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Original Research Article

Epley's maneuver versus Semont's maneuver in treatment of posterior canal benign positional paroxysmal vertigo

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ABSTRACT

Background: Benign paroxysmal positional vertigo (BPPV) is characterized by brief but violent attacks of paroxysmal vertigo provoked by certain positions of the head. BPPV is the most common cause of vertigo, resulting from migration of otoconia into the semicircular canals. Majority of patients have posterior canal BPPV. Epley's Canalith Repositioning and Semont Liberatory Maneuver have been shown to be highly efficacious in the successful treatment of posterior canal BPPV. The main objective of this study was to compare the efficacy of Epley's maneuver versus Semont's maneuver in the management of benign paroxysmal positional vertigo.
Methods: This study was conducted in the Department of Otorhinolaryngology of a rural Medical College in Kerala, for a period of one and half year, from January 2015 to June 2016. It was an observational prospective cohort study. 200 patients with posterior canal BPPV were enrolled in this study based on inclusion and exclusion criteria. Patients were allotted alternatively to Epley's group and Semont's group, 100 patients in each group based on the treatment maneuvers they underwent. Efficacy of maneuvers were assessed at the end of 1st week, 1st month and 3rd month on the basis of resolution of symptoms and Dix-Hallpike negativity.
Results: Of the 100 cases managed by Epley's maneuver 95 cases showed complete relief of symptoms after 3 months. Out of 100 cases managed by Semont's maneuver, 94 cases showed complete recovery after 3 months. The results were compared by Chi square test, as the data was mainly qualitative in nature. The results of both the groups were compared at the end of 1st week, 1st month and 3rd month, which revealed that both the Semont's and Epley's maneuver are equally effective in the treatment of posterior canal BPPV.
Conclusions: Both Epley's and Semont's maneuver are equally effective for treating the patients of posterior canal benign paroxysmal positional vertigo.

Keywords: BPPV, Canalolithiasis, Cupulolithiasis, Dix Hallpike test, Otolith, Semicircular canal

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.[1] The three most common causes of peripheral vertigo are: acute peripheral vestibulopathy (vestibular neuritis and labyrinthitis), Ménière's disease and Benign Paroxysmal Positional Vertigo (BPPV), the latter being the most frequent.[2] 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.[3] Most cases of BPPV are self-limiting.[4] Studies have shown that canal repositioning procedures remain an efficient and long lasting noninvasive treatment of

BPPV.[5] 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.[6] 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.[4] Patients with BPPV experience delays in diagnosis and treatment, and they frequently are inappropriately treated with vestibular suppressant medications.[5] 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.[3,6] 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.[6] The anterior (superior) canal variant is rare.[7] The characteristic clinical sign of BPPV is nystagmus following a Dix-Hallpike maneuver.[8] 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.[9,10] 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.[11] 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.[12] There is no high clinical trial comparing the Semont and Epley maneuvers in Kerala. Thus, is study was undertaken to compare the efficacy of Epley's versus Semont's maneuvers.

METHODS

This study was conducted in the Department of Otorhinolaryngology, in a rural Government Medical College in Kerala, India for a period of one and half years, from January 2015 to June 2016. Prior to commencement, the study was approved by the ethical committee of the Medical College. Ours was an Observational Prospective Cohort Study of 200 patients. 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 were willing 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 alternately allotted 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 Semont's maneuver).

Methodology

All the patients selected were explained about the purpose of study and a written consent was obtained from them to participate in the study before enrollment. Diagnosis of BPPV was made on the basis of clinical features and positive Dix-Hallpike test. Diagnostic workup included history, clinical and audiological examination to rule out other underlying etiologies. All the patients 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 1week, 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.

Three categories to classify subjective response to treatment:

- Complete resolution
- Improvement, and
- no improvement.

The results of the Hallpike test were classified as either positive or negative. Maneuvers were repeated upto 3 times based on Dix-Hallpike test positivity.

Data analysis

Data collected from each individual was entered into an excel sheet after coding of variables and appropriate analysis done with the help of Epi info. Mean and

standard deviation were calculated for quantitative data. Frequency and percentage were used for qualitative data. Chi-square test was used to compare qualitative variable. P-value<0.05 was considered as significant.

RESULTS

Age distribution

The age of patients in this study was from 19years to 75 years. Among the 200 patients, there were only 2 (1.1%) patients below 20 years. Mean age was 46 years. Maximum patients belonged to 51 to 60-year age group. (Table 1).

Table 1: Age distribution.

