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THE USEFULNESS OF BLADDER CAPACITY AND POSTVOIDING RESIDUAL VOLUME AS A PREDICTOR OF DHIC IN STROKE PATIENTS

Hypothesis / aims of study

In this study, we analyzed urodynamic study results of patient who had detrusor abnormalities and stroke retrospectively, to find out how well the bladder capacity and postvoiding residual volume was reflected in diagnosing DHIC.

Study design, materials and methods

Among stroke patients in our hospital between August 2003 to November 2009, we selected 127 of 178 patients who underwent urodynamic study because of urinary symptoms. Patients who had severe benign prostatic hyperplasia, poorly controlled diabetes, bladder outlet obstruction, detrusor- external urethral sphincter coordination disorder, and normal findings were excluded. The total bladder capacity, voiding volume, postvoiding residual volume and maximum flow rate, average flow rate, detrusor pressure at maximum flow, presence of involuntary contractions were studied in urodynamic study, thereby patients were divided into three groups classified by DO, DHIC, DU.

Results

57 patients were male, 70 were female. 58 people (45.6%) were DO, 16 people (12.5%) were DHIC, 53 people (41.7%) were DU. The average ages of each of the three groups were DO 64.13 (23-87) years, DHIC 67.31 (51-79), DU 67.90 (45-83), respectively.The average total bladder capacity in DO was 219.15 ± 98.30ml, DHIC 330.25 ± 115.75 ml, DU 486.00 ± 111.48ml ($p < 0.001$). Postvoiding residual volume in DO was 22.64 ± 20.85ml, DHIC 146.87 ± 95.09 ml, DU 425.33 ± 136.70ml, showed significant differences between the three groups ($p < 0.001$). The differences between total bladder capacity and postvoiding residual volume in DHIC and DO were drawn to the area of Receiver Operating Characteristic curves (ROC curve) and showed 0.818, 0.981 respectively. If the cut off value of total bladder capacity in DHIC was set to more than 262.50 ml, sensitivity was 90.9%, specificity was 68.4% and cut off value of the postvoiding residual volume to more than 67.50 ml, sensitivity was 90.9%, specificity was 94.7%.

Interpretation of results

The differences between the total bladder capacity and postvoiding residual volume in DHIC and DU were drawn to Receiver Operating Characteristic curves (ROC curve) and the area showed 0.789, 0.940 respectively. If the cut off value of total bladder capacity in DU was set to more than 335 ml, sensitivity was 90.3%, specificity was 72.7% and cut off value of the postvoiding residual volume to more than 220 ml, sensitivity was 90.3%, specificity was 81.8%.

Concluding message

In urodynamic study in stroke patients with urinary symptoms, if total bladder capacity is 263 ~ 335ml or postvoiding residual volume is 68~220 ml than DHIC first to consider, might provide useful information in treating patients who are difficult to perform urodynamic study.

Table 1. Characteristics of study population among three groups.

	DO	DHIC	DU	
No. pts (%)	58 (45.6)	16 (12.5)	53 (41.7)	p-value
Mean (range) age, years	64.13 (23-87)	67.31 (51-79)	67.90 (45-83)	0.420¶
Mean (±SD) Interval (month)	13.95 ± 27.84	9.31 ± 16.03	21.32 ± 47.30	0.506¶
Mean (±SD) TBC (ml)	219.15 ± 98.30	330.25 ± 115.75	486.00 ± 111.48	0.001¶
Mean (±SD) VV (ml)	196.67 ± 101.46	185.87 ± 108.48	63.94 ± 109.30	0.001¶
Mean (±SD) PVR (ml)	22.64 ± 20.85	146.87 ± 95.09	425.33 ± 136.70	0.001¶
Mean (±SD) Qmax (ml/s)	15.12 ± 9.98	11.95 ± 6.66	3.43 ± 5.23	0.001¶
Mean (±SD) Qavg (ml/s)	6.74 ± 3.80	5.28 ± 3.19	1.66 ± 2.51	0.001¶
Mean (±SD) Compliance	25.18 ± 72.43	16.98 ± 23.46	139.04 ± 206.60	0.001¶
Mean (±SD) PdetQmax (ml/s)	41.05 ± 24.12	30.00 ± 10.59	10.56 ± 15.07	0.001¶

¶ Kruskal Wallis test of ANOVA

CVA: Cerebrovascular attact, TBC: Total bladder capacity, VV: Voiding volume,
PVR: Postvoiding residual volume

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Is this a clinical trial?	**No**
What were the subjects in the study?	**HUMAN**
Was this study approved by an ethics committee?	**No**

This study did not require ethics committee approval because	**we analyzed urodynamic study results.**
Was the Declaration of Helsinki followed?	**Yes**
Was informed consent obtained from the patients?	**No**