



Case report

Falling post-MRI examinations: 2 case reports

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ARTICLE INFO

Keywords:

Evidence-based medicine
 Medical imaging
 Radiology
 Clinical research
 Vertigo
 Fall
 Magnetic resonance imaging
 Dizziness
 Case report

ABSTRACT

Background: The phenomenon where ambulant patients suffer sudden falls during the process of getting off the couch and walking to the changing room post magnetic resonance imaging (MRI) examination is uncommon. However, it can be a very disturbing experience for such patients. Therefore, there is the need to effectively support patients to avoid falls when they are getting off the MRI couch when the examination is completed.

Methods: Two ambulant patients who had undergone MRI were observed to have lost their balance when they attempted to get off from the MRI couch after their procedures. Face-to-face interrogations were made about what they felt.

Results: The two patients complained of experiencing some form of dizziness/vertigo when they got off the MRI couch.

Conclusion: This paper reported two cases of falls that occurred in an MRI facility. The aim was to emphasize the need for extra care and support for all patients who undergo MRI examinations due to the potential risk of MRI induced vertigo or dizziness regardless of the patient's condition.

1. Introduction

Though the phenomenon where an able patient suffers a sudden fall when attempting to get off the couch post magnetic resonance imaging (MRI) examinations is uncommon, it can be a very disturbing experience for such patients. Many factors such as balance disorders, hypnic jerk and sometimes abrupt awakening from sleep can lead to a sudden fall immediately after completing an MRI procedure. Other factors include muscle weakness, low blood pressure, poor vision, fasting, sedation or use of drowsy drugs, poor circulation to the brain, brief loss of consciousness or a sudden feeling of dizziness [1]. Roberts et al [2] have also argued that this sudden fall of patients may be due to MRI-induced vertigo or dizziness in patients undergoing MRI examinations. Since falls are known consequences of vertigo or dizziness [3, 4], it is important that the issue of MRI-induced vertigo is thoroughly addressed. According to Roberts et al [2], the MRI's strong magnetic field pushes on fluid that circulates in the inner ear's balance centre, leading to a feeling of unexpected and unsteady movement. In particular, this effect increases the risk of falling as some patients can experience imbalance when getting off the MRI couch or when walking to their changing rooms. This makes it imperative to support patients at all times in these activities to offset any potential risk of falling. Herein, we present two cases of falls that

occurred in our department, when patients were getting off the MRI couch. The aim was to emphasize the need for extra patient care after MRI examination because of the aforementioned potential risks.

2. Methods

2.1. Case presentation

The first case involved a 54-year-old man who presented with a chronic neck pain (>90 days) for MRI examination. The patient was neither claustrophobic, nor fasting. Also, he was not under drowsy drugs. The patient underwent a 20-minute MRI examination of the neck that utilised a neck coil. After the examination, the patient was brought out of the MRI gantry. When he attempted to get off the couch, he experienced a momentary loss of balance. The patient complained of experiencing some dizziness and spinning sensations upon interrogations.

The second case occurred to a 48-year-old man who, with a clinical history of headaches, had a 30-minute brain MRI scan using a head coil. The patient also experienced a momentary loss of balance after getting off the MRI couch unassisted and subsequently fell on the lowered MRI couch.

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Received 20 August 2019; Received in revised form 3 January 2020; Accepted 5 May 2020

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Medical reviews of the patients' data by a physician showed no evidence of intakes of medications that could make them drowsy. Both patients had no medical history of dizziness or vertigo. Similar to the first case, the second patient was neither claustrophobic nor fasting. There was no known neurologic deficit among the patients, and no breathing abnormalities were identified. Each patient was scanned with a 1.5 Tesla (T) Toshiba MRI scanner.

Both ambulant patients, however, complained of experiencing some spinning sensations when they sat on the MRI couch. Consequently, these feelings led to their falls when they attempted to get off the couch without any assistance.

Consent

Consent was obtained from the patients to describe the situation for publication as a case report. This was undertaken when the patients became competent to provide consent.

