TRIGONAL SENSITIVITY TESTING IN WOMEN

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ABSTRACT

Tests of the integrity of bladder sensation are a poorly understood and often neglected part of urodynamic investigations. The electrical techniques that have been described to test sensation involve the use of costly and complex equipment; electrical current also is not the natural stimulator of bladder nerves.

Trigonal sensitivity testing held promise as a simple, effective and inexpensive test of bladder sensation. We evaluated a modified version of this technique in 89 women: 78 had urodynamically proved lower urinary tract dysfunction and 11 were control patients. The technique proved to be of no value in distinguishing among various urodynamic diagnoses. In particular, patients with detrusor instability or bladder hypersensitivity showed no characteristic patterns on trigonal sensitivity testing. Sensitivity values correlated neither with the first sensation to void nor the cystometric bladder capacity during urodynamic testing. It does not appear to contribute any clinically useful information in the evaluation of lower urinary tract dysfunction in women. (J. Urol., 141: 356–358, 1989)

Normal bladder function is dependent on the integrity of motor and sensory nerve supply. Abnormalities of sensation are more difficult to assess and, consequently, are often neglected in standard urodynamic investigations.

Sensory testing of the bladder and urethra in the past generally has involved electrical current stimulation. The equipment for this testing generally is complex and expensive, and electrical current also is not the natural stimulator of bladder nerves. Keiswetter found that electrical sensitivity testing gave clinically useful results in female patients with a variety of lower urinary tract disorders, including sensory urgency, detrusor instability and genuine stress incontinence. This study was confirmed by Powell and Fenley, and Opsomer and associates. All 3 studies found that urethral sensitivity was significantly related to the first sensation to void and functional bladder capacity.

Klein recently introduced a technique that he termed trigonal sensitivity testing, which measured the amount of force that when delivered to the base of the bladder and posterior urethra just elicits an urge to void. The technique involved pulling on a Foley catheter inserted in the bladder with the balloon inflated. A simple strain gauge quantified the force applied. The technique held promise as a simpler, more physiological and less expensive method to test bladder sensation than those used previously.

Klein determined control values in 9 patients with Foley catheters in place for “purposes unrelated to micturitional disorders”. He gave no breakdown of these patients according to age, sex or diagnosis. There was little information regarding the age or sex of the study patients; there was information on only 3 women with stress incontinence and on 5 women with urge incontinence in an earlier report. He did not relate the results of sensitivity testing to the first sensation to void or functional bladder capacity as measured cystometrically; information that is available for electrical testing, and that might have yielded interesting information in these cases and strengthened its claim to being a physiological test.

We performed a study with a modified version of this technique to investigate these points and to evaluate its specific use in female patients with lower urinary tract dysfunction.

MATERIALS AND METHODS

In the original report a hand-held spring gauge was used with a hook adapted to engage a Foley catheter. We used a strain transducer originally designed to suspend a bag of fluid during filling cystometry (Lectromed AL 3190-140). Force applied to the transducer resulted in the deflection of a stylus writing on heat sensitive paper. Each centimeter deflection represented 100 ml water and, by inference, 100 gm. weight. Measurements and means were made to the nearest 10 units (0.1 cm.). The rate of application of traction was given by the initial slope of the pen deflection and this could be checked between patients to ensure uniformity.

A 14F Foley catheter was used with the balloon filled with 15 ml water. Traction was applied with the bladder empty until the patient noticed a sensation to void. Each test was performed 5 times and the mean value was calculated. Measurements and means were made to the nearest 10 units (0.1 cm.).

The test was performed in 89 patients, 78 of whom were attending a urodynamic clinic to assess urinary tract symptoms, mostly urinary incontinence. The control group consisted of 11 patients: 6, although having urinary tract symptoms, were completely normal on urodynamic testing, 3 were due to undergo hysterectomy for menstrual disorders and the remaining 2 were being investigated for infertility. These latter 2 groups had no complaints of urinary dysfunction. All 78 study patients underwent full urodynamic testing, including pad testing, supine and provocative cystometry, and urethral pressure testing at rest and during stress. All definitions and units conform to standards proposed by the International Continence

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Society unless otherwise stated. All tests were performed by the same observer (M. I. F.).

Six patients (7.6 per cent) were unable to delineate clearly an urge to void during catheter traction. In 2 patients diagnosed as having bladder hypersensitivity (idiopathic sensory urgency) catheter traction was too painful to allow the test to be performed. The results of sensitivity testing were assessed in relation to urodynamic parameters of first sensation to void, functional bladder capacity and final urodynamic diagnosis.

RESULTS

The figure shows the results of testing in 4 urodynamic categories: normal, genuine stress incontinence, detrusor instability and hypersensitive bladder. Age and parity did not differ significantly in any of the 4 groups and they are shown in table 1 together with the mean values of the first sensation to void and cystometric capacities in the diagnostic categories. The mean values plus or minus standard deviation were controls 280 ± 90, genuine stress incontinence 224 ± 140, detrusor instability 224 ± 120 and hypersensitive 160 ± 70. There are large overlaps in the diagnostic categories and the mean results did not differ significantly as assessed by 1-way analysis of variance (F value 1.827, an insignificant result). Further tests of statistical significance were inappropriate, since it was possible that any differences in the means were simply the result of sampling variability.

There was no significant correlation between sensitivity values and first sensation to void or cystometric bladder capacity in any of the diagnostic groupings (table 2).