Age (in years)	Number of patients	Percentage (%)
11-20	2	1.00
21-30	23	11.50
31-40	41	20.50
41-50	50	25.00
51-60	63	31.50
61-70	19	9.50
71-80	2	1.00
Total	200	100

Sex distribution

In the present study, out of the 200 patients 108 (54%) were females and 92 (46%) were males (Figure 1).

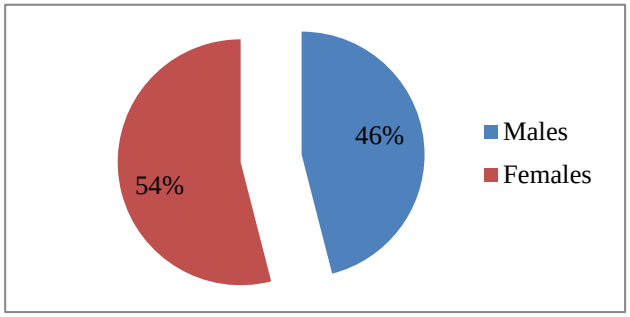

Figure 1: Sex distribution.

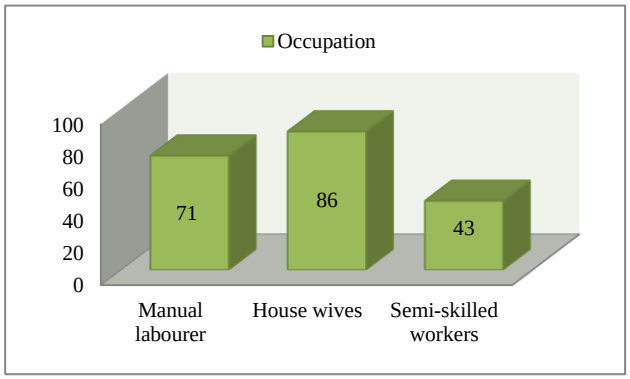

Figure 2: Occupation.

Occupation

Among 200 patients, 71 (35.5%) were manual labourers, 86 (43%) home makers, and 43 (21.5%) were semiskilled workers (Figure 2).

Clinical presentation

Among the 200 patients, 154 patients (77%) presented with characteristic positional vertigo. Dizziness was the presenting complaint for 26 patients (13%). 20 patients had feeling of imbalance. 53 patients (26.5%) had associated vomiting. 79 patients (39.5%) experienced nausea (Table 2).

Table 2: Clinical presentation.

Presenting complaint	Number of patients	Percentage
Positional vertigo	154	77
Dizziness	26	13
Imbalance	20	10
Nausea	79	39.5
Vomiting	53	26.5

Involvement of ear

Patients were diagnosed to have posterior canal BPPV based on Dix-Hallpike test positivity. Among 200 patients, the test was positive for right ear in 114 (57.29%) and for left ear in 72 (36.18%) patients. The test was positive on both sides in 14 (6.53%) patients (Figure 3).

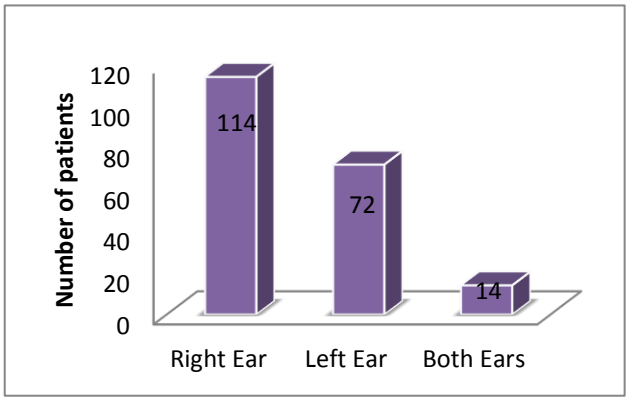

Figure 3: Involvement of ear.

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

Dix Hallpike test

a) At the end of first week:

84 (84%) patients who underwent Epley's maneuver and 81 (81%) patients who underwent Semont's maneuver

showed negative Dix-Hallpike test. 16 (16%) patients in Epley's group and 19 (19%) patients in Semont's group showed Dix- Hallpike test positive. So there is no statistically significant difference between the two maneuvers regarding efficacy as P-value=0.7 (>0.05). In total 165 (82.5%) patients had negative Dix-Hallpike test and 35 (17.5%) patients had positive Dix- Hallpike test at the end of 1st week (Table 3).

Table 3: Dix Hallpike test 1st week after maneuver.

