A Tangible Head Model to the Physical Treatment for Benign Paroxysmal Positional Vertigo (BPPV)

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Introduction

Benign paroxysmal positional vertigo (BPPV) is the most common type of vertigo. The cantholith repositioning procedure (CRP) is a treatment for BPPV. In this study, we developed a tangible head model for the physical treatment (CRP) of BPPV and assessed the educational efficacy of this model for people.

A Tangible Model for BPPV

This model is 10 times the size of the semicircular canal, which contains 10 cantholith particles, located in a mockup of the head that is 1.5 times the actual size.

The mockup of the semicircular canal is made by the CT data collected on human beings.

This head model is made of polyamide and made by the CT data collected on human beings.

The rear face of this model has peep windows, and so, we can watch the movement of 10 cantholith during the CRP.

Materials and Methods

Participants: 20 medical students who started to study otolaryngology.

Methods:
1. First, they learned the CRP by reading the article.
2. Next, they practiced the CRP using the same model, while watching the movement of the particles.
3. Third, they again tried to follow the procedure without watching the process.

Measure outcomes:
Comparison the number of cantholith particles, which they can move from the ampulla to the utricle, between the two trials before and after practice using the model.

Results

Before practice using the model, they could move 2.5 (mean value) cantholith particles. But, after practice, they could move 6.6 (mean value) cantholith particles. There was a statistical difference (P<0.01) between trials before and after practice using the model.

Discussion

5 of 20 subjects (medical students) could move all 10 particles from the ampulla to the utricle only by reading the article without practice using the model. Because they (5 subjects) could perfectly understand only by reading the article how to move the cantholith particles from the ampulla to the utricle by the CRP. However the other 15 subjects could not move only one cantholith particle. Because they could not understand only by reading the article how to move the particles, and why the particles stay in the posterior semicircular canal after the CRP.

Right side: affected

Case of Failure

The particles could not be moved from the ampulla to the utricle and stayed in the posterior semicircular canal, because the subjects did not set the head hanging position of the model. They rotated the head around the axis of the body parallel to the horizontal line.

Case of Success

The particles could be moved from the ampulla to the utricle, because the subjects set the head hanging position of the model and rotated the head.

15 subjects, who could not succeed the CRP only by reading the article, could move more particles with practice using this model than before practice. Because they could learn by using the model that setting the head hanging position is the most important point.

Conclusion

It was suggested that a tangible head model to the physical treatment for BPPV is a useful educational tool for people such as resident doctors, medical students and patients with BPPV.

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