

Correlation between Erection Hardness Score and Nocturnal Penile Tumescence Measurement

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ABSTRACT

Introduction. The Erection Hardness Score (EHS) and the Sexual Health Inventory for men (SHIM) are patient-reported outcome scoring systems for erectile function. It is unclear which is more reliable for predicting the objective erectile function.

Aim. The aim of this study was to evaluate whether the EHS could predict objective erectile function by measuring the maximal penile circumferential change (MPCC) with an erectometer.

Methods. The study included 98 patients who visited our clinic from 2005 to 2010. The erectile function was evaluated using the SHIM, EHS, and MPCC. The MPCC was measured with the largest circumferential change of three consecutive occurrences of nocturnal penile tumescence (NPT) determined using the erectometer.

Main Outcome Measures. We defined erectile dysfunction (ED) as MPCC < 20 mm and carried out multivariate analysis using logistic regression analysis to clarify the predictors for ED, with the variables including age, the SHIM score, and the EHS. We compared the tendency for MPCC ≥ 20 mm when EHS was 3 or more with that when EHS was 2 or less.

Results. The median age of the patients was 59.5 years (range 18–83). In logistic regression analysis, the EHS was the only predictor for ED with MPCC < 20 mm. The mean EHS in the MPCC < 20 mm group was 1.64 ± 0.20 (mean \pm SEM) and that in the MPCC ≥ 20 mm group was 2.46 ± 0.13 ($P = 0.0018$). There was a correlation between the EHS and the MPCC (correlation coefficient = 0.33). In comparison with the group having an EHS of 2 or less, that with an EHS of 3 or more tended to have MPCC ≥ 20 mm ($P = 0.013$).

Conclusions. The EHS was correlated with the MPCC. The EHS represents the objective erectile function shown by the measurement of NPT. **Matsuda Y, Hisasue S, Kumamoto Y, Kobayashi K, Hashimoto K, Sato Y, and Masumori N. Correlation between Erection Hardness Score and Nocturnal Penile Tumescence Measurement. J Sex Med 2014;11:2272–2276.**

Key Words. Erection Hardness Score; Erectile Function; Sexual Health Inventory for Men; Penile Circumferential Change; Axial Rigidity

Introduction

More than 10 years have passed since the first phosphodiesterase-5 inhibitor was introduced for the treatment of erectile dysfunction

(ED). In the historical first clinical trial for sildenafil, the Erection Hardness Score (EHS) was used for the outcome assessment [1,2]. In 1997, Rosen et al. reported the availability of the International Index of Erectile Function (IIEF) [1]. After that, the IIEF-5 Sexual Health Inventory for Men (SHIM) was introduced in 1999 as an abridged version of the IIEF [2]. The IIEF-5 and

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SHIM have been validated in many languages and are widely used for the evaluation of erectile function internationally. The EHS consists of single-item, patient-reported outcome scoring that enables us to obtain subjective information regarding erectile hardness. Recently, Mulhall et al. confirmed its validity for evaluating erectile hardness [3], and it possibly represents the state of erectile function more precisely.

On the other hand, several objective erectile function assessment tools have been introduced. They are based on the assessment of nocturnal penile tumescence (NPT) events, which represent the physiological erectile function [4–8]. These include the mercury-filled strain gauge recorder [4], the stamp test [5], the angle of erection in the standing position test [6], the axial penile buckling test [7], and RigiScan [8]. Today, the RigiScan is the gold standard for the objective assessment of erection, and it enables us to investigate the circumferential change and the rigidity of NPT accurately, although it is a relatively expensive and complicated procedure for patients [8]. We previously reported the usefulness of an erectometer to determine the maximal penile circumferential change (MPCC) during NPT compared with the RigiScan [9]. We believe that the erectometer can also be used as an assessment tool for determining objective erectile function.

The concern regarding the patient-reported outcome is how accurately the scoring represents objective erectile function. Previous reports suggested limitations in the use of the IIEF in a study investigating its correlation with results obtained using the RigiScan [10,11]. It is still unclear which is the most useful self-reported questionnaire in terms of reproducibility and reliability for predicting objective erectile function.

Aims

The goal of this study was to investigate the correlations among the total SHIM score, EHS, and MPCC measured with an erectometer.

Methods

We reviewed the medical charts of the patients who presented at our clinic between November 2005 and November 2010. We included the patients whose erectile function was evaluated with a self-administered questionnaire and the erectometer at the first visit. The questionnaires used for the erectile function assessment were the

SHIM and the EHS. In our clinic, the erection hardness was evaluated using a modified version of the EHS (S-EHS; Sapporo Medical University version of the EHS). The S-EHS is a component of the Sapporo Medical University sexual function questionnaire, which was validated in Japanese in 1999 [12]. The appendix shows the S-EHS, which is translated into English, and the original version of the EHS. The difference between the S-EHS and the original version of the EHS is the number of the grades above 3 (penis is hard enough for penetration). We integrated 4 and 5 in the S-EHS into 4 in the original EHS in this study.

The MPCC was measured using an erectometer (Nippon Medical Products, Asahikawa, Japan) during sleep for an average of two to three nights. The erectometer was originally developed by Jonas, and we previously adapted it for Japanese men [13,14]. Our modified erectometer consists of a sliding band and slit tube [14]. Briefly, the sliding band is pulled out through the slit tube at the time of penile circumferential expansion during NPT, and the method gives excellent correlation with the RigiScan [9]. According to the results of a previous study, we defined the cutoff point of ED as an MPCC of less than 20 mm [9,15].

Outcome Measures

We used the computer program StatView 5.0 for Windows (SAS Institute, Cary, NC, USA) for statistical analyses. We carried out multivariate analysis to identify factors contributing to the MPCC of 20 mm or less. The variables were age, the EHS, and the total SHIM score. Logistic regression analysis was used for the multivariate analysis. We used the Mann–Whitney *U*-test for age; chi-square test for hypertension, diabetes mellitus, and smoking; and the *t*-test for the EHS and the total SHIM score to compare the parameters among groups. The Kruskal–Wallis test and Spearman's rank correlation coefficient were used to identify the relationship between the EHS and MPCC. We compared the group with an EHS of 3 or more with that having an EHS of 2 or less by Pearson's chi-square test. A *P* value of <0.05 was considered to be statistically significant.

The details of this study were approved by the Review Board in Sapporo Medical University Hospital (<http://web.sapmed.ac.jp/byoin/chiken/irb.html>) (No. 25–122). The patients' right to refuse to participate in our study is described on our website (<http://web.sapmed.ac.jp/uro>).

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