Efficacy of the Epley maneuver for posterior canal BPPV: A long-term, controlled study of 81 patients

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Abstract

We assessed the efficacy of the Epley maneuver (canalith repositioning) in a study of 81 patients with posterior semicircular canal benign paroxysmal positional vertigo (BPPV). 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. In addition, 4 successfully treated patients experienced a recurrence between 1 and 6 months following treatment; 3 were retreated, and 2 of them responded well. We conclude that the Epley maneuver provides effective and long-term control of symptoms in patients with BPPV.

Introduction

Benign paroxysmal positional vertigo (BPPV), first described by Bárány in 1921,[1] is one of the most common causes of dizziness. Its annual incidence has been reported to be 64 cases per 100,000 population.[2] BPPV is a vestibular disorder that affects the semicircular canals of the labyrinth. Posterior semicircular canal BPPV is the most common type, but involvement of the other canals is seen, as well.[3] This article pertains to posterior canal BPPV only.

BPPV is characterized by brief episodes of vertigo that are precipitated by rapid changes in head position. Typical provocations include turning over in bed, lying down in bed, and extending the neck upward while reaching overhead. Some attacks are accompanied by nausea. The classic test maneuver and the typical findings in patients with BPPV were described in 1952 by Dix and Hallpike.[4] Classic BPPV is characterized by vertigo and nystagmus when the patient is rapidly placed in a supine position with the head in hyperextension to either side. The nystagmus has a short latency period of 1 to 5 seconds and fatigues after 30 to 45 seconds. The nystagmus is rotary and directed toward the downward ear. Typically, the nystagmus reverses when the patient returns to an upright position and fatigues as the maneuver is repeated.

Common causes of BPPV are head trauma and vestibular neuritis, but the etiology is unknown in most cases.[5]

The pathophysiology of BPPV is a source of controversy. In 1969, Schuknecht proposed the concept of *cupulolithiasis*; he hypothesized that canal debris adheres to the cupula and makes it abnormally sensitive to gravity.[6] Ten years later, an alternative explanation was offered by Hall et al, who proposed that in *canalithiasis*, degenerative debris does not adhere to the cupula but rather floats freely in the endolymph of the long arm of the canal.[7] Hall et al suggested that ampullary stimulation by these loose particles causes vertigo and nystagmus when the head is moved in the same plane as the posterior semicircular canal.

Based on the canalithiasis theory, Epley developed the *canalith repositioning procedure*, which came to be known as the *Epley maneuver*.[8] This maneuver was designed to cause the free canaliths to migrate by gravitation from the posterior semicircular canal to the utricle, where they would no longer interfere with the dynamics of the semicircular canals.

There is some evidence that the Epley maneuver is a safe and effective treatment for BPPV, but evidence that it provides a long-term resolution of symptoms is scarce.[9] In this article, we report the long-term results of our study of the Epley maneuver in the treatment of posterior semicircular canal BPPV.

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Patients and methods

We reviewed the charts of all patients with classic BPPV who had been seen in the Dizziness Unit of our hospital between Jan. 1, 2000, and Nov. 1, 2002. Study eligibility criteria included a typical history (brief, position-related dizziness) and a duration of symptoms of at least 1 month.

Our chart review revealed that each patient had undergone otologic and neurotologic evaluations. Vestibular testing had been performed when appropriate. The diagnosis of BPPV had been established by findings on the Dix-Hallpike maneuver. Frenzel glasses had been used to reduce visual fixation and to magnify the view of the eyes.

A total of 81 patients met the eligibility criteria for our study—61 patients in the treatment group and 20 in the control group.

Control group. The 20 controls had been seen between Jan. 1, 2000, and Jan. 31, 2001, prior to the introduction of the Epley maneuver at our hospital. These patients received no treatment for their BPPV.

Treatment group. The treatment group was made up of 17 men and 44 women who had been seen between Feb. 1, 2001, and Nov. 1, 2002.

Each patient was treated with the canalith repositioning maneuver described by Epley. During the maneuver, the patient's head was turned 45° toward the affected side and the patient was rapidly moved from the sitting position to the Dix-Hallpike position. The head was then kept tilted downward and rotated to 45° to the opposite side. Next, head and body were rotated until the patient was facing downward, 135° from the supine position. With the head turned to the unaffected side, the patient was brought to a sitting position. Finally, the head was turned forward with the chin down 20°. Each position was maintained for approximately 30 seconds or for as long as the nystagmus persisted. Unlike Epley,[8] we used neither mastoid oscillation nor premedication. Patients were instructed to keep their head as upright as possible for 48 hours after treatment; we suggested the use of an extra pillow during sleep. Seven patients who had bilateral disease were treated on only one side (the side with the more pronounced symptoms). Treatment of the contralateral side was not necessary in any of these patients.

Follow-up. All patients were contacted by telephone for follow-up evaluations 1 and 6 months following their initial visit. They were asked to subjectively quantify the

change in their vertigo as a percentage (0, 25, 50, 75, or 100%) of the degree of vertigo that they were experiencing at their first visit. A positive result was defined as an improvement of 75 or 100%.

In successfully treated patients, any symptoms of BPPV that manifested after the 1-month follow-up and before the 6-month evaluation were considered to represent a recurrence.

