Comparative Evaluation of Defecography phase to Non-defecography Valsalva Maneuver in dynamic pelvic floor floor MRI
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PELVIC FLOOR DYSFUNCTION

- Hidden women's health epidemic
- 50% middle aged & older are affected
- Large health care cost: 30% reoperations
- Unmet clinical need:
  - Paucity in understanding complex pelvic floor dynamics
  - Limited pre operative evaluation:
    - High recurrence rates
    - Repeat surgery
PURPOSE

To evaluate the utility of Defecography phase (DP) in dynamic pelvic floor MRI, in comparison to non-defecography Valsalva maneuver (VM).
METHOD AND MATERIALS

Study IRB-approved, HIPPA compliant

**INCLUSION CRITERIA**

All female patients who presented to pelvic floor clinic between Oct 2011- August 2015

**CLINICAL COMPLAINTS**

Urinary: Sensation of incomplete emptying, urgency, incontinence, nocturia, frequency

Fecal: incontinence, urgency, constipation

Vaginal prolapse or Dyspareunia

**PHYSICAL EXAMINATION**

Findings of pelvic floor prolapse were demonstrated by Baden Walker system

**EXCLUSION CRITERIA**

a) did not have a pelvic MRI performed, b) were of male gender, c) were unable to tolerate the gel administration or d) did not demonstrate expulsion of rectal gel during defecography maneuvers.
MRI TECHNIQUE

Patient Preparation

• Insertion of ultrasound gel into rectum & vagina

• Instructions to strain (exert pressure against closed sphincter) and defecate (expulsion of gel) during different phase of acquisition

MR Image acquisition:

• Fast imaging with steady-state free precession technique (True FISP)
• Mid sagittal acquisition was performed at rest, and during VM & DF
  • 350-mm² field of view, 256 × 208 matrix, partial Fourier acquisition of 7/8, 8-mm section thickness, flip angle of 40°, acceleration factor of two
MR IMAGE ANALYSIS

- Image review:
  - Image analysis was done in blinded fashion by two radiologists with 13 & 5 years of experience in abdominal & pelvic MRI.

- HMO system was employed for quantification of pelvic floor descent:
  - Pubo-coccygeal line (PCL)
  - M-line
  - H-line

- Presence of organ prolapse
- Quantification of degree of organ prolapse

MR IMAGE ANALYSIS

Cystocele

Vertical distance of the neck of urinary bladder below the PCL

Ano-rectal junction prolapse

- M-line >2cm
- Rectum below the H-line

Utero-vaginal Prolapse

Descent from its position on static images
RESULTS

Statistics:

• Change in measurements of the PCL, H-line and M-line was calculated between straining and defecation sequences.
• An unpaired t-test was used to compare the changes in measurements between straining and defecation sequences for the PCL, H-line and M-line, the degree of anorectal and vaginal prolapse, and the number of patients with cystocele and rectocele.
• A p-value of < 0.05 was considered statistically significance.

Patient Demographics:

• The final study cohort consisted of 237 patients that met study inclusion criteria (mean age 63 years, range 35-82 years).
RESULTS

- Anorectal Prolapse: 100%
- Cystourethrocele: 71% (Defecography phase), 14% (Valsalva maneuver)
- Vaginal vault prolapse: 71% (Defecography phase), 43% (Valsalva maneuver)

Defecography phase
Valsalva maneuver
RESULTS

Rectal descent = z = 2.80, p < 0.01
Cystocele descent = z = 5.70, p < 0.01
Vaginal vault descent = z = 4.14, p < 0.01
# RESULTS

<table>
<thead>
<tr>
<th></th>
<th>PCL</th>
<th>H-line</th>
<th>M-line</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Resting phase</strong></td>
<td>10.2</td>
<td>6.2</td>
<td>3.2</td>
</tr>
<tr>
<td><strong>Valsalva manoeuvre</strong></td>
<td>10.5</td>
<td>7.8</td>
<td>5.5</td>
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<tr>
<td><strong>Defecography phase</strong></td>
<td>7.8</td>
<td>13.4</td>
<td>7.6</td>
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</table>
Imaging of pelvic floor is complex; quantification and assessment of pelvic floor prolapse remains challenging to the radiologist and surgeons.

Defecography phase in dynamic pelvic floor MR unmasks a greater degree of instability involving either of the compartments of pelvic floor.

Better detection, and quantification of severity of cystocele, vaginal prolapse and ano-rectal junction prolapse can be done on DF in comparison to VM.
CYSTOCELE

GLOBAL PELVIC FLOOR PROLAPSE

Valsalva Maneuver  Defecography Phase
ANO RECTAL PROLAPSE & RECTOCELE

Valsalva Maneuver

Defecography Phase
UTERO-VAGINAL PROLAPSE

Valsalva Maneuver

Defecography Phase
CONCLUSION

- Pelvic floor structures may show mild instability or even appear normal on the straining phase, with marked prolapse subsequently revealed on DP imaging.

- Imaging in the Era of Comparative Effectiveness demands evaluation of pelvic floor dysfunction on the defecography phase on dynamic pelvic floor MR examinations, which currently and commonly based on assessment of pelvic floor structures on only straining/Non-defecography Valsalva Maneuver.
REFERENCES