

# Comparative Study Of The Effects Of Epley's And Lemperts' Roll Over Maneuvers In Patients With Paroxysmal Positional Vertigo In Tertiary Care Hospital Kanyakumari District- Hospital Based Study

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**Abstract- Background:** Benign Paroxysmal Positional Vertigo (BPPV) is among the commonly diagnosed disease of vestibular system. It can be described as a momentary sensation of spinning amid getting up or lying down on the bed. turning the head up or looking down and it lasts a few moments before resolving. One in 30 patients were diagnosed with the BPPV . it can mild moderate or severe depending on the symptoms.

**AIM AND OBJECTIVE** - To compare the effectictiveness of Epley's and Lemperts' roll over maneuvers in paroxysmal positional vertigo.

**METHODS AND MATERIALS.**

**SAMPLING:**

Sample size of each group: 41

Total sample size of study: 82

Scientific basis of sample used in the study

$$N = \frac{4O^2 (Z_{r-crit} + Z_{pwr})^2}{D^2}$$

$D^2$

Where  $N$  is the total sample size (the sum of the sizes of both comparison groups)

-  $O$  is the assumed SD of each group (assumed to be equal for both groups) the  $z_{crit}$  (95% of confidence interval) value Standard Normal Deviate ( $z_{crit}$ ) corresponding to Selected Significance Criteria and  $CI=2.576$

Standard Normal Deviate  $z_{pwr}(0.95)$  Corresponding to Selected Statistical is= 1.645

$D$  is the minimum expected difference between the two means.

Both  $z_{crit}$  and  $z_{pwr}$  are cutoff points along the x axis of a standard normal probability distribution.

**SUMMARY**

This is a hospital based prospective randomized controlled study to compare the effects of Epleys and Lemperts maneuver in BPPV.

It was on 82 patients between the age group of 18-75yrs. The effectiveness of the maneuvers was compared on the 1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup> follow-ups by PGA scoring system.

In the study, all patients fulfilling the inclusion criteria were taken up for the study and BPPV was diagnosed by Dix Hallpike's maneuver. Following this, they were divided into 2 groups. 1<sup>st</sup> underwent Epleys maneuver and 2<sup>nd</sup> Lemperts maneuver.

The 2 groups were comparable in every nature. The patients were followed up on the 3<sup>rd</sup>, 7<sup>th</sup> and 30<sup>th</sup> days and their symptoms were assessed using PGA score and plotted. In the study, it was found that BPPV was common in females and more often the right side ear was affected.

The results were statistically analyzed for both the groups and were found out that p value was less than 0.05 which implies that there is no significant difference in the values which means that Lemperts maneuver is not inferior to Epleys maneuver.

**CONCLUSION**

- Most commonly involves the right side than the left.
- Most common age group involved in BPPV is 41 to 60 years.
- BPPV is less common among males.
- Lemperts maneuver is not inferior to Epleys in the treatment of BPPV.
- Results show a p value of less than 0.05 which means difference in outcome of treatment with either maneuvers are insignificant.
- The results obtained in our study was comparable with other international studies showing that Lemperts and Epleys maneuvers are very effective in our population for treating BPPV.

**I. INTRODUCTION**

**B**enign Paroxysmal Positional Vertigo (BPPV) is among the commonly diagnosed disease of vestibular system. It can be described as a momentary sensation of spinning amid getting up or lying down on the bed. turning the head up or looking down and it lasts a few moments before resolving.

Benign Paroxysmal Positional Vertigo accounts for almost thirty one percentages of all cases of dizziness seen in dizziness clinics. It can be described as an abnormal perception of motion and can be elicited by stimulating positions.

Symptoms can manifest in different grades of harshness. Minor ones include unpredictable episodes of positional vertigo and Moderate symptoms include frequent positional attacks along with disequilibrium. If severe, vertigo provoked by most head movements, mimicking persisting vertigo & can last from days to even years together.

Majority of the cases of BPPV are benign<sup>2</sup> and they respond very well to physical therapy maneuvers.

