CASE REPORT

Nintendo Wii related Achilles tendon rupture: first reported case and literature review of motion sensing video game injuries

Rohit Singh, Gopikanthan Manoharan, Thomas Steven Moores, Amit Patel

Department of Trauma & Orthopaedics, Royal Shrewsbury Hospital, Shrewsbury, UK

Correspondence to
Rohit Singh,
Rohitamolsingh@hotmail.com

SUMMARY

Achilles tendon ruptures tend to occur more commonly in healthy men between the ages of 30 and 50 years who have had no previous injury or problem reported in the affected leg. The injury is usually due to sudden forced plantar flexion of the foot, unexpected dorsiflexion of the foot and violent dorsiflexion of a plantar flexed foot, all of which occur during high impact activities. We present the first reported case of interactive activity with Nintendo Wii games that have resulted in Achilles tendon rupture in a 46-year-old man. There have been no previous reports of Achilles tendon rupture with Nintendo Wii usage; it is a relatively uncommon mode of injury and is rare in terms of epidemiology of motion sensing video game injuries.

BACKGROUND

Achilles tendon ruptures occur more commonly in healthy men between the ages of 30 and 50 years who have had no previous injury or problem reported in the affected leg.¹ This demographic has sometimes been termed the 'weakened warrior' on account of previous cardiovascular fitness.²

The majority of Achilles tendon ruptures occur in the left leg in the substance of the tendoachilles, usually a few centimetres above the 'watershed zone'—above the calcaneal insertion of the tendon.³ The reason for the increased incidence of Achilles tendon ruptures on the left has been attributed to hand dominance, as right-handed individuals 'push off' more frequently with the left foot.³

The precluding mechanism of injury is usually sudden forced plantar flexion of the foot, unexpected dorsiflexion of the foot and violent dorsiflexion of a plantar flexed foot, all of which occur during high-impact activities.⁴ Other mechanisms include direct trauma and, less frequently, a complication of long standing without tendinitis.⁵

Other at-risk groups include those who malnourished, advanced age, taking fluoroquinolone antibiotics, corticosteroids and those who overexert themselves.⁶

Estimated worldwide frequency is 18/100 000. The male-to-female ratio of rupture is estimated from 1.7:1 to 12:1.⁷⁻⁹

Motion sensing video games are not fully appreciated as a causative factor for Achilles tendon rupture; however, we present the first reported case highlighting its occurrence during low-impact activities and emphasising its rarity in terms of its mechanism of injury and in terms of the epidemiology of motion sensing video game injuries.

CASE PRESENTATION

We report the case of a 46-year-old postman who was a recreational athlete who presented to our trauma and orthopaedic unit.

He was playing on the interactive computer game console, the Nintendo Wii. The game was 'Mario and Sonic at the Olympic games'. The patient was participating in this interactive game, during one of the 'events', which involved slow pace running, when the patient felt a sudden sharp pain in his calf, with an audible snap which is characteristic of an Achilles tendon rupture.

INVESTIGATIONS

The diagnosis was confirmed radiologically with an ultrasound scan.

TREATMENT

This patient was treated operatively with a percutaneous repair and immobilisation for 6 weeks.

OUTCOME AND FOLLOW-UP

The patient remains well at 1-year follow-up, with a full range of movement of his ankle, and has returned to work.

DISCUSSION

Motion-sensing video game software has provided users with the ability to mimic movements in many sports such as baseball, tennis and boxing. The data of injuries resulting from motion-sensing video game systems are minimal because they have only been available for a limited number of years.¹⁰ Previous studies indicated that female teenagers were those most commonly affected. Most injuries were soft tissue in nature and located in the shoulders, hands and fingers.¹¹

Another study utilising a database of self-reported Wii related injuries was categorised by the type of injury and game title being played at the time of injury.¹² This study found 39 reported Wii related injuries over a 2-year span, with 46% occurring while playing the Wii Sports Tennis software.¹¹ They further identified 14 distinct injury patterns sustained during gameplay.¹¹ Of these injuries, hand lacerations were the most common, accounting for 44% of the total number of reported cases. Other injuries reported from Nintendo Wii use have been of significant haemothorax and lateral patella dislocation with medial patellofemoral ligamentous damage and a large femoral osteochondral fracture.¹²⁻¹⁴

CrossMark

To cite: Singh R, Manoharan G, Moores TS, et al. *BMJ Case Rep* Published online: [please include Day Month Year] doi:10.1136/bcr-2013-202657

There are, however, some plus points in the medical field regarding the use of motion sensing video games. One study suggests a skill overlap between the Nintendo Wii and basic laparoscopic tasks. Surgical candidates with advanced Nintendo Wii ability may possess a higher baseline laparoscopic ability.¹⁵ It can also be used in a clinical setting for assessing balance and energy expenditure in rehabilitation regimes.^{16–18}

The Wii console appears to have a higher rate of associated injuries than traditional game consoles because of its unique user interface. There is little in the literature associating the game 'Mario and Sonic at the Olympic games' with injuries, in contrast to the Wii tennis software.¹⁰ There are also positive health aspects of Nintendo Wii usage such as increasing energy expenditure, balance and even improving surgical skill.^{16–18}

This is the first reported case of Achilles tendon rupture following motion sensing video game activity, unveiling new insights into this uncommon mode of injury and highlighting its rarity. This new information can be used to empower the general public of the potential risks and precautions needed with motion sensing video games, as well as raising suspicion among clinicians to ensure that the diagnosis is not overseen during this non-conventional mechanism of injury.