3. Discussion

Falls experienced by 'able-patients' when getting off the MRI couch post MRI scans are uncommon, but the experience can be very disturbing. Although the underlying cause of the patients' imbalance in this report is uncertain, several publications have suggested possible causes. Evidence suggests that when patients are in and around MRI machines, the high magnetic field induces vertigo in these patients [5, 6]. According to Roberts et al [2], the MRI's strong magnetic field pushes on fluid that circulates in the inner ear's balance centre of the MRI patient. This leads to a feeling of unexpected and unsteady movements. They further argued that the static magnetic field produced by the MRI scanner causes interaction with the vestibular system in the inner ear. These interactions induce an electrical perturbation in the potassium-rich endolymph within the semi-circular canals. This stimulates hair cells in the vestibular system, causing abnormal movements. Straumann and Bockisch [7] further revealed that vertigo becomes more prominent with newer scanners with stronger magnetic fields. Other factors known to cause imbalances in patients include: balance disorders, hypnic jerk, abrupt awakening from sleep, muscle weakness, low blood pressure, poor vision, fasting, sedation or use of drowsy drugs, poor circulation to the brain, dizziness and loss of consciousness [1].

With our patients, none of them had a known medical history that could have prompted dizziness. Also, prior to the procedure, none of them were informed they could experience MRI-based vertigo. They were brought out of the MRI gantry, told the procedure was completed and were supposed to walk to the changing rooms because they were ambulant patients. Unfortunately, little assistance was given to them as they got off the MRI couch and headed towards their changing rooms. This is not the routine practice in many facilities; however, there is the need to emphasize that patients should always be supported to get off the couch and be assisted to their changing rooms. This is because there are many factors apart from the MRI-induced vertigo that could affect patients' imbalance when getting off the couch unassisted. The lack of effective support could potentially lead to a major fall with the victim hitting the head on the hard floor. Though guidelines on patient handling exist, there is the need to ensure strict adherence with optimum care during post MRI examinations in order to avert any potential accidents as encountered in our two patients.

4. Conclusion

Falls as a result of patients getting off the MRI couch and walking unassisted to their changing rooms are not a common occurrence. However, they are inevitable if patients are not regularly assisted to get off the MRI couch and supported to their changing rooms post MRI examinations.

There is the need to ensure strict adherence with optimum care during post MRI examinations in order to avert any potential accidents as encountered in our two patients. This case report should also serve as a reminder to MRI radiographers to consistently support their patients after their MRI examinations.

Declarations

Author contribution statement

All authors listed have significantly contributed to the investigation, development and writing of this article.

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All authors listed have significantly contributed to the investigation, development and writing of this article.

Funding statement

This research did not receive any specific grant from funding agencies in the public, commercial, or not-for-profit sectors.

Competing interest statement

The authors declare no conflict of interest.

Additional information

No additional information is available for this paper.

References

- [1] L.Z. Rubenstein, Falls in older people: epidemiology, risk factors and strategies for prevention, *Age Ageing* 35 (S2) (2006) 37–41.
- [2] D.C. Roberts, V. Marcelli, J.S. Gillen, C.C. Della Santina, J.P. Carey, D.S. Zee, MRI magnetic field stimulates rotational sensors of the brain, *Curr. Biol.* 21 (2011) 1635–1640.
- [3] Y. Agrawal, J.P. Carey, C.C. Della Santina, M.C. Schubert, L.B. Minor, Disorders of balance and vestibular function in US adults, *Arch. Intern. Med.* 169 (10) (2010) 938–944.
- [4] H.M. Samy, A.M. Hamid, M. Friedman, Dizziness, vertigo, and imbalance, Available at: <http://emedicine.medscape.com/article/2149881-overview>. (Accessed 20 September 2015).
- [5] J.F. Schenck, C.L. Dumoulin, R.W. Redington, H.Y. Kressel, R.T. Elliott, I.L. McDougall, Human exposure to 4.0-Tesla magnetic fields in a whole-body scanner, *Med. Phys.* 19 (1992) 1089–1098.
- [6] C. Heilmaier, J.M. Theysohn, S. Maderwald, O. Kraff, M.E. Ladd, S.C. Ladd, A large-scale study on subjective perception of discomfort during 7 and 1.5 T MRI examinations, *Bioelectromagnetics* 32 (8) (2011) 610–619, 2011 Dec.
- [7] D. Straumann, C.J. Bockisch, Neurophysiology: vertigo in MRI machines, *Curr. Biol.* 21 (19) (2011) R806–R807.