



Relationship Among Potassium Stimulation Test and Cystoscopic and Cystometric Findings and Bladder Capacity in Patients with Symptoms of Interstitial Cystitis

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OBJECTIVE: To determine relationships among the potassium stimulation test, and the cystoscopic and cystometric findings, and bladder capacity in patients with symptoms of interstitial cystitis.

MATERIALS AND METHODS: From January 1997 to March 2003, 153 patients with symptoms of interstitial cystitis who underwent diagnostic procedures of the potassium stimulation test, cystometry, and cystoscopy were evaluated. Cystoscopy was performed under general anesthesia to evaluate the severity of post-dilatational hemorrhage and maximal bladder capacity. Student's *t*-test was used for statistical analysis.

RESULTS: Of the 153 patients who presented with symptoms of interstitial cystitis, 127 (83%) were female and 26 (17%) were male. The potassium stimulation test was positive in 110 (72%) and negative in 43 (28%). Anesthetized maximal bladder capacities averaged 672 and 681 ml in positive and negative potassium tests, respectively. Functional bladder capacities were 270 and 299 ml for the positive and negative potassium tests, respectively. Among the 110 patients with a positive potassium stimulation test, 7 (6.4%) had normal cystoscopic findings, while 103 (93.6%) had moderate or severe post-dilatational hemorrhage. However, among the 43 patients with a negative potassium stimulation test, 4 (9.3%) had normal cystoscopic findings, and 39 (90.7%) had post-dilatational hemorrhage.

CONCLUSIONS: The potassium stimulation test was not correlated with either cystoscopic findings, functional bladder capacity, or anesthetized bladder capacity. The potassium stimulation test could not predict the outcome of cystoscopic findings. These results imply that the potassium chloride test as an aid to a diagnosis of interstitial cystitis should be further evaluated. (JTUA 15:9-13, 2004)

Key words: interstitial cystitis, potassium test, glomerulation, cystometry.

INTRODUCTION

To date, interstitial cystitis remains a diagnosis of exclusion as no specific diagnostic test is yet available.

Although controversy exists as to the value of individual tests in treatment decisions and overall outcomes of patients, it is generally agreed that the diagnosis relies on thorough history-taking and physical examinations,

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combined with a lack of other identifiable causes to explain the patient's symptoms [1]. Aside from thorough history-taking and a physical examination, cystoscopy has been described as the most-important diagnostic tool in assessing the potential interstitial cystitis patient. Cystoscopy is used as much to rule out other disorders as to rule in interstitial cystitis. On the other hand, the potassium chloride bladder permeability test has been reported by Parsons et al. to be an aid to diagnosis [2], but it remains non-specific and is still not generally accepted. The clinical value of cystometric findings has been controversial [3,4]. To date, only 1 study was specifically carried out to evaluate correlations among cystometric and urodynamic findings and the potassium stimulation test [5]. We evaluated the clinical characteristics of our patients who presented with symptoms of interstitial cystitis (frequency, urgency, and nocturia with or without pain over the pubic area), specifically with regard to results of the potassium stimulation test in relation to cystometric and cystoscopic findings and anesthetized bladder capacity.

MATERIALS AND METHODS

Charts of 153 patients who presented with frequency, urgency, and/or pelvic pain between January 1997 and March 2003 were reviewed. The diagnosis was based on clinical symptoms, i.e., frequency (>8 times/day), urgency, and the presence or absence of pelvic pain or nocturia. The duration of symptoms was not used as an inclusion or exclusion criterion, unlike the National Institute for Diabetes and Digestive and Kidney Diseases criteria used in research settings. Patient information was obtained from their clinical charts. All patients had a 3-day voiding diary. A urodynamic evaluation test was performed in all patients before the potassium stimulation test with a 2-lumen 7-Fr urodynamic catheter at a fill rate of 50 ml/min. The cystometric capacity was recorded from the maximal capacity during cystometry. The potassium stimulation test was performed as described by Parsons et al. with distilled water used as the control [2]. The potassium stimulation test was performed before cystodilation on all patients. Pain and urgency were graded on 0-to-5 point scale. Two solutions were separately instilled into the bladder via a 7-Fr catheter. Solution 1 (40 ml distilled water) was instilled and left indwelling for 5 minutes. Patients were asked to rate the urgency and pain on separate analog scales from 0 to 5. The water was then removed, and solution 2 (15 ml of 15% KCl mixed with 25 ml of distilled water) was instilled. The patient was asked to rate the sensation of urgency and pain on separate analog scales from 0 to 5.

The potassium stimulation test was considered positive if urgency or pain grade for the potassium solution was at least 2 points greater than 0 and if the patient identified solution 2 as causing more than 2 points greater pain or urgency as compared to solution 1. The test was considered negative if neither solution was associated with any urgency or pain. Patients were blinded to the type of solution and the effect of instillation. Under general anesthesia, diagnostic hydrodistension was performed with the irrigation fluid at 85 cm above the patients' bladder. The distension was hold for 1 to 2 minutes, the bladder was drained, and then the volume of the effluent was measured. The presence of small, bleeding raspberry-like spots called glomerulations was recorded. These were pinpoint patchy hemorrhaging. A cystoscopic finding of glomerulation was graded as moderate if there was focal post-dilatation hemorrhage, or severe if there was diffuse post-dilatation hemorrhage.

