

# Benign Paroxysmal Positional Vertigo: Management and Its Impact on Falls

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## Abstract

**Introduction:** Benign paroxysmal positional vertigo (BPPV) is the most common cause of dizziness in the elderly. This has been identified as a risk factor in falls. Falls are the leading cause of disability and the leading cause of death from injury among people over 75 in the UK.

**Methods:** We assessed the effect of BPPV treatment on falls in an elderly population by retrospectively reviewing one unit's experience of BPPV management over an 8-year period from June 2008 to June 2016. We specifically assessed patients who were referred for the primary reason of falls and were aged over 65 years. These patients were evaluated and treated with particle repositioning maneuvers if their positional tests were positive. The frequency of falls prior to their visit and at 6-month clinic follow-up were reviewed.

**Results:** The total number of falls in the cohort reduced significantly ( $P < .0001$ ) after the procedure, from 128 to 46 falls (64% reduction). Associated comorbidities were also evaluated in this group.

**Conclusion:** A prompt and effective treatment of BPPV is prudent to prevent devastating falls in older people in our communities.

## Keywords

benign paroxysmal positional vertigo, miscellaneous, inner ear disorders, vestibular rehabilitation, elderly, vertigo, otology, otolaryngology, risk of falls

## Introduction

Benign paroxysmal positional vertigo (BPPV) is a condition characterized by brief episodic vertigo, often with a rotatory component, in association with rapid changes in head position. In the general population, the incidence of idiopathic BPPV ranges from 11 to 64 per 100 000 per year.<sup>1</sup> The peak incidence is between 50 and 70 years of age.<sup>1</sup> The lifetime prevalence is conservatively estimated as 2.4%.<sup>2</sup> Benign paroxysmal positional vertigo is however the most successfully treatable cause of vertigo,<sup>3</sup> primarily achieved through particle repositioning maneuvers. Given the peak onset of this condition, the overlap between BPPV and falls in the elderly cannot be underestimated.<sup>4,5</sup> Despite this, current National Institute for Health and Care Excellence (NICE) guidelines seem to have only limited mention of the assessment and treatment of BPPV in falls guidance.<sup>6</sup> Falls are the leading cause of disability and the leading cause of death from injury among people over 75 in the UK, and they are estimated to cost the NHS around 2.3 billion per year.<sup>7</sup> We therefore assessed the effect of BPPV treatment on falls in an elderly population.

## Methods

We retrospectively reviewed one unit's experience of BPPV management over an 8-year period, from June 2008 to June 2016. We specifically assessed patients who were referred for the primary reason of falls and were aged between 65 and 95 years. Patients who attended Sunderland Royal Hospital, Sunderland, UK, multidisciplinary balance unit were evaluated. Patient falls outcome data were collected at presentation and at 6-month clinic follow-up after treatment. The frequency of falls in 6 months prior to their visit was documented.

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**Table 1.** Incidence of Falls Pre and Post Benign Paroxysmal Positional Vertigo Intervention.

Before the Intervention		After the Intervention	
No. of Falls	No. of Patients	No. of Falls	No. of Patients
0	0	0	5
1	6	1	1
2	4	0	3
		1	1
3	14	1	12
		2	1
		3	1
4	8	0	2
		2	5
		4	1
5	8	1	3
		2	5

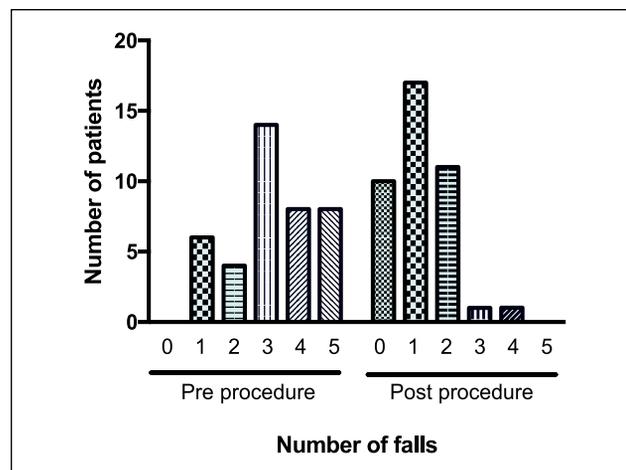
**Statistical Analysis**

Categorical variables were expressed as percentages and frequencies. Categorical data were compared using a chi-square test. The total number of falls pre to post intervention was compared using a Wilcoxon signed-rank test. The adopted level of statistical significance was  $P < .05$ .

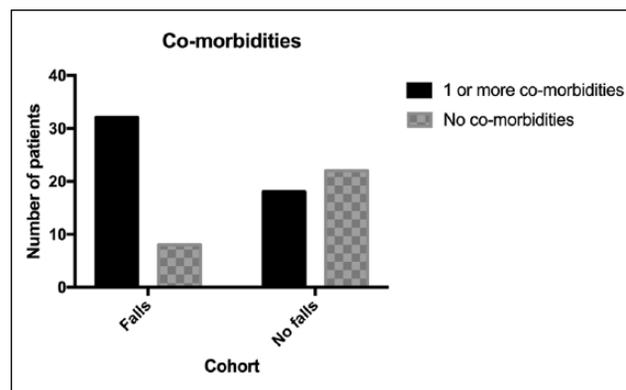
**Results**

We identified 873 patients within the study period who were diagnosed with BPPV through clinical history and examination, including positive Dix Hallpike test. Patient age group ranged from 18 to 95 years. The female:male ratio was 2:1. We identified 40 patients (4.6% of total) who were primarily referred for falls and were over 65 years of age. Of these, 27 were women, and 13 were men (female:male ratio 2:1). All but 2 patients underwent Epley canalith repositioning treatment (CRT). One patient was reluctant and therefore was given Brandt Daroff exercises; another patient had reverse Epley CRT for an anterior canal BPPV. Interestingly, 12 of 40 patients (30%) had no perceived sensation of vertigo even on Dix Hallpike testing but developed nystagmus. A repeat Dix Hallpike test was performed in all the patients who underwent CRT, and if it was positive, further CRT was performed until the test became negative. Only 3 patients needed more than 2 CRT.

