

# Benign paroxysmal positional vertigo secondary to laparoscopic surgery

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## Abstract

**Objectives:** Benign paroxysmal positional vertigo is a common vestibular disorder and it may be idiopathic or secondary to some conditions such as surgery, but rare following laparoscopic surgery.

**Methods:** We report two cases of benign paroxysmal positional vertigo secondary to laparoscopic surgery, one after laparoscopic cholecystectomy in a 51-year-old man and another following laparoscopic hysterectomy in a 60-year-old woman.

**Results:** Both patients were treated successfully with manual or device-assisted canalith repositioning maneuvers, with no recurrence on the follow-up of 6–18 months.

**Conclusions:** Benign paroxysmal positional vertigo is a rare but possible complication of laparoscopic surgery. Both manual and device-assisted repositioning maneuvers are effective treatments for this condition, with good efficacy and prognosis.

## Keywords

Benign paroxysmal positional vertigo, laparoscopic surgery, laparoscopic cholecystectomy, laparoscopic hysterectomy, postoperative complication, device-assisted canalith repositioning maneuver

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## Introduction

Benign paroxysmal positional vertigo (BPPV) is a common vestibular disorder characterized by repeated episodes of vertigo with changes in head position and also is the most common cause of vertigo.<sup>1,2</sup> The etiology and pathophysiology of BPPV are not very clear. Most of BPPV cases are idiopathic and some have identifiable causes.<sup>2,3</sup> BPPV due to surgery has been described in the literature, which occurs commonly after craniofacial surgery especially ear surgery<sup>3,4</sup> or dental and maxillary surgery,<sup>5</sup> but rarely following non-craniofacial surgery.<sup>4,6</sup> It is believed that BPPV occurs when otoconia detach from the macula of the utricle and enter the semicircular canal, either free-moving in the canal (canalolithiasis) or depositing on the cupula (cupulolithiasis), inducing vertigo and nystagmus with head position changes.<sup>1–3,7</sup>

BPPV is diagnosed based on a typical history of episodic vertigo associated with head position changes and the characteristic nystagmus provoked by specific diagnostic tests such as the Dix–Hallpike maneuver and the roll maneuver.<sup>1,2,7</sup> Various canalith repositioning maneuvers including the Epley maneuver and the Lempert maneuver have been used for the treatment of BPPV, with good efficacies.<sup>1,2</sup> But performing the diagnostic and therapeutic positioning maneuvers is challenging in postoperative patients with physical motion limitations.<sup>2,8</sup> Some devices have been

developed to treat BPPV with promising treatment outcomes.<sup>8–12</sup> We present herein two rare cases of BPPV secondary to laparoscopic surgery and the two patients were treated successfully with manual or device-assisted repositioning maneuvers.

## Case presentations

### Case 1

A 51-year-old man presented with complaining of 1-day history of repeated episodic vertigo. The vertigo attacks occurred commonly in lying down and each episode of vertigo lasted about few seconds. Aside from nausea, there were

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no other associated neurological or otological symptoms including hearing loss or tinnitus. The patient reported an uneventful medical history but underwent a laparoscopic cholecystectomy for acute calculous cholecystitis 5 days before the presentation. The procedure lasted 75 min and was completed without any complications during surgery. The patient had an uneventful postoperative course and was discharged without any problems 4 days after surgery.

