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Recurrent Vertigo Following a Mild Head Injury in a Housewife: Clinical, Psychosocial, and Daily Productivity Impacts

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ABSTRACT

Mild head injury or mild traumatic brain injury (mTBI) is a common case in Indonesia and is often considered trivial, although approximately 30–50% of patients experience residual symptoms such as vertigo, which can impact quality of life and productivity. A common problem is that post-traumatic vertigo is not properly managed due to late diagnosis and lack of patient education. This article reports the case of a 63 year old house wife with complaints of dizziness that occurs every 2-3 days with a duration of approximately 2 minutes per episode and appears erratically while sitting or doing activities. The patient had a history of a fall with a head injury three months prior accompanied by a loss of consciousness for approximately 5 minutes. Neurological examination showed impaired balance with positive Romberg and tandem tests, while the Dix-Hallpike maneuver showed no typical results. Based on the clinical presentation, the patient was diagnosed as post-concussion syndrome with the possibility benign paroxysmal positional vertigo secondary trauma. The patient was given therapy in the form of canalith repositioning maneuvers, pharmacotherapy, and education. Evaluation results showed symptom improvement, but limitations in daily activities and anxiety about recurrence persisted. This case demonstrates that post-traumatic vertigo has significant clinical and psychosocial impacts, necessitating a multidisciplinary approach for early diagnosis, optimal management, and patient education to maintain productivity

INTRODUCTION

Mild traumatic brain injury (mTBI) is one of the most common forms of trauma encountered in clinical practice and is a significant contributor to global morbidity. Epidemiologically, traumatic brain injury is reported to have a global incidence of approximately 295 cases per 100,000 population per year, with considerable regional variation. In Indonesia, the proportion of head injuries is reported to reach 11.9% of all trauma cases in a single year, with some regions showing higher rates. Most cases of traumatic brain injury are categorized as mild, even in one report reaching over 90% of all head injury incidents (Putra et al., 2021). Although only a small proportion of patients require hospitalization, the actual incidence is estimated to be higher because many cases are not recorded in health care facilities. This condition indicates that mTBI is not only a clinical problem, but also a significant public health burden due to its potential impact on neurological function, quality of life, and individual productivity.

Although often considered minor, mTBI can cause a variety of lasting clinical impacts, including physical, cognitive, and emotional impairment. These symptoms are known as post-concussion syndrome (PCS) and can appear weeks to months after the injury. Recent studies indicate that approximately 10–15% of patients experience PCS, with some studies showing this figure as high as 35.4%, indicating that post-traumatic complications are not uncommon (Suwaryo et al., 2024). This condition has the potential to disrupt daily activities, reduce quality of life, and increase the risk of long-term disability if not recognized and managed optimally.

The most common complaints associated with post-concussion syndrome (PCS) are vestibular system disorders, including dizziness and vertigo. Post-traumatic vertigo not only causes discomfort but also contributes to a decreased quality of life, delayed return to activity, and an increased risk of long-term disability. Prospective studies show that approximately 78% of patients with head injuries experience dizziness or balance disorders during follow-up, and approximately 21% of these develop

benign paroxysmal positional vertigo (BPPV) within 3 months of the injury. This figure is significantly higher than the prevalence of BPPV in the general population, which is only 0.5–2% over the same period, suggesting a strong link between head trauma and vestibular disorders (Andersson et al., 2022).

Physiologically, post-traumatic vertigo in mild traumatic brain injury is the result of vestibular system dysfunction involving both peripheral and central components. At the peripheral level, acceleration-deceleration forces during trauma can cause the release of otoconia from the utricle, which then migrate into the semicircular canals, disrupting endolymph dynamics and triggering vertigo during changes in head position (Smith et al., 2024). Furthermore, microscopic damage to the labyrinth and involvement of the central vestibular system, such as in diffuse axonal injury, also contribute to impaired sensory integration. This combination of mechanisms leads to a variety of clinical manifestations, including atypical symptoms with inconsistent examination results (Andersson et al., 2022).

