Canalith Repositioning for BPPV: An Evidence-Based Review & Practice Centered Approach to Treatment

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Agenda

I. Benign paroxysmal positional vertigo (BPPV) and canalith theory
   Historical background and review

II. Canalith repositioning treatments (CRT)
   Questions to be answered
   Literature review / published practice guidelines
   Best practice recommendations

III. Outcome data
   Collecting and utilizing as a marketing tool
Learning Outcomes

I. Describe the most effective treatment methods for BPPV based on published literature

II. Apply best-practice protocols to improve overall patient outcome

III. Discuss how CRT outcome data can be used as an effective marketing tool
Survey

How many currently perform vestibular assessments as part of your routine practice?

How many routinely administer canalith repositioning treatment for your patients with BPPV?
Audiologists are involved in the treatment of persons with vestibular disorders. They participate as full members of the balance team and can recommend and carry out treatment or rehabilitation of impairments of vestibular function.

American Academy of Audiology, 2004

Why do we care about treatment for BPPV?
Brief Review

Benign Positional Vertigo (BPPV) is one of the most common diagnosis made in dizziness specialty clinics.

It accounts for approx. 18% of patients seen at these facilities and 25% of those sent for vestibular testing. ¹,²

BPPV has a lifetime prevalence of 2.4% that increases with age and is 7x higher in those over age 60. ³,⁴
The diagnosis is implied by a history of short episodes of vertigo that are provoked by:

- rolling in bed,
- lying down,
- sitting up from a supine position,
- bending over, or
- looking up
The diagnosis is confirmed by visualization or video recording of characteristic eye movements accompanying the symptoms of vertigo when the patient's head is moved into a specific orientation with respect to gravity.
BPPV occurs when free otoconia are suspended in the endolymph of the vestibule (canalithiasis) and migrate into one of the semicircular canals.

Normally the SCCs are excited by head rotation only. When particles more dense than the endolymph of the SCC are introduced, the canals become gravity sensitive, pathologically responding to changes in head position.
An Abbreviated History of BPPV
The earliest reference to BPPV may have been by Shakespeare, according to a Review Article published in the International Journal of Otolaryngology, Hornibrook J., Int J of Otol, Volume 2011, Article ID 835671, 2011

“Romeo and Juliet” Act 1, Scene II [enter Romeo and Bevolio] Bevolio says “Tut man, one fire burns out another’s burning. One pain is lessen’d by another’s anguish; turn giddy, and be holp by backwards turning…”

Translation from “No Fear Shakespeare” web site:
http://nfs.sparknotes.com/romeojuliet/page_30.html

“Come on, man. You can put out one fire by starting another. A new pain will make the one you already have seem less. If you make yourself dizzy, you can cure yourself by spinning back around in the opposite direction.”
More to the Point

In the medical journals, the first descriptions of positionally induced vertigo are attributed to Adler in 1897 and Barany in 1921.

Both believed that it was a disorder of the otolithic or macular organs.
Margaret Dix and Charles Hallpike, in 1952, presented a symptomatological definition and a provocative positional test for what they called “positional nystagmus of the benign positional type”
Harold Schuknect, in 1962 at Harvard University proposed that BPPV “might be caused by detached utricular otoconia, acting upon the cupula of the posterior semicircular canal”.

In 1969 he confirmed finding basophilic staining masses attached to the posterior canal cupula in patients who had had BPPV symptoms.

He named this “cupulolithiasis” (heavy cupula).
Cupulolithiasis became the dominant theory for nearly 30 years, although it did not account for the variability and often long latency and fatiguability of the nystagmus, and was the driving force behind two early specific treatments.
Previously, “treatment” was based on Cawthorne’s exercises in which the patient was instructed to repeat continuously any movement which caused the vertigo until it ceased.

These are now referred to as Cawthorne-Cooksey (CC) exercises and are still utilized today to some extent for home therapies.
In 1980, Brandt and Daroff, based on the theory of cupulolithiasis devised an inpatient treatment where the subjects lay down on the provocative side, sat up for 30 seconds, and then lay down to the other side every 3 hours.
Also, in 1980 and later in 1988, Semont, a French physiotherapist, and Sterkers modified this to what they termed the *Liberatory maneuver*. 

It is now known as the *Semont maneuver*. 

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In attempting to explain the latency and fatiguability of BPPV nystagmus, 1979 Hall et al. and later in 1993 Epley made models of the semicircular canal independently and proposed that latency and fatiguability of the BPPV nystagmus were better explained by free-floating particles in the posterior canal which Epley called “canalithiasis”.
In 1992 Parnes and McClure (London, Ontario), in attempting a surgical posterior canal occlusion, observed and photographed free otoconia in the endolymphatic space.
Epley, based on his models, in 1992 proposed a controlled set of head movements he called the *canalith repositioning procedure (CRP).*

Epley presented this as an instruction course at the AAO, Head and Neck Surgery meeting and was ridiculed because he used a heavy massage vibrator over the mastoid process.
After seeing canaliths during the previously mentioned surgery, Parnes (1993) described an almost identical particle repositioning maneuver (PRM) [often called the Modified Epley maneuver] with the main difference being its slower pace and no use of mastoid vibration.
Previous “atypical” forms of positionally induced nystagmus were assumed to always have a central cause.

