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## Benign Paroxysmal Positional Vertigo: Effectiveness of Canal Repositioning Procedure

Saleh Mohamed Abobaker Alshaiby\*

### Abstract

The objectives of this study were to describe the frequency of benign paroxysmal positional vertigo (BPPV), to assess the effectiveness of canal repositioning procedure & its recurrence and to find out the relationship of with osteoporosis and menopause. This was a retrospective study of all patients with BPPV seen in ENT private clinic in Aden over six-years period. The total patients were 400 patients. They were 87 (21.7%) males and 313 (78.3%) females with ratio male to female 1:3.6. The mean age of patients was (53.79±7.25) years. Most common effected ear was the right ear with (70.7%). The effected right ear in male and female patients was predominant. In male patients was (12.7%) and in female patients (58.0%) of the total patients ( $p = 0.005$ ). Males without osteoporosis were predominant (18.7%) while females with osteoporosis more more common (41.8%). The difference between values is statistically highly significant ( $p=0.000$ ). Out of the 313 women, 177(56.5%) women were menopauses. Most of menopausal women have osteoporosis 166(53.0%); while only 11(3.5%) have no osteoporosis ( $p=0.000$ ). Thirty percent of patients have recurrence after canalith repositioning maneuver. We concluded that repositioning procedure is very safe, and canalith repositioning procedure obtained timely resolution of the vertigo. BPPV is common in females mostly in the menopausal age and with osteoporosis.

**Key words:** BPPV, effectiveness, canal repositioning procedure, osteoporosis, menopause.

### Introduction:

Benign paroxysmal positional vertigo (BPPV) is presented as brief periods of vertigo experienced with a change in the position of a person's head relative to gravity. Benign paroxysmal positional vertigo is a mechanical disorder of the inner ear and is caused by abnormal stimulation of 1 or more of the 3 semicircular canals. The otoconia from the utricle dislodge and settle within 1 of the 3 semicircular canals, changing the fluid-filled canal dynamics from detecting rotation of the canals to detecting gravitation forces on the head. With BPPV, changing the plane of the involved canal relative to gravity causes debris to settle to the lowest part of the canal, changing the fluid pressure across the cupula, deflecting the hair cells, and generating the characteristic ocular nystagmus with associated vertigo [7]. There are 2 mechanisms of BPPV, the most common being debris within the long arm of the canal; this mechanism is called canalithiasis [16]. Debris also may be found in the short arm of the canal or attached to the cupula, weighting the membrane; this mechanism is called cupulolithiasis [30]. The canal most commonly involved is the posterior semicircular canal [24]. The diagnosis of BPPV is based on history and findings on positional testing [2,14]. Patients who complain of vertigo with rolling in bed or getting out of bed are 4.3 times more likely to have BPPV [34]. The Dix-Hallpike test [11] and

the side-lying test [8] are the standard tests [2,14] for evaluating posterior canal BPPV. A comparison of the Dix-Hallpike test and the side-lying test revealed no significant difference between the 2 techniques [8].

### Objectives:

- To describe the frequency of benign paroxysmal positional vertigo (BPPV): related to sex and age.
- To assess the effectiveness of canal repositioning procedure and its recurrence.
- To find out the relationship of BPPV with osteoporosis and menopause.

### Patients and methods:

A retrospective study of all patients who suffer from benign paroxysmal positional vertigo (BPPV) was investigated in a ENT private clinic in Al-Mansoura, Aden over a six-years-period, from January 2011 to December 2016.

During this period, a total of 400 patients were found with this health problem.

The patients' charts were retrieved and information was obtained about sex, age, effected ear, duration of symptoms, complaining of osteoporosis, menopause of female patients, and recurrence after canalith repositioning maneuver (RCRM).

All patients were diagnosed by history and positional test (Dix-Hillpike test) and treated by canalith repositioning maneuver (Epley maneuver).

