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**RESIDUAL URINE VOLUMES IN WOMEN WITH LOWER URINARY TRACT SYMPTOMS : PREVALENCE, ASSOCIATIONS AND LEVEL PREDISPOSING TO RECURRENT URINARY TRACT INFECTIONS.**

Abstract Text:

### **Hypothesis / aims of study**

Residual urine volumes (RUVs) in women with lower urinary tract symptoms (symptomatic) have not been subject to comprehensive study. High RUVs (above 30mls [1]) have been long considered to affect the incidence of recurrent urinary tract infections (defined here as 2 or more UTI in the previous 12 months). The aim of the study was to determine the true prevalence of high RUVs and the relationships to presenting symptoms, prior hysterectomy and/or prior continence surgery, menopause/HRT use, clinical stress leakage (sign), all types of prolapse and final diagnoses. The level of RUV, higher than which recurrent UTI are more likely to occur, will be examined.

### **Study design, materials and methods**

592 women attending for an initial urogynaecological / urodynamic assessment took part in the study. In addition to a full clinical assessment, all women underwent free uroflowmetry, RUV measurement (by vaginal ultrasound [2] [Aloka UST-658-5 probe] within 60 seconds of voiding with the opportunity for one re-void if a significant residual was initially present) and multichannel filling and voiding cystometry.

### **Results**

The median age for the entire group was 57 (range 16-98). RUV measurements were: **0-10mls:** 444 (75%); **10-30mls:** 35 (6%); **31-50mls:** 37 (6%); **51-100mls:** 42 (7%); **over 100mls:** 34 (6%) – Figure 1. There was a significant increase in the incidence of higher RUVs with age ( $p < 0.001$ ) and also with parity ( $p < 0.001$ ).

**Presenting symptoms** of voiding difficulty ( $p < 0.001$ ) and prolapse ( $p < 0.001$ ) were significantly linked to higher RUVs with the symptom ( $p < 0.001$ ) and sign ( $p < 0.001$ ) of stress incontinence significantly linked to lower RUVs.

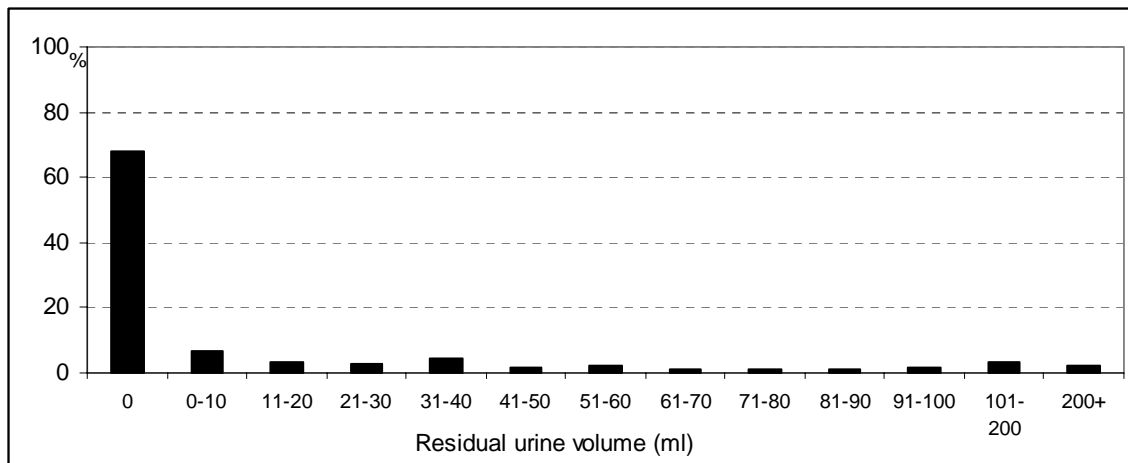
**Menopausal** women not taking HRT were more likely to have higher RUV's than menopausal women on HRT ( $p = 0.158$ ). There was a significant ( $p = 0.048$ ) benefit for women taking combined oestrogen/ progesterone therapy. Mean residuals were 7 mls (182 premenopausal women); 20 mls (119 menopausal women taking HRT); 38 mls (291 menopausal women not taking HRT,  $p < 0.001$ ).

**Prior surgery:** There was no significant relationship with prior hysterectomy ( $p = 0.101$ ) or with prior continence surgery ( $p = 0.083$ )

**Prolapse:** There was a significant relationship between increasing grades of uterine prolapse, anterior, posterior and apical vaginal prolapse with increasing RUV ( $p < 0.001$  for each prolapse type). Prevalence of RUV's over 30mls were 8% (Grade 0), 12% (Grade 1), 28% (Grade 2) and 64% (Grade 3) prolapse.

**Recurrent UTI:** There was a significant increase in recurrent UTI with increasing RUV. Pearson Chi squared analysis demonstrated 30mls as the level of RUV where the number of women with recurrent UTI are shown to significantly increase ( $p < 0.048$ ).

**Final diagnoses:** There were significant positive relationships of increasing RUV to the final diagnoses of prolapse ( $p < 0.001$ ) and voiding difficulty (including cystometry data) ( $p < 0.001$ ) with a significant inverse relation to the diagnosis of USI. The relationship to the diagnosis of overactive bladder ( $p = 0.105$ ) was not significant.



**Figure 1: Residual urine volumes in symptomatic women**

### **Interpretation of results**

The incidence of high RUVs in symptomatic women is low. Eighty-one per cent of RUVs are at or below 30mls, the level at which recurrent UTI is shown to increase. Their prevalence increases with age, parity and the symptoms and signs of prolapse. HRT use in menopausal women, particularly combined oestrogen/progesterone therapy, appears to be protective in reducing the incidence of high RUV. There is an inverse relationship between a high RUV and stress incontinence (symptom and sign) and the final diagnosis of USI.

### **Concluding message**

For women, low (up to 30mls) or no RUV should be a clinical expectation. Those with RUV over this amount should be assessed for a possible cause with a view to possible reduction of the risk of recurrent UTI.

### **References:**

1: Kinetics of urinary tract infections. II. The bladder. Br J Urol 1966;38:156-162

2: Transvaginal ultrasound in the assessment of bladder volumes in women. Preliminary report. Br J. Urol 1989; 64:149-151

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