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BLADDER WEIGHT IN WOMEN: A MEASUREMENT WITH DIAGNOSTIC VALUE?

Hypothesis / aims of study

Ultrasound bladder weight is a measurement derived from the ultrasound volume measurement of fluid in the bladder and the bladder wall thickness. From this the weight of the bladder can be calculated. It should intravesical volume independent and allow the measurement to acquired with a transabdominal approach.

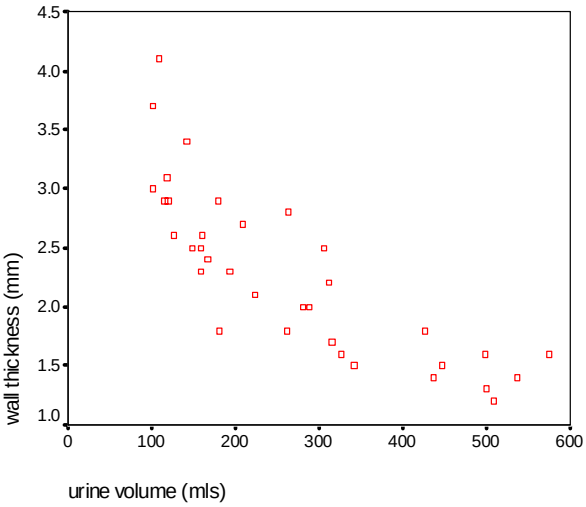
The aim of this study was to determine whether ultrasound estimated bladder weight could be used as a diagnostic tool.

Study design, materials and methods

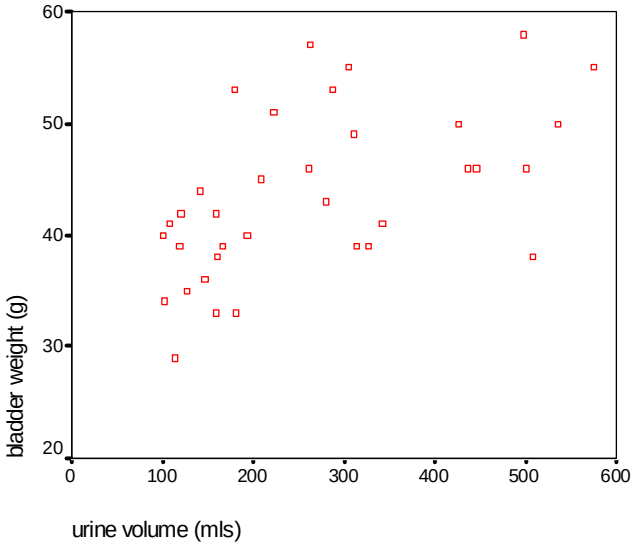
Women with lower urinary tract dysfunction attending urodynamic clinics were recruited. Initially with full bladders their bladders were scanned with a BVM 6500 (Diagnostic ultrasound, DxU), this is a small hand held device. The device can measure bladder intra-vesical volume and has an automated method of measuring the bladder wall thickness, from these measurements the ultrasound bladder weight (UEBW) is calculated. The machine uses a 3.7MHz probe, which takes 24 ultrasound planes over 5 seconds through 130 degrees. These multiple slices are used to calculate an accurate bladder volume. The bladder wall thickness is most accurately measured for bladder volumes between 200ml to 400ml according to the manufacturer.
The women then voided, were catheterised with a 12Ch filling catheter and a 4F intravesical pressure line. A rectal pressure catheter (4F) is also inserted and flushed. Urodynamics are then performed and the bladder was filled with saline at 100ml/min. Once the volume measured preoperatively is reached, the UEBW is measured once more. At maximum bladder capacity provocation is performed such as coughing, listening to running water and washing hands. The women then voided on a flow meter so that a pressure flow study was recorded.

Results

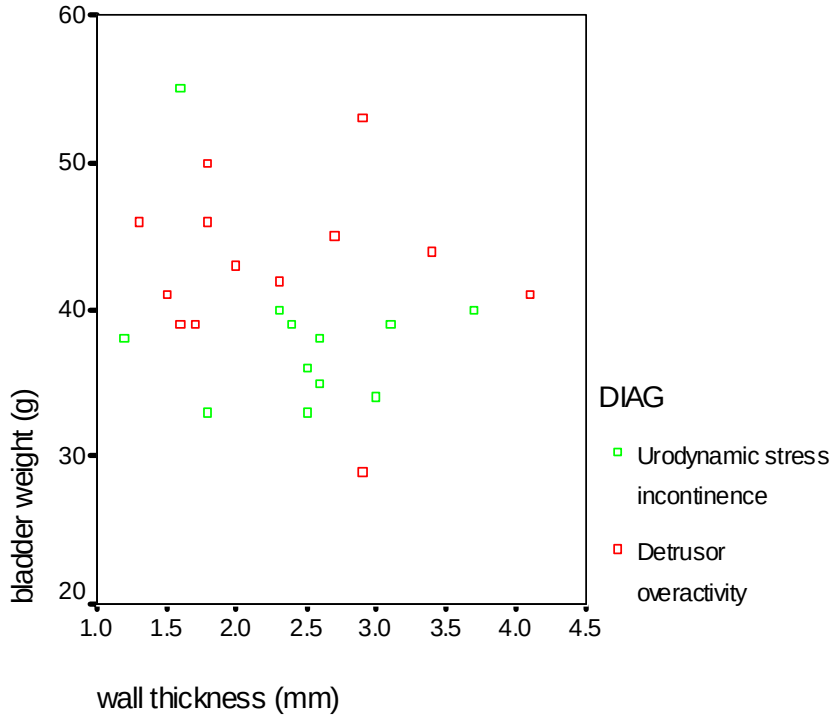
25 women were recruited to the study. 12 women were diagnosed as having urodynamic stress incontinence, UEBW mean 36.5g (sd 4.9), 13 women had detrusor overactivity UEBW mean 42.6g (sd 5.8).
In graph 1 the volume in bladder is plotted against bladder volume.



The bladder wall thickness decreases with increasing bladder volume, levelling at 400ml and above. Due to the change in thickness with volume this cannot be used as a diagnostic tool.



Graph 2 shows the ultrasound bladder weight against urine volume and the UEBW is volume independent between 200 and 400ml



Interpretation of results

This study shows that the ultrasound bladder weight in women is higher in women with detrusor overactivity than women with urodynamic stress incontinence. This may be due to the reduced detrusor muscle mass resulting from reduced outflow resistance in urodynamic stress incontinence or the increased detrusor muscle mass in detrusor overactivity due to isotonic contraction with detrusor contractions in inappropriate places. This could be the basis for a diagnostic or screening tool.

Concluding message

Ultrasound bladder weight varies between different urodynamic diagnoses of women and may reflect detrusor muscle mass.

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HUMAN SUBJECTS: **This study did not need ethical approval because Audit but followed the Declaration of Helsinki Informed consent was obtained from the patients.**