Validation of a video game made for training laparoscopic skills

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Chapter 7

Is a Nintendo a dangerous Christmas present? A narrative review of Nintendo-related injuries and other complaints

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Abstract

Objective: To collect all reported cases of injuries and other complaints caused by a Nintendo video game system.

Design: narrative review

Data sources and review methods: We searched the PubMed and Embase databases for reports on injuries and complaints that were attributed to playing a gaming system made by Nintendo.

Results: In total, 38 relevant articles were found; most of them were case reports or case series. Nintendo-related injuries and complaints range from neurological and psychological to various surgical problems. Traditional controllers with buttons are associated with a tendinitis of the extensor of the thumb, the joystick on the Nintendo 64 controller can lead to palmar ulceration, and the motion-sensitive Wii Remote may contribute to musculoskeletal problems and has been the cause of a variety of traumas.

Conclusions: Most problems are mild and, given the amount of game systems sold, the prevalence is very low. There is a relationship between the way of controlling a game, which varies per video game console, and the described injuries or complaints. All in all, playing a Nintendo is relatively safe.
Introduction

Nintendo was founded in 1889 by Fusajiro Yamauchi in Kyoto, Japan. Originally, the company sold Japanese playing cards, but after the Second World War, it experimented with products as toys, hotels, and taxi services. In the late ‘70s, Nintendo started selling video game systems. Due to their success in Japanese and Western markets, the company grew to become the well-famed multinational that entertains so many today. Its latest big hit, the Wii console, sold over 100 million units. Because of its popularity, Nintendo’s consoles and handhelds are common Christmas presents.

Nintendo's innovative products are also increasingly used for health care. The pressure-sensitive Balance Board, which assesses balance ability, can train balance in elderly and patients with multiple sclerosis or Parkinson’s disease. Also, the motion-sensitive Wii Remote controller can be used to improve basic laparoscopic skills, and so-called “exergames” are used for exercise in children with cystic fibrosis, losing weight, and cardiovascular training, and postoperative rehabilitation.

However, various reports of Nintendo-related injuries and complaints, ranging from mild to life-threatening, have surfaced as well. This made us wonder: is a Nintendo a safe Christmas present? We decided to gather all reported cases of Nintendo-related problems to see what we could learn from the 35-year-old video game history of this Japanese company.

Methods

In June 2014, we searched the PubMed and Embase databases using the terms Nintendo, or Game & Watch, Famicom, Game Boy (or the commonly miswritten gameboy), Virtual Boy, iQue, GameCube, or Wii – all names of Nintendo’s gaming systems not baring their brand’s name. This resulted in 543 (PubMed) and 655 (Embase) hits. Titles and abstracts (if available) were read and original papers reporting Nintendo-related complaints were selected. All papers, including three reviews of Wii-related injuries, were then screened for other suitable references. With the exception of one German article, all papers are in English.

Results

In total, 38 relevant papers were identified (30 case reports, 7 case series, and 1 prospective study). The reports can be split into two groups; before and after the introduction of the Wii. Before the Wii, Nintendo’s consoles had a traditional, wired controller with buttons or a
joystick. The Wii’s games, however, are controlled by a motion-sensitive remote, which requires players to swing their arms, resulting in more traumatic injuries.

Early reports
One of the first cases was a 13-year-old girl, who suffered from a generalized seizure after playing Super Mario Bros. on her Nintendo Entertainment System (1984, figure 1) for almost three hours. This “Nintendo epilepsy” was attributed to a rapid change of on-screen patterns. A large multicenter study later showed that patients with a history of television or game seizures are indeed more sensitive to a similar Mario game than to a normal television program.

In the early ‘90s, two cases of Nintendo-related incontinence were published. Corkery described a boy who developed episodes of faecal soiling and Schink reported three (related) boys that suddenly developed daytime enuresis. All children were so engrossed in Super Mario Bros. that they ignored their urge to go to the toilet. All cases were successfully treated by explaining how to pause the game. Schink jokingly suggested that Nintendo should develop a wet sensor that aborts the game if a player loses bladder control.

In 1991, Miller described how his son got intense neck pain after playing his Game Boy, a portable system from 1989 with a small, unlit display, for 30 minutes. His position while playing was reported as “hunched over, chin almost resting on his chest, elbows bent while he holds the small screen close to his face”. The complaints, which Miller called “Nintendo Neck”, were attributed to playing in this position.

Similarly, a “Nintendo Elbow” was diagnosed in a 12-year-old boy who suffered from right elbow pain after playing his Nintendo “a lot” for over a month. Symptoms resolved with an NSAID and rest.

We also found a report of “Nintendo hallucinations”. The patient, diagnosed with paranoid schizophrenia, suffered from persistent auditory hallucinations of video game music.
“Nintendinitis”

Nintendo-related complaints of the thumb, hand, and wrist are referred to as “Nintendinitis” or “Nintendonitis”. All reports, mostly letters to the editor, point out that strenuous gameplay with a traditional controller can result in temporary discomfort, most commonly due to tendinitis of the extensor pollicis longus, and can be treated by rest and/or an NSAID.

The first case dates from 1990; a 35-year-old woman experienced severe pain in her right thumb after playing her Nintendo uninterrupted for five hours. Casanova described a similar case and called “Nintendinitis” a form of tendinitis, caused by repetitive micro-trauma. Similar cases were reported by Siegel and MacGregor, who suggested that prophylactic hand care instructions should be given at school. Schnicke reported a boy who developed eczema on both his thumbs after playing his Game Boy on a daily basis.

