

# IS BLADDER VOIDING EFFICIENCY USEFUL TO EVALUATE BLADDER VOIDING FUNCTION IN WOMEN OLDER THAN 65 YEARS?

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## HYPOTHESIS / AIMS OF STUDY

• **Bladder voiding efficiency (BVE)** is defined as the ratio between voided volume and total bladder capacity [1]. Although easy to calculate this index is not widely used and none of the few published studies have addressed the incidence of aging.

• Recently, the reliability of BVE measurement from a free flow (FF) has been demonstrated in the general population [2].

For the first time, measurement of BVE could be tested in a large cohort of women older than 65 years.

• **Aims of our study** were **first** to search for the condition which had the predominant influence on evaluation of BVE (FF or intubated flow IF) and **second** the possible relationships with ageing, complaint and urodynamic diagnosis.

## STUDY DESIGN, MATERIAL AND METHODS

Urodynamic tracings of non-neurological women referred for investigation of various LUTS were analyzed. Each session was performed using the Dorado® unit from Laborie. Urodynamic study included one FF in private condition (sitting position) followed by one cystometry (triple lumen urethral catheter 7F allowing for urethral pressure recording) and intubated flow (IF). Post void residual volumes (PVR) were measured using a Bladder-scan.

Exclusion criteria were to be unable to void and/or expelled catheter during IF, voided volume either from FF or IF <100 mL and prolapse of grade ≥ 2.

## RESULTS

194 women met study criteria. Mean age was 74 ± 6 years [65-96 y]. Main complaint was urinary incontinence: stress (31 SUI), urge (59 UUI) and mixed (63 MUI). 41 women had various complaints without incontinence (among which 19 had frequency (FR) or dysuria (DYS)). Overall BVE IF (77.60 ± 25.84) was significantly lower than BVE FF (90.38 ± 15.27) (p<.0001). That decrease was observed whatever age sub-groups (table 1) each decrease was significant; decrease of BVE IF with ageing was not significant. Looking at the complaint BVE IF was significantly lower than BVE FF in women with urinary incontinence whatever the sub-type (table 2):

Age (y)	Nbr	BVE IF	BVE FF	p
65-70	69	81.76 ± 22.28	88.93 ± 17.64	.0129
71-75	56	75.75 ± 30.10	89.95 ± 14.96	.0038
76-80	32	76.44 ± 25.38	94.46 ± 10.92	.0003
>80	37	73.65 ± 25.41	90.22 ± 14.07	.0008

Table 1: BVE IF vs. BVE FF in age sub-groups

complaint	Nbr	BVE IF	BVE FF	p
SUI	31	76.08 ± 27.60	93.98 ± 10.67	.0020
MUI	63	79.46 ± 25.80	92.68 ± 13.16	<.0001
UUI	59	74.89 ± 26.46	88.80 ± 15.78	.0007
FR-DYS	19	75.95 ± 25.87	90.22 ± 15.35	n.s.
OTHER	22	83.12 ± 22.48	83.14 ± 21.94	n.s.

Table 2: BVE IF vs. BVE FF for main complaint

Urodynamic diagnosis (UD) was posed according to the ICS/IUGA recommendations. From UD, 2 sub-groups were defined according with involvement of detrusor. The first (115 women) had UD related to detrusor dysfunction (21 BOO, 13 detrusor hyperactivity with impaired contractility DHIC, 29 DO, 52 detrusor underactivity DU). The second sub-group (79 women) had UD found "normal" (31 N), related to urethral dysfunction (37 intrinsic sphincter deficiency ISD and 11 voiding triggered by urethral relaxation URA). BVE IF was significantly lower than BVE FF except for DO, ISD, N, and URA urodynamic diagnosis.

	Nbr	BVE IF	BVE FF	p		Nbr	BVE IF	BVE FF	p
BOO	21	59.5±25.3	87.6±23.6	.0019	DO	29	82.5±21.5	84.0±22.9	n.s.
DHIC	13	67.4±32.5	94.8±7.2	.0153	ISD	37	87.4±20.9	92.0±11.5	n.s.
DU	52	76.4±25.3	91.0±16.1	.0001	N	31	83.4±21.0	85.6±25.0	n.s.
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Table 3: BVE IF vs. BVE FF for urodynamic diagnosis

	Nbr	BVE IF	BVE FF	p
D	117	73.9±26.0	88.6±19.4	<.0001
N ou U	73	86.1±20.6	89.9±17.7	n.s.
p		.0008	n.s.	

Table 3bis: BVE IF vs. BVE FF for UD

## INTERPRETATION OF RESULTS

• **Main result** is the absence of reproducibility between BVE measurement from a FF and from an IF in this post-menopause population, as observed in pre-menopause and peri-menopause populations [2]. That absence of reproducibility is similar in age sub-groups stratification. Decrease of BVE IF with ageing is not significant. The lower values of BVE IF clearly shows an inability of old women to void with a urethral catheter in place. So, BVE FF seems a more reliable index of bladder efficiency.

• **Complaint of incontinence** results of significant decrease in BVE IF which could be useful information for management.

• **Looking at the urodynamic diagnosis**, an unexpected results is observed. For patients with UD diagnosis DO, BVE IF is not different from BVE FF, which can be the consequence of an higher contractility value (k =.0.57 ±. 06 for the DO sub-group vs. 0.19 ± 0.29 for the rest of the studied population).

## CONCLUDING MESSAGE

• **BVE is an easily measured index. In this large cohort of oldest non-neurological women studied urodynamically for a variety of LUTS, BVE is higher when evaluated from a FF whatever age and for complaint of urinary incontinence.**

• **In addition, a low BVE value from an IF could be the consequence of a detrusor dysfunction.**

## REFERENCES

1- Abrams P. Bladder outlet obstruction index, bladder contractility index and bladder voiding efficiency: three simple indices to define bladder voiding function. *BJU Int* 1999; 84:14-15.

2- Valentini FA, Marti BG, Zimmern PE, Robain G, Nelson PP. Comparison of bladder voiding efficiency in women when calculated from a free flow versus an intubated flow. *Bladder* 2018 5(4) :e36  
doi 10.14440/bladder.2018.790