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Causes for increased residual urine after non-invasive urodynamics using the condom catheter method

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The condom catheter method is a non-invasive urodynamic test to assess bladder function. During voiding through a catheter attached to a condom, urinary flow is repeatedly mechanically interrupted. The pressure in the condom then represents the isovolumetric bladder pressure (J Urol 1999; 162: 474-479). Post-void residual (PVR) urine volume is an important quantitative symptom in urology, relating to bladder function. In an ongoing longitudinal study in healthy males, we tested if condom measurements influence PVR. Subjects (n = 461, 40-79 years) voided 3 times: once in a flowmeter, and 2 times using the condom catheter method (Urology 2004; 63: 56-60). PVR was measured after each voiding using transabdominal ultrasound. Statistical significance was tested using Wilcoxon Rank test and Mann Whitney U-test. In the first 181 volunteers mean PVR after free voiding was 63 ml [IQR 3-88]. In the 2 condom measurements this was significantly increased to 109 ml [41-148, $p < 0.01$] and 123 ml [51-172, $p < 0.01$]. Analysis of variance showed a significant influence of the number of interruptions of voiding. Limitation of interruptions during the 2 condom measurements in another 121 volunteers, diminished PVR (80 ml [33-105, $p = 0.02$] and 94 ml [43-128, $p < 0.01$]). Between the voidings, subjects had to drink extra fluid. Increased water load has been shown to increase PVR (Int J Urol 2004; 11: 1078-1081). Therefore, the increase in PVR after the condom measurements could also have been caused by excessive fluid intake. To test this, we reversed the order of measurements (n = 49). When the condom measurements were done first, PVR (76 ml [13-99]) was significantly smaller than when the free flow preceded the condom measurements. When fluid intake before the first condom measurement was quantified, PVR was augmented after excessive fluid intake compared to normal fluid intake (90 ml [22-109] vs 36 ml [0-60], $p = 0.03$). PVR after the second condom measurement was larger than after free flow, despite comparable fluid intake (101 ml [32-141] vs 52 ml [14-69], $p < 0.01$). In conclusion, PVR volume is influenced by both involuntary interruption of voiding and excessive fluid intake.