On examinations, neurologic findings were normal and otological examination revealed normal ear canals and tympanic membranes, with no demonstrable spontaneous nystagmus. The patient was evaluated with the device-assisted diagnostic tests for BPPV. On the right Dix–Hallpike test, brief vertigo and vertical upbeating nystagmus with counterclockwise torsional component toward the dependent ear were induced (Figure 1(a) and (b)). The roll test was negative. The patient was diagnosed as having right posterior canal BPPV and then treated with the device-assisted Epley maneuver as described elsewhere.<sup>10</sup> The performance of the diagnostic or repositioning maneuver was reproduced by the diagnosis and therapy system for BPPV (Byrons Medical Science & Technique Inc., Jinan, China). Next day, the patient still complained of repeated episodic vertigo, but the vertigo attacks occurred when rolling over in bed rather than lying down, therefore the patient was re-evaluated. This time the Dix–Hallpike test was negative, indicating the posterior canal BPPV was resolved, but the roll test showed a geotropic direction-changing horizontal nystagmus (Figure 1(c)–(e)), with more intense nystagmus when patient's head turned to the right than to the left. The right horizontal canal BPPV was diagnosed, suggesting this was due to canal conversion from the posterior canal to the horizontal canal after the initial Epley maneuver.<sup>2,10</sup> Then, the patient was treated with a device-assisted and modified Lempert maneuver as described elsewhere,<sup>11</sup> and 5 days later, the patient received a repeated maneuver due to his remaining vertigo and persistent positive for the roll test. After this, the patient's symptoms resolved completely, with negative results in subsequent diagnostic tests. The patient remained asymptomatic on 18-month follow-up.

## Case 2

A 60-year-old woman presented with a 2-day history of repeated episodic vertigo. The vertigo episodes occurred commonly when the patient rolled over in bed. Each episode of vertigo lasted for seconds, accompanying with severe nausea. The patient had no other associated neurological or otological symptoms including hearing loss or tinnitus. She reported an uneventful medical history but a 30-year history of hysteromyoma and just underwent a total laparoscopic hysterectomy at our hospital 3 days before the onset of vertigo. The procedure lasted approximately 90 min, in which the patient was placed in the Trendelenburg position. The surgery was completed without any complications aside

from intraoperative blood loss of 50 mL. The patient had an uneventful postoperative course.

With assistance from the otolaryngology service, the patient received a complete otologic and neurologic examination since her vertigo symptom was not resolved with medical treatment. Neurologic examination yielded unremarkable findings and otologic examination revealed normal ear canals and tympanic membranes, with no spontaneous nystagmus. The manual diagnostic maneuvers for BPPV were performed. The Dix–Hallpike test was negative, but geotropic direction-changing horizontal nystagmus was induced on the roll test, with more intense nystagmus when rolling patient's head to the right. The canalolithiasis of right horizontal canal BPPV was diagnosed and the patient was treated with manual Gufoni repositioning maneuver, with complete resolution of vertigo symptom. Telephone follow-up indicated the patient had no recurrence of BPPV in 6 months after successful treatment.