RESULTS

Of the 153 patients, 127 (83%) were female and 26 (17%) were male. The average age when interstitial cystitis symptoms first appeared was 37.9 (range, 14-80) years. The mean duration of symptoms before seeking management was 56.8 (range, 1-360) months. The potassium stimulation test was positive in 110 (72%) patients, and negative in 43 (28%) patients. A cystometric study was performed on all 153 patients. Cystometric capacity of the bladder was 278 (range, 108-536) ml. Of the 110 patients with a positive potassium stimulation test, the maximal cystometric capacity of the bladder was 270 (range, 108-525) ml. The cystometric capacity of the bladder was 299 (range, 123-536) ml for 43 patients with a negative potassium stimulation test. There was no statistical difference between the positive and negative potassium stimulation tests with regard to the cystometric capacity of the bladder. The mean anesthetized bladder capacity was 675 (range, 300-1500) ml. The mean anesthetized bladder capacity was 672 (range, 300-1200) ml in the 110 potassium-positive patients and 681 (range, 40-1500) ml in the 43 potassium stimulation- negative patients. No statistical difference was noted between the positive and negative potassium stimulation tests with regard to the anesthetized maximal bladder capacity. Table 1 shows the relation between the potassium stimulation tests and cystoscopic findings. Of the 110 patients with a positive potassium stimulation test, 7 had normal cystoscopic findings. One hundred and three had glomerulations (50 with moderate and 53 with severe ones). Of the 43 patients with negative potassium stimulation tests, 4 had normal cystoscopic findings and 39

Table 1. Cystoscopic findings with regard to potassium stimulation test results.

Cystoscopy	KCL test	No. of negative results	No. of positive results	Total no.
Normal		4 (9.3%)	7 (6.4%)	11
Glomerulations (moderate)		39 (90.7%) (27)	103 (96.3%) (50)	142 (77)
(severe)		(12)	(53) ¹	(65)

¹ including Hunner's ulcer.

had glomerulations (27 had moderate and 12 had severe ones). Sixty-four percent with normal cystoscopic finding and 72% with glomerulations had positive potassium stimulation tests. Overall, cystoscopy was normal in 11 (7%) of our patients.

DISCUSSION

In our study, males accounted for 17% of all patients, which is higher than that of a previous report [6]. The reason for the higher proportion of males may have been due to our high suspicion and broad criteria of interstitial cystitis in male patients. Recent advances in understanding male chronic nonbacterial prostatitis (class III), which may be another form of interstitial cystitis in males [7], may explain the high incidence of interstitial cystitis in men in our study. The mean patient age of 37.9 years and duration of symptoms of 57 months are similar to those reported in the Interstitial Cystitis Data Base study [8]. The overall rate of positive intravesical potassium tests was 72% which is in accordance with other reports, at around 66% to 75% [2,9]. The cystometric capacities of the bladder were 270 and 299 ml for positive and negative potassium stimulation tests, respectively, which showed no statistical difference. The results are similar to those of another report [10]. Unfortunately we had no data on the first sensation to void. Mireille et al. reported a statistical difference of the first sensation to void of 48 and 85 ml between positive and negative groups on the potassium test. However, they could not explain this difference in their results [5]. In the Interstitial Cystitis Data Base study, bladder capacity and volume at first desire to void were related to day and night frequency rather than to severity of pain. Bladder volume at the first desire to void averaged 63 ml in patients with constant urgency and averaged 108 ml in those without urgency. Likewise, bladder capacities averaged 163 and 288 ml for the same respective patient subsets [11]. The maximal mean anesthetic capacities

averaged 672 and 681 ml for the positive and negative potassium stimulation tests, respectively, which showed no statistical difference. This result is in accordance with that of another report [10].

It is well known that the severity of findings on cystoscopy, including the density of glomerulations and the amount of bleeding, do not necessarily parallel the symptom state [12-15]. Our cystoscopic findings showed no significant correlation between the potassium stimulation test and cystoscopy done under general anesthesia, which is also in accordance with another study [9]. In general, it is expected that around 10% of patients with interstitial cystitis present with Hunner's ulcer [8]. However, only 10 cases (6%) with ulcer were noted in our study which may have been due to the less disease severity in our patient groups. A 76% correlation between National Institutes of Health criteria for the potassium stimulation test and interstitial cystitis is presented herein. However, no correlation was noted with regard to the severity of cystoscopic findings and the potassium stimulation test [2]. To date, little has been written on cystoscopic findings in interstitial cystitis patients who have also undergone a potassium stimulation test.

CONCLUSIONS

Our study showed no significant correlations between the potassium stimulation test and bladder capacity or anesthetized bladder capacity. The potassium stimulation test could not predict the outcome of cystoscopic findings as to symptoms of interstitial cystitis patients. The potassium stimulation test as an aid to a diagnosis of interstitial cystitis should be further evaluated.

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