Introduction

• Underactive bladder (UAB) is understudied and associated with poor quality of life with unresolved symptoms.

• There is no consensus on the definition of UAB, but it is characterized by symptoms of hesitancy, slow/intermittent stream, and sensation of incomplete emptying.

Objectives

Primary
• To assess the effect of electrical stimulation on bothersome urinary symptoms and bladder emptying.

Secondary
• To determine bladder and urethral sensory nerve function in women with underactive bladder.

• To assess the effect of intravesical stimulation on cystometric volumes.

• To assess the effect of intraurethral stimulation on detrusor contraction strength and duration.

Aims and Hypotheses

Sensory Nerve Function
- Women will have decreased sensitivity to electrical stimulation compared to normative data in asymptomatic women.

Intervention
- Intravesical electrical stimulation will decrease cystometric volume endpoints, increase emptying efficiency, and decrease bothersome symptoms.

- Intraurethral electrical stimulation will increase contraction strength and duration, increase emptying efficiency, and decrease bothersome symptoms.

Eligibility Criteria

Inclusion Criteria
Meet 2 of the 3:
- Self-reported poor sensation during filling or emptying
  Q: In the past 7 days, where did you feel sensations when you felt you needed to urinate? A: “No” response to bladder area
  Q: In the past 7 days, how often did you have no sensation of urine flow while you were urinating? A: “Most of the time” or “Every time” response
  Q: In the past 7 days, how often did you feel that your bladder was not completely empty after urination? A: “Most of the time” or “Every time” response

- Self-reported bothersome symptoms
  Q: In the past 7 days, how satisfied were you with your bladder function? A: “Not at all satisfied” or “Somewhat satisfied” response
  Q: In the past 7 days, how bothered were you by urinary symptoms? A: “Very bothered” or “Extremely bothered” response

- Clinic uroflowmetry voiding efficiency (VV / VV + PVR) < 80% (VV + PVR must be > 150ml)

Exclusion Criteria
- Preexisting neurological impairment (e.g., SCI, MS, Guillain-Barre, cauda equina syndrome, cerebrovascular accident, Parkinson’s disease, TBI)

- Functional obstruction demonstrated by elevated pelvic floor activity on EMG during UDS or high tone pelvic floor on clinical exam

- Surgical procedures to increase bladder capacity (e.g., augmentation cystoplasty)

- Active urinary tract infection

Symptom Questionnaire
Symptom Index (29) instrument providing patient-reported outcome measures to assess urinary symptoms.

Methods

Sensory Nerve Function
Current perception threshold (CPT) testing delivers electrical stimulation at varying amplitudes and frequencies to quantify sensory nerve function.

Intervention
Intravesical stimulation
- ↑ bladder CPT or “first desire to void” > 275ml
- 20 Hz, 80% of tolerable intensity
- 30-60 minute session

Intraurethral stimulation
- ↑ urethral CPT or baseline detrusor underactivity
- 10 Hz, 80% of tolerable intensity
- Stimulate at “strong desire to void”

Conclusions
- Studies will determine novel pathological CPT reference values to guide tissue specific intervention.

- Studies will improve patient selection and establish an individualized approach to neuromodulation in women with UAB.