Although post-traumatic vertigo is a fairly common manifestation after mild traumatic brain injury, it remains underdiagnosed. This is due to the wide variety of etiologies and nonspecific symptoms, which complicate clinical identification. Furthermore, the delayed onset of symptoms and the limited availability of vestibular evaluation during the acute phase lead to missed or delayed recognition of many cases (Chan et al., 2025). The impact is not only clinical but also impacts patients' quality of life and daily activities, particularly in the elderly population, who are at high risk for decreased independence and recurrent falls (Gianoli, 2022). Therefore, a more comprehensive approach is needed to recognize and manage post-traumatic vertigo early.

The impact of post-traumatic vertigo is not only limited to clinical aspects, but also significantly affects the quality of life and social functioning of patients (Fawzan et al., 2022). Studies show that complaints of dizziness and vertigo are associated with a decreased quality of life in approximately 15–

20% of the adult population each year, with a higher prevalence in women and the elderly (Steensnaes et al., 2023). Furthermore, vestibular disorders are reported to cause a decreased quality of life in up to 86.4% of patients, with approximately 33.6% experiencing severe impairment. This condition impacts limitations in daily activities, decreased independence, and increased anxiety and risk of falls, especially in the elderly population. These impacts also have implications for decreased productivity and social functioning, including in carrying out daily domestic roles (Molnár et al., 2022). Therefore, the management of post-traumatic vertigo needs to comprehensively consider aspects of the patient's quality of life and social role.

This case report aims to describe the recurrent vertigo that occurred several months after a mild head injury in an elderly housewife, and to evaluate its clinical and psychosocial aspects and impact on daily activity productivity. Furthermore, this report is expected to raise clinician awareness of the possibility of post-traumatic vestibular disorders with atypical clinical manifestations and emphasize the importance of a multidisciplinary approach in their diagnosis and management.

Patient's Identity

This article is a case report which describes the occurrence of post-traumatic vertigo in a 63 years old woman, a housewife, who came to the neurology clinic of PKU Muhammadiyah Gamping Hospital, Yogyakarta, on May 2, 2026. Data were obtained retrospectively through anamnesis, physical examination, and medical record review. Clinical evaluation was carried out based on the characteristics of vertigo complaints and the results of neurological and vestibular examinations, including the Romberg test, tandem gait, and Dix-Hallpike maneuver. In addition, an assessment of the patient's psychosocial aspects and daily activities was carried out through interviews regarding activity limitations, level of independence, and the impact of the condition on the patient's domestic role. Management included canalith repositioning maneuvers, pharmacotherapy as indicated, and education regarding activity modification, with further evaluation through follow up to assess the response to therapy. This study has obtained patient

consent through informed consent, and patient identities have been disguised to maintain confidentiality.

Case Report

A 63 year old woman, a housewife, came to the neurology clinic at PKU Muhammadiyah Gamping Hospital with a chief complaint of sudden dizziness that had appeared for the past two months. The complaints recurred every two to three days, lasting approximately two minutes per episode, and could occur both at rest and during activity. Four months prior, the patient had a history of falling in the bathroom with a blow to the head accompanied by a loss of consciousness for less than five minutes. The patient had undergone a head CT scan with normal results and had no significant complaints after the incident.

The patient had no history of similar complaints. Past medical history, family history, and history of regular medication use were denied. A history of drug and food allergies was also denied. On general physical examination, the patient was in good general condition, *compos mentis* consciousness, and vital signs within normal limits. Neurological examination showed normal cranial nerve function, normal physiological and pathological reflexes, and no focal neurological deficits. Balance testing showed a positive Romberg result, while the Dix-Hallpike maneuver showed an atypical positive response to the right side. Audiometry examination was within normal limits.

