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Original Research Article

Comparing the efficacy of repositioning manoeuvres over medications in the treatment of posterior and lateral canal benign paroxysmal positional vertigo: a prospective, randomized and comparative study

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ABSTRACT

Background: Benign paroxysmal positional vertigo (BPPV) is a benign peripheral disorder of vestibular system and is the most common cause of peripheral vertigo. The aim of our study was to compare and assess the efficacy of Epley's and Barbeque roll over manoeuvres with labyrinthine sedatives in the management of Benign Paroxysmal Positional Vertigo (BPPV) over a period of one month and to know the prevalence of BPPV in different age and gender groups among the two semicircular canals(posterior and lateral).
Methods-This prospective randomized comparative clinical trial included 60 patients with clinically diagnosed BPPV in a tertiary care centre and were investigated for a period on one year. The clinical diagnosis of specific canal type of BPPV was assessed based on the diagnostic tests, Dix Hallpike test and McClure test. In manoeuvre group, posterior canal BPPV, Epley's manoeuvre was performed and for lateral canal BPPV, Barbeque roll over manoeuvre was performed as treatment. In pharmacological group, labyrinthine sedatives i.e. either cinnarizine 25mg twice a day or betahistine 16 mg twice a day were administered for one month as treatment.
Results: Results were assessed at the end of 48 hours (immediate time period) and at four weeks' time period after the treatment, under three different outcome categories namely disappeared, improving and unchanged. Treatment of Benign Paroxysmal Positional Vertigo with repositioning manoeuvre had higher success percentage of 83.3% than the medical treatment.
Conclusion: The treatment of BPPV with repostioning manoeuvres had a better outcome than the medical treatment.

Keywords: Epley's manoeuvre, Barbeque roll over manoeuvre, Dix hallpike test, McClure test, Betahistine, Cinnarizine

INTRODUCTION

Benign paroxysmal positional vertigo (BPPV) is the most common origin of vertigo and is idiopathic in nature in 50-70% of the cases.[1-5] It contributes to 20–30% of diagnoses in specialized dizziness clinics and more than one million cases are reported annually in India.[6] BPPV is thought to be caused by debris of calcium carbonate crystals, which break off from the lining of the channels in inner ear and get into one of the ear's fluid-filled canals. Classic BPPV involves the posterior semi-circular canal and represents the most common type of BPPV.[7] BPPV originating from stimulation of the lateral semi-circular canal is the second most common type whereas the one arising from superior semi-circular canal does not occur frequently.[8] Earlier, BPPV was treated only with

vestibular suppressants such as anticholinergics, antihistamines, and benzodiazepines.[9-14]

Calcium channel blockers, such as flunarizine and cinnarizine have also been used as anti-vertiginous agents.[15] Betahistine effects occur through H2 agonism or H3 antagonism and its said to increase the circulation of inner ear.[16]

BPPV can now be treated either by medication or manoeuvres. The aim of the study was to assess the efficacy of Epley's and Barbeque roll over manoeuvres in comparison with labyrinthine sedatives in BPPV over a period of one month and to know the regional prevalence of BPPV in different age and gender groups in various canals.

METHODS

The study was a prospective, randomized, comparative study conducted at ENT Outpatient department of Apollo main hospital, Greamsroad, Chennai for a time period of 1 year from December 2016 to November 2017 and the study population consisted of 60 patients above 18 years with clinically diagnosed BPPV.

Institute Ethics Committee's approval was obtained. Informed consent was taken from all the patients who participated in the study. Inclusion Criteria includes all the adult patients above 18 years with clinically diagnosed BPPV and patients who have not received previous medical treatment for BPPV. Patients with conditions where repositioning manoeuvre cannot be carried out, anterior canal BPPV and history of previous medical treatment for BPPV were excluded from the study.

Sample size calculation has been derived using statistical software G power 3.1.9.2. The formula used for evaluation of sample size is $n=(Z\alpha/2+Z\beta)2\times(P1(1-P)+P2(1-P2))/(P1-P2)2$ (Where, $Z\alpha/2$ is standard normal variate (level of significance) =1.96, $Z\beta$ is standard normal variate (power of 80%)=1.28, P1=0.94, P2=0.58). Total sample size of 60 patients were derived.