Based on studies, canal repositioning procedures remain the most effective non-invasive treatment of BPPV<sup>1</sup>.

The incidence of BPPV is from 11% - 64% / 100,000 /year<sup>4</sup>.

Benign paroxysmal positional vertigo is usually idiopathic<sup>5</sup>.

Other causes include

- Head injury
- Vertebrobasilar artery insufficiency,
- ear surgeries
- menieres disease
- vestibular neuritis<sup>6</sup>
- Middle ear diseases<sup>7</sup>.

An association between BPPV and Meniere's disease has also been reported. 2. AIM AND OBJECTIVE - .to compare the effects of Epley's and Lemperts roll over maneuvers in ' paroxysmal positional vertigo.

**II. METHODS AND MATERIALS:**

It is a hospital based randomnized hospital based study.

**III. SAMPLING:**

**Sample size of each group: 41**

**Total sample size of study: 82**

**Scientific basis of sample used in the study**

$$N = \frac{40^2 (Z_{r-rit} + Z_{pwr})^2}{D^2}$$

Where  $N$  is the total sample size (the sum of the sizes of both comparison groups)

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- is the assumed SD of each group (assumed to be equal for both groups) the  $z_{crit}$  (95% of confidence interval) value Standard Normal Deviate ( $z_{crit}$ ) corresponding to Selected Significance Criteria and CIs=2.576

Standard Normal Deviate  $z_{pwr}(0.95)$  Corresponding to Selected Statistical= 1.645

$\Delta$  is the minimum expected difference between the two means.

Both  $z_{crit}$  and  $z_{pwr}$  are cutoff points along the x axis of a standard normal

probability distribution that demarcate probabilities matching the specified significance criterion and statistical power, respectively.

Both groups that make up  $N$  are assumed to be equal in number, and it is assumed that two-tailed statistical analysis will be used.

$F$  depends only on the difference between the two means; it does not depend on the magnitude of either one.

Since we are doing a non parametric analysis, power efficacy of 5% extra also considered. Since we expect a lost follow up of 15%, the sample size has been increased by 10%. Hence the total sample size has been upsized to 82.

i) Inclusion criteria:

■ All cases of benign paroxysmal positional vertigo diagnosed by Dix- Hallpike's test.

■ Age group of 18-75yrs

j) Exclusion criteria:

- Patients having a recent head injury
- Patients having a recent neck injury
- All cases diagnosed of cervical spondylosis.
- If the patient is on Labyrinthine sedatives
- Patients having other comorbid conditions
- If Dix-Hallpike's is negative
- Age below 18yrs and above 75 yrs
- Patients who have undergone Ear surgery
- Those who are having ear discharge
- Patient on drugs causing dizziness

Parameters to be studied:

1. Nausea
2. Vomiting
3. Nystagmus
4. Tinnitus
5. Hearing loss
6. Vertigo

The response to treatment was assessed using Physician Global Assessment, Response to Treatment which has a nine- point scale.

