



## EFFECTIVENESS OF POSITIONAL MANEUVERS IN MANAGEMENT OF POSTERIOR CANAL BENIGN POSITIONAL PAROXYSMAL VERTIGO- A CONTROLLED TRIAL

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### ABSTRACT

**BACKGROUND:** Vertigo is defined as an illusion of motion caused by a mismatch of information from the visual, vestibular and proprioceptive systems. Vertigo is divided into central and peripheral types. Central vertigo is generally more serious, whereas peripheral vertigo is usually benign.

**MATERIALS & METHODS:** The sample size of 101 patients was taken. Patients aged 18 years and older with diagnosed of posterior canal BPPV undergoing Epley's or Semont's maneuver based on positive Dix-Hallpike test who gave consent to take part in the study were included in it. Patients with previous or current diagnoses of labyrinthine diseases, pregnancy, systemic diseases were excluded from the study

**RESULTS :** Maximum patients (31%) belonged to 51 to 60-year age group 95% patients in Epley's group and 94% patients in Semont's group were Dix- Hallpike test negative at the end of 3rd month. Thus, there was no statistically significant difference between the two groups based on Dix-Hallpike test positivity following either maneuvers as P-value =0.675.

**CONCLUSION:** Both Epley's and Semont's maneuvers are highly efficacious treatment methods for PC-BPPV which is indicated by the fact that at the end of the study there was no statistically significant difference between the efficacy of these two maneuvers.

**KEYWORDS :** Vertigo, Positional Maneuvers, BPPV

### INTRODUCTION

Vertigo is defined as an illusion of motion caused by a mismatch of information from the visual, vestibular and proprioceptive systems. Vertigo is divided into central and peripheral types. Central vertigo is generally more serious, whereas peripheral vertigo is usually benign.<sup>1</sup> The three most common causes of peripheral vertigo are: acute peripheral vestibulopathy (vestibular neuritis and labyrinthitis), Meniere's disease and Benign Paroxysmal Positional Vertigo (BPPV), the latter being the most frequent.<sup>2</sup> In the general population, the lifetime prevalence of BPPV is 2.4%, and the 1-year incidence is 0.6% although this may be an underestimate as many patients with this condition do not come to medical attention.<sup>3</sup> Most cases of BPPV are self-limiting.<sup>4</sup> Studies have shown that canal repositioning procedures remain an efficient and long lasting noninvasive treatment of BPPV.<sup>5</sup> However some controversy exists as to whether these maneuvers actually have an effect on BPPV other than central habituation. Moreover resistant cases and variants of the disease remain a significant problem.<sup>6</sup> Benign paroxysmal positional vertigo can affect the quality of life of elderly patients and is associated with reduced activities of daily living, episodes of falls, and depression.<sup>4</sup> Patients with BPPV experience delays in diagnosis and treatment, and they frequently are inappropriately treated with vestibular suppressant medications.<sup>5</sup> Patients with BPPV usually present with a characteristic history of brief recurrent episodes of vertigo that occur following certain changes in head position with respect to gravity. Nystagmus usually accompanies the symptoms of BPPV.

BPPV occurs as a result of displaced otoconia (otoliths), normally attached to the otolithic membrane in the utricle. Because of trauma, infection, aging, and even without any known cause, otoliths can detach from the utricle and collect within the semicircular canals.<sup>3,6</sup> Head movements cause movement of these detached otoliths within the canals which inappropriately trigger the receptors in the semicircular canals and send false signals to the brain, causing vertigo and nystagmus. Majority of patients have posterior canal BPPV, while about 15 percent have the lateral canal

variant.<sup>6</sup> The anterior (superior) canal variant is rare.<sup>7</sup> The characteristic clinical sign of BPPV is nystagmus following a Dix-Hallpike maneuver.<sup>8</sup> Medical history, physical examination and Dix-Hallpike test is extensively used in the diagnosis. The result is positive if the patient develops symptoms (vertigo) and nystagmus. Various techniques in the treatment of BPPV have been put forth, beginning with the Liberatory maneuver by Semont, Freyss and Vitte in 1988, and followed by the Canalith Repositioning by Epley.<sup>9,10</sup> Among these treatment modalities, Canalith repositioning procedures (CRPs) are the first-choice treatment for BPPV.