While performing CRPs, Epley (1995) noticed a sudden change of “typical” torsional posterior canal nystagmus to horizontal direction-changing nystagmus.
He deduced the nystagmus is caused by otoconia in the horizontal and even the superior canal.

Without any clinical proof, he prognosticated the logical treatment for horizontal canal BPPV would be a 360 degree horizontal plane rotation away from the symptomatic ear.
Horizontal canal BPPV was then reported by others (Baloh et al., 1993: De La Meilleure et al., 1996: Nuti, et al., 1996)

In 1996, a 270 degree “barbeque” roll was trialed by Lempert and Tiel-Wilck)
Modern Day Treatment Maneuvers

- Epley / modified Epley maneuver (CRP)
- Semont (Liberatory) maneuver
- Gans repositioning maneuver
- Cassani maneuver
- Apiani maneuver
- Lempert (BBQ Roll) maneuver
- Gufoni maneuver
- Vanucchi-Asprella liberatory maneuver
- Brandt-Daroff exercises
Questions to be answered

Which treatment(s) are the most effective?

Do per-treatment modifications (e.g. mastoid vibration) increase efficacy?

Do post-treatment restrictions (cervical collar or position avoidance) increase positive results?

What is appropriate follow-up?
Literature Review:

There have been numerous studies individually, over the years, examining specifically these types of questions in different manners.

Literature Review:

This was followed shortly thereafter in August 2008 by The American Academy of Otolaryngology – Head and Neck Surgery with their publication of *Clinical practice guidelines: Benign paroxysmal positional vertigo.*

Both papers sought to establish best-practice guidelines by reviewing published studies, analyzing conclusions and making evidence based recommendations.
Literature Review:

Studies were rated somewhat differently between the two publications but were based largely upon study design (risk of bias), classification of evidence and strength of recommendation (consistency/repeatability) across the research.

Conclusions or guidelines were then made by both groups based upon the ratings conferred upon findings and the studies themselves.
Literature Review:

Results were as follows:
Question #1a:
Which treatments are most effective for posterior (inferior) canal BPPV?
Fifteen randomly controlled studies identified (two class I and three class II) for Epley maneuver.  

Four studies identified (one class II, one class III and two class IV) for Semont maneuver. 

Fifteen randomly controlled studies identified with several denoted as ‘high quality.’ Grade B based on small sample sizes and heterogeneity.
Modified Epley maneuver (CRP) is established as an effective and safe therapy that should be offered to patients of all ages with posterior SCC canal BPPV. \(^5,6\)

The Semont maneuver is possibly as effective for BPPV (insufficient evidence to establish relative efficacy of the Semont maneuver to modified Epley maneuver (CRP). \(^5,6\)

Epley maneuver (CRP) and Semont maneuver are both more effective than Brandt-Daroff or no treatment in relieving symptoms of PC BPPV. \(^5,6\)
Question #1b:
Which treatments are most effective for horizontal (lateral) canal BPPV?
21 Class IV studies identified. ⁵

All horizontal canal BPPV maneuvers included; the Lempert maneuver (barbecue roll), the Gufoni maneuver, and the Vanucchi-Asprella liberatory maneuver. ⁵

Limited RCT data exists with respect to effectiveness of horizontal canal BPPV treatment. Most studies examined are primarily cohort or case studies. ⁶
Answer:

Modified Epley (CRP) is ineffective for horizontal canal BPPV treatment.\textsuperscript{5,6}

Based on Class IV studies, variations of the Lempert supine (BBQ roll) maneuver, the Gufoni method, or forced prolonged positioning seem moderately effective for horizontal canal BPPV.\textsuperscript{5}

Based primarily on cohort and case series studies, the Lempert roll maneuver in addition to forced prolonged positioning appear to be about 75% effective in treating horizontal canal BPPV. However, response rate variability is high.\textsuperscript{6}
Answer: continued

Variations of the roll maneuver appear moderately effective when used as treatment for horizontal canal BPPV.\(^6\)

The Gufuoni and Vannucchi-Asprella liberatory maneuvers may be effective but no data beyond uncontrolled studies support their effectiveness.\(^6\)

There are presently no randomly controlled studies to provide reliable measures of effectiveness for other methods of tx.\(^6\)

There is insufficient evidence to recommend a preferred treatment maneuver for horizontal canal BPPV above all others so no further recommendations can be made at this time.\(^5,6\)
Question #1c:
Which treatments are most effective for anterior (superior) canal BPPV?
2 Class IV studies identified.  

Both uncontrolled Class IV studies report high response rates to maneuvers for anterior canal BPPV.  

