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Triad of spinal pain, spinal joint dysfunction, and extremity pain in 4 pediatric cases of "Wii-itis": a 21st century pediatric condition

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Abstract

Objective: This article describes 4 pediatric cases of overuse injuries related to playing Nintendo Wii (Nintendo, Redmond, WA). A brief discussion is also presented regarding other 21st century problems found in the literature, such as problems associated with playing the Nintendo DS portable electronic device, text messaging, and Blackberry (Research in Motion, Waterloo, Ontario) thumb.

Clinical Features: Four pediatric patients, ranging from 3 to 9 years old, who had injuries causally related to what has been described in the literature as "Wii-itis" (spinal pain, spinal joint dysfunction [chiropractic subluxation], and related extremity pain), presented to a chiropractic clinic.

Intervention and Outcomes: Each of the 4 pediatric cases was evaluated and managed using chiropractic techniques. All patients successfully had their complaints resolve with 1 chiropractic visit.

Conclusion: Children in the new era of portable electronic devices are presenting to chiropractic offices with a set of symptoms directly related to overuse or repetitive strain from prolonged play on these systems.

Introduction

There has been a rise in repetitive strain disorders that are a result of using portable electronic devices. With the significant rise in the utilization of cell phones, iPods (Apple Corporation, Cupertino, CA), computers, and video games, people of all ages are spending more and more time in sedentary positions, creating forward head posture, and experiencing an alarming rate of neck and shoulder pain, especially in pediatric populations.[1-4]

Many adult patients who are in the business world use the Blackberry (Research in Motion, Waterloo, Ontario) and iPhone (Apple Corporation), which are mini-computer phones with Web accessibility. Overuse

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of this type of device has caused an increase in what has been dubbed by US News and World Report as the "Blackberry thumb."

Children also have trouble putting down their portable electronic gaming systems, such as the Nintendo DS (Redmond, WA) or Sony PSP (Sony Corporation of America, New York, NY). This has caused an increase in pediatric neck pain and in shoulder and hand pain, as well as raising the likelihood of forward posture.[1-4]

In 2007, the Nintendo Wii, the latest in video game technology, was introduced. It combines the incredible graphics now available because of the vast improvement in microchip engineering with motion-sensitive controllers that respond to one's every hand movement. This technological wonder has created a different and interactive way to play certain video games, especially games that involve sports. Rather than sit motionless with a controller in one's hands, the Wii enables the players' movements to be translated to the character they are controlling. For example, if the children are "bowling," they actually move their arms and body as if they were holding and releasing the bowling ball itself.

The advances in technology are brilliant, but the creators of the Wii most likely did not take into account 2 concerns. First, if children or adults play a sports-related video game on the Wii for hours at a time, it is possible that they may develop overuse or repetitive strain injuries. Second, injury may occur while using one's arms or body in a fast motion (ie, swinging a baseball bat, hitting a tennis ball), when there is no resistance offered either by the weight of the object they are holding or by the incoming object they are striking. If children are playing Nintendo Wii tennis and are "swinging a tennis racket," when in fact they are not swinging anything but a Wii remote control that weighs a few ounces, this can potentially create a sprain/strain injury to the players' neck and upper extremities. This may be complicated when the normal counterforce of a tennis ball contacting a racket is nonexistent as well. The risk of injury may be heightened when the player is performing these repetitive motions over the course of several hours.

The 4 cases presented in this article are reportedly due to overuse injuries caused by this uniquely 21st century device. The purpose of this article is to describe the objective and subjective complaints that a child or adult may present with associated with playing Wii games and what patterns may be seen so as to address this increasingly common problem with conservative chiropractic treatment.

Method

Four pediatric patients presented to the author's chiropractic office with overuse injuries related to the use of the Nintendo Wii. Each patient had been a regular client in our office. Because they presented with new symptoms, each was given a brief reexamination to determine their status. They then were adjusted using the Activator Adjusting Instrument and in accordance with Activator protocols. Appropriate patient consent was obtained to publish this information.