The aim of CRPs is to move the displaced otoliths from the semicircular canal back to the utricle. Out of all the CRPs, the Epley's maneuver has been the most successfully used, and is particularly indicated in the treatment of posterior canal BPPV.<sup>11</sup> The Semont's liberatory maneuver has not been as extensively studied as the Epley maneuver, but the available evidence also supports its effectiveness in treatment of posterior canal BPPV. Numerous observational studies have shown response rates of approximately 50 to 70% after a single application of either Semont's or Epley's procedure and approximately 80 to 90% after repeated trials.<sup>12</sup> There is no high clinical trial comparing the Semont and Epley maneuvers in Kerala. Thus, this study was undertaken to compare the efficacy of Epley's versus Semont's maneuvers.

### METHODOLOGY

This study was conducted in the Department of Otorhinolaryngology, associated with Government Medical College, Srinagar in Jammu & Kashmir for a period of 11 months, from January 2018 to November 2018. The study was approved by the ethical committee of the GMC, Srinagar. The sample size of 101 patients was taken. Patients aged 18 years and older with diagnosed of posterior canal BPPV undergoing Epley's or Semont's maneuver based on positive Dix-Hallpike test who gave consent to take part in the study were included in it. Patients with previous or current diagnoses of labyrinthine diseases, pregnancy, systemic diseases were excluded from the study. Patients were Sequentially selected

into either of the two groups depending on the treatment maneuver they received-Epley's group (received Epley's maneuver) and Semont's group (received Simon's maneuver).

Consecutive sampling was followed for selection of patients after explaining the purpose of study. An informed consent was obtained from them to participate in the study before enrollment. Diagnosis of BPPV was made on the basis of clinical examination and positive Dix-Hallpike test. Diagnostics included history, clinical and audiological examination were conducted to rule out other underlying etiologies. All the patients in the study were found to have a normal ENT and CNS examination, except for a positive Dix-Hallpike test confirming the clinical suspicion of BPPV.A

questionnaire was designed stressing the various applicable issues to vertigo, among which were the nature of vertigo, its relevant symptoms, accompanying complaints, and associated chronic medical illnesses. Patients who were treated with Epley's or Semont's maneuver based on Dix-Hallpike test positivity was observed for the efficacy of treatment modality. Follow up visits were advised at the end of 1 week, 1 month and 3 months after Epley's or Semont's maneuver. Effectiveness of Epley's and Semont's Maneuvers was evaluated on the basis of recurrence of symptoms, improvement in the symptoms and Dix Hallpike test negativity. Outcome variables were: response to the D-H test, patients' report on resolution of vertigo.

We categorized the subjective outcome of patients as 3 categories: Complete resolution, Improvement, and no improvement. The results of the Hallpike test were classified as either positive or negative. Maneuvers were repeated up to 3 times based on Dix-Hallpike test positivity.

**Data analysis**

Data collected from each individual was entered into a Microsoft excel sheet and statistical analysis was done with the help of SPSS v 23. Mean and standard deviation were calculated for quantitative variables. Frequency and percentage were used for qualitative data. Chi-square test was used to compare qualitative variable for assessing the statistical association. A P-value<0.05 was considered as significant.

**RESULTS**

**Age distribution**

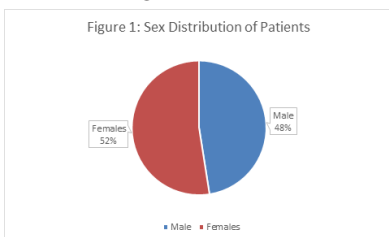
The age of patients in this study was from 18 years to 77 years. Among the 101 patients, there were only 2 (1.9%) patients below 20 years. Mean age was 48 years. Maximum patients (31%) belonged to 51 to 60-year age group. (Table 1).

**Table 1: Age Distribution of the Patients**

Age in years	No of patients	Percentages
18-20	2	1.98019802
21-30	11	10.89108911
31-40	20	19.8019802
41-50	25	24.75247525
51-60	31	30.69306931
61-70	10	9.900990099
71-80	2	1.98019802
Total	101	100

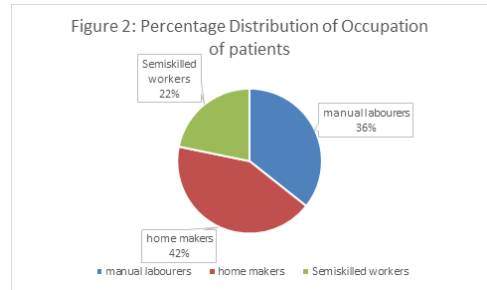
**Sex distribution**

In the present study, out of the 101 patients 53 (52%) were females and 48 (48%) were males (Figure 1).