Based on anamnesis and clinical examination, the patient was diagnosed with post-concussion syndrome with the possibility benign paroxysmal positional vertigo (BPPV) secondary to trauma. Management includes non-pharmacological therapy in the form of three canalith repositioning maneuvers (Epley maneuvers), pharmacotherapy in the form of betahistine 2 x 6 mg, and education regarding modification of daily activities.

The patient's vertigo has impacted her daily domestic activities. She reported reducing household activities such as sweeping, mopping, washing clothes, prolonged cooking, and activities that require bending or changing head positions quickly due to concerns about triggering a recurrence of vertigo. She also reduced her outdoor activities and more frequently asked family members for help with certain household chores. Psychosocially, she felt anxious and fearful of falling again, especially when

alone at home. This condition caused her to feel more limited in her daily activities than before her head injury.

In the evaluation follow-up After one month, the patient reported approximately 60% improvement in her vertigo. However, she remained concerned about a recurrence and was reluctant to undertake strenuous household activities, which resulted in decreased productivity in daily activities.

DISCUSSION

Recurrent vertigo occurring several months after a mild head injury in an elderly patient is a manifestation that requires special attention. In this case, the symptoms appeared with a delayed onset of approximately two months after the trauma, although initial examinations revealed no abnormalities. This is consistent with the theory that the symptoms are post-concussion syndrome, including vertigo, can appear delayed after a mild head injury (Smith et al., 2024). Furthermore, the symptoms experienced are not entirely typical, as they can occur at rest or during activity and do not show a consistent provocative response to the Dix-Hallpike test. This condition aligns with previous research reports that post-traumatic vertigo can have a variety of clinical manifestations, particularly in the elderly population, potentially complicating the diagnostic process (Gianoli, 2022).

Vertigo is one of the manifestations that often appears as part of post-concussion syndrome after mild traumatic brain injury (mTBI). This condition encompasses a range of physical, cognitive, and emotional symptoms that can occur after mild head trauma, including complaints of dizziness, balance problems, and vertigo. Research shows that the prevalence post-concussion syndrome The incidence of post-traumatic dizziness in mTBI patients varies considerably, ranging from 10–15% in some studies to as high as 35.4% in certain populations (Suwaryo et al., 2024). Within this spectrum of symptoms, dizziness is a frequently reported complaint, occurring in approximately 20.5% of patients with PCS. Furthermore, other studies have shown that post-traumatic dizziness is common and may reflect a variety of complex mechanisms, with symptoms developing from early to several months after injury. This confirms that vertigo is an important part of the clinical manifestations. post-concussion syndrome which plays a role in the course of the disease and

recovery of post-traumatic patients (Castillo-Bustamante et al., 2025).

Pathophysiologically, post-traumatic vertigo is primarily related to disorders of the peripheral vestibular system. Head trauma with acceleration-deceleration or rotational mechanisms can cause the detachment of otoconia from the utricular macula. The detached otoconia particles then migrate into the semicircular canals, particularly the posterior canal, thereby disrupting endolymph dynamics and triggering the sensation of vertigo when the head changes position. This mechanism is the basis for the occurrence of vertigo benign paroxysmal positional vertigo (BPPV) secondary to trauma is often found in patients after head injury (Kong & Seo, 2026).

In addition to peripheral mechanisms, trauma can also cause disorders of the central vestibular system. Mild head injuries can cause secondary changes such as inflammation, microcirculatory disorders, and diffuse axonal injury that affects the integration of information between the vestibular, visual, and proprioceptive systems (Castillo-Bustamante et al., 2025). This combination of peripheral and central disorders causes a variety of clinical manifestations of post-traumatic vertigo that are not always typical, including in patients with inconsistent provocative examination results.