Maneuver	Negative	Positive	Total
Epley's	84	16	100
Semont's	81	19	100
Total	165	35	200
χ^2-0.1385 p-value=0.70			

b) At the end of 1st month:

Among 200 patients 189 (94.5%) patients were Dix Hallpike test negative and 11 (5.5%) patients were Dix-Hallpike test positive at the end of 1st month. 96% patients in Epley's group and 93% patients in Semont's group showed Dix Hallpike test negativity. Here also there was no significant difference between these two maneuvers as P- value=0.535 (Table 4).

Table 4: Dix-Hallpike test at the end of one month.

Maneuver	Negative	Positive	Total
Epley's	96	4	100
Semont's	93	7	100
Total	189	11	200
χ^2-0.3848 p-value=0.535			

c) At the end of 3rd month:

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 =1.0 (Table 5).

Table 5: Dix-Hallpike test at the end of 3 months.

Maneuver	Negative	Positive	Total
Epley's	95	5	100
Semont's	94	6	100
Total	189	11	200
χ^2-0.00 p value=1.0			

Improvement of vertigo and associated symptoms

Out of the 100 patients in Epley's group 83% patients had complete resolution of symptoms on follow up at 1st week whereas 94% patients became free from vertigo on follow up at 1st month. After 3 months 95% patients out of 100 were free from vertigo. Symptomatic improvement was there for the remaining 5 patients also.

Out of 100 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 1st month. After 3 month a total of 94 patients out of 100 were free from vertigo. No improvement in symptoms was noticed in only one patient in this group at the end of 3rd month.

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

Maneuver	Complete resolution	Improvement	No improvement	Total
Epley's	83	14	3	100
Semont's	74	20	6	100
Total	157	34	9	200
χ^2-2.57 p value=0.276				

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

Maneuver	Complete resolution	Improvement	No improvement	Total
Epley's	94	5	1	100
Semont's	89	9	2	100
Total	183	14	3	200
χ 2-1.61	p value=0.446			

Difference in results was insignificant between both the groups in the 1st week (p-value=0.276), 1st month (p-value=0.446) and 3rd month (p-value=0.60) (Table 6-8).

Repeatation of Epley's and Semont's maneuver

Out of 100 patients in Epley's group 13% patients needed repetition of the maneuver. Out of this 11 patients needed

2 sittings and 2 patients needed 3 sittings for complete resolution of symptoms. Among 100 patients of Semont's group 26% patients needed repetition of procedure. Out of this 24% needed 2 settings while 2 patients needed 3 sittings (Table 9).

Table 6: Vertigo at the end of 3rd month after maneuver.

Maneuver	Complete resolution	Improvement	No improvement	Total
Epley's	95	5	0	100
Semont's	94	5	1	100
Total	189	10	1	200

χ^2-1.00; p value=0.60

Table 9: Repetition of maneuver.

	Epley's group	Semont's group
Once	11	24
Twice	2	2

χ^2-5.8 p value=0.0529

Recurrence rate of Epley's and Semont's maneuverotal

In Epley's group 4% had recurrence in 1st month and 5% had recurrence in 3rd month whereas in Semont's group 7% patients had recurrence in 1st month and 5% 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: Reccurence rate of Epley's and Semont's maneuver.

Maneuver	Nil	1st Month	3rd month	Total
Epley's	91	4	5	100
Semont's	88	7	5	100
Total	179	11	10	200

DISCUSSION

Vertigo and dizziness are common symptoms in the general population. A minimum of 20% of all patients complaining of vertigo have BPPV. Due to increased incidence and prevalence of BPPV a large number of studies have been conducted internationally to find the effectiveness of various treating maneuvers.

The most common age group in this study was 51 to 60 years (31.5%) followed by 41 to 50 years (25%). Mean age was 46 years. In this study female predominance was seen with 54% females and 46% males. These observations are similar to a study by Salvinelli F et al, Neuhauser et al and Mariana Azevedo Caldas which showed a strong suggestion of female preponderance and predilection for older age group.[13-15] However, inspite of the clear female predominance, the studies do not reveal any statistically significant differences between genders.

