CASE REPORT

The quickest way to A&E may be via the Segway

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SUMMARY

The Segway, the two-wheeled, motorised self-transport device is becoming increasingly popular across the globe with the trend of Segway tours now starting to hit cities across the UK. However, Segways have been shown to be potentially extremely dangerous. Stumbling from a moving Segway places pressure on the knee joint while it is being medially or laterally stressed. This is the mechanism associated with tibial plateau fractures; complex fractures often associated with other soft tissue injuries, which are easily missed, are challenging to manage and can be very disabling. This is the case of a young, otherwise healthy woman, who tripped from a moving Segway and sustained a lateral depressed tibial plateau fracture. She was managed with a knee brace, physiotherapy and serial check radiographs. The fracture healed well and she has returned to an almost normal level of function with intensive physiotherapy.

BACKGROUND

The Segway, the two-wheeled, motorised self-transport device is becoming increasingly popular across the globe with the trend of Segway tours now starting to hit cities across the UK. However, Segways have been shown to be potentially extremely dangerous with a recent case-series from the USA highlighting how they can be responsible for a wide range of injuries.¹ In some cases patients required admission to the intensive care unit owing to the severity of injury.

Unsurprisingly, since the introduction of Segway tour programmes locally, we have seen several patients admitted with Segway-related injuries. Alongside the common bumps, grazes and minor fractures that could be sustained during any outdoor pursuit one patient presented with a tibial-plateau fracture.

Tibial plateau fractures are normally secondary to falls or vehicular accidents.² The mechanism of injury is commonly one of varus or valgus strain coupled with a degree of axial loading and compression.² This mechanism of placing pressure through the knee joint while it is being medially or laterally stressed would, theoretically, be easy to achieve if one were to heavily place one's foot onto the floor while the rest of the body is in the motion in the opposing direction. This is a position that could be easily achieved if one were to stumble from a moving Segway.

Tibial plateau fractures are challenging fractures to manage³ and are often associated with soft tissue injuries.⁴ It has been estimated that up to 50% are associated with meniscal and up to 70% with ligamentous injury.⁵ Furthermore, these are complex injuries normally require extensive, and sometimes

multiple, operations. These factors, coupled with the fact that patients are often required to avoid fully weight bearing for several months to allow fracture union, make tibial plateau fractures potentially very disabling injuries.

CASE PRESENTATION

A 26-year-old female chef, named KW, presented to the emergency department (ED) after falling from a Segway the previous day. She stated that while adjusting her footing, her foot 'got stuck' and she lost her balance and slipped from the side of the still moving Segway landing on her left leg. She immediately felt pain in and around the left knee, which became instantly swollen. She did not sustain any other injuries and had no significant medical history.

Figure 1 Admission anteroposterior radiograph showing a lateral depressed tibial plateau fracture.

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Figure 2 Coronal CT imaging showing fracture.

On initial assessment in the ED, she was noted to have a left knee effusion and generalised pain around the joint. The pain inhibited her performing a straight leg raise, but she had an otherwise full range of movement. Clinical examination did not illicit a significant ligamentous injury and she was neurovascularly intact.

INVESTIGATIONS

Plain radiographs were obtained which showed a lateral depressed tibial plateau fracture (figure 1)—AO classification 41-B3,⁶ Schatzker 2.⁷

TREATMENT

After discussion with the patient, it was decided to manage her non-operatively and she was placed into a medial collateral ligament brace and discharged, non-weight bearing, to be followed in 1 week in the fracture clinic with a CT scan beforehand.

CT imaging (figures 2–4) confirmed the diagnosis and she was kept in the brace and physiotherapy arranged. She was

Figure 3 Axial CT imaging showing fracture.

followed-up three more times over the next 4 months, with check radiographs showing no further displacement. At her final appointment, she had resumed fully weight-bearing and was undertaking regular closed chain exercises—imaging confirmed good bone healing (figure 5).

OUTCOME AND FOLLOW-UP

She was discharged to the care of the physiotherapy team and has continued to progress well in the community.

DISCUSSION

This case highlights how the Segway's unique vehicular action can in fact be dangerous when used by those lacking proper experience and supervision. It also highlights the risk of significant knee injury, including tibial plateau fracture, should one fall from a Segway. These are significant injuries and can have devastating effects on a patient's function and quality of life. No previous cases that highlight this link have been reported.

Aside from treatment issues, one of the problems with tibial plateau fractures is getting the diagnosis and being sure to exclude other soft tissue injury. Because fractures may be hard to see on plain radiographs anteroposterior, lateral and oblique x-ray views should always be obtained and there should be a low threshold for further imaging with CT if there is still clinical suspicion of a fracture.⁷ Equally if there is any suspicion of soft tissue damage MRI will often also be required to ascertain the severity of the injury and to plan appropriate treatment.⁸ Some studies suggest that MRI should be a standard investigation in tibial plateau fractures.⁷

Fortunately this patient presented early and had a minimally displaced isolated injury which was managed promptly and effectively. However, with the increasing popularity of 'Segway

Figure 4 CT three-dimensional reconstruction of injury.

Figure 5 Anteroposterior radiograph on discharge, showing good bone healing.

tours' across the country these injuries are likely to become more common. In fact, our local Segway tour operator now runs a 'Segway Assault Course.' This will, undoubtedly, increase the number of cases of Segway-related injury. Furthermore, because tibial plateau injuries can be hard to spot and disastrous if not managed appropriately, clinicians need to be alert to the possibility of a 'Segway knee' in those who have come off and ensure they are adequately investigated, clinically and radiologically.

Learning points

- ▶ Tibial plateau injuries require long periods of rehabilitation which may significantly affect a patient's mobility and quality of life.
- ▶ Tibial plateau fractures are associated with soft tissue injuries which can also lead to instability and potentially irreversible loss of function.
- ▶ Owing to the way they work and the way they are used—a fall from a Segway provides the 'perfect' mechanism of injury for sustaining a tibial plateau fracture.
- ▶ With increasing usage nationally and internationally the risks associated with Segway use need to be recognised and their management understood.

Contributors The team responsible for this patient's care was led by JH. His registrar was MW and his house officer was JB. The patient was initially seen and managed (orthopaedically) by JH. Follow-up appointments were conducted by JH and MW. After discussing the case with MW, JB collected the patient's information from medical records, accessed the radiology images and contacted the patient to gain written consent for a report to be produced. JB collated the information, performed a literature search and wrote up the case. MW edited the report and, with JB, made amendments. JH then reviewed and amended the report. JB then produced a final draft.

Competing interests None.

Provenance and peer review Not commissioned; externally peer reviewed.

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