61

Lewis J[1], Sullivan M[1], Nabha K[1], Bartolome V[1], Siroky M[1], Yalla S [1]
1. VA Boston Healthcare System

RELATIONSHIPS BETWEEN BLADDER OUTLET OBSTRUCTION, BLADDER COMPLIANCE AND RENAL FUNCTION IN ADULT MEN WITH LUTS

Hypothesis / aims of study

Benign prostatic hyperplasia (BPH), with or without bladder outlet obstruction (BOO), is known to be a major contributor to patient complaints of lower urinary tract symptoms (LUTS). What is unclear, however, is whether LUTS, if caused by BOO, merely affects quality of life rather than altering bladder compliance and/or renal function.

While it is well-established in children as well as adults with neurogenic bladder dysfunction that poor bladder compliance results in upper tract deterioration, this relationship has not been clearly demonstrated in adult men with BPH. A previous study suggested that in a small subset of men with diminished bladder compliance, who have both BOO (diagnosed by voiding profilometry) and detrusor instability (DI), there is a significant increase in the incidence of azotemia [1]. As for the causes of diminished bladder compliance in the BPH population, factors such as advanced age, BOO, high voiding pressures, and DI have been implicated [2].

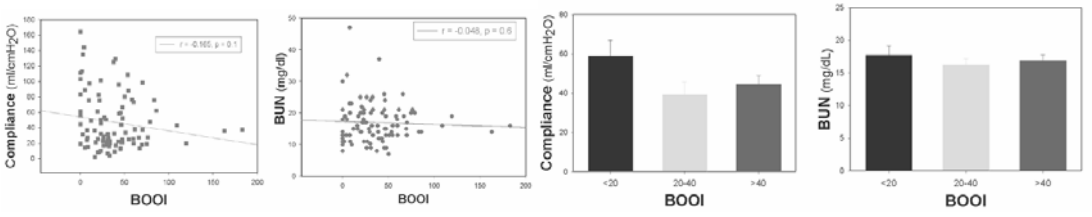
To extend our understanding of the relationships between bladder compliance, outlet resistance and renal function associated with non-neuropathic voiding dysfunction presumably related to BPH, we analyzed a group of veterans with bothersome LUTS.

Study design, materials and methods

A retrospective analysis was carried out in 99 veterans who presented to the Urology clinic complaining of LUTS and underwent a pressure-flow urodynamic study (UDS). Patients with spinal cord injury, multiple sclerosis, Parkinson's disease or other overt neurogenic causes of voiding symptoms were excluded. Bladder outlet obstruction index (BOOI), capacity and work parameters were calculated from the UDS. Bladder contractility was assessed using the maximum Watts factor (Wf). Bladder compliance was calculated from the cystometry curve prior to the onset of bladder contraction, and end-fill compliance was calculated over the final 50 ml of bladder filling. Serum measures of BUN and creatinine were collected. Note was made as to whether the patient had concurrent hypertension (HTN), diabetes mellitus (DM), and/or congestive heart failure (CHF).

Results

Mean age of the patient group was 66.8 years (range: 37-86). BOOI showed no significant correlation with either total or end-fill compliance, BUN or creatinine but was moderately correlated with internal work ($r=0.37$, $p<0.05$). Compliance was weakly correlated with external work ($r=0.28$, $p=0.005$) and BUN ($r=-0.28$, $p=0.005$) but not correlated with Wf or internal work. Age was significantly correlated with BUN ($r = 0.375$, $p<0.001$) and creatinine ($r=0.29$, $p=0.005$). Patients with poor compliance (<30 ml/cmH_2O) showed no significant difference in BUN and creatinine or degree of obstruction compared to patients with normal compliance. Furthermore, subgroups based on severity of obstruction (BOOI<20, BOOI 20-40, BOOI>40) showed no significant differences in compliance (mean compliance ∀ SEM = 59 ∀ 8.0, 39 ∀ 6.5, and 44 ∀ 4.5 ml/cmH_2O respectively), BUN or creatinine. The incidence of diminished compliance was similar (43%) in both the obstructed and non-obstructed patients. 18.9% (n=18) had decreased renal function (serum creatinine = 1.3 mg/dl); however, compliance, degree of obstruction, and age in these patients were not different from patients with normal renal function. Although the incidence of hypertension was the same in both



groups, the incidences of DM (50%) and CHF (11.1%) were higher (but not significantly) in patients with decreased renal function compared to those with normal renal function (27.3% and 5.2%). DM, HTN or CHF were present in 31.6%, 61.1% and 6.3% of patients respectively. No differences in serum measures of renal function, compliance and BOOI were detected compared respectively with those without these diseases. 31.6% of the cohort had none of these comorbidities. In patients with both HTN and DM, renal function in those with BOO (37%) was not different from those without BOO.

Interpretation of results

While LUTS due to BOO can be bothersome to a man's quality of life, the degree of obstruction is not associated with a decline of his bladder compliance or of his renal function. The incidence of diminished compliance is similar in patients with and without obstruction suggesting that changes in compliance are not exclusively attributable to an obstructive process in patients with LUTS. Renal function is not significantly reduced in this patient population, despite 61% being significantly obstructed. Changes in BUN are associated with changes in age and compliance but are unrelated to severity of obstruction. The lack of significant renal deterioration in this population is consistent with a recent study that showed no cases of renal insufficiency in 3047 BPH patients followed over 5 years [3]. Comorbidities (DM, HTN) do not appear to significantly impact renal function in this cohort, even when associated with BOO.

Concluding message

Since diminished bladder compliance and deterioration of renal function are not uniquely associated with BOO, it is unclear why a few isolated patients develop severe deterioration of the upper tract, compromising renal function. We speculate, however, that either the duration and rapidity of progression of BOO, diminished proprioception of bladder filling induced by covert neuropathic changes, bladder ischemia and/or age-related changes in the bladder smooth muscle may be responsible for deleterious upper tract changes and renal compromise in select patients. These aspects require future investigation.

References

1. Urodynamic risk factors for renal dysfunction in men with obstructive and nonobstructive voiding dysfunction. J *Urol;* 1997; 181-185.
2. Interrelationships of bladder compliance with age, detrusor instability, and obstruction in elderly men with lower urinary tract symptoms. *Neurourol Urodynam* 1999;18:3-15.
3. The long-term effect of doxazosin, finasteride, and combination therapy on the clinical progression of benign prostatic hyperplasia. *N Engl J Med* 2003; 249 (25):2387-2398.

FUNDING: Department of Veterans Affairs, Medical Research Service, Washington, D.C.