INTRODUCTION

- **Biofeedback:** *Introduced by Maizels et al. (1979)* 3-4
  - Goal: for children to maintain a relaxed pelvic floor & voluntary urethral sphincter with voiding.
  - Awareness & functional usage of pelvic floor musculature 4
- **Dysfunctional voiding:** Dis-coordination between the detrusor muscle and the external sphincter 3
- Also titled Dysfunctional Elimination Syndrome (DES) 4
- Each study used pediatric participants from ages >5, eldest age = 16 1,3,4
- Studies excluded children with neurological involvement

RELEVANT CONSIDERATIONS

**Social Obstacles** 2-3
- Bladder Irritants: overextend or incite an uninhibited bladder contraction
- School Setting: increased frequency, deceased time

**Urinary Incontinence Causes:** 3
- Sphincter, Bladder, or Combination

**Incontinence Patterns:** daytime and/or nighttime incontinence, urinary frequency & urgency, retention behavior of bowel & bladder, & UTI occurrence. 1,4

**Other Treatment Forms**
- UTI prevention
- Timed voiding
- Anti-cholinergics
- Pelvic Floor Exercises 4
  (performed without biofeedback)
- Animation gives reinforcement! 3-4
  - Games required contractions
  - Visual & auditory stimulation

STUDY PROTOCOLS

**Kibar et al. (2007)** Participants consisted of 121 patients with Spinning Top Urethra (STU) & voiding dysfunction.

*(Groups allocated by the parents’ preference)*

**Group 1** (n=49): Simple bladder retraining & timed voiding (Voiding every 2 hours, with regular fluid intake (2 glasses with meals, 1 glass in between))
- VCUG w/o sedation performed 6 & 12 months later to determine status of STU & Vesicoureteral reflux (VUR)
- Recorded volume & incontinence episodes

**Group 2** (n=72): Biofeedback therapy
- Performed 30, 3 sec. sub-maximal contractions followed by a prolonged relaxation (30 sec).
- Initially 1x/week, then scheduled at 3-4 week intervals for 6 months

**RESULTS:**

<table>
<thead>
<tr>
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<th>At 6 months (%)</th>
<th>Group 1</th>
<th>Group 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>(all p&lt;.05)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>STU</td>
<td>8/49 (16)</td>
<td>47/72 (65)</td>
<td></td>
</tr>
<tr>
<td>VUR</td>
<td>10/39 (26)</td>
<td>48/59 (81)</td>
<td></td>
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<tr>
<td>1st year of</td>
<td></td>
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<tr>
<td>Follow-Up (%)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>STU</td>
<td>13/49 (26)</td>
<td>56/72 (78)</td>
<td></td>
</tr>
<tr>
<td>VUR</td>
<td>16/39 (41)</td>
<td>50/59 (85)</td>
<td></td>
</tr>
</tbody>
</table>

**Vasconcelos et al. (2006)** 56 patients with DES randomly assigned to 2 groups:

**Group 1** (n=26): 24 sessions over 3 month period
- Both groups adhered to voiding & drinking schedules and Kegel exercises (Group 2 had the addition of biofeedback)
- 5 sec. contractions
- 10 sec. rest period
- Perform Kegels at home for 20 minutes 3/week.
- ‘Cured’ if no wetting episodes in a 4-wk. period & ‘improved’ if wetting episodes decreased 50%.

**Group 2** (n=30): 16 sessions over 2 month period
- Both groups adhered to voiding & drinking schedules and Kegel exercises (Group 2 had the addition of biofeedback)
- 5 sec. contractions
- 10 sec. rest period
- Perform Kegels at home for 20 minutes 3/week.
- ‘Cured’ if no wetting episodes in a 4-wk. period & ‘improved’ if wetting episodes decreased 50%.

**RESULTS:**

<table>
<thead>
<tr>
<th></th>
<th>Group 1</th>
<th>Group 2</th>
</tr>
</thead>
<tbody>
<tr>
<td>STU</td>
<td>15/21 (71)</td>
<td>21/21 (100)</td>
</tr>
<tr>
<td>VUR</td>
<td>13/15 (87)</td>
<td>18/18 (100)</td>
</tr>
</tbody>
</table>

**Conclusion:**

- Both groups had improvements in voiding behavior & quality of life.
- Biofeedback therapy was superior to voiding therapy alone.

REFERENCES


BIOFEEDBACK MODES

**Figure 1.** VCUG (VOIDING CYSTOUROGRAPHY) & UROFLOWMETRY, combined with electromyography (UROFLOW-EMG), of 9-year-old boy with dysfunctional voiding & STU.

- (A) Grade 4 VUR, STU, irregularity of bladder wall on VCUG & dysfunctional voiding pattern on Uroflow-EMG before biofeedback treatment.
- (B) VUR, STU, irregularity of bladder wall, & dysfunctional voiding pattern had resolved after biofeedback treatment.

- Animated vs. Non-animated
- Surface EMG patches
  - Perineum (3 & 9 o’clock)¹ (2 & 10)⁴ & Rectus Abdominus
- Kibar et al. used UDS-120 urodynamic system