Benign paroxysmal positional vertigo (BPPV) is the most common cause of peripheral vertigo, including post-traumatic vertigo. In the context of head injury, BPPV is known as the most common cause of vestibular disorders due to trauma and is a major component of post-traumatic dizziness which can be identified and treated specifically. Epidemiological studies show that the risk of developing BPPV increases significantly after head injury, with approximately 21% of patients experiencing BPPV in the first three months post-trauma, while the prevalence is in patients with a history of traumatic brain injury Reported rates range from 10% to 57%. This variation is likely due to limited diagnostic accuracy and spontaneous resolution of symptoms. These findings confirm that BPPV is a dominant cause of post-traumatic vertigo, with important clinical implications. Therefore, it should always be considered as the primary diagnosis in patients presenting with vertigo after head injury before evaluating other, more complex etiologies (Smith et al., 2025).

Classically, benign paroxysmal positional vertigo (BPPV) is characterized by episodes of vertigo triggered by changes in head position, characterized by a brief onset, short duration, and a latency of several seconds before symptoms appear. The diagnosis is usually made through the Dix-Hallpike maneuver, which shows a typical rotatory nystagmus corresponding to the involved canal. However, in this case, symptoms do not strictly follow this classic pattern, as vertigo can occur both at rest and with activity, and does not show a typical provocative response to the Dix-Hallpike examination (Madrigal et al., 2024).

This difference can be explained by the characteristics post-traumatic BPPV which tends to have more complex clinical manifestations than idiopathic BPPV. Many cases show that post-traumatic BPPV more often involves multi-canal, bilateral, or non-posterior canals, resulting in a non-typical nystagmus pattern and being more difficult to identify with just one provocative maneuver (Kong & Seo, 2026). In addition, in patients with a history of traumatic brain injury, the nystagmus response on examination may be reduced or inconsistent due to the presence of accompanying vestibular dysfunction, thus causing a negative or inconclusive Dix-Hallpike result. This explains why in this case, although clinically suggestive of secondary traumatic BPPV, the examination findings do not show the classic picture.

The onset of vertigo approximately two months after the trauma in this case suggests a delayed onset, which can be found in post-traumatic BPPV. Previous cases have shown that the interval between head injury and the onset of vertigo symptoms can vary widely, ranging from a few days to several months after the trauma. This condition is thought to be related to gradual processes in the vestibular system, such as biochemical changes, inflammation, metabolic disturbances, and weakening of the attachment of otoconia to the utricular macula, which causes otoconia to become more easily detached over time. Furthermore, in mild traumatic brain injury, vestibular symptoms often do not immediately appear in the acute phase, so the connection between trauma and vertigo is less recognized by both patients and clinicians (Taylor et al., 2022).

These findings differ from most cases of classic traumatic BPPV, which typically show onset within the first two weeks post-trauma. Therefore, the delay

in symptom onset in this case is important because it can lead to delays in diagnosis and management. This variation in onset also emphasizes that post-traumatic vertigo does not always follow a typical clinical pattern, especially in elderly patients with the possibility of concurrent peripheral and central vestibular involvement.

Post-traumatic vertigo is often underdiagnosed because its clinical manifestations tend to be nonspecific and can mimic various other conditions following mild traumatic brain injury (mTBI). Complaints such as dizziness, imbalance, headache, fatigue, and cognitive impairment often co-occur, making it difficult to identify vestibular disorders as the primary cause of symptoms. Furthermore, the term "dizziness" itself has a broad and subjective spectrum of meanings, making it difficult for patients to specifically describe their symptoms or associate them with specific positional changes (Bölükba et al., 2026).

On the other hand, clinical evaluation of mild head injuries generally focuses more on the acute phase and the exclusion of intracranial complications, resulting in under-recognition of vestibular disorders. Research also suggests that many patients with post-concussive dizziness do not undergo an adequate vestibular examination until symptoms persist for a long time. However, patients with persistent symptoms require a comprehensive vestibular evaluation, including oculomotor and peripheral vestibular function tests, as well as provocative maneuvers such as the Dix-Hallpike test (Gianoli, 2022). The lack of an initial vestibular evaluation can lead to delays in diagnosis and management, especially in cases with atypical manifestations such as this patient.