The diagnosis of specific canal (posterior/lateral) type of BPPV was assessed based on the diagnostic tests: Dix Hallpike test and McClure test.

After obtaining the specific diagnosis, the proforma containing patient's details was filled which included a 5-point questionnaire adapted from dizziness handicap inventory (DHI) and is a useful tool for assessing the impairment in the quality of life of a patient with dizziness.

Out of 25 questions in the DHI, only physical factor associated questions were selected and a 5-point questionnaire was formulated which is shown in Table 1.[17] This questionnaire was filled at the time of diagnosis and baseline scores were recorded.

Table 1: Adapted DHI questionnaire score.

Adapted DHI score	
Points if "yes"	**Questionnaire**
1	Does looking up increase vertigo symptoms?
1	Do you have difficulty getting in or out of bed due to vertigo symptoms?
1	Do quick movements of your head increase your symptoms?
1	Do you have giddiness while lying down?
1	Does bending over increase your vertigo symptoms?

Randomization was done by the computer-generated random numbers. A total of 60 patients were recruited with 30 in each group. Randomization was done using a random number generated by the computer, 30 different random allocation sequences (Group A and B) were generated for two treatments, sequentially numbered opaque sealed envelopes were used to accommodate these numbers.

The envelopes were opened sequentially only after the participants name was written on the appropriate envelop, in that way 60 samples were recruited. In group A, respective manoeuvre i.e., Epley's manoeuvre for Posterior canal BPPV and Barbeque roll over manoeuvre for lateral canal BPPV was performed.

After performing therapeutic manoeuvre, patients were instructed about the postural care for 48 hours which included sleeping with supine and elevated head posture with soft cervical collar to prevent sudden neck movements, not lying on the side of disease, sleeping all night with the healthy ear down (horizontal canal).[18]

In group B, labyrinthine sedatives (cinnarizine 25 mg twice a day or betahistine 16 mg twice a day) were administered for one month.

All the sixty patients were followed via phone call at the end of 2nd day- post intervention (48 hours after manoeuvre/medication) and at the end of 4th week - post intervention (30 days after manoeuvre/30 days of medication).

The 5 point DHI questionnaire was filled again at 48 hours post treatment and 4th week over phone and respective points were recorded. By comparing these questionnaire scores at immediate and fourth week period to the same patient's baseline score, three types of outcomes were derived.

This triple outcome categorization was obtained from a modified Epley's classification of post Manoeuvre follow up (Table 2) and the following conclusions were arrived at, disappeared: all vertigo symptoms disappeared.[19] Improving: vertigo symptoms improved significantly but persisted to some extent. Unchanged: No effect on BPPV symptoms.

Table 2: Modified Epley's categorization.

Modified epley's category	Corresponding DHI score
Disappeared	0 (complete resolution of symptoms from baseline score)
Improving	1-5 (reduction of symptoms from baseline to immediate or fourth week score)
Unchanged	1-5 (no reduction of symptoms from baseline score/increase from baseline score to immediate or fourth week score)

Statistical analysis was accomplished with the help of statistical software, SPSS version 25.0. Continuous variables were represented as Mean±SD and were analysed by independent sample 't' test. Categorical variables were expressed as percentage comparison and were analysed by either Chi square test or Fisher's exact test. P value<0.05 was considered as statistically significant.

RESULTS

In our study, majority of the patients with BPPV were from the 41 to 50 years age group (25%) followed by patients in the age group of 51 years and above 60 years with an equal frequency distribution of 23.33%. In our study, there were 38 male patients (63.3%) and 22 female patients (36.7%) out of 60 patients. The aetiologic correlation of BPPV patients revealed that idiopathic BPPV was highly prevalent among the population followed by hypertension.

