ORIGINAL ARTICLE

Comparison of Postural Restriction with Cervical Soft Collar, Canalith Repositioning Procedure and Observation in the Initial Management of Benign Paroxysmal Positional Vertigo: A Randomized Control Trial

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Background: Benign paroxysmal positional vertigo (BPPV) is a prevalent vestibular disorder often triggered by head position changes. While the canalith repositioning procedure (CRP) is a standard initial treatment, it has contraindications and potential complications. The present study investigated whether postural restriction with a cervical soft collar can serve as an equally effective initial management strategy for BPPV.

Objective: To compare the effects of postural restriction with a cervical soft collar against CRP and observation in patients with BPPV.

Materials and Methods: Seventy-five patients with a positive Dix-Hallpike test (DHT) were enrolled and randomly assigned to three groups, postural restriction with cervical soft collar, CRP, and observation. DHT results and Dizziness Handicap Inventory (DHI) scores were recorded. The presence of vertigo during CRP was assessed. Follow-ups were conducted in the first and second week.

Results: The conversion rates from a positive to a negative DHT for the postural restriction group in the first and second week were 88% and 100%, and did not show statistically significant differences compared to the CRP group at 68% and 96%, but were significantly different from the observation group at 56% and 88% (p=0.0117 and 0.0184). DHI scores were similar between the soft collar and observation groups in the second week. Complications from CRP were noted in 12% of cases, with no complications reported in the other groups.

Conclusion: Postural restriction with cervical soft collar may serve as an effective initial treatment for BPPV, comparable to CRP, without associated complications, and more effective than observation.

Keywords: Benign paroxysmal positional vertigo (BPPV); Cervical soft collar; Canalith repositioning procedure (CRP); Modified Epley's maneuver; Dix-Hallpike test (DHT); Dizziness Handicap Inventory (DHI)

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Benign paroxysmal positional vertigo (BPPV) is a common vestibular disorder seen in primary care and otolaryngology[1,2]. BPPV is usually triggered by changes in the head's position due to moving of otoliths into the semicircular canal, The clinical symptoms of vertigo last less than one minute, are provoked by positional changes, and has a nystagmus in the direction of the affected canal[3]. Dix-Hallpike test (DHT) is the gold standard test for diagnosis of posterior canal BPPV that is the most common type of BPPV[4].

Although the canalith repositioning procedure (CRP) is considered initial management, it has complications. It is a transient provocation of symptoms of vertigo and severe vomiting by the procedure and has risk for falls due to imbalance after the procedure[5-7]. Therefore, patients may develop complications after CRP. Furthermore, there are contraindications for patients with cervical stenosis, Down's syndrome, severe rheumatoid arthritis, cervical radiculopathies, Paget's disease, morbid obesity, ankylosing spondylitis, low back dysfunction, retinal detachment, carotid stenosis, and spinal cord injuries. Observation with postural restriction is one of treatment options for BPPV patients who have contraindication for CRP. However, the symptoms resolve in 15% to 85% at one

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Table 1. Baseline clinical characteristics of each group and comparative analysis

Characteristics	Collar (n=25)	CRP (n=25)	Observe (n=25)	p-value
Age (years); mean±SD	51.28±16.16	48.92±14.22	50.00±12.37	0.844[a]
Sex; n (%)				0.499[b]
Male	7 (28.0)	11 (44.0)	9 (36.0)	
Female	18 (72.0)	14 (56.0)	16 (64.0)	
Affected site; n (%)				0.683[b]
Right	13 (52.0)	14 (56.0)	16 (64.0)	
Left	12 (48.0)	11 (44.0)	9 (36.0)	
Duration of vertigo (days); median (IQR)	3 (2 to 7)	2 (2 to 5)	3 (1 to 4)	0.967[c]

CRP=canalith repositioning procedure; SD=standard deviation; IQR=interquartile range
(a) One-way ANOVA, (b) Chi-square test, (c) Kruskal-Wallis test

month[3]. Although observation has less intervention and is more appropriate for incorporating patients, it takes a long time for the suffering patients. In addition, it is difficult to restrict the position of the head. Postural restriction with cervical soft collar may be the initial management for decreasing duration of the vertigo symptoms. When compared with treatment by CRP, it may be equally effective, and suffering may be reduced.

Materials and Methods

The present study was approved by the Ethics Committee of Burapha University on November 9, 2023 (IRB1-109/2023) and registered at the Thai Clinical Trials Registry, TCTR20240326001.

Sample size was calculated by the comparison of two independent population success rates. The success rate of the experimental group was 68.4 [9] and 100 [10]. The number of samples per group was 21. When calculating a dropout rate of 20%, the number of samples per group was 25.

The present study included 75 patients with unilateral positive DHT and had a randomized controlled study design. The patients enrolled in the study between November 2023 and July 2024. All participants were randomly assigned to three groups using a computer program, one group with postural restriction with cervical soft collar, one group with CRP, or modified Epley maneuver, and the third group as observation. DHT and Dizziness Handicap Inventory (DHI)[8] were recorded. The presence of a vertigo during CRP was assessed. All participants received betahistine at 12 milligram, three times daily and follow-up in the first and second week. However, Patients who still had positive DHT or symptoms of vertigo received follow-up in the third and fourth week until recovery.