Patients with post-traumatic vertigo, several differential diagnoses should be considered because dizziness after mild traumatic brain injury (mTBI) can originate from peripheral, central, or non-vestibular vestibular disorders. Vestibular migraine is an important differential diagnosis because it can cause spontaneous or positional vertigo with nystagmus that resembles BPPV. However, this condition is generally accompanied by a history of migraine, a temporal relationship with migraine symptoms, and more persistent nystagmus than BPPV. Furthermore, central vertigo such as posterior circulation disorders or central vestibular dysfunction due to diffuse axonal injury should also

be considered, especially if oculomotor abnormalities, focal neurological disorders, or vestibular examination results do not match the peripheral pattern. Other diagnoses such as orthostatic hypotension and post-traumatic autonomic dysfunction can also cause dizziness, although usually more of a lightheaded or floating sensation than a spinning vertigo (Sideris et al., 2026). In this case, the diagnosis is more likely secondary to traumatic BPPV because of the history of previous head impact followed by recurrent vertigo with balance disturbances, although the manifestations are not entirely typical. There was no history of migraines, focal neurological deficits, hearing loss, or other typical signs of central disorders. Furthermore, the recurrent brief episodes of vertigo were more consistent with peripheral vestibular disorders than with other non-vestibular causes. These findings support the belief that post-traumatic BPPV remains the most likely diagnosis in this patient, despite her atypical clinical presentation (Gianoli, 2022).

Clinical examination plays a crucial role in the evaluation of post-traumatic vertigo, particularly in assessing balance disturbances and vestibular system involvement. In this case, the Romberg and tandem tests indicated balance disturbances suggestive of vestibular dysfunction, while the Dix-Hallpike maneuver was performed to evaluate for benign paroxysmal positional vertigo (BPPV). While the Dix-Hallpike remains the gold standard for diagnosing BPPV, balance tests such as the Romberg are essential in the evaluation of patients with traumatic brain injury, in post-traumatic BPPV, test results can be nonspecific due to multi-channel involvement, bilaterality, or vestibular hypofunction, which makes nystagmus difficult to detect, increasing the likelihood of false-negative results. Many sources also describe subjective BPPV, characterized by vertigo without clear nystagmus during positional maneuvers. This may explain why, in this case, the clinical symptoms remain suggestive of secondary traumatic BPPV despite the non-typical Dix-Hallpike results (Lee & Lee, 2024).

Management of post-traumatic vertigo in this case was carried out through a combination of canalith repositioning maneuvers and symptomatic therapy. In patients with suspected benign paroxysmal positional vertigo (BPPV), repositioning maneuvers such as Epley are the recommended first-

line therapy because they directly aim to return the otoconia from the semicircular canals to the utricle. Various studies have shown that repositioning manoeuvres provides better symptom resolution rates than education or vestibular training alone in post-traumatic BPPV. In addition, some patients with post-traumatic BPPV require more than one therapy session to achieve optimal improvement, especially in cases with multi-canal involvement or atypical forms (Chan et al., 2025). In this case, the patient underwent three Epley maneuvers along with betahistine as a symptomatic therapy to help reduce vertigo and discomfort during the recovery process. Betahistine works as a histamine analog that improves microcirculation in the inner ear and improves central vestibular compensation, thereby helping to reduce the frequency and intensity of vertigo. Although it does not eliminate the underlying cause of BPPV, the use of betahistine can help increase patient tolerance to symptoms during the vestibular rehabilitation process. After a one-month evaluation, vertigo complaints were reported to have improved by approximately 60%, which is in line with the theory that adequate vestibular management can provide clinical improvement and quality of life in patients with post-traumatic vertigo (Jensen & Hougaard, 2022).