Right posterior canal BPPV was observed in 28 (46.7%) patients and left posterior canal BPPV was observed in 28 (46.7%) patients. Similarly, 3 (5%) patients showed right lateral canal BPPV and 1 (1.7%) patient was found to have left lateral canal BPPV. For the three patients who were diagnosed with lateral canal BPPV and treated with Barbeque manoeuvre, the success rate was 100%. The treatment outcomes were analysed in two time periods 1. Immediately (48 hours) 2. one month (4 weeks) after the treatment.

Immediate period outcome

At the end of 48 hours, scores based on patients response were analysed for "disappeared", "Improving" and "Unchanged" categories. Out of the 30 patients who underwent manoeuvre treatment, 19 patients (90.5%) showed immediate relief from BPPV. As a contrast, only 2 out of 30 patients (9.5%) who took medications were alleviated of the BPPV symptoms within the same period of comparison. In conclusion, a higher percentage of manoeuvre group of patients fell under 'immediate disappeared' category than the medicated group.

Under the 'immediate improvement' category, only 10 patients (65.5%) in the manoeuvre group showed signs of improvement out of their BPPV symptoms, whereas 19 patients (34.5%) in the medication group were improving from BPPV symptoms. Therefore, medical management group of patients showed a higher percentage of 'immediate improvement'. Total number of patients who fall under the 'immediate unchanged' category were 10 among which 9 patients were from medication group and only one patient was from the manoeuvre group. Hence, the percentage of 'immediate unchanged' category was much lower for the maneuver group (10%) compared to the medication group (90%).

Data analysis of BPPV patients comparing the outcome of manoeuvre and medical management treatment modalities during the immediate (2nd day) period is shown in Table 3.

4 weeks period outcome

Consolidated number of 'disappeared' responses from the two groups of treatment are 39 among which the percentage of patients with 'disappeared' responses was 64.1% for the manoeuvred group and that of the medically managed group was only 35.9%. Effectively, manoeuvre group had 25.2 % higher chances of BPPV symptoms disappearance during the fourth week treatment outcome period.

While comparing the "improving" category outcome between the groups, data revealed that 5 patients (16.7%) from the medical management group were improving from their BPPV symptoms. Interestingly, no patient (0%) in the manoeuvre group qualified for improving status during the fourth week treatment outcome period.

During the fourth week treatment outcome period, the total number of 16 patients showed no changes. The percentage of "unchanged" category in manoeuvre group turned out to be 31.3 and for the medication group it was 68.8. The data supports the fact that manoeuvre group had 37.5 % less chances of BPPV symptoms unchanged.

Chi-square test of the consolidated data showed was a highly significant difference between the manoeuvre and the medical management groups amongst the fourth week treatment outcome variables (disappeared, improving and unchanged), with a p value of 0.006. Table 4 shows the consolidated data during the fourth week.

Table 3: comparison of outcome of manoeuvre and medical management treatment modalities during the immediate period (48 hours).

			Treatment outcome (immediate)			Total
			Disappeared	Improving	Unchanged	
Group	Manoeuvre	Count	19	10	1	30
		% within group	63.3	33.3	3.3	100.0
		% within treatment outcome (immediate)	90.5	34.5	10.0	50.0
	Medical management	count	2	19	9	30
		% within group	6.7	63.3	30.0	100.0
		% within treatment outcome (immediate)	9.5	65.5	90.0	50.0
Total		count	21	29	10	60
		% within group	35.0	48.3	16.7	100.0
		% within treatment outcome (immediate)	100.0	100.0	100.0	100.0

Table 4: Comparison of outcome of manoeuvre and medical management treatment modalities during the fourth week.