Statistical analysis was performed using Stata, version 14.1 (StataCorp LP, College Station, TX, USA) and data on characteristics were compared by using a one-way ANOVA, chi-square and Kruskal-Wallis test. The chi-square test was used to assess the statistical significance between the three groups. Kruskal-Wallis test, Mann-Whitney U test, and Friedman test were applied to analyze categorical variables. The level of statistical significance was p-value of less than 0.05.

Results

The demographics of the patients are summarized in Table 1, which showed no significant difference between the three groups.

The effectiveness of treatment in each group performed by the conversion from a positive to a negative DHT. The patients in postural restriction with cervical soft collar group had success rates of 88% and 100%, respectively in the first and second week, and showed no statistically significant differences compared to the CRP group, which was 68% and 96%, respectively. However, it showed statistically significant differences compared to the observation group, which was 56% and 88%, respectively (p=0.0117 and 0.0184, respectively). Furthermore, patients in the observation group took longer to recover than other groups. Patients took up to four weeks to improve their symptoms (Table 2).

DHI scores had comparable results between soft collar and observation groups in the second week. Patients in the observation group took longer to recover than other groups (Table 3). In addition, complications from CRP were found at 12%, with three patients, which were not found in other groups.

Discussion

There is substantial evidence supporting the

Table 2. Results of Dix-Hallpike test of each group

Dix-Hallpike test	Collar (n=25)	CRP (n=25)	Observe (n=25)	p-value
Day 0; n (%)	25 (100.0)	25 (100.0)	25 (100.0)	1.000[a]
Week 1; n (%)	3 (12.0)[c]	8 (32.0)[c]	11 (44.0)[c]	0.043[a]
Week 2; n (%)	0 (0.0)[d]	1 (4.0)[d]	5 (20.0)[d]	0.022[a]
Week 3; n (%)	-	0 (0.0) (n=1)	2 (33.3) (n=6)	0.128[a]
Week 4; n (%)	-	-	0 (0.0) (n=2)	-
p-value within group	0.0000027[b]	0.000037b	0.00018[b]	

CRP=canalith repositioning procedure

(a) Chi-square test; (b) McNemar's chi-square test between day 0 and week 1; (c) Pairwise comparison: week 1: Collar vs. CRP (p=0.0878), Collar vs. Observe (p=0.0117); (d) Pairwise comparison: week 2: Collar vs. CRP (p=0.3124), Collar vs. Observe (p=0.0184)

Table 3. Scores of Dizziness Handicap Inventory (DHI) of each group

DHI scores	Collar (n=25)	CRP (n=25)	Observe (n=25)	p-value
Day 0; median (IQR)	56 (48 to 71)	62 (40 to 72)	60 (48 to 68)	0.9849[a]
Week 1; median (IQR)	20 (6 to 46)[d]	20 (0 to 32)[d]	36 (12 to 46)[d]	0.2962[a]
Week 2; median (IQR)	0 (0 to 2)[e]	0 (0 to 12)[e]	2 (0 to 18)[e]	0.0851[a]
Week 3; median (IQR)	-	12 (n=1)	6 (0 to 14) (n=6)	0.8026[b]
Week 4; median (IQR)	-	-	0 (22) (n=2)	-
p-value within group	<0.0001[c]	<0.0001[c]	<0.0001[c]	

IQR=interquartile range

(a) Kruskal-Wallis test; (b) Mann-Whitney U test; (c) Friedman test; (d) Pairwise comparison: week 1: Collar vs. CRP (p=0.7534), Collar vs. Observe (p=0.2422), (e) Pairwise comparison: week 2: Collar vs. CRP (p=0.1037), Collar vs. Observe (p=0.0136)

efficacy of positional restriction with a soft cervical collar following the modified Epley's maneuver in treating posterior canal BPPV. While both positional restriction and CRP demonstrate similar effectiveness in resolving vertigo symptoms, positional restriction is associated with fewer adverse effects like nausea and vomiting[9,10]. Observation without intervention may lead to prolonged recovery times.

The present study compared three treatment modalities, CRP, positional restriction with a soft collar, and observation. No previous studies have directly compared these three approaches. The authors found that patients who underwent CRP frequently experienced vomiting, while observation resulted in extended recovery periods. For patients with contraindications to CRP, positional restriction with a soft collar may offer a more effective alternative to observation or medication alone.

The present study results indicated statistically significant differences in DHI scores between the positional restriction and observation groups in the second week (p=0.0136). However, in the first week, no significant difference was observed due to low median scores in both groups.

The soft collar group experienced no serious adverse events, and patients found it comfortable to wear during activities or at work.

The limitations of the present study include a small sample size and single-center design. A multicenter study with a larger sample size could provide more robust evidence. Future studies should also investigate the effectiveness of positional restriction for distinct types of BPPV such as lateral and anterior canals, and its impact on recurrence rates. The short follow-up of four weeks limits assessment of long-term outcomes like recurrence.

Conclusion

The present study findings suggest that positional restriction with a soft cervical collar is as effective as CRP in treating posterior canal BPPV and may be considered as an initial treatment option due to its lower risk of adverse effects. Moreover, it is more effective than observation alone in terms of recovery time.

What is already known about this topic?

CRP is the standard initial treatment for BPPV. CRP can cause adverse effects such as vertigo, severe vomiting, and increased fall risk.

What does this study add?

Positional restriction with a soft cervical collar is a safe and effective alternative to CRP for posterior

canal BPPV. This approach may lead to faster recovery times compared to observation alone.

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Conflicts of interest

The authors declare that there is no conflict of interest regarding the publication of this paper.

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