For the Capability of Pulse Oximetry with Moving Horizontal and Vertical Controlled by Accelerator.

Yamada A., Morioka N., Takada M., Inui T., Ozaki M. *Anesthesiology.* 2006;105:A247.

Introduction

Today's plethysmography is extremely precise, allowing measurement even of patient's body motion or peripheral circulatory failure. However, body sway is likely to cause intolerable errors in a critical situation. Therefore, various studies of body sway have produced results whereby reproducibility and individual difference are often great. Therefore, we reexamined the measurement precision, intentionally controlling finger-tip motion using an acceleration sensor, dividing the motion into horizontal and vertical directions into fast movement (2G) and slow movement (1G), and then having the patients stop their breathing and move their fingertips under declining oxygen saturation.

Methods

After the Ethical Committee of Tokyo Women's Medical University approved the study, oral consent was obtained from the six healthy adult participants. After that time, they each wore probes on the ring finger (Masimo set) and the forefinger (N-595) of their left hand as the controlled hand, fixed on the desk. In addition, they wore the probes on the third finger (Masimo SET), the forefinger (N-595), the little finger (N-390), and the acceleration sensor on the middle finger of the right hand. After the probes were set, the following eight kinds of movements were performed. 1. Horizontal movement of hand (slow). 2. Vertical movement of the hand (slow). 3. Horizontal movement of the hand (fast). 4. Vertical movement of the hand (fast). In 5–8, movements in 1–4 were conducted, respectively, while the patients stopped their breathing for 1 min. The pulse rate and oxygen saturation level were input every second. With 5–8, they were also input in 3 min of the recovery time plus 1 min of the experiment. The input data were calculated by letting the difference of each, with its corresponding control, be the square for 1 min, to make a comparison of the different types as mean values. For statistical processing, values between two types were compared using Mann-Whitney's U test.

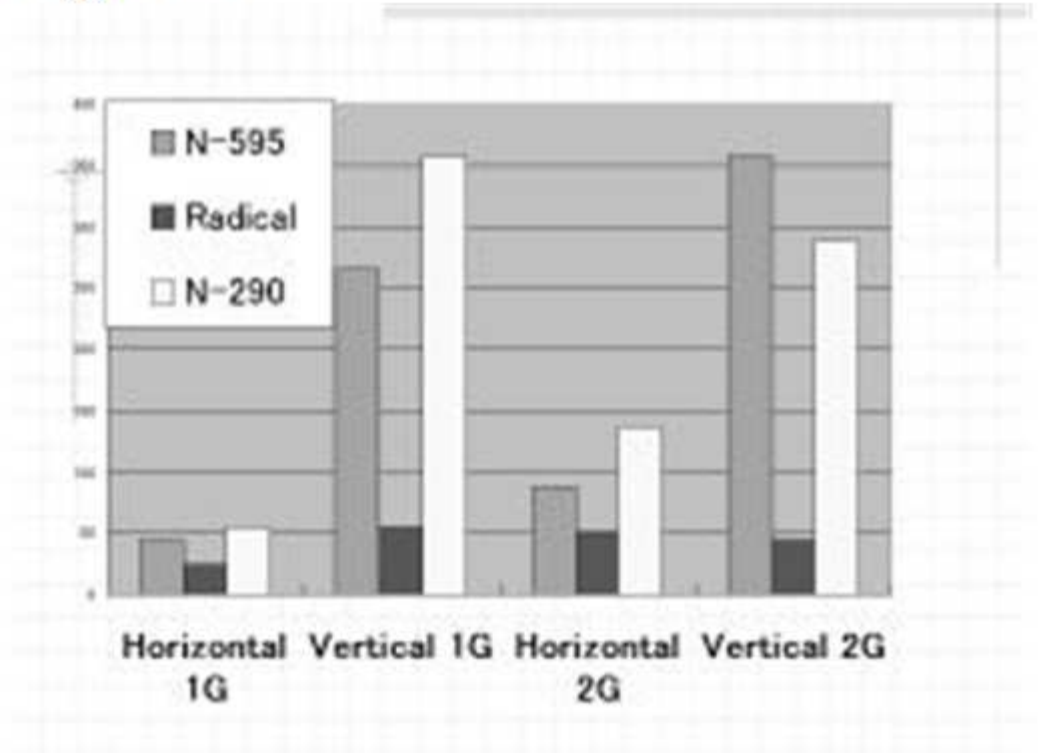
Results

In both fast and slow movements, Masimo's errors were smaller. Regarding the pulse rate, it was measured synchronistically with each motion in N-390 of a generation before.

Conclusion

In the two monitor that are widely used, the Masimo set's errors were very small regardless of the motion speed and direction.

Figure 1


N-595
Radical
N-290
Horizontal 1G
Vertical 1G
Horizontal 2G
Vertical 2G