**Occupation**

Among 101 patients, 71 (35.5%) were manual laborer's, 86 (43%) home makers, and 43 (21.5%) were semiskilled workers (Figure 2).



**Clinical presentation**

Among the 101 patients, 54 patients (53.4%) presented with characteristic positional vertigo. Dizziness was the presenting complaint for 13 patients (12.8%). 11 patients had feeling of imbalance. 26 patients (26.5%) had associated vomiting. 38 patients (39.5%) experienced nausea.

**Involvement of ear**

Patients were diagnosed to have posterior canal BPPV based on Dix-Hallpike test positivity. Among 101 patients, the test was positive for right ear in 57 (56.44%) and for left ear in 37 (36.63) patients. The test was positive on both sides in 7 (6.93%) patients.

**Assessment of efficacy of Epley's and Semont's maneuver**

*Dix Hallpike test*

**a) At the end of first week:**

43 (84%) patients who underwent Epley's maneuver and 41 (82%) patients who underwent Semont's Maneuver showed negative Dix-Hallpike test. 8 (16%) patients in Epley's group and 9 (18%) patients in Semont's group showed Dix-Hallpike test positive. So, there was no statistically significant difference between the two maneuvers regarding efficacy as P-value was 0.756 (>0.05). In total 84 (83.1%) patients had negative Dix-Hallpike test and 17 (16.8%) patients had positive Dix-Hallpike test at the end of 1st week (Table 3).

**Table 3: Dix Hallpike test first week after maneuver**

	Negative	Positive	Row Totals
Epleys	43 42.42 [0.01]	8 8.58 [0.04]	51
Semonts	41 41.58 [0.01]	9 9.42 [0.04]	50
Column Totals	84	17	101 (Grand Total)

Chi square statistic= 0.0966, p value 0.756

**b) At the end of 1<sup>st</sup> month:**

Among 101 patients 89 (88.1%) patients were Dix Hallpike test negative and 12 (11.9%) patients were Dix-Hallpike test positive at the end of 1st month. 92% patients in Epley's group and 84 % patients in Semont's group showed Dix Hallpike test negativity. Here also there was no significant difference between these two maneuvers as P-value=0.20 (Table 4).

**Table 4: Dix Hallpike test first month after maneuver**

	Negative	Positive	Row Totals
Epleys	47 44.94 [0.09]	4 6.06 [0.70]	51
Semonts	42 44.06 [0.10]	8 5.94 [0.71]	50
Column Totals	88	12	101 (Grand Total)

Chi square statistic= 1.60, p value = 0.20

**c) At the end of 3<sup>rd</sup> month:**

95% patients in Epley's group and 94% patients in Semont's group were Dix-Hallpike test negative at the end of 3<sup>rd</sup> month. Thus, there was no statistically significant difference between the two groups based on Dix-Hallpike test positivity following either maneuvers as P-value=0.675 (Table 5).

**Table 5: Dix Hallpike test three month after maneuver**

	negative	post	Row Totals
Epleys	48 47.47 [0.01]	3 3.53 [0.08]	51
Semonts	46 46.53 [0.01]	4 3.47 [0.08]	50

<b>Column Totals</b>	94	7	<b>101 (Grand Total)</b>
Chi square statistic= 0.175, p value =0.675			

*Improvement of vertigo and associated symptoms*

Out of the 51 patients in Epley's group 83% patients had complete resolution of symptoms on follow up at 1<sup>st</sup> week whereas 94% patients became free from vertigo on follow up at 1<sup>st</sup> month. After 3 months 95% patients out of 51 were free from vertigo. Symptomatic improvement was there for the remaining 5 patients also.

Out of 50 patients in Semont's group, 74% had complete resolution of vertigo by 1st week whereas 89% patients became free from vertigo on follow up at 1<sup>st</sup> month. After 3 month a total of 47 patients out of 50 were free from vertigo. No improvement in symptoms was noticed in only one patient in this group at the end of 3<sup>rd</sup> month.

