#338 AUTOMATED CLASSIFICATION OF FEMALE UROFLOWMETRY CURVE PATTERNS

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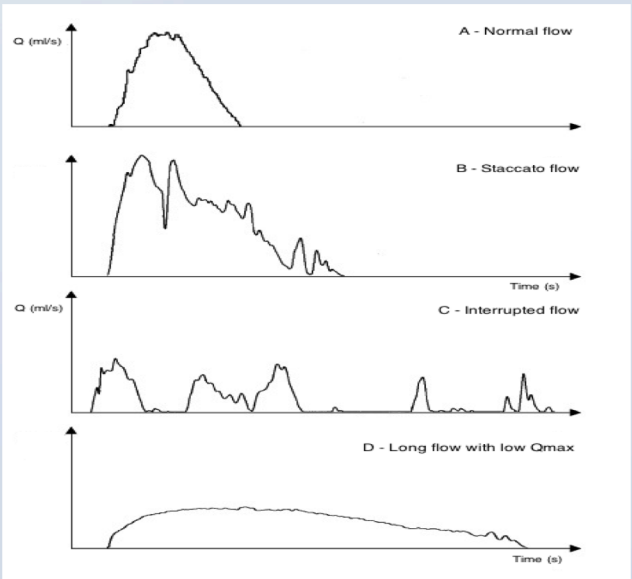
ABSTRACT

Uroflowmetry is a widely used diagnostic test in patients with lower urinary tract dysfunction. The uroflowmetry curve (UFC) pattern is one of the uroflowmetry outcomes. There is no structured and objective manner to classify the UFC pattern in one of the four categories: normal, staccato, interrupted or long flow. Computerized analysis of UFC patterns and automated UFC pattern classification may lead to a more standardized and objective analysis of UFC's. Since a more objective assessment of UFC's might contribute to a correct diagnosis of female voiding function, we aimed to develop an automated system for the classification of UFC patterns.



METHODS

Three sets of UFC's were used to develop an automated classification system in three stages. UFC's were classified by experts and reference curves (most reliable curves) were selected. Datasets were tested in three systems:

1.Questionnaire system
2.Optimized parameter system
3.Machine learning system

The ability of each system to reliably identify the correct UFC pattern, compared to the reference curves, was tested.

RESULTS

System	AUC	S-score
Questionnaire	0.98	0.98
Optimized parameter	0.99	0.94
Machine learning	1.00	0.98

The machine system performed better than the other two systems in heterogeneous datasets.

SYSTEMS

Questionnaire

(1)
IF the deceleration time is maximally twice as long as the acceleration time
OR the deceleration steepness (deceleration time/Qmax) of the curve is 0.6 or less
OR the voiding time of the curve is less than 12 seconds

(1.1) IF 1 = YES:
IF the curve never drops to 2 ml/s or less

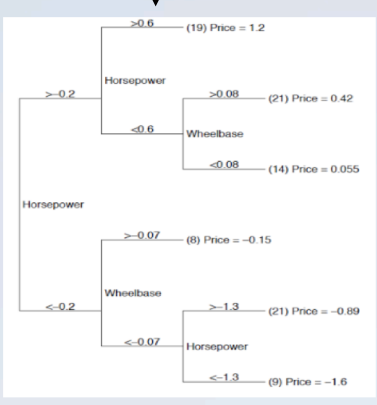
(1.2) IF 1.1 = YES:
IF the ratio between voiding time and Qmax (time/Qmax) is 1 or less

(1.3) IF 1.2 = YES:
IF no additional peak, representing a magnitude of 20% or more of the Qmax, exists

(1.4) IF 1.3 = YES
Curve is classified as a normal (type A) curve

Optimized parameter

Machine learning



CONCLUSION

We developed an automated system for the classification of female UFC patterns. The machine learning system resulted in a nearly perfect classification and can be used in later databases.