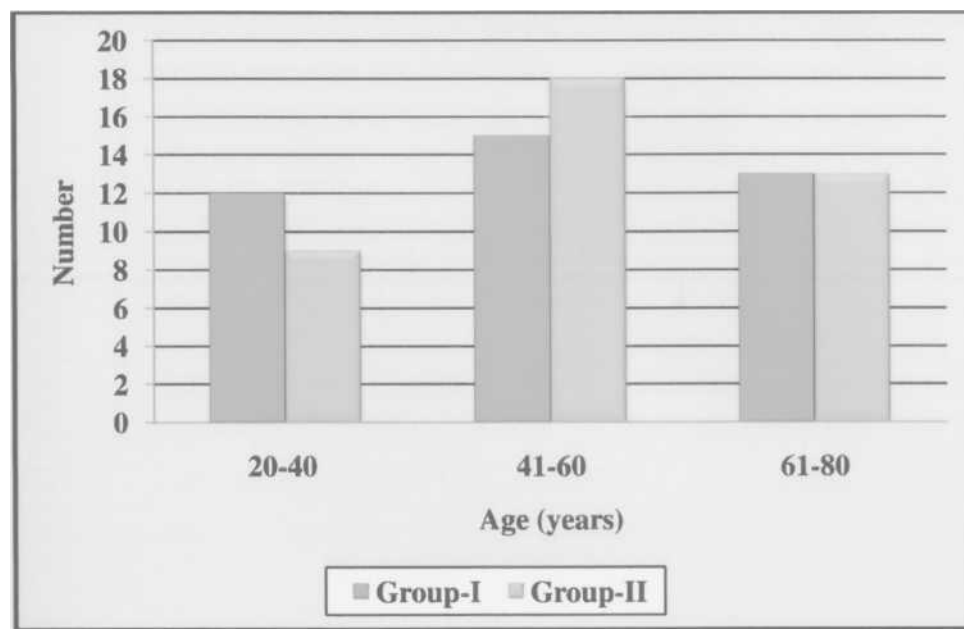
- +4 Clearance of signs and symptoms (above 100% improvement).
- +3 Marked improvement (about 75% improvement).
- +2 Moderate improvement (about 50% improvement).
- +1 Slight improvement (about 25% improvement).
- 0 Unchanged
- -1 Slight worsening (about 25% worse).
- -2 Moderate worsening (about 50% worse).
- -3 Marked worsening (about 75% worse).
- -4 Severe worsening (about 100% worse).

o) Methods/techniques/instruments/reagents/kits etc used to measure the quantitative parameters along with their manufacturing source details:

- Epleys maneuver
  - Lemperts roll maneuver
  - table
  - wrist-watch
- Procedure in detail:

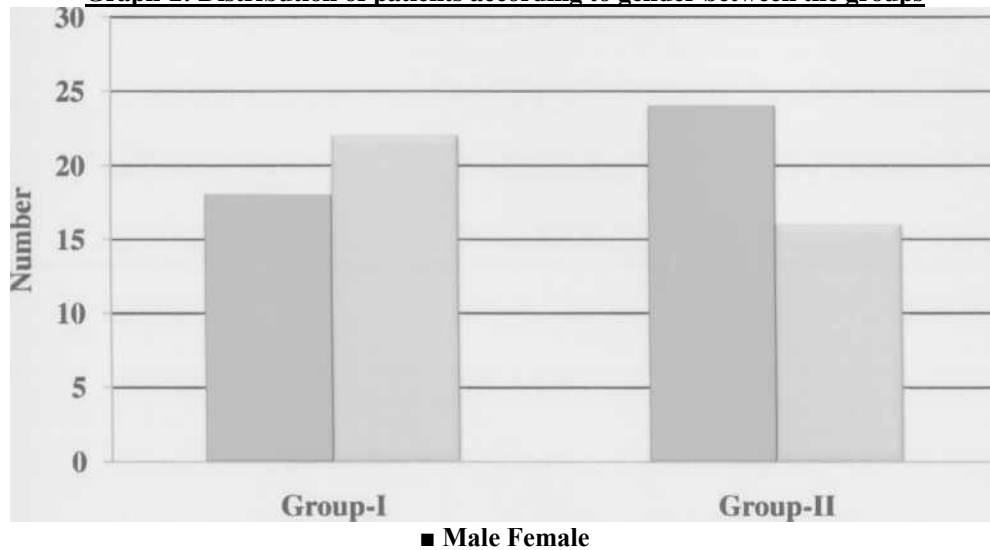
At first history of the patients was taken about duration of vertigo, its severity, associated hearing loss and tinnitus. Detailed examination of ear was. Dix Hallpike's test done to confirm the diagnosis. In dix-hallpike maneuver, the patient was subjected to two brisk movements, both beginning with the patient, while sitting. The patients head was first turned forty five degrees toward one side, and then the patient is briskly lie straight, with the head still turned hanging over the end of the examining table. The patients head is held in that position for 30 seconds and observed for nystagmus .Next the patient is returned to the sitting position and eye movements observed for any nystagmus. The maneuver is then performed with the head turned 45 degrees to the other side. 3<sup>rd</sup> group A treated with Epley's Maneuvre , which started with the patient in read upright position. Then the Dix Hallpike's provoking position was assumed. The eyes were observed for nystagmus until it stopped. Then after Thirty seconds the head is turned towards the opposite side while keeping the read extended for three seconds and then patient was rolled into lateral rcsition. In this position the head position was in 180 degrees opposite to initial Dix Hallpike's position. After the disappearance of nystagmus for 30 seconds maintaining the head position the patient is rapidly brought to sitting position with head rotated forwards. The patient was then kept in this position for one minute to complete the Epleys. Group B was treated with Lempert's -roll maneuver. The patient's head was positioned with the affected ear down, the head was then turned quickly 90 degrees toward the unaffected side (face up). A series of 90-degree turns toward the unaffected side was then undertaken sequentially until the patient had turned 360 degrees and was back to the affected ear-down position. From there, the patient was turned to the face-up position and then brought up to the sitting position. The successive head turns can be done in 15- to 20-second intervals even when the nystagmus continues. The patient was then observed for 45 minutes at the end of which if they still complain persistence of vertigo or nausea, the procedure is taken as a failure and the patients were sent after giving them drugs. If there was relief from symptoms, the patients were examined on 3rd day, 7th day, 30th day and efficacy of treatment was recorded

