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Cassadó J[1], Espuña M[2], Pascual M A[3], Fillol M[4], Brescó-Torras P[5], Goitia M[6], Puch M[7], Candela A[8], Urbaneja M[9], Feijoo L[10], Nohales F[11], Gispem G[12]

1. *Mutua Terrassa,* ***2.*** *Hospital Clinic,* ***3.*** *Hospital Universitario de Canarias,* ***4.*** *Hospital La Plana,* ***5.*** *Hospital Igualada,* ***6.*** *Hospital Cruces,* ***7.*** *Hospital Infanta Sofía,* ***8.*** *Hospital General Universitario de Alicante,* ***9.*** *Hospital Virgen del Rocío,* ***10.*** *Hospital Zamora,* ***11.*** *Hospital La Fe,* ***12.*** *Grupo GISPEM*

HOW TO MEASSURE BLADDER VOLUMES IN WOMEN WITH ADVANCED PELVIC ORGAN PROLAPSE?

Hypothesis / aims of study

Bladder volume can be assessed by catheterisation and by ultrasound (US). In the clinical assessment of women with pelvic organ prolapse (POP), there are two circumstances in which it's important to know the bladder volume: when we are going to perform the stress test and for the determination of postvoid residual urine (PVR). Transvaginal and translabial/perineal US have been proved to be convenient and accurate methods to measure postvoid residual. Different formulas can be used to determine bladder volumes using bladder diameters measured by bidimensional (2D) US. **The aim** of this study was to compare the results obtained with 3 different formulas for the determination of bladder volumes by translabial 2D US, in women with advanced pelvic organ prolapse.

Study design, materials and methods

This was a prospective observational multicentre study with consecutive women in the waiting list for prolapse surgery, in 24 Gynaecology departments. All women had a routine urogynaecological assessment, with comprehensive history, including validated symptom questionnaires and a prolapse assessment, performed using the ICS-IUGA POP-Q system (with empty bladder). All women included in the study had a symptomatic genital prolapse (POPQ >= 2nd degree). Women with any previous pelvic surgery were excluded.

Bladder dimensions were measured by translabial 2D US. Bladder volumes were determined before and after spontaneous voiding (all women had been encouraged to attend with full bladder). Initially, a first translabial US was performed before micturition, immediately then women were asked to urinate in complete privacy (without POP reduction) and the voided volume was collected and measured. Immediately after micturition, the bladder dimensions were determined again by a second translabial US and just when this second US was finalized, the PVR was measured by catheterization, using a short catheter of single-use (12F or 14F). Maximum longitudinal diameter (height) and maximum anterioposterior diameter (depth) of the bladder volume were measured in centimetres in the sagittal plane. Maximum transversal diameter of bladder volume was also measured in the transversal plane (Figure 1). All the measures were performed encompassing only the anechoic contents, avoiding the pubic bone shadow.

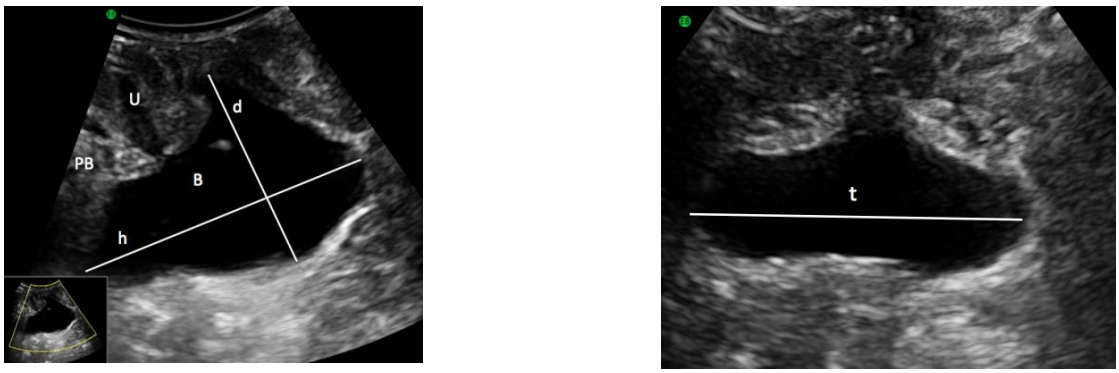

Figure 1*: On the left, in sagittal plane we can see urethra (U), bladder (B), pubis (PB) and height (h) and depht (d) of bladder volume. On the right, maximum transversal diameter of bladder volume (t) is also shown in the transversal plane.*

The bladder volumes were determined by US using 3 formulas: Haylen(1) (volume in ml= height x depth x 5,9 - 14.6), Dietz(2) (volume in ml= height x depth x 5,6) and Dicuio(3) (volume in ml = height x depth x transverse x 0.5).