			Treatment outcome (4 weeks)			Total
			Disappeared	Improving	Unchanged	
Group	Manoeuvre	Count	25	0	5	30
		% within group	83.3	0.0	16.7	100.0
		% within treatment outcome (4 weeks)	64.1	0.0	31.3	50.0%
	Medical management	Count	14	5	11	30
		% within group	46.7	16.7	36.7	100.0
		% within treatment outcome (4 weeks)	35.9	100.0	68.8	50.0%
Total		Count	39	5	16	60
		% within group	65.0	8.3	26.7	100.0
		% within treatment outcome (4 weeks)	100.0	100.0	100.0	100.0

DISCUSSION

BPPV causes significant morbidity as it affects the quality of life of vertigo patients. Hence, the present study was undertaken to evaluate the efficacy of positioning manoeuvres in comparison with labyrinthine sedatives in the management of BPPV. During the immediate period, 63.3% of patients who belonged to manoeuvre group were alleviated from BPPV symptoms. But during the fourth week period, 83.3% of patients presented with resolution of symptoms from the same manoeuvre group. The apparent increase in the percentage of success between immediate and fourth week period in manoeuvre group can be attributed to compliance of the patient to the lifestyle modifications as advised and the spontaneous resolution of the pathology in BPPV.[19] Even though there was apparent increase in the percentage of disappearance of BPPV symptoms between immediate and fourth week period in manoeuvre group, all the 19 patients of the manoeuvre group in the 'disappeared' category remained without BPPV symptoms till the fourth week time period denoting zero percentage of recurrence. Out of 10 patients who were 'improving' out of BPPV symptoms during the immediate period, 6 patients (60%) were fully relieved of BPPV symptoms during the fourth week period in the manoeuvre group and 4 patients (40%) unfortunately had their BPPV symptoms worsened and fell in to "unchanged" category. There was no representation in the improving category of the fourth week period in the manoeuvre group.

In the immediate period of unchanged category, only one patient in the manoeuvre group didn't respond to repositioning manoeuvre and the same patient didn't improve nor had his BPPV symptoms disappeared. The patient continued to be in the unchanged category in the fourth week time period too. The most probable cause is due to displacement of otolith particles into other semicircular canals and due to the non-compliance of the instructions given to the patients. Especially, the patient failed to wear neck collar for 48 hours following manoeuvre.

Results from the present study are fully inclusive in nature with respect to the patients unlike the previous studies.[20] The patients responded better when they were treated with Epley's Manoeuvre with less relapse and recurrence. The efficacy of the treatment was assessed using: conversion of positive to negative Dix Hallpike test and DHI score for vertigo as observed in other studies.[21-23] Medication group cure rate was 46.7% in the present study which is lower than the manoeuvre group and this was supported by earlier studies.[24,25]

Among various manoeuvres and other techniques, Epley's technique was found to be the most successful in treating posterior canal BPPV and the present study confirms the previous observations.[7,26-28] Right labyrinth involvement in BPPV was more frequent relative to left labyrinth in our study which is in accordance with the previous studies8. A previous study on the use of cervical collar in the resolution of patient symptoms after the manoeuvres indicated the absence of any positive improvement.[29] A correlation of age with respect to the incidence of BPPV in this study revealed a mean value of 50.4 years.[7]

According to literature, order of frequency of the known causes of BPPV include head trauma, middle ear infection, viral labyrinthitis, ear surgery and most of the occurrences have no clear precipitating events30. The present study found association to BPPV in the following order of frequency:idiopathic>metabolic cause>ear surgery > middle ear infection>head trauma.

The limitations of the present study has relatively small sample size and short duration of study. No objective diagnostic scoring was done during the follow up period. Hence, in future study objective as well as subjective assessment can be considered.

CONCLUSION

The repositioning manoeuvre are very effective in treating patients with BPPV and had a higher success percentage of 83.3% than the medical treatment and was mostly idiopathic in aetiology. BPPV was found to be more prevalent in male patients in the fourth to fifth decade and was primarily associated with posterior semi-circular canal than lateral canal BPPV. Relatively, right labyrinth was found to be more pathogenic than the left. Repostioning Manoeuvres are better in reducing the symptoms as well as complete disappearance of symptoms of BPPV with less recurrence rate on comparing the effects of medications. Though it is a known fact that manoeuvre gives a better results modern day busy practitioners prefer to use medications as it is less time consuming and needs less follow up and not preferring manoeuvre due to poor compliance of the patients with the post manoeuvre instructions hence it is advisable to use soft cervical collar post manoeuvre to have a good compliance of patients.

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