**Graph-1: Distribution of patients according to age between the groups**



As per the study, majority of the patients were in the age group of 41-60 years of age (15 patients).

**Graph-2: Distribution of patients according to gender between the groups**



According to the study, majority of the patients with BPPV were females (22 females in group 1 and 16 in group 2) i.e., 55% in 1 and 40 % in 2<sup>nd</sup> group respectively.

Distribution of patients according to presence/absence of spontaneous- nystagmus .

Clinical observations	Spontaneous Nystagmus	
	Number	Percentage
Present	67	81.71
Absent	15	18.29

'Out of the 82 patients in the study, 67 of them, i.e, 81.71% had spontaneous nystagmus on clinical examination.'

**Table-4: Comparison of distribution of nausea in patients in three follow-ups between the groups**

Nausea Grade	Group-I			Group-II		
	1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>	1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>
+4	2	10*	28*	2	8	28*
+3	6	13*	10	4*	11	6*
+2	13	13	1	7*>#	15	2*
+1	8	4	-	13*	2*	-
0	9	-	-	8	-	-
-1	2	-	-	2	-	-
-2	-	-	-	1	-	-
-3	-	-	-	-	-	-
-4	-	-	-	-	-	-

‘(\*P<0.05 significant compared with in the group-I and II, #P<0.05 significant compared between group-I with group-II)’

As per PGA scoring, after doing the maneuvers, 28 patients had complete relief from nausea by the e 3<sup>rd</sup> follow up in both groups, 10 patients in group 1 and 6 patients in group 2 had about 75%improvement , 1 patient in group 1 and in group 2 had 50% improvement of symptoms of nausea .

**Table 1: Comparison of distribution vomiting patients in three follow-ups between the groups**

Vomiting Grade	Group-I			Group-II		
	1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>	1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>
-4	2	10*	27*	2	10*	31*
-3	4*	12	4*	7	16*	3

	13	8	1*	12	6*	1*
-1	8	1*	-	7	2*	-
	6	1*		6	1*	-
-1	1	-	-	2	-	-
	-	-	-	-	-	-
•A	-	-	-	-	-	-
-4	-	-	-	-	-	-

According to the study, 27 patients in group 1 and 31 in group 2 had complete recovery (100%) from the symptoms of vomiting by the 3<sup>rd</sup> follow up.

- patients in group 1 and 3 in group 2 had marked improvement (75%) of symptoms of vomiting by 3<sup>rd</sup> follow up.
- 1 patient each of group 1 and 2 had moderate improvement of symptom of
- vomiting (50%) by the 3<sup>rd</sup> follow up.