DISCUSSION

Experience with the technique of trigonal sensitivity testing as described has proved disappointing. Some separation of sensitivity values according to final urodynamic parameters is essential if the technique is to be of clinical value. While this test is inexpensive and simple to perform, it does not have any degree of sensitivity and specificity. The variances of the results are large within the diagnostic groups and also within multiple tests performed on the same patient. This finding casts doubt on the over-all reproducibility of the test.

It is unlikely that differences in terminology are responsible for our results and those reported by Klein. It does not use the terminology of the International Continence Society but he states clearly in the 1986 study that the 5 women with urge incontinence had uninhibited detrusor contractions on gas cystometry, that is they are in the category of detrusor instability as defined by the International Continence Society. The International Continence Society category of hypersensitive bladder we believe represents his category of urgency without incontinence, since in none of our group was incontinence a complaint. The similarity of the 2 groups is confirmed by their trigonal sensitivity results: 166 ± 74 as reported by Klein and 160 ± 70 in our study. We would suggest that the reason his patients with urge incontinence were relatively hyposensitive is because there were not enough women in this category to draw a firm conclusion. In our data there are 4 women in the detrusor instability category who scored above 400 units. However, there exist similar women in the genuine stress incontinence and normal groups. These hyposensitive women were significantly older than the rest of the group and the normal patients (mean age 58 years compared to 43 years for normal subjects and 47 years for the stress and urge groups). The high scoring normal subject was 67 years old. It may well be that this represents an aging phenomenon (although trigonal sensitivity over-all does not correlate with age). Only 3 of the 9 women who had high scores had a history of genital tract surgery that might have accounted for the observation by causing denervation and fibrosis around the bladder neck and trigone.

Bladder sensation largely has been neglected in the clinical investigation of bladder malfunction even though it has been suggested convincing that abnormalities of bladder function may be owing to deficits of sensation. It has proved easier to quantify the results of motor activity by the measurement of bladder pressures than to quantify sensation usefully, normal or abnormal. It was hoped that trigonal sensitivity testing would prove to be a more physiological test than electrical methods but this has not been our experience.

Traction on a Foley catheter placed in the bladder with its balloon inflated will not only stimulate the bladder and urethra but a whole host of other structures that may have no more than an oblique role in any proposed sensory defect. One cannot hope to gain anything but the most gross overview of afferent function using such an indelicate technique in women with lower urinary tract disorders.

REFERENCES


EDITORIAL COMMENT

The authors have applied the relatively new method of trigone sensitivity testing to the study of clinical abnormalities of the lower urinary tract in women. They fail to substantiate earlier reports and conclude that the “technique proved to be of no value ...”. They studied 70 normal and 11 control women. Of the abnormal patients 33 had genuine stress incontinence and 23 had detrusor instability. These 2 conditions in their pure state are motor disorders and, thus, are not associated with abnormalities of the sensory limb of micturition. Therefore, the overlap in sensory testing between these groups and the normal subjects, as observed by the authors, is consistent with the pathophysiology of these conditions and not surprising. In the group in which difference in sensory level should have been expected (the hypersensitive group) the authors completely ignore their own findings of much greater trigone sensitivity (160 ± 70) than in the normal subjects (280 ± 90). It is regretful that they did not examine more closely the cases in this group to determine if some consistency could be uncovered in a subset of it.

No correlation between trigone sensitivity and either the first urge to void or the bladder capacity was found. For the authors this “suggests that there is little physiological basis for the technique” but here I disagree and suggest that they have missed the point. Trigone sensitivity and first urge to void during filling are not the same thing. Thus, the finding that they do not always correlate simply supports their being different and does not suggest that one or the other is unphysiological. (A forthcoming study of more than 250 patients will show a correlation between them and will note that often the correlation is broken down by disease states.) Moreover, failure to find a correlation between trigone sensitivity and bladder capacity in patients with abnormal bladder function should not have surprised the authors because the former is a measure of sensory function, the latter is a measure of motor function and the 2 functions often are dissociated in pathological conditions.

It is inappropriate to expect a diagnosis to be made on the basis of any single test, be it laboratory, clinical or radiological, so it would be unwise to discard a test because it failed to meet that expectation. Trigone sensitivity is, after all, only one more test. As such its proper use is in the context of the over-all clinical pattern plus the urodynamic data in deriving a diagnosis.

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REPLY BY AUTHORS

Using the technique of trigonal sensitivity testing Doctor Klein claims to have distinguished 2 types of afferent receptors in the human bladder. Arbitrarily, using the results of testing on 9 normal patients (not classified according to even the most basic parameters of age and sex), he defined the concept of absent first sensor as those patients who require more than 410 gm. catheter traction to stimulate the desire to void. We saw such patients in all of our diagnostic groups (including controls) but we believe that these patients are merely the upper par of the normal range. Close reading of Doctor Klein’s latest paper show that the mean age of the 5 patients reported is 65 years, which we find interesting. Unfortunately, these patients were not segregated by sex since the absence of a prostate gland in women may alter considerably how trigonal sensitivity is perceived and it may account partially for our divergent views. Why the human bladder should be endowed with a receptor that appears to be unique in the animal kingdom and is specifically stimulated by tugging on an inflated Foley catheter balloon remains one of the more intriguing parts of his hypothesis. He then asks us to imagine the situation when this peripheral receptor does not exist or is defective (without a history of pelvic surgery or neurological disease), another situation which has never, to our knowledge, been described at another site in the body. Finally, we cannot agree that bladder capacity is a motor phenomenon, and whether sensory and motor functions are often dissociated in pathological conditions is presently a speculative and unsubstantiated claim.