Case 1

The first patient was an 8-year-old athletic boy who had just received the Wii as a present the day before. He played on the Wii for 8 hours that day (with only a brief lunch break), after which he reported to his mother that he was tired and had a sore arm. The following day, the mother brought her son in with significant complaints of pain and stiffness in his right shoulder and neck. This was the first case of "Wii-itis" seen in the author's office. The discomfort had interfered with his ability to concentrate in school and hampered his playtime during gym class and recess. A cervical/thoracic spine examination revealed joint restrictions and slight discomfort. There was mild point tenderness about the cervical spine and during palpation of the cervical paravertebral musculature. There were mild paravertebral muscle spasms in the cervical region as well as trigger points in the surrounding tissues, especially on the right side. The left and right shoulder musculature was in mild spasm, and he complained that his neck was stiff while in motion. His right scapula was found to be hypomobile. He had slightly limited motion in right shoulder flexion and internal rotation. Segmental joint dysfunctions (ie, chiropractic subluxations) were found at the C2, C6, T2, and T4 segments. The right scapula was laterally misaligned, and the right humerus appeared posterior. Motion and static palpation of the cervical and thoracic vertebra indicated spinal joint dysfunctions at several levels. Postural deviations were noted, including right head tilt and a half-inch–high right shoulder.

The child was diagnosed with cervicalgia (723.1) assumed to be from overuse of the Nintendo Wii, somatic dysfunction (cervical, 739.1; thoracic, 739.2), and shoulder pain (719.41). For purposes of this article, the triad of cervicalgia, spinal dysfunction/chiropractic subluxation, and upper extremity pain is identified as "Wii-itis." Treatment consisted of conservative

chiropractic spinal manipulation using the Activator adjusting technique. Spinal manipulations were delivered to C2 and C6 at the lamina pedicle junction in an anterior, superior, and medial line of drive (LOD); T2 and T4 at the transverse process with an anterior and superior LOD; and the opposite rib in a lateral and inferior LOD. His right scapula was adjusted with the lateral scapula protocol, and the right posterior humerus was adjusted with an anterior LOD. Immediately after the treatment, he felt improvement, most notably in his neck. Prognosis for full recovery was good. The patient was told to not play any video games of any kind for 48 hours. He was advised to put ice on his neck and shoulders while watching television. By the next visit the following week, he reported full recovery in both his neck and upper extremity complaints.

Cases 2 to 4

Cases 2 to 4 were 3 children from the same family. The parents had purchased a Wii device the prior weekend; and the parents reported that the children played "more than 10 hours in the last 2 days," calling it a "Wii-a-thon." The 3 children, ranging in age from 3 to 9 years old, all had similar complaints of pain and stiffness in the right side of the neck and right shoulder. The discomfort had interfered with their activities of normal daily living for all 3 children, including irritability in school and at home. An examination was performed on each child.

The first child (case 2), a 9-year-old girl, had cervical and thoracic spinal joint restrictions; and she was mildly uncomfortable during palpation. There existed mild point tenderness about the cervical spine and during palpation of the cervical paravertebral musculature. There were mild paravertebral muscle spasms in the cervical region as well as trigger points in the surrounding tissues, especially on the right side. She had slightly limited motion in right shoulder flexion and internal rotation. The right scapula was laterally misaligned. Motion and static palpation of the cervical and thoracic vertebra indicated spinal joint dysfunctions at the C2, C5, and T4 segments. Postural deviations were noted, including a half-inch–high left shoulder.

Examination of the second child (case 3), a 7-year-old boy, revealed a mild restriction in the child's upper cervical spine and in his midthoracic spine. There was mild point tenderness about the lower cervical spine and during palpation of the lower cervical paravertebral musculature. Motion and static palpation of the spine indicated spinal joint dysfunctions at C1, C6, and T3. The shoulder misalignment pattern indicated that his right humerus was posterior and had a right shoulder trigger point. Postural deviations were noted, including right head tilt and half-inch–high right shoulder.

The third child (case 4), a 3-year-old boy, had very mild point tenderness about the lower cervical spine and during palpation of the lower cervical paravertebral musculature. Motion and static palpation of the spine vertebra indicated spinal joint dysfunctions at 2 levels (C2 and T4). Postural deviations were evident, including slight anterior head tilt and slightly high right shoulder.