Statistical analysis was performed with the aid of SPSS 11 for Mac OS X.

Results

Multivariate analysis revealed that treatment and control groups were comparable in terms of age, sex, duration of symptoms, and bilaterality (table).

Table. Patient characteristics in the treatment and control groups

	Treatment group (n = 61)	Control group (n = 20)
Mean age (yr)	59	58
Sex (n [%])		
Male	17 (28)	6 (30)
Female	44 (72)	14 (70)
Mean duration of symptoms (mo)	17	14
Extent of involvement (n [%])		
Unilateral	54 (89)	18 (90)
Bilateral	7 (11)	2 (10)

Treatment group. Positive results were seen in 54 patients (89%) at 1 month and in 56 patients (92%) at 6 months.

In most cases, alleviation of BPPV symptoms became noticeable 2 or 3 days after treatment. Although feelings of light-headedness, unsteadiness, and imbalance were common soon after treatment, these symptoms are not consistent with BPPV and therefore we did not take them into consideration when analyzing the efficacy of treatment.

Seven patients reported no change in positional vertigo at 1 month; 3 underwent a repeat Epley maneuver, and all were eventually free of vertigo.

At the 6-month follow-up, 4 patients who had reported a positive result at the 1-month follow-up subsequently reported a recurrence of their vertigo at some point subsequent to the first follow-up. One of these patients developed horizontal canal BPPV 4 months after treatment; the other 3 patients underwent a second treatment, and 2 responded well.

Control group. Only 2 of the 20 controls (10%) reported improvement at the 1-month follow-up. At the 6-month evaluation, that number had increased to 10 (50%).

The difference in resolution of vertigo between the two groups was statistically significant at both 1 month (χ^2: 43.52; $p<0.0001$ [Fisher exact test]) and 6 months (χ^2: 17.44; $p<0.0001$ [Fisher exact]).

Discussion

High success rates have been shown in uncontrolled studies of the Epley maneuver:

- In his initial description of his maneuver in 1992, Epley reported a 100% success rate in 30 patients.[8]
- In 1993, Parnes and Price-Jones reported a positive result in 30 of 38 patients (79%).[10]
- In 1994, Welling and Barnes described a complete or significant recovery in 21 of 25 patients (84%).[11]
- In a large study published in 2000, Nunez et al reported a resolution of symptoms in 138 of 151 patients (91%).[12]

However, because these studies were uncontrolled, the spontaneous recovery rate was not taken into account.

Randomized controlled studies of the Epley maneuver have also shown a statistically significant benefit in its favor:

- In 1995, Lynn et al reported that the Epley maneuver resulted in both objective and subjective improvements at a 1-month follow-up.[13] Objective improvement was seen in 16 of 18 treated patients (89%), compared with only 4 of 15 controls (27%) who underwent a sham procedure. Likewise, subjective improvement was seen in 11 treated patients (61%) and 3 controls (20%).
- In 1999, Wolf et al reported objective improvements in 23 of 31 treated patients (74%) and in 5 of 10 untreated controls (50%) at 3 months' follow-up.[14]
- In 2000, Froehling et al found objective improvement in 16 of 24 treated patients (67%) and in 10 of 26 controls (38%) who underwent a sham procedure.[15] Subjective improvement was achieved by 12 (50%) and 5 (19%) subjects, respectively. However, the follow-up period spanned only 2 weeks.

- In 2003, Yimtae et al described improvement in 22 of 29 treated patients (76%) and in 14 of 29 untreated controls (48%) at 1 month.[16]

Our study differs from most of these others in that (1) we included patients whose symptoms had been present for at least 1 month, (2) our control group was comparable with our treatment group, (3) our follow-up period was relatively long, and (4) our sample size was relatively large. Because many cases of BPPV resolve spontaneously within a few weeks or months, we excluded all patients whose symptoms had been present for less than 1 month. It is unlikely that the vertigo resolution in our treatment group was a spontaneous phenomenon because improvement usually occurred within a few days of treatment. Therefore, we can reasonably conclude that the Epley maneuver was in fact responsible for the resolution of symptoms.

We acknowledge that our assessment of outcomes was subjective and that we did not perform a posttreatment Dix-Hallpike maneuver to ascertain results objectively. Unfortunately, the design of our study did not allow for Dix-Hallpike testing as part of our follow-up.

We earlier noted that we discounted our finding that some successfully treated patients experienced feelings of light-headedness, unsteadiness, and imbalance shortly after treatment (a finding also reported by others[9,10]). Certainly, our treatment success rate would have been lower had we considered the presence of these symptoms to represent a negative result. But again, our purpose was to study only position-related vertigo, and these symptoms are not consistent with BPPV.

We are not aware of any complications of treatment in our study. Herdman and Tusa reported that the Epley maneuver may cause BPPV of the horizontal or anterior canal if debris moves into either canal.[17] In our study, 1 patient with recurrent vertigo developed horizontal canal BPPV, but it is unlikely that this was caused by the Epley maneuver because these symptoms did not appear until 4 months after treatment.

In conclusion, our study establishes that the Epley maneuver provides effective and long-term control of symptoms in patients with posterior canal BPPV.

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