**Table-2: Comparison of distribution of patients in three follow-ups between the groups**

Nystagmus Grade	Group-I			Group-II		
	1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>	1 <sup>st</sup>	2 <sup>nd</sup>	ya-
-4	-	8	28*	-	8	27*
-3	7	22*	8*	6	19*	8*
4-2	19	4*	2*	20	5*	2*
-1	8	4	-	6	3	-
0	3	-	-	5	-	-
-1	1	-	-	1	-	-
-2	1	-	-	1	-	-
-3	-	-	-	-	-	-
-4	-	-	-	-	-	-

(\*P<0.05 no significant compared with in the group-1 and II, P>0.05 no significant compared between group-I with group-II)

As per the study, 28 patients in group 1 and 27 in group 2 had 100% clearance of nystagmus by the 3<sup>rd</sup> follow up, 8 in each group had marked improvement (75%) clearance and 2 in each group had moderate improvement(50% clearance) of nystagmus while doing the maneuvers by 3<sup>rd</sup> follow up.

**Table-3: Comparison of distribution of patients in three follow-ups between the groups**

Vertigo Grade	Group-I			Group-II		
	1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>	1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>
+4	-	8*	27	-	7	29*
+3	9	29*	12*	8	21*	8*
+2	15	5*	1*	15	8*	2*
+1	8	2*	-	7	2	-
0	5	1	-	6	1	-
-1	2	-	-	2	-	-
-2	2	-	-	2	-	-
-3	-	-	-	-	-	-
-4	-	-	-	-	-	-

(\*P<0.05 no significant compared with in the group-I and II, P>0.05 no significant compared between group-I with group-II)

27 and 29 patients each of group 1 and 2 respectively had 100 % clearance of symptoms, 12 in group 1 and 8 of group 2 had 75% clearance, and 1 from group 1 and 2 from group 2 had 50% vertigo clearance by the 3<sup>rd</sup> followup.

#### IV. DISCUSSION:

This is a study to compare the effects of Epleys maneuver and Lemperts logroll maneuver in benign paroxysmal positional vertigo. It was done by dividing the patients into 2 groups. Group 1 underwent Epleys maneuver and group 2 Lemperts log roll maneuver. We had 82 patients who were freshly diagnosed of benign paroxysmal positional vertigo by undergoing dix-Hallpike’s maneuver. A detailed examination of the ears, vestibular system and central nervous system were done and all other causes of vertigo were ruled out. By systemic random sampling they were divided into 2 groups and were followed up on the 3<sup>rd</sup>, 7<sup>th</sup> and 30<sup>th</sup> days and the maneuvers were repeated on each followup. As per the study, 27 and 29 patients each of group 1 and 2 respectively had 100 % clearance of symptoms, 12 in group 1 and 8 of group 2 had 75% clearance, and 1 from group 1 and 2 from group 2 had 50% vertigo clearance by the 3<sup>rd</sup> followup. According to the study, 28 patients in group 1 and 27 in group 2 had 100% .learance of nystagmus by the 3<sup>rd</sup> follow up, 8 in each group had marked vnpovement (75%) clearance and 2 in each group had moderate improvement(50% clearance) of nystagmus while doing the manuevres by 3<sup>rd</sup> follow up.

According to the study, 27 patients in group 1 and 31 in group 2 had complete recovery (100%) from the symptoms of vomiting by the 3<sup>rd</sup> follow up.

- patients in group 1 and 3 in group 2 had marked improvement (75%) of symptoms of vomiting by 3<sup>rd</sup> follow up.

1 patient each of group 1 and 2 had moderate improvement of symptom of vomiting (50%) by the 3<sup>rd</sup> follow up.

In the study, after doing the maneuvers, 28 patients had complete relief from nausea by the e 3<sup>rd</sup> follow up in both groups.

10 patients in group 1 and 6 patients in group 2 had about 75%improvement.

