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Outcome of Gans Repositioning Maneuver in Patients with Posterior Canal Benign Paroxysmal Positional Vertigo with Cervical Spondylosis

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Abstract

Background and Objectives: Cervical spondylosis and BPPV often co-exist in older population. As GRM doesn't involve hyperextension of neck, which is better avoided among patients with cervical spine pathology, we decided to assess the outcome of GRM in patients with cervical spondylosis in terms of safety & efficacy. **Methodology:** Twenty patients with clinically proven posterior semicircular canal BPPV and radiologically evident cervical spondylosis without symptomatic spondylotic myelopathy or radiculopathy or severe restriction of neck or back movement were enrolled. GRM was done on the first day and repeated until resolution of nystagmus, for a maximum of four times. Lack of response to GRM even after fourth attempt was considered as failure. The manuever was repeated in the successful group on day two and after one week & these patients were followed up for one month. **Results:** Overall, 75% of the patients (50.9% to 91.3% - 95% C.I.) had a successful repositioning maneuver. Favourable parameters for better chances of cure were higher age (>55 years), male gender & higher grade of cervical spondylosis. 20% of patients had experienced temporary pain for few hours on the day of maneuver. None of the patients who had less than two attempts of GRM had post-procedure pain. Clinically, none of the patients had precipitation of cervical myelopathy or radiculopathy. **Conclusion:** GRM is a safe & effective particle repositioning maneuver for patients with posterior semicircular canal BPPV with co-existent cervical spondylosis.

Keywords: Benign paroxysmal positional vertigo, cervical spondylosis, Gans repositioning maneuver

Introduction

Cervical spondylosis often complicates benign paroxysmal positional vertigo (BPPV) in the older population.[1,2] Epley's canalith repositioning maneuver, one of the most popular treatments for posterior semicircular canal (SCC) BPPV, involves hyperextension of the neck. Hence, fear of precipitating dynamic cervical spinal cord compression secondary to dorsal buckling of the stiffened ligamentum flavum does exist when it is adopted in patients with cervical spondylosis.[3]

The new hybrid maneuver by Dr. Richard. E. Gans includes side-lying posture like Semont's maneuver and turning to the opposite side like Epley's maneuver but avoids hyperextension of the cervical spine[1,2,4] [Figure 1]. Hence, we intended to observe the outcome of Gans repositioning maneuver (GRM) in patients with cervical spondylosis.

Materials and Methods

Twenty patients who visited the ENT Outpatient Department at ACS Medical College and Hospital in the time period of 3 years from January 2016 to January 2019 and clinically met the inclusion and exclusion criteria were chosen by universal sampling technique as participants for our study.

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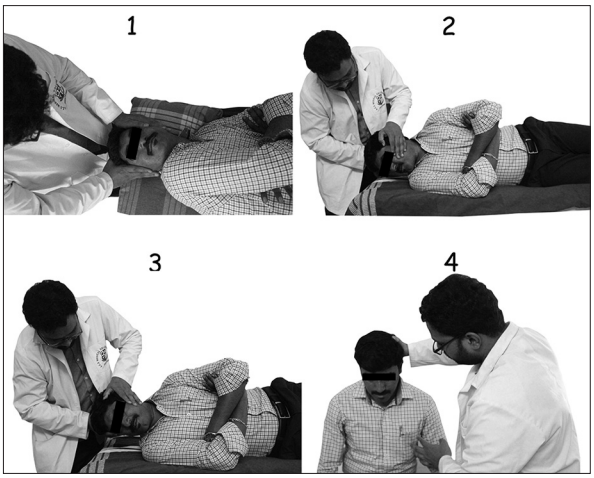

Figure 1: Gans repositioning maneuver sequence for an imaginary case of left posterior canal benign paroxysmal positional vertigo. Step 1: Head turned 45° to the right and placed in a side-lying position on the left side. Step 2. A patient rolled from the left side to the right side with head maintained in position 45° to the right. Step 3. Liberatory headshake: After provocation of symptoms elicited by position 2, the patient instructed to shake head side to side three or four times. Step 4. The patient's body brought to seated position with head turned forward to center position

Rationale for sample size

Based on literature review,[1] 95.6% of the cases were found to have been successfully treated within two attempts of GRM. After setting the limits of precision at 10% and using the formula, sample size = $(Z^{\alpha})^2$*P*Q/L^2, we found the desired sample size to be 18 and we decided to study on 20 patients.

