Evaluation and Treatment of Fecal Incontinence

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Disclosures

• No relevant disclosures

Pelvic Floor Disorders

• Incontinence
• Constipation
• Prolapse
• Pain
Pelvic Floor Disorders

- Surgery
- Physical Therapy
- Medications

Spectrum of Disease

Constipation
Hemorrhoids
Non-relaxing Puborectalis
Incontinence
Incontinence

Center for Pelvic Health

- Colorectal surgery
- Urogynecology
- Obstetrics
- Gynecology
- Radiology
- Primary Care
- Gastroenterology
- Psychology
- Urology
- Nursing
- Nutrition
- Pharmacy
- Pediatric Specialists
Summary

• Review of anatomy
• Physiology of Continence / Defecation
• Incontinence
• Evaluation
• Medical treatments
• Surgical treatments

• Emphasis on decision making processes

Anatomy and Physiology of Defecation

constipation

Prolapse

Incontinence

Pain
Anatomy

- Bony pelvis
- Rectum
- Pelvic floor
- Internal sphincter
- External sphincter

Anatomy of Pelvic Floor

- Bony pelvis
- Levator Ani
- Puborectalis
- Pubococcygeus
- Iliococcygeus
- Ischiococcygeus
- Gluteus

Sphincters

- Int Hemorrhoid Complex
- Internal Sphincter
- Conjugated Longitudinal Muscle
- Ext Sphincter
- Deep Superficial Subcutaneous
- Ext Hemorrhoid Complex
Sensation of the Anal Canal

- puborectalis / levators sense rectal distention
- Anal canal is able to distinguish between solid, liquid, and gas
- Somatic sensory nerve fibers do not extend above the dentate line

Physiology of Defecation

- Distention of sigmoid initiates peristaltic waves propelling stool into the rectum
- Accommodation response
- Rectoanal inhibitory reflex / sampling response
- Rectal distension causes a decrease in IAS tone and increase in EAS tone
- Pelvic floor, puborectalis, and external sphincter voluntarily relax, thus allowing defecation
- Voluntary increase in abdominal pressure
Continence / Incontinence

• Difficult to define
• Difficult to study
• Difficult to interpret literature
• Difficult for patients to discuss
• Difficult to compare between patients
• Less difficult to treat
Continence

at a socially acceptable time and place

Physiology of Continence

• Complex interaction of factors
  • Psychiatric factors
  • Dietary factors
  • Stool volume and consistency
  • Neurologic component
  • Anal cushions
  • Mechanical factors
    • Anorectal angle
    • Rectal capacity
    • Internal sphincter – involuntary resting tone
    • External sphincter – voluntary squeeze pressure
  • Sphincter function
    • Internal sphincter – involuntary resting tone
    • External sphincter – voluntary squeeze pressure
  • Anal sensation
Psychiatric Factors

• Mental Status
• CVA
• Depression / Mania
• Psychosis
• Anxiety
• Medications
• Psychiatric evaluation

Physiology of Continence

• Complex interaction of factors
• Psychiatric factors
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Physiology of Continence

• The quality and quantity of stool impacts the ability to defer defecation
• Bowel evacuation program
  • Metamucil
  • Kondremul
  • Glycerine Suppositories
### Physiology of Continence

- Complex interaction of factors
  - **Neurologic component**
    - Anorectal angle
    - Rectal capacity
    - Internal sphincter – involuntary resting tone
    - External sphincter – voluntary squeeze pressure
- **Mechanical factors**
  - Anorectal angle
  - Rectal capacity
- **Sphincter function**
  - Internal sphincter – involuntary resting tone
  - External sphincter – voluntary squeeze pressure
- **Anal sensation**

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### Anal Cushions

- Leaves 7-8 mm gap
- Cushions are a dynamic part of anus
Physiology of Continence

• Complex interaction of factors
  • Mechanical factors
    • Anorectal angle
    • Rectal capacity
    • Internal sphincter – involuntary resting tone
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  • Anal cushions

• Neurologic component
  • Sphincter function
    • Internal sphincter – involuntary resting tone
    • External sphincter – voluntary squeeze pressure
  • Anal sensation

Is Fecal Incontinence Really a Problem?
Incontinence

- Socially and psychologically crippling
- Medications
- Undergarments
- Management of skin breakdown
- Female urinary/genital infections
- Social alienation
- Depression
- Decreased libido / sexual dysfunction
- Suicide

Incontinence

- 0.5-15% of the general population complain of fecal incontinence
  - Macmillan AK. DCR 2004
- Patients at primary care office = 18%
  - Johnson JT. Am J Gastro 1996
- Geriatric patients = 26%
- Psychiatric patients = 31%
  - Clarke N. Health Trends 1979
- Nursing Home = 39%
  - Nelson R. JAMA 1995
- Institutionalization of the elderly
  - 2nd leading admission to a chronic care facility