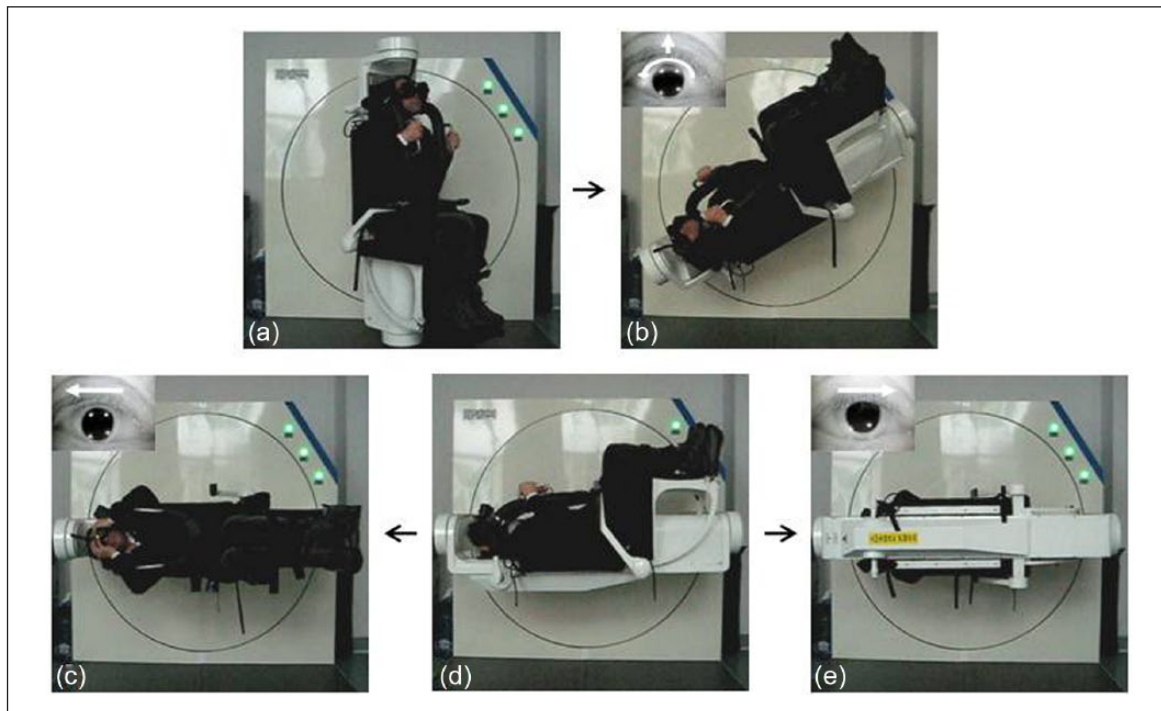
## Discussion

Up to now, only one case of BPPV associated with laparoscopic surgery has been reported, which may be due to the low incidence of BPPV after laparoscopic surgery or underreporting of the self-limiting disease.<sup>6</sup> Our report indicates that BPPV may be not a very rare complication of laparoscopic surgery.

The etiologic and pathogenic mechanism of BPPV secondary to non-craniofacial surgery is not very clear. Baloh et al. demonstrated the five patients with BPPV secondary to abdominal or cardiac surgery did not have documented operative complications that could explain the associated BPPV. The authors thought that possibly occurrence of brief hypotension and hypoperfusion of the inner ear could account for BPPV in these cases.<sup>4</sup> But in the two patients of our report, there was no identifiable condition resulting in hypotension and hypoperfusion of the inner ear. Khan et al.<sup>6</sup> reported that a 51-year-old woman developed BPPV after laparoscopic hysterectomy, and the steep Trendelenburg position during surgery was considered a triggering factor for BPPV in their patient. However, the steep Trendelenburg position during surgery existed in case 2 but not in case 1 of our report. In addition, if the position during surgery was a triggering factor for BPPV in case 2, her BPPV should occur in short time after surgery. The exact etiologic component and pathogenic mechanism of BPPV for our cases could not be elucidated well due to the absence of identifiable causes or risk factors accounting for the postoperative BPPV.

## Conclusion

Our report indicates that BPPV is a rare but possible complication of laparoscopic surgery. Both manual and device-assisted repositioning maneuvers are effective for the treatment of BPPV, with good efficacy and prognosis. The



**Figure 1.** Nystagmus on diagnostic tests for benign paroxysmal positional vertigo (BPPV) following laparoscopic cholecystectomy. On the right Dix–Hallpike test at initial evaluation, when the patient in upright sitting position with the head turning 45 degrees to the left (a) is moved to head hanging position (b), a vertical upbeat nystagmus with counterclockwise torsional component toward the dependent ear is induced, indicating a diagnosis of right posterior canal BPPV. On the roll test at re-evaluation 1 day after the Epley maneuver for the treatment of right posterior canal BPPV, a geotropic horizontal nystagmus toward the right is provoked when rolling the patient to the right (c) from the neutral position (d), and a weaker geotropic horizontal nystagmus toward the left is induced when rolling the patient to the left (e), suggesting the occurrence of right horizontal canal BPPV due to canal conversion. Arrows depict the directions of nystagmus.

device-assisted diagnostic and therapeutic positioning maneuvers for BPPV can be a better choice in postoperative patients with physical motion limitations.

#### Declaration of conflicting interests

The author(s) declared no potential conflicts of interest with respect to the research, authorship, and/or publication of this article.

#### Ethical approval

Our institution does not require ethical approval for reporting individual cases or case series.

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#### Informed consent

Written informed consent was obtained from the patients for their anonymized information to be published in this article.

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