Demographic and ultrasound data were recorded by means of an electronic case report form and were exported to the data analysis and statistical software Stata 10.0 (Stata Corp LP). Correlation (Spearman's rho) was calculated between the volume determined by US measurements prior to micturition and real volume (voided + catheterisation), and also between the volume determined by US measurements after micturition and real volume (catheterisation). Correlations were calculated for each of the three formulas considered.

Results

In total 194 women with POP were studied. The average patient age was 64.52 (9.78) years (range 32.50-86.44), mean parity was 2.77 (1.27) (range 0-8) and mean body mass index (BMI) was 26.64 (3.58) range (18.73- 35.96). Table 1 shows the distribution of the women according to the type and the degree of POP (ICS-IUGA POPQ).

	Anterior		Middle		Posterior	
	n	%	n	%	n	%
No prolapse	4	2,07%	9	4,66%	59	30,73%
Grade I	5	2,59%	16	8,29%	66	34,38%
Grade II	33	17,10%	61	31,61%	41	21,35%
Grade III	105	54,40%	73	37,82%	17	8,85%
Grade IV	46	23,83%	34	17,62%	9	4,69%

Table 1.

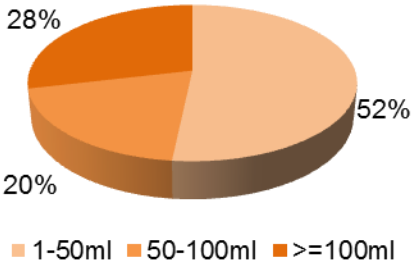

Figure 2.

Only 16 patients voided completely without residual, the median PVR measured by catheterization was 43.5 ml. (range 1-320 ml.). Figure 2 shows the distribution of women according to volume measured by catheterisation. The median PVR determined by US was: 40.43 ml (range -12.83 -421.53 ml) with Haylen's formula; 52.24 ml (range 1.68 - 413.95 ml.) with Dietz's formula and 16.59 ml (range 0.05-332.64 ml.) with Dicuio's formula.

We obtained a total of 359 bladder volumes (194 before micturition and 165 after micturition).

The correlation between total measured volume (spontaneous + catheterization), and the volume determined by the three different formulas, as well as the correlation between the volume measured by catheterization and the post-void volume determined by the three different formulas are shown in the Table 2.

	PRE-VOID (large volumes)		POST-VOID (small volumes)	
	rho	p	rho	p
HAYLEN	0.850	<0.001	0.696	<0.001
DIETZ	0.850	<0.001	0.696	<0.001
DICUIO	0.820	<0.001	0.745	<0.001

Table 2: *Correlation between calculated (using the three different formulas) and measured pre-void and post-void volumes with the different formulas.*

Interpretation of results

Bladder volumes in women with advanced POP can be easily measured by translabial 2D ultrasound. The volumes determined by the 3 different formulas show strong correlations with the real bladder volume. The correlation is slightly stronger for pre-micturition volumes (full bladder) than for post-micturition residuals (small volumes).

Concluding message

All bladder volumes measured by translabial 2D ultrasound, in women with advanced POP, large and small, can be determined with any of the three formulas (Haylen, Dietz and Dicuio) and with all of them, we can get a good correlation with the actual bladder volume. However, Dietz's formula avoids estimation of negative volumes, found when using Haylen's formula when estimating the postvoid residuals. Dicuio's formula, which uses three diameters, seems to work slightly better for small volumes.

References

1. Haylen BT. Verification of the accuracy and range of transvaginal ultrasound in measuring bladder volumes in women. Br J Urol 1989;64:350-352.
2. Dietz HP, Velez D, Shek KL, Martin A. Determination of postvoid residual by translabial ultrasound. Int Urogyn J 2012;23:1749-1752.
3. Dicuio M, Pomara G, Menchini Fabris F, Ales V, Dahlstrand C, Morelli G. Measurements of urinary bladder volumen: comparison of five ultrasound calculation methods in volunteers. Arch Ital Urol Androl 2005;77:60-62.

Disclosures

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