After the introduction of the Nintendo 64 console in 1997 (figure 2), reports of the original “Nintendinitis” subsided. But with a new controller, new problems surfaced. The Nintendo 64 was Nintendo’s first console that featured 3D graphics. Its controller featured a joystick that made 3D navigation easier, but also gave rise to “ulcerative Nintendinitis”; a central palmar ulcer. In some games, and Mario Party in particular, players had to quickly rotate the joystick with their thumb. However, rubbing it with a hand palm turned out to be quicker, resulting in ulceration. After receiving over 90 complaints, Nintendo handed out protective gloves to all owners of the game, which had already sold a million times.
Enter the Wii

In 2006, Nintendo introduced the Wii (figure 3), a console with a controller that detects motion, speed, and position. In its most popular game, Wii Sports, players swing these so-called Wii Remotes to participate in sports like tennis and boxing. This resulted in new types of injury, mostly of traumatic origin. In 2009, a preliminary report with data of 21 Wii-related injuries from the National Electronic Injury Surveillance System showed that most injuries were confined to the upper extremities, face, and neck. Sparks et al. reviewed 39 Wii injuries that gamers self-reported via a special website. In 34 cases, Wii Sports had caused the injury, with tennis being its most dangerous sport. The most common injuries were hand lacerations and bruising, and peri-orbital haematomas.
“Wiiitis”

The first Wii-related injury, dubbed “Wiiitis”, was of a 29-year-old man who suffered from acute tendinitis of his right infraspinatus muscle after playing Wii Sports for several hours.\(^{37}\) Others also reported acute upper extremity muscle pain after playing the game.\(^{38,39}\) One even described a case of arm swelling and a rise in creatine kinase, consistent with significant muscle injury.\(^{40}\) Another case of upper extremity “Wiiitis” was analyzed with magnetic resonance imaging, showing increased signal intensity in various upper extremity muscles.\(^{41}\) It is pointed out that “Wiiitis” can be associated with different muscles in the arm and shoulder, depending on the movements made during different games. All cases were treated with rest and an NSAID.

As with “Nintendinitis”, the term “Wiiitis” is used for various injuries. In 2010, four paediatric cases of “Wiiitis” were reported; patients presented not only with a painful arm, but also with a painful neck and postural deviations.\(^{42}\) Boehm et al. described a case of carpal tunnel syndrome in a woman who played a bowling game for 6-8 hours daily for 10 days.\(^{43}\) Also, there are two reports of “Achilles Wiiitis”; a (partial) tear of the Achilles tendon.\(^{44,45}\) Furthermore, one case of “Wiiitis” even presented as a massive venous thrombosis of the gluteal veins, reaching into the inferior vena cava.\(^{46}\)

“Wii Knee”

The term “Wii Knee” comprises Wii-related knee injuries. The first report was of a young woman who sustained a dislocated left patella when she fell while serving a tennis ball in Wii Sports.\(^{47}\) Robinson et al. described a “Wii Knee” – a dislocated patella and a fractured lateral femoral condyle – in a boy who accidentally twisted his knee while playing the Wii.\(^{48}\) Another report mentions a medial meniscal tear in a woman who played a bowling game.\(^{49}\)

Some Wii-related injuries are life-threatening. A 55-year-old woman sustained a massive haemothorax (>1250 ml) after falling on her sofa while playing tennis on her Wii.\(^{50}\) Another patient required resection of infarcted bowel, when a pre-existing para-umbilical hernia strangulated while doing exercises with Wii Fit.\(^{51}\) Two patients were even admitted with an ischemic stroke due to an internal carotid artery dissection after playing the Wii.\(^{52}\)
Also, various Wii-related fractures were reported. A 38-year-old man fractured his spinous process of C7 after he had swung a Wii Remote rather vigorously. Eley reported a small, right fifth metatarsal fracture in a girl who fell during a game of Wii Fit. And Galanopoulos et al. described how a patient sustained an intra-articular fracture of the first metacarpal bone by playing a sports game.

Wells reported a girl who sustained a forehead laceration after her brother had accidentally hit her with a Wii Remote. The report by Razavi et al. tells the story of a 7-year-old boy, who accidentally struck his left eye while playing Wii Sports, leading to a permanent loss of vision. And, finally, Bhangu et al. described a woman with a rupture of the extensor pollicis longus after hitting a wall while playing tennis.

**Discussion**

We’ve presented a variety of Nintendo-related injuries and other complaints. Most reported problems are mild, and, given the amount of game systems sold, the prevalence is low. The types of injury mostly depend on the way of controlling the game. Excessive gameplay with traditional controllers is associated with a tendinitis of the thumb, the Nintendo 64 joystick can lead to palmar ulceration, and the motion-sensitive Wii Remote may contribute to musculoskeletal problems and has caused various traumas.

To keep gaming safe, Nintendo often acts on these problems. Some examples are the mentioned hand-out of protective gloves and a massive give-away of protective, silicone Wii Remote covers to prevent trauma (and smashed TV-screens). Nintendo nowadays even warns players with in-game messages to remind them to take a break.

All in all, we think it’s relatively safe for Father Christmas to give a Nintendo as a Christmas present. However, don’t swing your controller too hard, watch out where you play, and take frequent breaks.
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