All the patients with a clinically positive positional test for BPPV (classical/modified Dix–Hallpike test) underwent screening by digital X-ray of the cervical spine for associated cervical spondylosis. Only the patients with coexistent posterior SCC BPPV and cervical spondylosis who formally gave consent for the procedure were included in the study. The degree of cervical spondylosis was graded using the Kellgren's classification[5] by a radiologist [Table 1].

A senior orthopedician's opinion was obtained to clinically assess the patient and rule out any contraindication for the maneuver. The main exclusion criteria were presence of a clinical suspicion of either cervical radiculopathy or myelopathy as we did not want to accidentally end up precipitating neurological deficits in the patient after the maneuver. Patients with severe restriction of neck or back movement, with obesity (weight >100 Kg) or hip issues (like posthip replacement) who found it difficult to perform the maneuver, were also excluded from our study.

After obtaining the orthopedician's clearance and informed written consent from the patient, was done. For patients who had a positive modified Dix–Hallpike test prior to the maneuver, GRM was repeated until the modified Dix–Hallpike test was negative. Among patients who had only a positive Dix–Hallpike test but had a negative modified Dix–Hallpike test before the maneuver, GRM was done until the Dix–Hallpike test was negative. After confirming the treatment to be successful by a negative positional test following the maneuver, we repeated the maneuver once more for safety purpose, as putting the patient into the testing posture may trigger the particles to come back into the SCC from the utricle again.

Table 1: Kellgren's grading of cervical spondylosis

Kellgren's grade	Features on X-ray
Grade 0 (normal)	No degenerative changes
Grade1 (minimal/early)	Minimal anterior osteophyte formation
	No reduction of intervertebral disc height
	No vertebral endplate sclerosis
Grade 2 (mild)	Definite anterior osteophyte formation
	Subtle or no reduction in intervertebral disc height (<25%)
	Just recognizable sclerosis of the endplates
Grade 3 (moderate)	Definite anterior osteophyte formation
	Moderate reduction in intervertebral disc height (25%-75%)
	Definite sclerosis of the endplates and osteophytes
Grade 4 (gross)	Large and multiple large osteophyte formation is seen
	Severe narrowing of the disc space (>75%)
	Sclerosis of the endplates with irregularities

A maximum of four attempts were given on day 1 before labeling the maneuver to be unsuccessful. In such case, further GRM was not attempted. If the treatment was found successful, it was repeated the very next day and again after a month. The maneuver was planned to be discontinued if patients complained of any symptoms suggestive of spinal cord or nerve root compression. If the patient had a resolution of nystagmus on day 1 but had postprocedure pain, the repetition of the maneuver was deferred until subsidence of pain. During these reviews, the Dix–Hallpike and modified Dix–Hallpike test results were observed. Patients who had negative positional test even a month after maneuver were declared as being treated successfully.

All the patients were enquired regarding any worsening of their symptoms pertaining to cervical spondylosis and were reviewed by the orthopedician to rule out any neurological deficit precipitated by the maneuver. The demographic details, complaints, and clinical examination findings of the patients were recorded in a detailed proforma and tabulated in an excel sheet and statistically analyzed using Epi Info version no. 7.2.2.16 (Centers for Disease Control and Prevention, Atlanta, Georgia, USA).

Results

Twenty patients with posterior SCC BPPV with radiological and clinical evidence of cervical spondylosis without any symptoms or signs suggestive of myelopathy or radiculopathy

were enrolled as participants in this study. The study group comprised of 11 female and 9 male patients. The mean age of the patients was 55.05 ± 26.96 (95% CI: 28.09 to 82.01). Twelve patients had cervical spondylosis of Grade I/II and eight patients had Grade III/IV cervical spondylosis. The results of the study are shown in Tables 2-4.