Topic not addressed by AAO-HNS.
Answer:

Anterior canal BPPV is usually transitory and most often the result of “canal switch” that occurs in the course of treatment for more common forms of BPPV.\(^5\)

Success rates were between 92-97% using modified Epley (CRP), though there were no controls to determine whether this represents an improvement over the natural history of this frequently self-resolving form of BPPV.\(^5\)

No best practice recommendations can be made at this time based on insufficient evidence.\(^5\)
Question #2: Do per-treatment modifications (e.g. mastoid vibration) increase treatment efficacy?
One Class II study showed no difference in immediate symptom resolution or relapse rate between groups.⁵

One Class III showed no difference in symptom relief between the groups at 4 to 6 weeks.⁵

Two Class IV studies showed no difference in the rate of symptom resolution.⁵

A third Class IV study reported of patients treated with vibration, 92% were “improved,” vs. 60% with CRP alone.⁵

One Class II, one Class III, and two Class IV studies showed no added benefit when mastoid vibration was added to a CRP as treatment for posterior canal BPPV.⁵
Answer:

Mastoid oscillation is probably no added benefit to patients treated with CRP for posterior canal BPPV. 5

Topic not addressed by AAO-HNS.
Question #3
Do post-treatment restrictions (e.g. cervical collar or position avoidance) increase treatment efficacy?
One class I and one class II study demonstrating benefit for use of cervical collar (48 hours) and avoided sleeping on affected side for one week.⁵

Five Class IV studies comparing CRP with and without post-treatment activity restriction showed no added benefit from activity restriction or position avoidance.⁵

One Class IV study showed minimal benefit in patients with post-activity restrictions.⁵
Two studies found no improvement in those with restrictions. 6

Another study found slight benefit in patients with post-activity restrictions as measured by the number of maneuvers required to produce a negative Dix-Hallpike response. 6
Answer:

Based on six Class IV studies, there is insufficient evidence to determine the efficacy of post-maneuver restrictions in patients treated with modified Epley maneuver (CRP). 5

Similar response rates whether or not post-treatment positional or activity restrictions (i.e. cervical collar or positional avoidance) are observed. 6

No recommendation about cervical restriction or position avoidance can be made at this time. 5

There is insufficient evidence to recommend post-maneuver restrictions at this time. 6
Question #4
What is appropriate follow-up for BPPV treatment?
Patients with BPPV will have variable responses to therapy depending upon numerous factors.

Failure to respond to therapy may indicate an initially erroneous diagnosis of BPPV as some CNS disorders mimic presentation and would not respond to CRT.

In cohort studies the rate of false-positive BPPV diagnosis found to be CNS lesions after initial CRT is 1 to 3 percent. ⁶
Almost all treatment outcomes for BPPV are reported in the form of the patients reported symptoms; thus complete resolution, improvement or no improvement. ⁶

A symptom-based reassessment following initial tx allows clinicians to gain a more objective measure of outcome. ⁶

Aggregate evidence quality: Grade C, based on studies with known significant failure rates for an observation option and lower failure rates for PRM. ⁶
Answer:

Clinicians should reassess patients within one month after an initial period of observation or treatment to confirm symptom resolution.⁶

One month reassessment time allows for balance between overly early re-check (which may force unnecessary 2nd tx on those that would resolve w/ additional time) and unduly delayed reassessment (which could potentially allow harm from misdiagnosis or relegate patient to excessive suffering)⁶

Recommendation based on observational outcome studies and expert opinion and a preponderance of benefit over harm.⁶
But how is all this information useful for my practice?
Audiologists should be recognized as a key contributor for management of the balance patient (scope of practice)

We want patients to identify us as the professionals to see for not just hearing problems but also balance disorders

We want to eliminate unnecessary physician referrals

We want to use outcome data gathered from our BPPV tx as a means to market ourselves & our practices to others
Collecting the data

How to gather the data?

Questionnaire or survey (Likert scale)

- Develop your own scale
- Utilize an existing outcome measure (DHI)
- Modify an existing measure (re-verify it)
Collecting the data

When to gather the data?

- Pre and post intervention optimal
  
  Pre: At time of first appointment
  
  Post: One to two weeks or longer (?)
  
- Give adequate time for total resolution of sx

- Post can be done via phone call or mailed survey
Collecting the data

What types of information to gather?

- Rate your dizziness prior to evaluation
- Rate your dizziness post treatment
- Does your dizziness cause restrictions in your life
- How has this treatment affected that
- How do you feel about your dizziness now
- If you are still experiencing dizziness, rate it
Collecting the data

Enter all information into a database.

Perform a statistical analysis to show significant improvement

T-test $P<.05$ $P<.001$

Graphical representation of results

various internet tools to aid you
Market yourself effectively!

- Resolved: 77%
- Improved but still present: 17%
- No change: 6%

Improvement in dizziness

Improvement in quality of life
What did we learn?

Evidence-based practices = Better results
Better results = Positive patient experiences
Positive patient experiences = Increased word of mouth
Increased word of mouth = Greater # of referrals
Greater # of referrals = Higher profitability
Higher profitability = SUCCESSFUL PRACTICE
References


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Questions
THANK YOU!!!