

# 545: Comparative-fill urodynamics reveals dynamic elasticity in healthy bladders but not bladders with detrusor overactivity

Zachary E Cullingsworth<sup>1</sup>, Andrea Balthazar MD<sup>2</sup>, Anna S Nagle PhD<sup>1</sup>, John E Speich PhD<sup>1</sup>, and Adam P Klausner MD<sup>2</sup>

<sup>1</sup>Department of Mechanical & Nuclear Engineering, Virginia Commonwealth University College of Engineering, <sup>2</sup>Department of Surgery/Division of Urology, Virginia Commonwealth University School of Medicine, Richmond, VA, Richmond, VA

## Hypothesis/aims of study

### Dynamic Elasticity:

- A mechanism for acutely regulating detrusor wall tension
- Reversible strain softening
  - Lost via repeat passive filling and emptying
  - Regained after active voiding
- Identified by comparative-fill urodynamic studies (UDS) in individuals with overactive bladder (OAB)

### Objective:

- Test the hypothesis that individuals with detrusor overactivity (DO) exhibit less dynamic elasticity than those without DO

## Study design & methods

- Individuals with and without urgency based on ICIq-OAB surveys (question 5a  $\geq 3$  and 0, respectively)
- Vesical pressure ( $P_{ves}$ ) data were collected during repeat fill-and-empty UDS
- Initial fill-active void cycle determined cystometric capacity (CCap)
- DO identified by a neurourologist
- Dynamic elasticity was quantified by comparing three fills (Fig 1, Fills 1-3):
  - Fill 1 - "before strain softening"
    - baseline after an active void
  - Fill 2 "after strain softening" (i.e. after passive emptying)
    - quantify degree of dynamic elasticity
  - Fill 3 "after active voiding"
    - quantify dynamic elasticity was recovered after active voiding
- Average  $P_{ves}$  calculated for the filling range from 0% to 40% CCap (Fig 1, blue lines)
- These values were normalized to the average  $P_{ves}$  for Fill 1 (Fig 2)

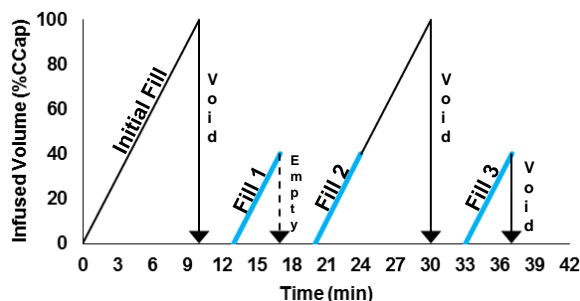


Figure 1: Comparative-fill urodynamics protocol

### Disclosures Statement

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## Results

- UDS data from 21 participants were analyzed (Table 1)
- 9/10 participants without DO exhibited dynamic elasticity
  - Decrease in  $P_{ves}$  during a fill subsequent to passive emptying (Fig 2, Fill 2, \*)
  - $P_{ves}$  return to baseline during a fill subsequent to active voiding (Fig 2, Fill 3).
- Only 3/11 participants with DO exhibited dynamic elasticity (Fig 2).
- Absence of dynamic elasticity was significantly associated with the presence of DO (Fischer's exact test,  $p < 0.01$ ).
- Dynamic elasticity was shown in all 5 healthy participants without OAB or DO

Table 1: Association of dynamic elastic to detrusor overactivity

	Dynamic elasticity shown	No dynamic elasticity shown	Total
Detrusor overactivity	3	8	11
Non-detrusor overactivity	9	1	10
Total	12	9	21

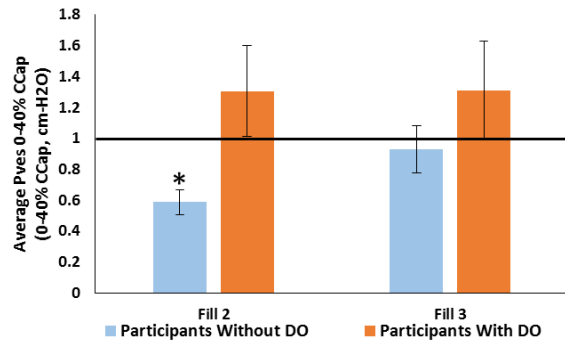


Figure 2: Average  $P_{ves}$  during filling from 0 to 40% CCap during fills 2 and 3 normalized

## Interpretation of results and concluding message

- Contractile activity reverses loss in dynamic elasticity due to a fill-passive empty cycle
- Patients without DO show a loss in dynamic elasticity in Fill 2 that was restored by the active voiding contraction following Fill 2
- Patients with DO show no loss in dynamic elasticity in Fill 2 a decrease in average  $P_{ves}$ 
  - DO during Fill 1 prevented the decrease in  $P_{ves}$
  - DO during Fill 2 restored the decrease  $P_{ves}$  during that particular fill
- DO may alter the bladder's mechanism for acutely regulating elasticity, possibly contributing to OAB
- Quantification of dynamic elasticity could lead to patient sub-typing and targeted OAB treatments