Discussion

Most of the articles in literature have focused on the efficacy of GRM[1,2,4,6,7] and have compared it with that of other particle repositioning maneuvers.[2,4,6,7] Although technically many authors have mentioned that GRM should be safe in patients with neck issues such as cervical spondylosis,[1,2,4,6,7] there is a paucity of data pertaining to the safety of GRM in such patients. The inherent fear in some of the otorhinolaryngologists that performing the maneuver would land up precipitating any focal neurological deficits refrains them from adopting any particle repositioning maneuver as a treatment modality and makes them just to prescribe vestibular suppressants. Drugs can only temporarily reduce the severity of the symptoms but cannot be expected to abolish vertigo as the underlying pathology of cupulolithiasis/canalithiasis goes unaddressed. The Clinical Practice Guideline Update 2017 by Bhattacharyya *et al*.[8] recommends against the use of vestibular suppressants in treatment of BPPV. The use of vestibular suppressants may obscure the findings on the positional test. In addition, there is evidence of potential side effects from the antihistamine class of medications on cognitive functioning[9] and on gastrointestinal motility, urinary retention, vision, and dry mouth in the elderly.[10]

There is no evidence in the literature to suggest that any of these vestibular suppressant medications are effective as a definitive, primary treatment for BPPV or as a substitute for repositioning maneuvers.[8] Patients mostly continue to stay symptomatic despite treatment with these drugs. Hence, in this study, we intended to study the success rate and safety of GRM in patients with cervical spondylosis.

Hyperextension and torsion of the head for few seconds as in the Dix–Hallpike test could be acceptable as stated by Dispenza *et al*.,[4] but persistent hyperextension for 30–120 s on either side as in Epley's CRM may be hazardous to the spine. Although the modified Dix–Hallpike test is preferred in patients with cervical spondylosis,[11] some patients in our study (25%) had a negative modified Dix–Hallpike test, and we had to do a Dix–Hallpike test to confirm both posterior SCC BPPV and its resolution.

Patients were selected in our study after formally ruling out any evidence of cervical myelopathy or radiculopathy by obtaining the senior orthopedician's opinion [Table 5 for clinical features suggestive of cervical cord compression).[3,12,13]

Complaints of neck pain with or without radiating arm pain along with findings of diminished muscle stretch reflexes,

Table 2: Overall efficacy of gans repositioning maneuver

Total number	GRM effective (%)	95% CI
20	15 (75)	50.9-91.3

CI: Confidence interval, GRM: Gans repositioning maneuver

Table 3: Factors influencing efficacy of gans repositioning maneuver (*n*=20)

	n (%)	Successful (%)	Unsuccessful (%)
Age group			
31-55	10 (50)	6 (60)	4 (40)
55-80	10 (50)	9 (90)	1 (10)
Gender			
Male	9 (45)	8 (88.89)	1 (11.11)
Female	11 (55)	7 (63.63)	4 (36.37)
Grade			
I and II	12 (60)	7 (58.33)	5 (41.67)
III and IV	8 (40)	8 (100)	0 (0)

GRM: Gans repositioning maneuver

Table 4: Postprocedure pain

	n (%)
Age group (*n*)	
31-55 (10)	1 (10)
56-80 (10)	3 (30)
Sex (*n*)	
Male (9)	1 (11.11)
Female (11)	3 (27.27)
Grade (*n*)	
I and II (12)	1 (8.33)
III and IV (8)	3 (37.5)
Number of attempts (*n*)	
<2 (9)	0
>2 (11)	4 (36.36)

Table 5: Signs of cervical myelopathy

Motor signs
Weakness in triceps and hand intrinsic muscles
Atrophy of intrinsic hand muscles
Clumsiness with fine motor skills
Proximal weakness of lower extremities
Upper motor neuron signs
Inverted radial reflex
Hoffman's sign
Babinski sign
Pathological clonus
Sensory dysfunction
Lhermitte's sign
Impaired Romberg's test
Glove-like sensory loss in hands
Proprioceptive dysfunction
Late findings
Muscle atrophy
Fasciculations
Sphincter dysfunction

loss of sensation, and motor weakness are considered as classical diagnostic findings of cervical radiculopathy. Cervical range of motion is also often impaired in such individuals.[13]

Various provocative tests have been found to be useful in the diagnosis of cervical radiculopathy, namely Spurling's test, shoulder abduction test, Valsalva's maneuver, neck distraction, and Elvey's upper limb tension test.[14]