The data was entered into a computer and analyzed using SPSS version 17, statistical

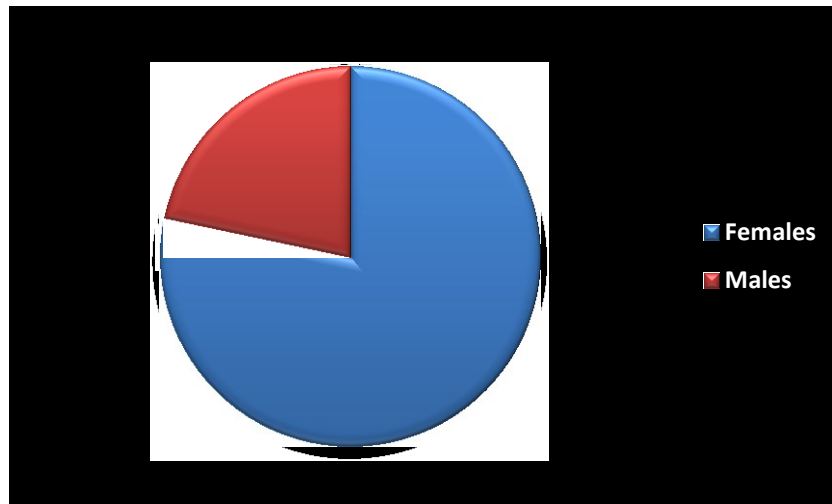
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package. For variables difference, chi-square tests, and P values were calculated, with differences at the 5% level being regarded as significant.

**Results:**

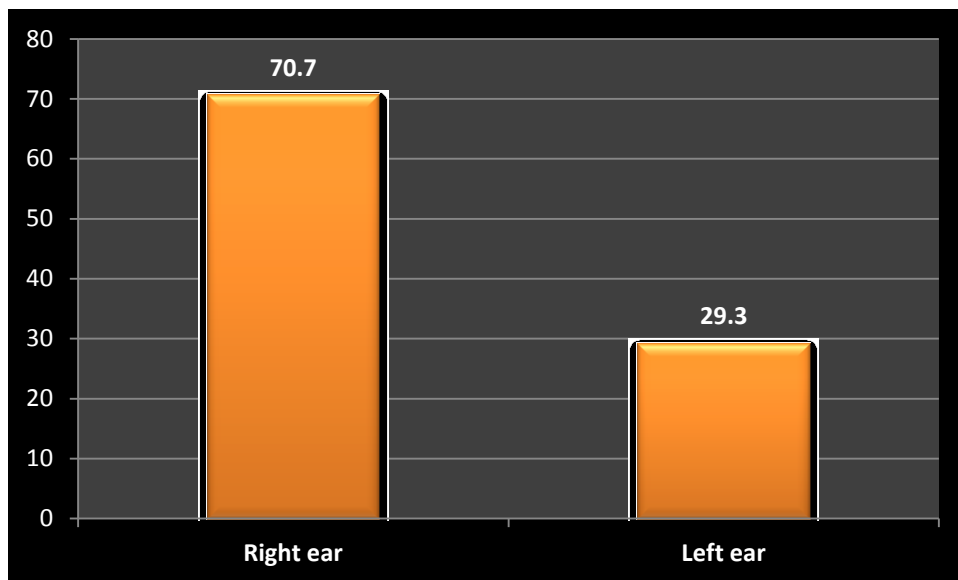
During the six years of the study period, 400 patients presented by vertigo were seen in our private clinic.

There were 87 (21.7%) males and 313 (78.3%) females with ratio male to female 1:3.6(Figure 1). The mean age of all patients was (53.79±7.25) years, range (40–75) years,(52.07±7.15) for males, and (54.27±7.21) for females, (P = 0.000).



**Figure 1: Distribution of patients related to sex**

The distribution of patients related to effected ear was 283(70.7%) with right ear and 117(29.3%) with left ear as shown in Figure 2.



**Figure 2: Distribution of patients according to effected ear**

Table 1 revealed that the effected right ear in male and female patients was predominant. In male patients was 51(12.7%) and in female

patients 232(58.0%)of the total patients. The difference between values is statistically significant (p = 0.005).

**Table 1: Distribution of effected ear related to sex**

Effected ear	Sex		Total No (%)
	Male No (%)	Female No (%)	
Right ear	51(12.7%)	232 (58.0%)	283(70.7%)
Left ear	36(9.0%)	81(20.3%)	117 (29.3%)
Total	87(21.7%)	313(78.3%)	400 (100%)

Chi-square = 7.904; p-value = 0.005

Table 2 shows that male patients without osteoporosis predominant with 75(18.7%) while female patients with osteoporosis were more

common with 167(41.8%). The difference between the values is statistically highly significant (p=0.000).