Post-traumatic vertigo can significantly impact a patient's quality of life, both physically, psychologically, and socially. Recurrent complaints of vertigo and imbalance can interfere with activities of daily living (ADL), such as walking, changing positions, performing household chores, and even simple activities like getting out of bed. In elderly patients, this condition also increases the risk of falls, so patients tend to limit movement and physical activity to avoid recurrence of symptoms. In addition to physical impacts, chronic vertigo is also associated with psychological disorders such as anxiety, fear, frustration, and avoidance of social activities due to fear of sudden vertigo attacks (Swain, 2024). Research even suggests that vestibular disorders can affect quality of life in emotional, social, and daily productivity aspects, including decreased participation in domestic and work activities. In this case, the patient experienced a decrease in courage to undertake more strenuous household activities after the onset of recurrent vertigo, indicating that the impact of vertigo is not only limited to clinical symptoms, but also affects the

sense of security, independence, and overall quality of life (Kleffelgård et al., 2023).

The impact of post-traumatic vertigo is not limited to clinical aspects but also affects the patient's social functioning and daily productivity. In this case, the patient is an elderly housewife who experienced limitations in performing domestic activities due to recurrent vertigo. Data shows that vertigo and balance disorders can hinder daily activities such as walking, changing positions, bending, and performing household chores, leading to decreased independence and productivity. Unpredictable vertigo episodes also lead to a fear of falling and concern about symptom recurrence, which then leads the patient to limit physical and social activities. In elderly women, this condition can have a greater impact because daily domestic activities are highly dependent on mobility and balance (Stewart et al., 2022). Furthermore, chronic vestibular disorders are known to cause anxiety, social isolation, and dependence on other family members for routine activities. Therefore, post-traumatic vertigo should be viewed as a condition with multidimensional implications, including on the patient's social functioning, family dynamics, and daily productivity.

The clinical implications of this case demonstrate the importance of being aware of vestibular disorders after mild traumatic brain injury (mTBI), especially in patients with persistent dizziness or balance disorders. This situation emphasizes the need for patients after mild head trauma to undergo a more comprehensive vertigo screening and vestibular evaluation, as symptoms can appear delayed and often go unrecognized in the acute phase. Furthermore, patient education regarding the possibility of post-traumatic vestibular symptoms, warning signs, and the importance of follow-up monitoring is crucial in preventing delayed diagnosis and reducing the risk of recurrent falls. Management of post-traumatic vertigo also requires a multidisciplinary approach involving neurology, medical rehabilitation, vestibular physiotherapy, and psychosocial support to help restore function and quality of life. With a comprehensive approach, it is hoped that post-traumatic vestibular disorders can be recognized early and managed optimally, thereby minimizing the impact on daily activities and patient productivity (Kaae et al., 2022).

CONCLUSION

Recurrent post-traumatic vertigo is a manifestation of post-concussion syndrome that can appear delayed after mild traumatic brain injury and often does not present with a typical clinical picture. In this case, a history of mild head injury with onset of vertigo several months after the trauma, accompanied by balance disturbances and inconclusive vestibular examination results, suggests the possibility of benign paroxysmal positional vertigo (BPPV) secondary to trauma. This condition indicates that post-traumatic vestibular disorders can involve both peripheral and central mechanisms and therefore requires a comprehensive clinical evaluation.

In addition to its clinical impact, post-traumatic vertigo also affects patients' quality of life, domestic activities, sense of safety, and daily productivity, especially in the elderly. Management through canalith repositioning maneuvers, symptomatic therapy, education, and activity modifications provides symptomatic improvement, although activity limitations may persist during the recovery process. Therefore, clinicians are required to be vigilant about the possibility of vestibular disorders in patients after mild head injury, including through early screening, adequate vestibular evaluation, and a multidisciplinary approach to reduce the long-term impact on patient function and quality of life. Further research is needed to evaluate the clinical characteristics, risk factors, and optimal rehabilitation strategies for post-traumatic vertigo with atypical manifestations.

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