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IS LOW BLADDER COMPLIANCE PREDICTIVE OF DETRUSOR OVERACTIVITY?

<u>Hypothesis / aims of study</u>
There is a complex interrelationship between detrusor overactivity and low bladder compliance. Ultra-structural changes in the bladders of patients with detrusor overactivity (DO) include increased collagen and elastin content in the extracellular matrix and decreased detrusor neural density[1]. Nerve density reduction and connective tissue alteration have also been identified as factors contributory to low bladder compliance[2]. In addition to these ultra-structural similarities DO and low bladder compliance exhibit a urodynamic association. Values of bladder compliance have been shown to be lower in those with DO and the presence of DO has been described as an independent predictor of low bladder compliance[2]. The aim of this study was to assess the predictive value of low bladder compliance for the diagnosis of detrusor overactivity using ambulatory urodynamics as the gold standard investigation for comparison.

<u>Study design, materials and methods</u>
All patients with LUTS attending a single centre for both conventional and ambulatory urodynamics over a five-year period were reviewed. Patients with neuropathic bladder disorders and urological malignancy were excluded. Pressure-flow studies were performed in accordance with "Good Urodynamic Practice" guidelines and the filling rate for conventional cystometry was 100mls/min. Bladder compliance during artificial filling was calculated using filled volume and end filling pressure. The results from the ambulatory urodynamic studies were recorded and specific attention was paid to the presence or absence of DO. The bladder compliance of those patients with DO on ambulatory studies was compared to those with no evidence of DO. Differences were examined using Student's t-test. The predictive value of various set levels of bladder compliance was compared using a receiver-operator characteristics curve in an attempt to find the optimal threshold of bladder compliance for the diagnosis of DO.

<u>Results</u>
162 patients underwent both conventional and ambulatory urodynamics at our institution from 1998 – 2003. Following exclusions 142 (88%) data sets were suitable for analysis. 115 (81%) patients were female. Overall mean (s.d.) bladder compliance was 120 (92) ml/ cmH_2O. Ambulatory studies revealed 90 (63%) patients exhibited DO. The mean (s.d.) bladder compliance in this group was 110 (88) ml/cmH_2O compared to 138 (97) ml/cm H_2O in those who did not show DO on ambulatory urodynamics. This difference was not statistically significant (p=0.1). The predictive values of various levels of bladder compliance to diagnose DO are shown in the ROC curve (Fig 1). The area under the curve is less than 0.5 and the line of identity representing chance is shown for comparison..
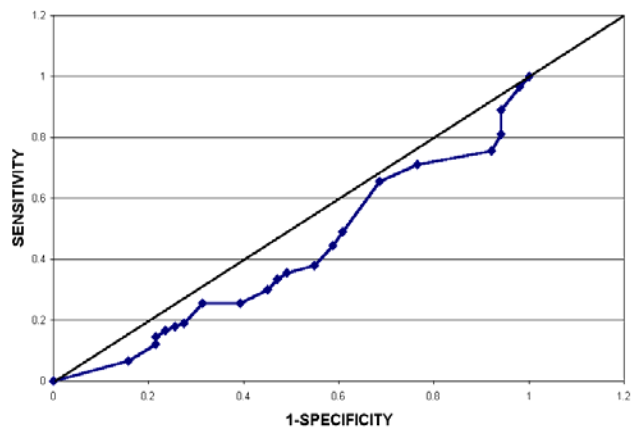
Figure 1 ROC curve plotting sensitivity and specificity of diagnosis of DO using various threshold levels of bladder compliance.

Interpretation of results

Calculated values of bladder compliance showed wide variation within our study group. The overall value is higher than figures quoted in previously reported studies and this may be due to the large proportion of women in our study or the relatively fast filling rate used at our institution. Although the level of bladder compliance in those patients with DO was numerically lower on average than in those without DO this difference was not found to be statistically significant and this differs from previously published work[2]. Perhaps this is a consequence of the different patient groups in the two studies. This group primarily consisted of women with LUTS whereas previous work has been done in elderly males. In addition the diagnostic capability of bladder compliance was found to be poor in this study and again this is in contention with previous evidence. DO has been found to be an independent predictor of low bladder compliance in other studies but our data suggest that the reverse is not true. No value of bladder compliance could predict the presence of detrusor overactivity any better than chance. The area under the curve is generally taken as an indication of diagnostic performance and the area of less than 0.5 indicates very poor accuracy.

Concluding message

Low bladder compliance is not indicative of the presence of detrusor overactivity although it is postulated that similar ultrastructural changes occur in these two conditions. Although previous work has suggested a urodynamic association between DO and low bladder compliance in a group of elderly men this study investigating a predominantly female group with LUTS found poor diagnostic association between these two measurements.

References

1   Focal changes in nerve, muscle and connective tissue in normal and unstable human bladder. *BJU Int 1999:84(9):953-60*

2   Interrelationships of bladder compliance with age, detrusor instability and obstruction in elderly men with LUTS. *Neurourol Urodyn 1999;18:3-15*