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Intradetrusor OnabotulinumtoxinA Injections In Non-Neurogenic Detrusor Overactivity: Is a Urodynamic Outcome Assessment Necessary?

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Objectives

To evaluate whether patients' treatment satisfaction after intradetrusor onabotulinumtoxinA injections for non-neurogenic detrusor overactivity is sufficient for adequate outcome evaluation, or if urodynamic investigation is necessary.

Introduction

Intradetrusor onabotulinumtoxinA (BoNT-A) injections are a well-established therapy for refractory neurogenic and non-neurogenic detrusor overactivity (DO). While urodynamic investigation might be necessary after treatment in patients with maximum storage detrusor pressure ($Pdet_{max}$) > 40 cm cmH_2O to monitor the effect of the injections on bladder pressure in neurogenic DO [1], its value in the non-neurological population remains unclear.

Methods

Study type: combined retrospective and prospective study.

Patient cohort: 40 patients undergoing intradetrusor BoNT-A injections for refractory non-neurogenic DO in two university hospitals from January 2018 to June 2023 (Table 1). Patients underwent **urodynamic investigation both before and 6-12 weeks after BoNT-A injections**.

Primary outcome measure: **prevalence of $Pdet_{max}$ > 40 cmH_2O** in patients which were satisfied with the treatment. Satisfaction was assessed by questionnaires, medical history, and achievement of urinary continence.

Secondary outcome measures: treatment effects on various clinical and urodynamic variables.

Statistical analyses: t-test (unpaired, one-sided) was used to compare measures between different patient groups (Tables 2 and 3) both before and after BoNT-injections.

Table 1. Demographic and clinical characteristics.

Variable	*N*
Number of patients	40
Sex	
Female	20 (50%)
Male	20 (50%)
Age (y) [mean±std]	58.5±19.2
Type of bladder emptying (before BoNT-A)	
Spontaneous voiding	29 (72.5%)
Spontaneous voiding + Indwelling catheter	5 (12.5%)
Indwelling catheter	3 (7.5%)
Intermittent self-catheterisation	3 (7.5%)
BoNT-A units	
100	21 (52.5%)
150	2 (5.0%)
200	17 (42.5%)

Results

- After intradetrusor BoNT-A injections, 22 of 40 patients (55%) were satisfied (Table 2). Of these, 4 patients (18%) had a $Pdet_{max}$ > 40 cmH_2O (Table 3).
- The maximal cytometric capacity (MCC) measured 6-12 weeks after BoNT-A injections was significantly higher in the satisfied compared to the unsatisfied group (Table 2).
- Only 12 of the 40 patients (30%) had no DO after BoNT-A injections.

Table 2. Clinical and urodynamic parameters in patients **satisfied** (N=22/40) versus **unsatisfied** (N=18/40) with treatment outcome. Values are presented as mean (standard deviation) across the group, with the exception of DO, which is expressed as a proportion.

Variable	Before onabotulinumtoxin-A treatment			After onabotulinumtoxin-A treatment		
	Satisfied	Unsatisfied	p	Satisfied	Unsatisfied	p
Number of patients	22	18		22	18	
Urinary frequency/24h	13 (7)	13 (5)	0.380	7 (4)	10 (4)	0.087
UI episodes/24h	3 (5)	4 (5)	0.335	1 (2)	3 (4)	0.153
MCC (ml)	349 (217)	281 (186)	0.157	492 (245)	340 (158)	0.015
Compliance (ml/cmH_2O)	122 (93)	86 (75)	0.103	154 (105)	126 (84)	0.191
$Pdet_{max}$ storage (cmH_2O)	54 (33)	44 (36)	0.185	25 (17)	30 (26)	0.220
Bladder filling volume at first DO (ml)	169 (135)	161 (146)	0.432	222 (185)	143 (95)	0.086
DO (n/N) (%)	22/22 (100)	18/18 (100)	0.999	15/22 (68)	13/18 (72)	0.999

Table 3. Clinical and urodynamic parameters in patients **satisfied** with treatment outcome and **$Pdet_{max}$≤40 cmH_2O** (N=18/22) versus patients satisfied with treatment outcome and **$Pdet_{max}$>40 cmH_2O** (N=4/22). Values are presented as mean (standard deviation) across the group, with the exception of DO, which is expressed as a proportion.

Variable	Before onabotulinumtoxin-A treatment			After onabotulinumtoxin-A treatment		
	≤40 cmH_2O	>40 cmH_2O	p	≤40 cmH_2O	>40 cmH_2O	p
Number of patients	18	4		18	4	
Urinary frequency/24h	14 (7)	13 (4)	0.421	8 (4)	6 (1)	0.182
UI episodes/24h	4 (5)	2 (2)	0.294	1 (3)	0 (1)	0.343
MCC (ml)	340 (230)	388 (169)	0.351	489 (265)	503 (148)	0.462
Compliance (ml/cmH_2O)	110 (95)	175 (65)	0.106	159 (113)	128 (17)	0.325
$Pdet_{max}$ storage (cmH_2O)	51 (34)	68 (21)	0.169	18 (11)	52 (12)	<0.001
Bladder filling volume at first DO (ml)	151 (128)	250 (157)	0.095	198 (199)	306 (99)	0.159
DO (n/N) (%)	18/18 (100)	4/4 (100)	0.999	11/18 (61.1)	4/4 (100)	0.359

Discussion

Maximum detrusor pressure above 40 cmH_2O have previously been linked to a higher risk of vesicoureteral reflux, establishing this threshold as a prognostic marker for upper urinary tract injury [2].

Patients with non-neurogenic DO are considered to have a lower risk of upper urinary tract impairment; therefore, the treatment outcome of BoNT-A injections is mainly evaluated based on clinical response (e.g., achievement of continence).

In our cohort, a notable subgroup with baseline $Pdet_{max}$ >40 cmH_2O would benefit from urodynamic investigation after BoNT-A injections, as 18% (4/22) of patients satisfied with their treatment outcome still had a $Pdet_{max}$ >40 cmH_2O.

References

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Conclusion

In patients with refractory non-neurogenic detrusor overactivity and baseline maximum storage detrusor pressure > 40 cmH_2O, treatment satisfaction alone is inadequate for outcome assessment after intradetrusor BoNT-A injections, as high storage detrusor pressures (>40 cmH_2O) jeopardizing the upper urinary tract might be missed in almost one out of five satisfied patients.

Therefore, we recommend urodynamic investigation (i) before the first BoNT-A injections (baseline) and (ii) after the injections in the subgroup of patients with baseline $Pdet_{max}$ >40 cmH_2O.