The 3 children were diagnosed with the triad of cervicalgia (723.1), assumed to be due to overuse of the Wii; somatic dysfunction (cervical, 739.1; thoracic, 739.2); and shoulder pain (719.41). Treatment consisted of conservative chiropractic spinal manipulation using the Activator adjusting technique. For case 2, manipulations were delivered to C2 and C5 at the lamina pedicle junction in an anterior, superior, and medial LOD; T4 at the transverse process with an anterior and superior LOD; and the opposite rib in a lateral and inferior LOD. Her right scapula was adjusted with the lateral scapula protocol. Regarding case 3, manipulations were delivered to C1 with a medial LOD; C6 at the lamina pedicle junction in an anterior, superior, and medial LOD; T3 at the transverse process with an anterior and superior LOD; and the opposite rib in a lateral and inferior LOD. His right posterior humerus was adjusted with an anterior LOD; and a trigger point located in the right trapezius muscle, with an anterior inferior LOD. Case 4 manipulations were given at C2 lamina pedicle junction with an anterior, superior, and medial LOD; T4 transverse process with an anterior and superior LOD; and the opposite rib in a lateral and inferior LOD.

Immediately after their treatment, each patient reported improvement, most notably in their neck and thoracic regions. The patients were told to refrain from playing any video games of any kind for 48 hours. The 7- and 9-year-old children were advised to put ice on their necks and shoulders while watching television. The 3-year-old boy was given a recommendation to take a bath. By the following visit the next week, they had full resolution of all complaints.

Discussion

These 4 patient complaints temporally associated with playing a Wii device were similar in their histories

(pediatric patients playing for hours on this particular video gaming system), presentation of subjective complaints (neck and shoulder pain), and objective findings (cervical and thoracic subluxations with scapula and/or humeral involvement). Of interest is that in the cases in which the scapula was misaligned, it was in a lateral malposition and that in the cases in which the humerus was misaligned, it was in a posterior mal-position. This article defines "Wii-itis" as having 3 components: spinal pain, spinal joint dysfunction (ie, chiropractic subluxation), and related extremity pain after playing on this particular gaming system. In the 4 presented cases, the triad is cervicalgia, cervical and thoracic joint dysfunctions, and shoulder pain.

Future research is needed to assess why these gaming devices seem to create rapid overuse or repetitive strain disorders. As stated in Conservative Management of Sports Injuries, "In 80% of cases of overuse injuries, the young athlete has only recently taken up the sport."[5] A further question is to identify if extended playing of sports games on the Wii can cause these types of overuse injuries. Therefore, the possible mechanism of injury must be addressed.

A number of the sports-based games played on the Wii involve the use of a single arm with a throwing/swinging motion (pitching a baseball, throwing a bowling ball, hitting with a tennis racket). According to the Activator Method textbook, repetitive motions such as these can "… generate very high stresses in the rotator cuff."[6] These stresses can quickly accumulate, causing problems due to repetitive microtrauma. Hammer[7] defines *repetitive microtrauma* as "… cumulative forces over a period of time, as in throwing or racquet sports." These forces will create tension in the shoulder stabilizers, increasing the likelihood of humeral head translation, thereby leading to instability.[7] This instability could also affect surrounding muscles and joints, such as the cervical spine, shoulder muscles, and scapula.

Instability can lead to scapular dysfunction. Because the scapulothoracic region is the interface between the upper extremity and the torso, scapula involvement can affect the entire kinetic chain of the arm.[6] The kinetic chain of the arm begins with the cervical spine. Hence, playing for hours on this gaming system can potentially create an instability, causing an overuse syndrome due to the accumulation of repetitive microtraumas of the upper extremity kinetic chain. This may also explain the rapid recovery seen with these children because the Activator Method aims at addressing the entire kinetic chain from the cervical spine to the scapula adjustment. The 4-part scapula manipulation consists of working on the scapula, humerus, ulna or radius, and the carpal bones.[6] Activator trigger point therapy was additionally used on case 3, which has been shown in a recent trial to have an immediate beneficial effect.[8]

Sports-based games played on the Wii are not the only source of injury on a video gaming system. The recent introduction of games such as Rock Band and Guitar Hero, in which players "strum" a guitar or beat the equivalent of electronic drums in time with the music, has also created similar syndromes. Symptoms have been reported through blogs and news articles of wrist pain related to Guitar Hero. For example, there was a notable article on NBC sports regarding the Detroit Tigers' star pitcher missing games in the playoffs because of straining his wrist playing Guitar Hero (http://nbcsports.msnbc.com/id/16212095/).

