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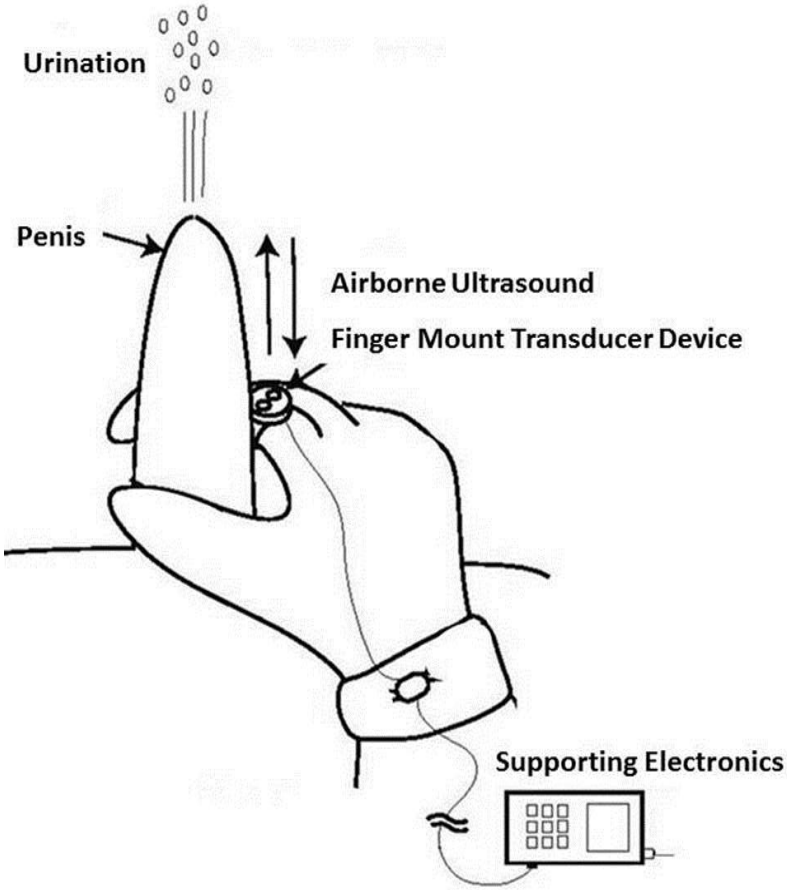
DEVELOPMENT AND UTILITY EVALUATION OF NEW UROFLOWMETRY DEVICE USING WEARABLE AIRBORNE ULTRASOUND DOPPLER SYSTEM

Hypothesis / aims of study

Conventional uroflowmetry (UFM) is based on a urine receiving container equipped with various sensors, such as a stress and weight sensor. That is, conventional UFM uses a device like a toilet bowl equipped with sensors. We need the measuring urinary flow anytime and anywhere in an easy, natural, and repeated manner. A uroflowmetry device based on a 40 KHz airborne ultrasound continuous wave Doppler system [1] was developed as a non-contact, indirect measuring device that can be easily worn by the test subjects who urinate or can operate independently and does not need post-procedures after each measurement. The prototype of the new device (figure) [2] was used to collect urination data from normal adult volunteers. The data were then comparatively analyzed with those from a conventional UFM device to examine the utility of the new device.

Study design, materials and methods

Twenty-two normal adult volunteers (16 males and 6 females; age 21 to 68 years, with a mean age of 36.6 years) were requested to collect samples using both the present and conventional UFM (Medtronics ; URODYN™ 1000) devices at our outpatient clinic in August 2011. A total of 31 urinations were performed with both devices. The data collection situation and collected data of the new UFM device were analyzed to compare the results with those of the conventional UFM device.



Results

Data could be collected with the new and conventional UFM devices for a total of 27 urinations (87.1%). The Doppler spectrum (urination pattern) could be evaluated in chronological order for all the 27 urinations. The new device failed to measure urinary flow for 4 urinations (in 2 males and 2 females) because the component attached to a finger was not positioned at right angles to the urination.

Interpretation of results

It was confirmed from the examination of effectiveness that there is a potential for the clinical application of the new device. Even women can use the device effectively by understanding the method of use.

Concluding message

It was proved that the new device can measure urinary flow anytime and anywhere in an easy, natural, and repeated manner. The results obtained suggest that the device may greatly change the concept of urodynamics, depending on future progress.

However, accuracy in collecting samples and analyzing data will have to be further improved using the latest engineering technology.

References

1. Takeuchi Y; 13th IRMMW session F1.8, SPIE 1039;385-6,1988.
2. Matsumoto S, et al. Proceedings of Symposium on Ultrasonic Electronics, 32;449-50,2011.

Disclosures

Funding: This study was supported by Adaptable and Seamless Technology transfer Program through target-driven R & D (A-STEP: AS232Z01208F) of Japan Science and Technology Agency (JST) **Clinical Trial:** No **Subjects:** HUMAN **Ethics Committee:** This study was approved by Asahikawa Medical University Ethical Committee. **Helsinki:** Yes **Informed Consent:** No