In this study, right ear was affected in 57.29% patients and the left ear in 36.18% patients. Both ears were affected in only 6.53% patients. Right labyrinth involvement was more frequent in our patients, which was similar to Von Brevern et al findings; according to these authors, the right labyrinth is involved 1.41 times more often than the left labyrinth, due to the habit of sleeping in right lateral decubitus.[3] Also this finding is similar to a study by Richard E et al in which right ear was affected in 211 patients and the left ear in 148 patients.[16] Both ears were affected in only 17 patients. There was a 56% predominance of a right ear involvement. Pospeich et al presented the results of rehabilitation with the use of Semont and Epley Maneuver in 46 patients.[17] The regression of symptoms in 24 cases treated with the use of Semont Maneuver was achieved in 62% and in 73% cases treated with the use of Epley Maneuver. Although this study showed significant success rates for both the maneuvers in our study we had even better results.

In present study, complete resolution of symptoms occurred in 83% patients of Epley's group and 75% of patients in Semont's group on follow up at 1st week. Niamatullah and Yousaf N documented 70% cure rates with Semont's Maneuver and 57% cure rates with Epley Maneuver.[18] Prokopakis et al assessed the long-term efficacy of Epley Maneuver in the treatment of patients with BPPV. 544 (92%) of 592 patients treated reported no symptoms of vertigo after one month revealing the efficacy of Epley Maneuver.[19]

In this study, we achieved 94% cure of BPPV from Epley's maneuver in 1 month. 83% of the patients were successfully cleared of symptoms with a single treatment and 11% required two treatments. These data compare favorably with Epley et al finding that 80% of his 30 patients were successfully cleared with one treatment.[10] Epley's data further suggested that 98% were symptom-free by the end of 3 months which is almost similar to my result (94%).

Richard W et al assessed the efficacy of the Epley's maneuver in a study of 81 patients with posterior semicircular canal BPPV.[20] A group of 61 patients

underwent the maneuver, while a control group of 20 patients received no therapy. All patients were evaluated at 1 and 6 months. The percentage of patients who experienced subjective improvement was significantly higher in the treatment group at both 1 month (89% vs. 10%) and 6 months (92% vs. 50%). Three patients in the treatment group who did not improve after treatment underwent a second maneuver and all achieved a positive result. The results of this study support my study regarding the efficacy of Epley's maneuver. Ruckenstein showed 74 percent of cure rate in patients that were treated with one or two Epley maneuvers which is lower than that of present study.[21] Lynn et al reported a success rate of 89 percent[22] and Ahmed et al reported 79.7% recovery in BPPV patients after a single treatment session with Epley Maneuver.[23]

Tahir et al conducted a study comparing the efficacy of Epley's and Semont's maneuver.[24] After 30 days 83.3% patients in Semont's group and 93.3 patients in Epley's group became free from vertigo on Dix-Hallpike test. Although his study showed significant success rate of both the maneuvers but in this study, we had even better results. By 1 month 93% patients in Semont's group and 96% patients in Epley's group had negative Dix-Hallpike test. 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 (75%). In a study done by Dispenza et al the maneuver was casually selected among Semont, Epley, and hybrid.[26] Patients were divided into 3 groups according to the maneuver adopted. Fisher exact test showed that no statistical differences exist between hybrid Maneuver and other maneuvers in terms of efficacy. All maneuvers evaluated demonstrated similar efficacy as in this study.

In this study among 100 patients of Semont's group 24 (24%) patients completely relieved of symptoms by 2 treatments and 2 (2%) patients required 3 treatments, so that 74% required only single treatment. This result is lower than the result in a study by Semont et al who reported that 84% of his patients required only one treatment and 93% successfully cleared with two treatments.[9]

In this study 1 patient in Semont's group had no improvement of symptoms even after 2 treatments. One possibility is canal conversion, which is a complication of repositioning maneuvers. 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. Authors did not differentiate the underlying pathophysiology or etiology of the BPPV. For example, would a patient with BPPV secondary to vestibular neuritis be less likely clear from a single treatment versus an idiopathic occurrence of BPPV?

The high (81-84%) success rate of a single treatment, and 93-96% success rate with just two treatments, suggests that it is unlikely that underlying etiology would provide information to affect treatment of choice.

CONCLUSION

BPPV is the most common cause of peripheral vertigo and it can be easily diagnosed in outpatient department by Dix Hallpike test. Both Epley's and Semont's maneuvers are highly efficacious treatment methods for PC-BPPV. At the end of this study, by 3rd month there is no statistically significant difference between the efficacy of these two therapeutic maneuvers. So Semont's maneuver is an alternative treatment modality to Epley's maneuver, especially in patients who have difficulty in extending the neck due to spinal disorders. Primary care physicians, and patients themselves should be aware of this highly efficacious and cost-effective treatment for the leading cause of dizziness and vertigo.

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