1 patient in group 1 and in group 2 had 50% improvement of symptoms of nausea by the 3<sup>rd</sup> follow up.

As percentage of the sample, we had 31.75% and 24.39% in the age group of 18-40 in groups 1 & 2, 36.58% & 43.9% in 41-60 yr old age group, and 31.71% each in 61-75 age group .

Maximum number of patients was in the age group of 41-60 years.



As percentage of distribution of sample according to gender, we have 46.34% males in group 1 and 60.98 % males in group 2. 75.61% and 78.05% in either group were employed.

Right side was more frequently involved in both the groups, i.e, 53.66% in both the groups.

The mean pulse rate was  $73.25 \pm 7.81$  in group 1 and  $74.42 \pm 8.32$  in group 2.

The mean systolic and diastolic blood pressure on laying down was  $127.62 \pm 1.16$  and  $72.27 \pm 8.43$  in group 1

The mean systolic and diastolic blood pressures in group 1 on standing up were  $124.65 \pm 1.13$  and  $72.02 \pm 8.27$ .

The mean systolic and diastolic blood pressure in group 2 while lying down was  $125.50 \pm 1.22$  and  $69.77 \pm 8.58$ .

The mean systolic and diastolic blood pressure in group 2 while standing was

$123.40 \pm 1.21$  and  $69.74 \pm 8.58$ , 17.50% patients in group 1 & 2 had pallor on clinical examination.

.81.71% (61 patients) in group 1 and 57.50% in group 2 had nausea as a presenting symptom.

35% patients, in 1<sup>st</sup> group and 65%, in- 2<sup>nd</sup> group had vomiting as a symptom.

The primary aim of the study was to compare the effects of the 2 maneuvers in management of BPPV. All the results showed minimal, insignificant difference in values implying that Lempert's log roll maneuver is not inferior to Epley's maneuver.

Epley's maneuver is the gold standard for treating BPPV. A lot of studies have been conducted to prove the efficacy of Epley's maneuver but till now, none have been conducted on Lempert's maneuver. Hence, in this study we have come to a conclusion that Lempert's maneuver is not inferior to Epley's maneuver and almost equally effective as Epley's

## V. SUMMARY

This is a hospital based prospective randomized controlled study to compare the effects of Epley's and Lempert's maneuver in BPPV.

It was on 82 patients between the age group of 18-75 yrs. The effectiveness of the maneuvers was compared on the 1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup> follow-ups by PGA scoring system.

In the study, all patients fulfilling the inclusion criteria were taken up for the study and BPPV was diagnosed by Dix Hallpike's maneuver. Following this, they were divided into 2 groups. 1<sup>st</sup> underwent Epley's maneuver and 2<sup>nd</sup> Lempert's maneuver.

The 2 groups were comparable in every nature. The patients were followed up on the 3<sup>rd</sup>, 7<sup>th</sup> and 30<sup>th</sup> days and their symptoms were assessed using PGA score and plotted. In the study, it was found that BPPV was common in females and more often the right side ear was affected.

The results were statistically analyzed for both the groups and were found out that p value was less than 0.05 which implies that there is no significant difference in the values which means that Lempert's maneuver is not inferior to Epley's maneuver.

## VI. CONCLUSION

- Most commonly involves the right side than the left.
- Most common age group involved in BPPV is 41 to 60 years.
- BPPV is less common among males.
- Lempert's maneuver is not inferior to Epley's in the treatment of BPPV.
- Results show a p value of less than 0.05 which means difference in outcome of treatment with either maneuvers are insignificant.
- The results obtained in our study was comparable with other international studies showing that Lempert's and Epley's maneuvers are very effective in our population for treating BPPV.

## VII. RECOMMENDATIONS

Further studies need to be conducted with a larger sample size.

The study should be done for longer periods to find out the long term efficacy of the corrective procedures for BPPV.

In BPPV further studies should be conducted to find out the 'true prevalence and burden' of untreated BPPV in older adults, the normal history of untreated BPPV and functional impact of BPPV on day to day life.

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