**Table 2: Distribution of patients with osteoporosis and without osteoporosis**

Patients	Sex		Total No (%)
	Male No (%)	Female No (%)	
With osteoporosis	12(3.0%)	167 (41.8%)	179 (44.8%)
Without osteoporosis	75 (18.7%)	146 (36.5%)	221 (55.2)
Total	87 (21.7)	313 (78.3)	400 (100%)

Chi-square = 43.095; p-value = 0.000

Table 3 shows the distribution of osteoporosis among menopause and non-menopause women in our study. The total women were 313. Out of them 177(56.5%) women were menapases and 136(43.5%) were non-menapases. Most of

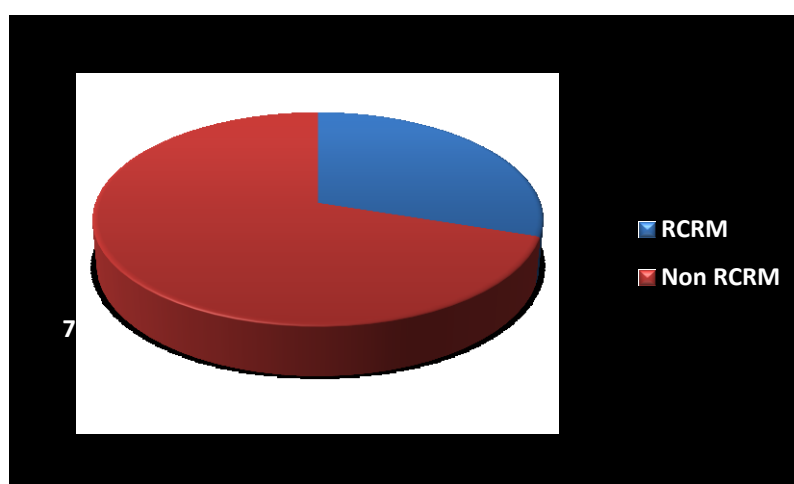
menopause women have osteoporosis 166(53.0%). While only 11(3.5%) of menopause women have no osteoporoses. The difference between values was statistically highly significant (p=0.000).

**Table 3: distribution of osteoporosis among menopause and non-menopause women (n=313)**

Menopause	Osteoporosis		Total No (%)
	No osteoporosis No (%)	Yes with osteoporosis No (%)	
No	135 (43.1%)	1 (0.3%)	136 (43.5%)
Yes	11 (3.5%)	166 (53.0%)	177 (56.5%)
Total	146 (46.6%)	167 (53.4%)	313 (100%)

Chi-square = 267.559; p = 0.000

Figure 3 shows that 30% of patients have recurrence after canalith repositioning maneuver while 70% have no recurrence.



**Figure 3: Percent of recurrence after canalith repositioning maneuver & non-recurrence**

#### **Discussion:**

BPPV is a clinical entity with a high incidence in the world population; it may be considered as the most frequent vestibular condition [6,15,21]. This disease is benign and may be treated by specific vestibular rehabilitation procedures, such as canalith repositioning procedures, vestibular suppressant drugs or surgery in refractory cases to medical treatments [15,21,29]. In the present study, female patients were predominant with a ratio male to female 1:3.6.

One epidemiological study of the general population in Germany conducted by von Brevern and his colleagues found that 2.4% of the population (3.2% of women, 1.6% of men) experienced BPPV at some time during their lives [32].

Yetiser et al. [36] reported that Females were found to be affected more frequently with a ratio male to female 1:1.5.

Also Dickson [10] reported that BPPV affects females twice as often as males. Other published studies confirmed our finding of females predominant by affecting with BPPV [1,5,13,17,20,23].

We found in our study that the mean age of all patients was (53.79±7.25) years, range (40–75) years, (52.07±7.15) for males, and (54.27±7.21) for females. Similar to our finding were reported by others [1,5,13,33].

In Brandt's [4] series, BPPV was considered as very common in elderly patients, especially around age 70 years; at this age, 30.0% of cases had presented this disease at least once.

In this study the distribution of patients related to effected ear was 283(70.7%) with right ear and

117(29.3%) with left ear.

Korres et al. [23] mentioned that right side has found to be affected more, maybe because the habit to sleep on the right side is more popular. The difference between values found statistically significant ( $p=0.005$ ).

In the current study, we found male patients without osteoporosis were more common 75(18.7%) as male patients with osteoporosis 12(3.0%), while female patients with osteoporosis were predominant with 167(41.8%). The difference between values is statistically highly significant ( $p=0.000$ ).

Several other independent groups from different countries have reported significantly reduced bone mineral density and increased incidences of osteoporosis/osteopenia in BPPV patients [18,19,31]. Osteoporosis is common in Yemeni women. This may be due to the increased incidence of hystrectomy due to multiple pregnancy or fibronoid tumors.

