

RESIDUAL URINE MEASURED BY ULTRASOUND: IS IT VALID AND RELIABLE?

Hypothesis / aims of study

Postvoid residual urine (PVR) measured by catheterism or ultrasound is a high recommended test in urinary incontinence, especially in neurogenic patients. Ultrasound is usually performed to measure residual urine, because is less invasive than catheterisation.

To assess whether ultrasound post-voiding volumes are reproducible (reliability) by different observers and close to those obtained by bladder catheterization as gold standard (validity).

Study design, materials and methods

This is a prospective double-blind study involving 150 patients attending our neurourology department to undergo an urodynamic study because of LUTS. We included patients of both sexes, with and without neurological disease, meeting the following conditions: (1) urine infection free, (2) urethral catheterisation possible and not contraindicated, (3) no previous bladder enlargement surgery nor (4) bladder anatomical pathological conditions. Postvoid residual volume (PRV) was blind-measured with ultrasound by two experienced examiners, if any detected PRV >50 mL, the patient was then voided by catheterisation (98 altogether). Global outcome and subanalysis was established by three groups (PVR >100 mL, >150 mL, >200 mL). Reliability was proved using an intraclass correlation coefficient (ICC) and a Bland-Altman plot whilst Kappa index was performed in each subgroup. Sensibility, specificity and COR curves for each group demonstrated validity analysis.

Results

Kappa index ($p < 0,000$) for each group were: >100 mL = 0,89, >150 mL = 0,85, >200 mL = 0,89. global ICC = 0,97 ($p < 0,000$) and in group >200mL ICC = 0,78 ($p < 0,000$). Both observer's measures mean difference (Bland-Altman plot) = -0,7 mL CI 95% (-5,7–5,6). Ultrasound vs catheter PRV global mean difference = 47,1 mL CI 95% (36,2-58,1). Sensibility and specificity group data are respectively >100 mL = 72,4% and 95%, >150 mL = 59,1% and 100%, >200 mL = 54,2% and 100%.

AUC for residual volumes >100 mL, >150 mL and >200 mL were 0,83 (0,76-0,90), 0,79 (0,72-0,86) and 0,77(0,68-0,85) respectively.

Interpretation of results

Ultrasound is a reliable diagnostic test to quantify PRV given its high reproducibility rate and interobserver agreement. Although this reliability, its validity is not as good, because residual urine measured by ultrasound may underestimate real residual volume, specially if PRV > 200 mL.

Concluding message

Ultrasound is a reliable diagnostic test to quantify PRV given its high reproducibility rate and interobserver agreement. Ecography ensures diagnosis given a positive PRV due to its high specificity whereas may have considerable false negative results, most in high residual volumes.. Number of catheterisations needed in patients with positive residual urine shouldn't be decided by ultrasound measurement.

Disclosures

Funding: None **Clinical Trial:** No **Subjects:** HUMAN **Ethics not Req'd:** Diagnosis test were routinely performed in our general patients, no additional test performed in the study **Helsinki:** Yes **Informed Consent:** Yes