**Table 6: Vertigo at the end of 1st week after maneuver**

	Complete Resolution	Improvement	No Improvement	Row Totals
<b>Epleys</b>	42 39.89 [0.11]	7 8.58 [0.29]	2 2.52 [0.11]	51
<b>Semonts</b>	37 39.11 [0.11]	10 8.42 [0.30]	3 2.48 [0.11]	50
<b>Column Totals</b>	79	17	5	<b>101 (Grand Total)</b>

The chi-square statistic is 1.0361. The p-value is .595691

**Table 7: Vertigo at the end of 1st month after manoeuvre.**

	Complete Resolution	Improvement	No Improvement	Row Totals
<b>Epleys</b>	44 41.91 [0.10]	4 6.56 [1.00]	3 2.52 [0.09]	51
<b>Semonts</b>	39 41.09 [0.11]	9 6.44 [1.02]	2 2.48 [0.09]	50
<b>Column Totals</b>	83	13	5	<b>101 (Grand Total)</b>

Chi square = 2.41, p value = 0.299

**Table 8: Vertigo at the end of 3rd month after maneuver.**

	Complete Resolution	Improvement	No improvement	Row Totals
<b>Epleys</b>	45 45.45 [0.00]	5 4.54 [0.05]	1 1.01 [0.00]	51
<b>Semont</b>	45 44.55 [0.00]	4 4.46 [0.05]	1 0.99 [0.00]	50
<b>Column Totals</b>	90	9	2	<b>101 (Grand Total)</b>

chi-square statistic is 0.1012. The p-value is .950649.

Difference in results was insignificant between both the groups in the 1<sup>st</sup> week (p-value=0.595), 1<sup>st</sup> month (p-value=0.299) and 3<sup>rd</sup> month (p-value=0.950) (Table 6-8).

*Repetition of Epley's and Semont's maneuver*

Out of 51 patients in Epley's group 13% patients needed repetition of the maneuver. Out of this 7 patients needed 2 sittings and 5 patients needed single sittings for complete resolution of symptoms. Among 50 patients of Semont's group 26% patients needed repetition of procedure. Out of this 24% needed 2 sittings while 2 patients needed 3 sittings (Table 9).

**Table 9: Repetition of maneuver**

	Epleys Group	Semonts Group	Row Totals
Twice	5 2.45 [2.65]	2 4.55 [1.43]	7
Thrice	2 4.55 [1.43]	11 8.45 [0.77]	13
<b>Column Totals</b>	7	13	<b>20 (Grand Total)</b>

The chi-square statistic is 6.2819. The p-value is .012198

Recurrence rate of Epley's and Semont's maneuver total

In Epley's group 4% had recurrence in 1st month and 8 % had recurrence in 3rd month whereas in Semont's group 6 % patients had recurrence in 1st month and 6 % patients had recurrence in 3rd month. Recurrence of symptoms is slightly higher among patients

of Semont's group compared to Epley's group, but it is not statistically significant (Table 10).

**Table 10: Recurrence rate of Epley's and Semont's maneuver**

	Nil	1st Month	3rd Month	Row Totals
<b>Epley's</b>	45 44.94 [0.00]	2 2.52 [0.11]	4 3.53 [0.06]	51
<b>Semont's</b>	44 44.06 [0.00]	3 2.48 [0.11]	3 3.47 [0.06]	50
<b>Column Totals</b>	89	5	7	<b>101 (Grand Total)</b>

Chi-square statistic is 0.3442. The p-value is .841.

**DISCUSSION:**

Bppv is one of the most common cause of peripheral vertigo in the general population. It is characterized by a sudden, transient gyrotary sensation which is accompanied by characteristic nystagmus. Symptoms are provoked by positional changes of the head with respect to gravity and can range in severity from mild dizziness to debilitating episodes that may induce nausea or vomiting, and significantly hinder daily functioning.

The most common age group in the present study was of 51-60 yrs. with a mean age of 48yrs. maximum number of patients belonged to this age group with 30.69%. In the present study female predominance was seen with 52% females and 48% male were seen to be having bppv. These observations were similar to the study conducted by Ajayan et al and Neuhauser et al which showed predilection for older age group and female predominance as was concluded in our study.