In our institute, we usually repeat Epley's maneuver until the Dix–Hallpike test is negative for suitable cases of BPPV. Hence, we adopted the same policy even for GRM and repeated it on the same day until resolution of nystagmus on positional testing. However, we repeated it a maximum of four times and called it off after the same because we did not want the patient's neck to be under strain for long time. The repetition was also avoided if the patient complained of pain or numbness or weakness of limbs during the procedure. The result of the maneuver was considered as a failure in case of nonresolution of symptoms even after four attempts. This method is different from the conventional one mentioned by Roberts *et al*.[1] In the original study, they had repeated GRM only in weekly intervals until resolution of nystagmus, but all the participants had a resolution of vertigo and nystagmus latest by the fourth attempt. This was the other rationale behind fixing the maximum attempts for a patient to four. In the study by Dispenza *et al*.,[4] they had performed the maneuver a maximum of two times in one sitting and repeated it after 3 days if the maneuver had no response on day 1. However, we did not repeat the maneuver again in patients who did not have response on day 1 as in our study as we were studying regarding the safety of the GRM in patients with cervical spondylosis which has not been tested in the previous studies mentioned in literature.

In our study, we have observed all the patients only for 1 month which is much lesser than the duration in the study by Roberts *et al*.[1] However, none of the patients reported to us after the initial treatment with recurrent symptoms after this 1-month period.

It was observed that patients belonging to higher age group (>55 years) had a better success rate when compared to patients <55 years of age (90% vs. 60%). It was also observed that male patients did better after the maneuver when compared to females (88.89% vs. 63.63%). Patients with a higher grade of cervical spondylosis (III and IV) were found to have a better response to therapy on comparison with those with a lower grade of cervical spondylosis (I and II). In fact, all the patients with a higher grade of cervical spondylosis had a successful resolution of vertigo after GRM [Table 3].

Overall, the maneuver was successful in 75% of the patients (95% CI: 50.9%–91.3%) which is closer to the success rate of GRM among patients with hip or neck issues mentioned in the study by Dispenza *et al*.[4] (78.95%, 15/19 patients) [Table 2].

The average number of attempts required for successful resolution of vertigo in patients in our study was 2.27 which was close to the mean value (2.3) among the subgroup with hip, neck, or vertebral column diseases in the study by Dispenza *et al*.[4] However, only 1.25 and 1.7 average attempts of GRM were necessary in studies by Roberts *et al*.[1] and by Badawy *et al*.,[7] respectively, for successful therapy. The methodological differences may account for some of the differences in results observed between our study and the rest of the articles in literature pertaining to GRM.

One patient (5%) had an initial disappearance of nystagmus on day 1 after three attempts of GRM but had a recurrence of positional vertigo on the next day. However, even in this patient, nystagmus subsided with just one attempt on day 2, and on further follow-up, the patient did not have any recurrence of vertigo or nystagmus.

Women as against men (30% vs. 10%), patients of higher age group vs. lower age group (27.27% vs. 11.11%), and patients with a higher grade of cervical spondylosis as against those with a lower grade (37.5% as against 8.33%) experienced postprocedure pain more often. Patients who had needed less than two attempts of GRM for resolution of vertigo did not develop any postprocedure pain [Table 4].

Overall, in this study, only four (20%) patients experienced postprocedure pain. When asked to grade the pain on the Visual Analog Scale score of 1–10, two patients had a score of 2 and another two patients had a score of 3. All these patients had pain only for few hours after the maneuver, and the pain had subsided on prescribing one or two doses of analgesics. Saberi *et al*.[6] noticed a higher rate of cervical pain in Epley's group versus Gans group (23.3 vs. 0.0%, $P = 0.005$). The average VAS score for discomfort among patients with neck and back issues in the study by Dispenza *et al*.[4] after GRM was around 4.

None of the patients in our study developed any signs or symptoms of cervical myelopathy or radiculopathy after the GRM. None of the patients discontinued the maneuver due to pain in our study. Hence, the maneuver was found to be safe in all the patients with BPPV plus cervical spondylosis included in our study.