Presently, no reports of long-term or permanent shoulder or spinal injury due to playing on this system have been seen in the literature. In 2007 and 2008, 4 articles did appear in medical journals regarding "Acute Wii-itis" in shoulder injuries[9,10] and "Wii Knee."[11,12] A recent presentation at the American College of Rheumatology Annual Scientific Meeting measured wrist pain in children playing with video games. It was found that playing the Wii was associated with increased reporting of wrist pain.[13] No reports have appeared in peer-reviewed chiropractic journals regarding Wii injuries. However, in the August/September issue of *Today's Chiropractic Lifestyle*, a brief editorial outlined several Wii-related problems.[14]

There have been some reports of blunt trauma from the use of the Wii found on the Internet. Hundreds of incidents on a popular blog entitled "Wii have a problem" (http://www.wiihaveaproblem.com) show children and adults with facial or arm trauma, including black eyes, due to being struck by another player holding a Wii remote. Serious injuries have occurred when children struck a window with a Wii remote, breaking the window and lacerating their hands in the process.

Electronic devices are becoming a necessity to keep up with the fast pace of Western culture. Text messaging does have the potential to create repetitive strain injuries to the fingers or thumbs, and is being seen not only with older more established patients who carry the Blackberry or iPhone, but with younger preteens and teens with standard phones.[1-4,15] According to a survey by the Chartered Society of Physiotherapists in the United Kingdom, 1 in 6 teenagers reports discomfort in his or her hands when texting.[15]

Handheld games such as Nintendo DS are prevalent, and their regular use can cause an increase in neck and hand injuries as well as forward head positioning.[1-4]

This may lead to cervical hypolordosis and thoracic kyphosis; so it is possible that when this current generation of children is in their 20s, their postures may show the results of years of anterior head tilt, which can lead to a large segment of that generation having poor posture.[1-4]

Technology encompasses more than just electronic gaming devices. For instance, remote surgery is becoming a subspecialty in which a patient can be in one hospital and their surgeon in any other hospital in the world, provided both centers have the appropriate technology.[16] This certainly has its benefits; but as with all technological improvements, there are potential downsides. For example, there may be repercussions of not actually performing the task that your fine hand movements are initiating, both for the doctor performing the surgery and the patient being operated on. This may lead to the development of new forms of carpal tunnel, epicondylitis, or rotator cuff tendinitis from poor biomechanics leading to repetitive strain injuries in these doctors performing remote surgery.

There exists in the literature a surprisingly small amount of information on 21st century injuries due to overuse or misuse of technology. Interestingly enough, there are many more orthopedic-related articles to 21st century footwear such as injuries from Heelys Street Gliders (Carrollton, TX).[17]

Because doctors of chiropractic have been shown in a recent survey by the National Center for Complementary and Alternative Medicine to be taking care of 2.8% of children compared with 8.6% of adults, the chances of chiropractors seeing more pediatric patients is probable.[18] Doctors of chiropractic should become well versed not only in pediatric treatment (which includes the necessity for pediatric extremity adjusting), but also in their differential diagnosis and case presentation. More research needs to be done in this area to elucidate the causal relationship of these 21st century devices and the problems they are potentially creating.

Limitations

A limitation of this study is the small amount of subjects and the fact that this is a retrospective work rather than a clinical trial. A further limitation exists in that the injuries were all self-reported as being due to excessive playing on an electronic gaming device. These injuries all appeared to be due to such play activity, but a causal relationship could not be fully identified. A visual analog scale outcome tool to measuring pain was not used because it has been shown in pediatric populations that these devices do not offer a high degree of validity.[19] Hence, in a further study, a different outcome measurement tool such as the Faces Pain Scale may be used.[20]

Conclusion

Nintendo Wii–related injuries are currently a novel mechanism of trauma and hence are something that pediatric patients are very willing and eager to share with their clinician. But this will not always be the case, as are injuries currently seen in pediatrics due to high-volume text messaging, overuse of cell phones causing neck strain, or even back-pack–related injuries. These problems are very often an embarrassment for the child/teenager and hence may not be the first words that come out of their mouth during the initial consultation. Doctors of chiropractic must use best clinical judgment as they negotiate the current trendy issues of today with their concomitant potential for injury.

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