e-scooter injuries between January 2021 and July 2022, of whom 188 had 214 orthopaedic injuries. The demographics, injury, and incident characteristics of these patients were collected. All fractures were classified as per the AO/OTA classification. Two groups were created as operatively or conservatively treated patients and data were comparatively analyzed. Follow-up examination incorporated a survey using binary questions on patients' perspectives. An etiological comparative analysis of hip fractures in young adults admitted to the same center between 2016-2022 was conducted.

RESULTS:

The median patient age was 25. Inexperienced drivers constituted 32% of the injured. The protective gear use rate was at 3%. Higher speed ($p=.014$) and age ($p=.011$) were significantly associated with operative treatment. Of the 188 patients, 181 (97%) responded. The mean time to survey from injury was 12.9 ± 5 months. There was a significant association between operative treatment and return to preinjury physical function ($p<.001$), regret ($p=.022$), and support for a total ban of e-scooter ($p=.021$). There was non-significant association between time to survey and return to physical function ($p=.079$). Of note, 98% of the individuals who got injured on the first ride never used an e-scooter again.

A total of 39% of the operated patients couldn't return to pre-injury physical function, while 74% regretted using an e-scooter. The most common etiological factor for traumatic young hip fractures was fall from a height between 2016-2020, whereas it became e-scooter accidents in 2021-2022.

DISCUSSION AND CONCLUSION:

This study has some novel findings. First, it reports on a wide spectrum of orthopaedic injuries with one of the largest available sample sizes. The represented patient data involves injuries, some extremely rare, in a single study cohort. This is important, as 39% of the operated patients stated not being able to return to preinjury physical function at a mean of 12.9 ± 5 months. Moreover, the level of driving experience showed that 34% of the injured were inexperienced drivers. An estimated speed of > 15 km/h was associated with needing an operative treatment. The survey results not only shed light on how the patients handled their injuries, but also reflected their perspectives. High rates of regret and not using e-scooters after the injury emphasize the need for future preventive measures and regulations. Lastly, the etiological analysis of young-aged traumatic hip fractures identified e-scooter as the leading factor in the last two years, which was previously only the fifth most common factor.

The rate of operative e-scooter-related injuries are high (39%) and leave the patient in regret (84%) and physically limited condition (39%) even after a mean of 13 months. A speed limit of ≤ 15 km/h could decrease the rate of operative injuries ($p=0.014$), and so could preventive measures, as inexperienced (34%), and underage (16%) drivers, and illegal driving behavior (46% on pavement) constituted a considerable percentage, while the use of protective equipment was almost non-existent (3%). These should encourage local governments and other stakeholders to make decisive and preventive steps for public health, such as making e-scooter inoperable on pavement, setting lower speed limits, and imposing

deterrent penalties for inattentive use. E-scooter use rapidly became the top etiological factor in the last years for traumatic young hip fractures, which is otherwise a rare injury with devastating outcomes.