Limitations

A further study with a higher sample size may be necessary to test the significance of association between the variables such as age, sex, degree of cervical spondylosis, or total number of attempts with the outcome of GRM as mentioned in the tables. Probably, a modification of the methodology by restricting the maximum number of attempts to two per sitting and repeating it every 3 days or in weekly intervals as done in previous studies may further reduce the incidence of postprocedure pain. As all the patients in our study have been free of any long-term complications, probably not restricting the maximum attempts to four and repeating it on regular intervals until resolution of vertigo would not be a wrong choice. This may account for the difference in efficacy of GRM between ours and the previous

studies. Furthermore, a more prolonged follow-up may add on to the authenticity of the results of the study. If we would be able to perform the maneuver on a 180° rotatable table with a patient fixed to same with secure straps, the maneuver may be feasible even in obese patients and in patients with hip or back issues, provided the table is tested for safety and does not carry any risk of fall or injury to the patient.

Conclusion

GRM is a safe and an effective particle repositioning maneuver for the treatment of vertigo in patients with posterior SCC BPPV complicated with coexisting cervical spondylosis. Further research may be necessary to test the safety of GRM in patients with cervical spinal cord or nerve root compression as ours was aimed to be only a preliminary study to test the safety of GRM in patients with cervical spondylosis.

Declaration of patient consent

The authors certify that they have obtained all appropriate patient consent forms. In the form the patient(s) has/have given his/her/their consent for his/her/their images and other clinical information to b`e reported in the journal. The patients understand that their names and initials will not be published and due efforts will be made to conceal their identity, but anonymity cannot be guaranteed.

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Conflicts of interest

There are no conflicts of interest.

References

1. Roberts RA, Gans RE, Montaudo RL. Efficacy of a new treatment maneuver for posterior canal benign paroxysmal positional vertigo. J Am Acad Audiol 2006;17:598-604.
2. Omaraa A, Mosaadb DM, Mohamedb AS, El-Raoofb NA. Epley repositioning maneuver versus Gans repositioning maneuver on postural instability in elderly patients with benign paroxysmal positional vertigo. Egypt J Otolaryngol 2017;33:518-22.
3. Young WF. Cervical spondylotic myelopathy: A common cause of spinal cord dysfunction in older persons. Am Fam Physician 2000;62:1064-70, 1073.
4. Dispenza F, Kulamarva G, De Stefano A. Comparison of repositioning maneuvers for benign paroxysmal positional vertigo of posterior semicircular canal: Advantages of hybrid maneuver. Am J Otolaryngol 2012;33:528-32.
5. Kellgren JH, Jeffrey MR, Ball J. The epidemiology of chronic rheumatism. Vol. II: Atlas of standard radiographs of arthritis. Oxf Blackwell Sci Pub 1963;2:14-9.
6. Saberi A, Nemati S, Sabnan S, Mollahoseini F, Kazemnejad E. A safe-repositioning maneuver for the management of benign paroxysmal positional vertigo: Gans vs. Epley maneuver; a randomized comparative clinical trial. Eur Arch Otorhinolaryngol 2017;274:2973-9.
7. Badawy WM, Gad El-Mawla EK, Chedid AE, Mustafa AH. Effect of a hybrid maneuver in treating posterior canal benign paroxysmal positional vertigo. J Am Acad Audiol 2015;26:138-44.
8. Bhattacharyya N, Gubbels SP, Schwartz SR, Edlow JA, El-Kashlan H, Fife T, *et al.* Clinical practice guideline: Benign paroxysmal positional vertigo (Update) executive summary. Otolaryngol Head Neck Surg 2017;156:403-16.
9. Hain TC, Yacovino D. Pharmacologic treatment of persons with dizziness. Neurol Clin 2005;23:831-53, vii.
10. Ancelin ML, Artero S, Portet F, Dupuy AM, Touchon J, Ritchie K. Non-degenerative mild cognitive impairment in elderly people and use of anticholinergic drugs: Longitudinal cohort study. BMJ 2006;332:455-9.
11. Humphriss RL, Baguley DM, Sparkes V, Peerman SE, Moffat DA. Contraindications to the dix-hallpike manoeuvre: A multidisciplinary review. Int J Audiol 2003;42:166-73.
12. Bakhsheshian J, Mehta VA, Liu JC. Current diagnosis and management of cervical spondylotic myelopathy. Global Spine J 2017;7:572-86.
13. Mullin J, Shedid D, Benzel E. Overview of cervical spondylosis pathophysiology and biomechanics. World Spinal column J 2011;2:89-97.
14. Wainner RS, Gill H. Diagnosis and nonoperative management of cervical radiculopathy. J Orthop Sports Phys Ther 2000;30:728-44.