At 6-month follow-up, 38 of 40 patients had a reduction in falls incidence after the intervention. There were 2 patients who had no change in the frequency of their falls. A repeat Dix Hallpike positional test was negative with no perception of vertigo and no nystagmus. Overall, the number of patients who fell (at least once) pre to post procedure was significantly reduced, from 40 to 30 ( $P = .0007$ ) (see Table 1 and Figure 1). In addition, the total number of falls



**Figure 1.** Incidence of falls pre and post benign paroxysmal positional vertigo intervention.



**Figure 2.** Comorbidities data on falls and no falls in benign paroxysmal positional vertigo patients.

in the cohort reduced significantly ( $P < .0001$ ) from 128 to 46 falls (64% reduction).

Assessing associated comorbidities that may contribute to falls, 32 of 40 patients (80%) had at least 1 comorbidity. Sixteen of 40 (40%) had postural hypotension, 22 of 40 (55%) had documented small vessel arteriosclerotic disease on previous MRI scan, and 7 of 40 had cognitive impairment. Fourteen of 40 (35%) had muscle weakness mainly affecting their limbs. Twenty-four of 40 (60%) suffered with arthritis affecting predominantly their lower limb joints, and 6 of these patients had undergone joint replacement surgery. Visual impairment existed in 23 of 40, ranging from refractive errors, cataracts, diabetes, glaucoma, macular degeneration, and visual field loss. To identify if these comorbidities were also contributing to the falls, in a cumulative effect with BPPV, we identified an age- and sex-matched cohort of patients with BPPV without any falls history. This group had significantly more comorbidities ( $P = .0024$ , Figure 2).

## Discussion

Elderly patients referred primarily for falls make up a significant proportion of the patients with BPPV seen in our practice. We demonstrated that a significant reduction in falls can be achieved through the performance of CRT. It has been estimated that 9% of elderly patients undergoing complex geriatric assessment for non-balance related complaints have unrecognized BPPV.<sup>5</sup> When individuals are symptomatic, BPPV has been found to be present in 40% of geriatric patients seen for dizziness, with an overall general prevalence of 3.4% in >60 age group.<sup>2,8</sup> Falls are the sixth cause of death for the over 65 aged individuals and account for 70% of accidental death in individuals over 75.<sup>9</sup>

This study is limited by the relatively small sample size and potential recall bias but clearly demonstrates an impact of CRT on elderly patient falls in those with ENT clinician-diagnosed BPPV. Despite the higher proportion of comorbidities in the falls cohort, we were still able to achieve a significant reduction in the number of falls with our BPPV intervention. We would hypothesize that in an already high-risk falls cohort, the additional impact of BPPV on balance is sufficient to result in falls, therefore further emphasizing the importance BPPV identification and management in the elderly population.

It has been suggested previously that 13% of patients in a falls clinic had a diagnosis of BPPV.<sup>10</sup> A study conducted in 2014 by physicians working in geriatric medicine concluded that patients admitted with falls, in the absence of acute medical illness, could benefit from assessment for BPPV.<sup>11</sup> A recent randomized controlled trial comparing vestibular rehabilitation therapy and canalith repositioning maneuver (CRM) to canalith repositioning maneuver alone demonstrates that CRM alone is effective to ameliorate vertiginous symptoms and potentially improve quality of life in the elderly.<sup>12</sup> Ganança and colleagues<sup>9</sup> have demonstrated that in elderly patients with BPPV, the number of falls reduces after the particle repositioning maneuvers.

Clinicians must consider that CRT may have to be modified in elderly patients to account for their frailty and arthritis in the neck.<sup>13</sup> This may further limit the desire of nonspecialists performing this procedure. A study from Norwich, UK, in 2005 calculated the mean latency between initial presentation to primary care with BPPV to successful treatment was 92 weeks.<sup>3</sup> Furthermore, among the 40 patients that were in our falls group, 30% of patients had no sensation of vertigo even on positional testing. Therefore, greater awareness and screening for BPPV in the elderly with falls and faster initiation of treatment may prevent devastating falls in older people of our communities.<sup>4,6</sup>

## Conclusion

Canalith repositioning treatments in elderly patients presenting with falls and evidence of BPPV can have a significant impact on reducing the number of falls. Greater awareness of BPPV as a cause of falls would be beneficial in allowing prompt and effective treatment.

## Authors' Note

How were patients included in the publication of this article? Two patients who underwent Epley canalith repositioning treatment critically reviewed this manuscript and provided helpful suggestions. They firmly endorsed individualized strategies over rigid pathways in management of their vertiginous symptoms. A patient contributor also recommended further research on effectiveness of a structured positional vertigo treatment clinic in the primary care with early involvement of general practitioner, physiotherapist, and audiologist and complex cases to be referred into secondary/tertiary care.

## Declaration of Conflicting Interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

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