Learning points

- We present the first reported case of Achilles tendon rupture where a motion sensing video game was the causative factor.
- The most common mechanisms of injury include sudden forced plantar flexion of the foot, unexpected dorsiflexion of the foot and violent dorsiflexion of a plantar flexed foot.
- The Wii console appears to have a higher rate of associated injuries than traditional game consoles because of its unique user interface. The 'wii tennis' software package is associated with the highest rate of injuries. This is the first reported injury from the 'Mario and Sonic at the Olympic games' software.
- There are also positive health aspects of Nintendo Wii usage such as increasing energy expenditure, balance and even improving surgical skill.
- Achilles tendon ruptures can occur in young healthy men during low-impact activities.

Contributors RS wrote the case report. GM and TSM were involved in the literature review. AP was involved in editing the final version.

Competing interests None.

Patient consent Obtained.

Provenance and peer review Not commissioned; externally peer reviewed.

REFERENCES

- 1 Doral MN, Alam M, Bozkurt M, *et al.* Functional anatomy of the Achilles tendon. *Knee Surg Sports Traumatol Arthrosc* 2010;18:638–43.
- 2 Filardo G, Presti ML, Kon E, *et al.* Nonoperative biological treatment approach for partial Achilles tendon lesion. *Orthopedics* 2010;33:120–3.
- 3 Chang HJ, Burke AE, Glass RM. JAMA patient page. Achilles tendinopathy. *JAMA* 2010;303:188.
- 4 Khan RJ, Fick D, Keogh A, *et al.* Treatment of acute Achilles tendon ruptures. A meta-analysis of randomized, controlled trials. *J Bone Joint Surg Am* 2005;87:2202–10.
- 5 Schepsis AA, Jones H, Haas AL. Achilles tendon disorders in athletes. *Am J Sports Med* 2002;30:287–305.
- 6 Keene JS. Tendon injuries of the foot and ankle. In: DeLee JC, Drez D, eds. *Orthopaedic sports medicine*. Philadelphia, PA: WB Saunders, 1994:1768–805.
- 7 Maffulli N. Rupture of the Achilles tendon. *J Bone Joint Surg Am* 1999;81:1019–36.
- 8 Moore KL. *Clinically oriented anatomy*. 3rd edn. Philadelphia, PA: Lippincott Williams & Wilkins, 1999.
- 9 Kader D, Saxena A, Movin T, *et al.* Achilles tendinopathy: some aspects of basic science and clinical management. *Br J Sports Med* 2002;36:239–49.
- 10 Jones C, Hammig B. Case report: injuries associated with interactive game consoles: preliminary data. *Phys Sportsmed* 2009;37:138–40.
- 11 Bhangu A, Lwin M, Dias R. Wimbledon or bust: Nintendo Wii related rupture of the extensor pollicis longus tendon. *J Hand Surg Eur Vol* 2009;34:399–400.
- 12 Peek AC, Ibrahim T, Abunasra H, *et al.* White-out from a Wii: traumatic haemothorax sustained playing Nintendo Wii. *Ann R Coll Surg Engl* 2008;90:W9–10.
- 13 Robinson RJ, Barron DA, Grainger AJ, *et al.* Wii knee. *Emerg Radiol* 2008;15:255–7.
- 14 Sparks D, Chase D, Coughlin L. Wii have a problem: a review of self-reported Wii related injuries. *Inform Prim Care* 2009;17:55–7.
- 15 Badurdeen S, Abdul-Samad O, Story G, *et al.* Nintendo Wii video-gaming ability predicts laparoscopic skill. *Surg Endosc* 2010;24:1824–8.
- 16 Saposnik G, Mamdani M, Bayley M, *et al.* EVREST Steering Committee; EVREST Study Group for the Stroke Outcome Research Canada Working Group. Effectiveness of Virtual Reality Exercises in Stroke Rehabilitation (EVREST): rationale, design, and protocol of a pilot randomized clinical trial assessing the Wii gaming system. *Int J Stroke* 2010;5:47–51.
- 17 Clark RA, Bryant AL, Pua Y, *et al.* Validity and reliability of the Nintendo Wii Balance Board for assessment of standing balance. *Gait Posture* 2010;31:307–10.
- 18 Nitz JC, Kuys S, Isles R, *et al.* Is the Wii Fit a new-generation tool for improving balance, health and well-being? A pilot study. *Climacteric* 2010;13:487–91.

Copyright 2014 BMJ Publishing Group. All rights reserved. For permission to reuse any of this content visit <http://group.bmj.com/group/rights-licensing/permissions>.
BMJ Case Report Fellows may re-use this article for personal use and teaching without any further permission.

Become a Fellow of BMJ Case Reports today and you can:

- Submit as many cases as you like
- Enjoy fast sympathetic peer review and rapid publication of accepted articles
- Access all the published articles
- Re-use any of the published material for personal use and teaching without further permission

For information on Institutional Fellowships contact consortiasales@bmjgroup.com

Visit casereports.bmj.com for more articles like this and to become a Fellow