In the present study right ear was seen to be affected in (56.44%) of the patients and left ear in 37% patients and 6.93% patients were seen to have Bppv in both the ears. This finding was similar to the study conducted by Richard E al in which right ear was affected in 211 patients and left ear was affected in 148 patients. The involvement of right labyrinth was more due to the habit of sleeping in right lateral decubitus.3

In the present study complete resolution of symptoms occurred in 84% of patients of epley's group and 82% of patients in Semonts group on follow up after first week. Niamatullah and Yousaf N documented 82% cure rates with Semont's Maneuver and 57% cure rates with Epley Maneuver.19 whereas Prokopakis et al found 92% patients were symptom free after one month treated with epleys maneuver20.

In the present study we achieved 89% complete resolution in epley's group and 84% in semonts group which also showed dix hallpike test negative after the end of one month. The study conducted by Ajayan P.V et al achieved 94% cure for BPPV from epley's maneuver and 89% with semont maneuver after the period of one month. Richard W et al assessed the efficacy of the Epley's maneuver in a study of 81 patients with posterior semicircular canal BPPV.21

A group of 61 patients underwent Epley's maneuver while 20 patients received no therapy forming control group.89% of patients experienced subjective improvement after 1 month in epley's group while 10% from control while after 6 months 92% experienced improvement from Epley's group compared to 50% from control the result of this study support my observations. Lynn et al reported a success rate of 89 percent22 and Ahmed et al reported 79.7% recovery in BPPV patients after a single treatment session with Epley Maneuver.23

Vaz Garcia conducted a study involving 175 patients from both sexes.25 All suffered from BPPV and were treated with by Semont Maneuver. The study revealed that one-week after Semont Maneuver 79% of patients was cured. The success rates of Semont Maneuver are similar to this study (82%).

In present study among 50 patients 26% of patients needed repetition of procedure. Out of this 24% needed 2 sittings while 2

patients needed 3 sittings so that 82% of patients required only single sitting. Similar results were observed by Semont et al who reported that 84% of his patients required only one treatment and 93% successfully cleared with two treatments.<sup>16</sup>

Although these data demonstrate that Epley's and Semont's liberatory maneuver, are effective treatments for PC BPPV clinicians must recognize that with both of these maneuvers, there is a chance (2.5%-6%) of causing a transient worsening of the patient's condition through a "canal conversion" from the PC to the lateral canal.

#### CONCLUSION:

BPPV is the most common cause of peripheral vertigo which can be easily diagnosed in OPD by Dix Hallpike test. Both Epley's and Semont's maneuvers are highly efficacious treatment methods for PC-BPPV which is indicated by the fact that at the end of the study there was no statistically significant difference between the efficacy of these two maneuvers. Semont's maneuver is an alternative method for the treatment of PC-BPPV especially patients who have neck problems.

