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ORIGINAL ARTICLE

Detrusor contractility in women: Influence of ageing and clinical conditions

Contractilité du détrusor chez la femme : influence de l'âge et des conditions cliniques

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KEYWORDS
Detrusor contractility;
Urodynamics;
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Summary
Aims. — We assume that the voiding process in women is governed by the detrusor contractility and a ''urethral resistance''. The value of these 2 parameters, respectively named *k* and *U* in the VBN (Valentini-Besson-Nelson) mathematical model of micturition is deduced from the VBN analysis of pressure-flow recordings (PFs). Our objectives were to search for a correlation between these 2 parameters and clinically relevant variables such as chief complaint, urodynamic diagnosis (UD), and age by decades.
Methods. — PFs from 125 non-neurogenic women (mean age 58.0 ± 17.2 years [range 20—90 years]) were retrospectively analyzed using the VBN model. VBN criteria for inclusion were maximum flow rate > 2 mL/s, voided volume > 100 mL, and non-interrupted flow. Evaluated parameters were *k* (without unit) and *U* (unit: cm H_2O). Standard values were *k* = 1.0 and *U* = 0.
Results. — VBN parameter ranges were *k* [0.14—1.55] and *U* [0.0—73.0 cm H_2O]. There was a significant correlation between *k* and *U* for the whole population ($P < 0.0001$) with $k = (.259 + 0.015^*U)$ ($R^2 = 0.723$) and each chief complaint. For UD, significant difference comparing *k* and *U* in phasic detrusor overactivity with intrinsic sphincter deficiency and urodynamic stress incontinence was noted. In sub-groups defined according to decades of age, the values of *k* and *U* remained similar in sub-groups for those who are less than 50 years old and decreased regularly with ageing.

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Conclusion. — The detrusor contractility can be easily evaluated in women; lower than in men, its range is less spread out but also adjusted to compensate a ''urethral resistance''. Phasic detrusor overactivity and post-menopausal age significantly affect detrusor force value.
Level of evidence.— 3.

MOTS CLÉS
Contractilité du détrusor ;
Urodynamique ;
Modèle VBN ;
Femme

Résumé
Introduction. — Nous admettons que la miction chez la femme est gouvernée par 2 paramètres mécaniques, la contractilité du détrusor et une « résistance urétrale », dénommés *k* et *U*. L'analyse modélisée des instantanés mictionnels (IM) permet leur évaluation. Nos objectifs étaient de chercher une corrélation entre ces 2 paramètres et certaines variables cliniques telles que plainte principale, diagnostic urodynamique (DU), et âge.
Méthodes. — Rétrospectivement, les IM de 125 patientes non neurologiques ont été analysés avec le modèle VBN (Valentini-Besson-Nelson). Cette analyse requérait les conditions suivantes : débit maximum > 2 mL/s, volume uriné > 100 mL et débit ininterrompu. Les valeurs standard des paramètres sont *k* (sans unité) = 1,0 et *U* = 0,0 cm H_2O.
Résultats. — Les valeurs extrêmes des paramètres VBN étaient respectivement pour *k* et *U* [0,14—1,55] et [0,0—73,0 cm H_2O]. Il existait une corrélation significative entre *k* et *U* pour la population totale ($p < 0,0001$) avec $k = (0,259 + 0,015*U)$ ($R^2 = 0,723$) de même que pour chaque plainte principale. Concernant le DU, il a été trouvé une différence significative pour *k* et *U* entre hyperactivité phasique du détrusor et incompétence sphinctérienne ou incontinence d'effort urodynamique. La stratification de la population en tranches d'âge de 10 ans a permis de montrer que les valeurs de *k* et *U* restaient semblables jusqu'à 50 ans puis décroissaient régulièrement avec le vieillissement.
Conclusion. — La contractilité du détrusor peut être évaluée chez la femme par analyse des IM ; plus faible que chez l'homme, ses bornes sont plus resserrées mais elle s'ajuste à la «résistance urétrale». L'hyperactivité phasique du détrusor et la post-ménopause affectent significativement la contractilité du détrusor.
Niveau de preuve.— 3.

Introduction

Evaluation of detrusor contractility in women is a challenge because voiding pressures are usually low and there is no universally accepted tool to assess its value. Almost all developed methods to estimate the detrusor contractility from standard pressure-flow measurements are based on the bladder output relation [1] and established for male populations.

In women, some studies have been conducted to assess detrusor contractility during a stop test: voluntary stop test [1,2], mechanical stop [3] or continuous occlusion test [4]. The only physiological method is the voluntary stop test but it greatly underestimates the contractility whereas the other methods are less ideal as they can induce discomfort [5].

If some studies concluded that detrusor contractility decreased with age [6] or that female bladders were less strong than male bladders [7], few studies have attempted to quantify the influence of ageing [6].

We started from the hypothesis that female voidings were governed by similar mechanical parameters to male voidings: the detrusor contractility and a ''urethral resistance''. Using the VBN mathematical model of micturition [8,9] our objectives were to analyze pressure-flow (P-Fs) data to evaluate the VBN parameter *k* (simulating detrusor force) in women and to search for a correlation with a ''urethral resistance'' simulated VBN parameter *U*. Next, we sought out a possible correlation between *k* and *U* and three relevant clinical variables: chief complaint, urodynamic diagnosis (UD) and age.

Materials and methods

This study was conducted in accordance with the Declaration of Helsinki. According to the local practice of our ethics committee, there is no formal institutional review board approval required for retrospective studies.

Retrospectively, urodynamic data obtained from a database which consisted of 125 women without symptom suggestive of obstruction (i.e. no hesitancy, straining to void, double voiding, slow stream...), no history of prior anti-incontinence surgery, and referred for