We found in this study the most of menopausal women have osteoporosis 166(53.0%). While only 11(3.5%) of menopausal women have no osteoporoses. The difference between values was statistically highly significant ( $p=0.000$ ).

In a published study from Brazil by Ogun et al. [27], they found that menopause is a major trigger of BPPV. Another common menopausal disease is osteoporosis and osteopenia.

Von Brevern et al [32] reported in their study that osteoporosis is common in women after menopause. Among the seven clinical studies analyzed, the study subjects in four [25,28,35] were postmenopausal women (older women), Another published study [18] included adult

women (about half of them were postmenopausal), while the remaining two studies [9,19] included adult men and women. They reported in their study that the incidence of osteoporosis was higher in women than in men, with female:male ratios of about 2:1 in these two studies.

The current study revealed that 30% of patients have recurrence after canalith repositioning maneuver while 70% have no recurrence.

As similar thing to our finding was reported by Dorigueto et al. [12] that most of the patients in their study had the non-recurrent form of the BPPV (70%). Recurrence rate was of 26% in one year of follow up.

Nunez et al. [26] mentioned that benign paroxysmal positional vertigo is a recurring disease, with a recurrence rate of approximately 15% per year.

Other published studies found recurrence of BPPV in 56% of individuals, in 50% of individuals [3] and 55% individuals [22] reported in other studies.

#### **Conclusion:**

1- Repositioning procedure is very safe, fast and effective in treating patient with posterior semicircular canal benign paroxysmal positional vertigo.

2- Canalith repositioning procedure obtained timely resolution of the vertigo in all patients. 30 percent experienced one or more recurrence but responded well to retreatment with CRP.

3- Posterior semicircular canal benign paroxysmal positional vertigo easy treated by CRP, so no need to an expensive investigations and medications that prescribe by some medical specialist and neurosurgeon.

4- Lack of education is very important factor in the direction of the patients to other specialty rather than ENT in treatment of this disease entity.

5-BPPV is common in females mostly in the menopausal age and with osteoporosis, estrogen hormone may play role in the pathophysiology , further research with gynecologist is needed.

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## الدوار الموضعي الانتيابي الحميد: فعالية إجراء إعادة القناة إلى وضعها الطبيعي

صالح محمد أبوبكر الشعيبي

### الملخص

كانت أهداف هذه الدراسة وصف وتيرة الدوار الموضعي الانتيابي الحميد ، لتقويم فعالية إجراء إعادة تموضع القناة وتكرارها ومعرفة العلاقة مع هشاشة العظام وسن اليأس . وكانت دراسة استرجاعية لجميع المرضى الذين يعانون من وتيرة الدوار الموضعي الانتيابي الحميد تم معاينتهم في عيادة خاصة للأنف والأذن والحنجرة في عدن على مدى ست سنوات . مجموع المرضى 400 مريض. منهم 87 (21.7%) من الذكور و 313 (78.3%) من الإناث مع نسبة الذكور إلى الإناث 1: 3.6. متوسط عمر المرضى  $(7.25 \pm 53.79)$  سنة. وكانت الأذن الأكثر شيوعا هي الأذن اليمنى مع (70.7%) ، وكانت سائدة بين الذكور والإناث ففي الذكور (12.7%) وفي الإناث (58.0%) من مجموع المرضى ( $p = 0.005$ ). وكان الذكور الذين لا يعانون من هشاشة العظام الغالبة (18.7%) بين الذكور في حين أن الإناث مع هشاشة العظام أكثر شيوعا (41.8%). الفرق بين القيم ذو دلالة إحصائية عالية ( $p = 0.000$ ). من بين 313 امرأة، كان هناك 177 (56.5%) من النساء في سن اليأس. ومعظم النساء بعد سن اليأس لديهن هشاشة العظام 166 (53.0%) ، في حين أن 11 فقط (3.5%) ليس لديهم هشاشة العظام ( $p = 0.000$ ) ثلاثون في المئة من المرضى كانت عندهم انتكاسة بعد إجراء إعادة القناة السمعية إلى وضعها . وخلصنا إلى أن إجراء إعادة الوضع هو آمن جدا، وأن إجراءات إعادة القناة السمعية إلى وضعها تمكن من الحصول على حل في الوقت المناسب للدوار. كما أن الدوار الموضعي الانتيابي الحميد شائع بين النساء في سن اليأس ولديهن هشاشة العظام .

**الكلمات المفتاحية:** الدوار الموضعي الانتيابي الحميد ، الفاعلية، إجراء إعادة تموضع القناة، هشاشة العظام، سن اليأس