#### REFERENCES

- Newman-Toker DE, Hsieh YH, Camargo CA, Pelletier AJ, Butchy GT, Edlow JA. Spectrum of dizziness visits to US emergency departments: cross-sectional analysis from a nationally representative sample. In: Mayo Clinic Proceedings. Elsevier. 2008;83(7):765-775.
- Post RE, Dickerson LM. Dizziness: a diagnostic approach. Am Fam Physician. 2010;82(4):361-8.
- Von Brevern M, Radtke A, Lezius F, Feldmann M, Ziese T, Lempert T, et al. Epidemiology of benign paroxysmal positional vertigo: a population based study. *J Neurology Neurosurg Psychiatr.* 2007;78(7):710-5.
- Oghalai JS, Manolidis S, Barth JL, Stewart MG, Jenkins HA. Unrecognized benign paroxysmal positional vertigo in elderly patients. *Otolaryngol Head Neck Surg.* 2000;122(5):630-4.
- Fife D, Fitzgerald JE. Do patients with benign paroxysmal positional vertigo receive prompt treatment? analysis of waiting times and human and financial costs associated with current practice. *Int J Audiol.* 2005;44(1):50-7.
- Baloh RW, Jacobson K, Honrubia V. Horizontal semicircular canal variant of benign positional vertigo. *Neurology.* 1993;43(12):2542.
- Bertholon P, Bronstein AM, Davies RA, Rudge P, Thilo KV. Positional down beating nystagmus in 50 patients: cerebellar disorders and possible anterior semicircular canalithiasis. *J Neurol Neurosurg Psychiatr.* 2002;72(3):366-72.
- Dix MR, Hallpike CS. The pathology, symptomatology and diagnosis of certain common disorders of the vestibular system.
- Semont A, Freyss G, Vitte E. Curing the BPPV with a liberatory maneuver. In: *Clinical Testing of the Vestibular System.* Karger Publishers. 1988:290-293.
- Epley JM. The canalith repositioning procedure: for treatment of benign paroxysmal positional vertigo. *Otolaryngol Head Neck Surg.* 1992;107(3):399-404.
- Brandt T, Bronstein AM. Cervical vertigo. *J Neurol Neurosurg Psychiatr.* 2001;71(1):8-12.
- Mandalà M, Santoro GP, Libonati GA, Casani AP, Faralli M, Giannoni B, et al. Double-blind randomized trial on short-term efficacy of the Semont maneuver for the treatment of posterior canal benign paroxysmal positional vertigo. *J Neurol.* 2012;259(5):882-5.
- Salvinelli F, Firrisi L, Casale M, Trivelli M, D'asciano L, Lamanna F, et al. Benign paroxysmal positional vertigo: diagnosis and treatment. *La Clinica Terapeutica.* 2004;155(9):395-400.
- Neuhauser H, Lempert T. Vertigo and dizziness related to migraine: a diagnostic challenge. *Cephalalgia.* 2004;24(2):83-91.
- Caldas MA, Ganança CF, Ganança FF, Ganança MM, Caovilla HH. Clinical features of benign paroxysmal positional vertigo. *Brazilian J Otorhinolaryngol.* 2009;75(4):502-6.
- Gans RE, Harrington-Gans PA. Treatment efficacy of benign paroxysmal positional vertigo (BPPV) with canalith repositioning maneuver and Semont liberatory maneuver in 376 patients. *Seminars in Hearing.* 2002;23(2):129-42.
- Pościech L. Rehabilitation of benign paroxysmal positional vertigo in the experience of the Wrocław Clinics. *Otolaryngologia Polska The Polish Otolaryngology.* 1999;54(5):57-60.
- Naimatullah YN. Single treatment approaches to benign paroxysmal positional vertigo. *Pak J Otolaryngol.* 2004;20:3-5.
- Prokopakis EP, Chimonis T, Tsagournisakis M, Christodoulou P, Hirsch BE, Lachanas VA, et al. Benign paroxysmal positional vertigo: 10-year experience in treating 592 patients with canalith repositioning procedure. *Laryngoscope.* 2005;115(9):1667-71.
- Wietske R, Bruinjes TD, Oostenbrink P, van Leeuwen RB. Efficacy of the Epley maneuver for posterior canal BPPV: a long-term, controlled study of 81 patients. *Ear Nose Throat J.* 2005;84(1):22.
- Ruckenstein MJ. Therapeutic efficacy of the Epley canalith repositioning maneuver. *Laryngoscope.* 2001;111(6):940-5.
- Lynn S, Pool A, Rose D, Brey R, Suman V. Randomized trial of the canalith repositioning procedure. *Otolaryngol Head Neck Surg.* 1995;113(6):712-20.
- Ahmed Z, Akhtar MR, Ahmed T, Raza N, Ayub W. Modified Epley's manoeuvre for treatment of benign positional vertigo: An experience with over 100 cases. *Pak Armed Forces Med J.* 2003;53:160-3.
- Mazoor T, Niazi SB. Efficacy of Semont manoeuvre versus Epley manoeuvre in benign paroxysmal positional vertigo. *Pak Armed Forces Med J.* 2011;30(2).
- Vaz GF. Treatment failures in benign paroxysmal positional vertigo. Role of vestibular rehabilitation. *Revue de Laryngologie-Otologie-Rhinologie.* 2004;126(4):271-4.
- Dispenza F, Kulamarva G, De Stefano A. Comparison of repositioning maneuvers for

benign paroxysmal positional vertigo of posterior semicircular canal: advantages of hybrid maneuver. *Am J Otolaryngol.* 2012;33(5):528-32.