Is Fecal Incontinence Really Such a Big Problem?
Incontinence

- The adult diaper industry >$400,000,000 annually
  - Johanson JF. Am J Gastro 1996
- Total economic impact $16-26 billion annually in USA

Cost of Fecal Incontinence

- Mail survey 537 University of Michigan patients
- Utilization of services and medications over 12 months for products, services, productivity loss
- Average total cost $4110 (0-46,342)

Etiology of Incontinence

- Previous surgery
- Obstetric
- Aging
- Trauma
  - Sexual
  - Stretch due to prolapse
- Primary disease
  - IBD
  - IBS
  - Diarrhea
  - Irradiation
- Neurogenic causes
  - Central or peripheral
  - Congenital abnormalities
- Miscellaneous
  - Malignancies
  - Constipation
  - Idiopathic incontinence
Fecal Incontinence After Anorectal Surgery

- surgery--a relevant problem?
  - Ommer A. Int J Colorectal Dis 2008

- Literature Review
  - Sphincterotomy 0-45%
  - Hemorrhoid surgery 0-28%
  - Fistulotomy 0-64%
  - Fistula flaps 0-43%

Fecal Incontinence After LAR

- More frequent use of sphincter preserving techniques for rectal resection than the anal sphincter pressure
- Schuld J. Colorectal Disease 2009
- Radiation therapy
- Colonic J pouch
- Coloplasty
- Transanal Transabdominal approaches
- Radiation frequency. Urgency, incontinence
- Transanal
- Transabdominal approaches

Etiology of Incontinence - OB

- Mechanical tear of the sphincters
  - Farmer Am J Obstet Gynecol 2003
- Pudendal neuropathy
  - Up to 60%
  - Snooks Br J Obstet Gynaecol 1985
  - Jacobs Dis Colon Rectum 1990
Etiology of Incontinence - OB

- U/S sphincter defects in 35% vaginal deliveries
  - Sultan AH. NEJM 1993
- 3 months postpartum
  - 3.1% fecal incontinence
  - 25% incontinent to flatus
  - Eason E. CMAJ 2002
- 6 months postpartum
  - 17% if sphincter injury and 8% if Cesarean
  - Scowton Obstet Gynaec 2005

Etiology of Incontinence - OB

- Risk factors
  - Vaginal delivery
    - First vaginal birth
  - 3rd or 4th degree tears
    - 85% incontinence after primary repair
    - Sultan AH. BMJ 1994
  - Forceps
  - Vacuum-assisted delivery
  - Midline episiotomy

Episiotomy
(from Williams Obstetrics, 17th edition)

<table>
<thead>
<tr>
<th>Repair</th>
<th>Midline</th>
<th>Mediolateral</th>
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<tbody>
<tr>
<td>Healing</td>
<td>Easy</td>
<td>More difficult</td>
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<tr>
<td>Pain</td>
<td>Good</td>
<td>Sometimes faulty</td>
</tr>
<tr>
<td>Dyspareunia</td>
<td>Less</td>
<td>More</td>
</tr>
<tr>
<td>Anatomic Results</td>
<td>Rare</td>
<td>Occasional</td>
</tr>
<tr>
<td>Blood Loss</td>
<td>Excellent</td>
<td>Faulty 10%</td>
</tr>
<tr>
<td></td>
<td>Less</td>
<td>More</td>
</tr>
</tbody>
</table>
Etiology of Incontinence - OB

• The anterior portion of the sphincter in a woman
  • Contains only one loop of muscle
  • Is shorter than posterior
  • Is weaker than posterior
  • May cause incontinence when divided

Obstetric Injuries

Fecal Incontinence after Obstetric Injury

• Anal sphincter defects and anal incontinence symptoms after repair of obstetric anal sphincter lacerations in primiparous women
  • Vaccaro C. Int Urogynecol J Pelvic Floor Dysfunct 2008

• 47 primiparous women in Tacoma, WA underwent obstetric anal sphincter laceration repair

• 43% fecal incontinence at 8-12 weeks
• 11% fecal incontinence at 1 year
Obstetric Injuries

- 30% sphincter injuries, but 3% reporting incontinence
  - Alternative methods of continence
  - Delayed onset of symptoms
  - Lack of reporting / lack of discussion
- Cesarean section protects sphincter, but does not fully prevent incontinence.
  - Pudendal neuropathy

Fecal Incontinence in Healthy Women

- disorders in US women
  - Nygaard I. JAMA 2008
  - 9.0% with FI

Evaluation of Continence

- History and Physical
- Proctoscopy / Colonoscopy
- Manometry
- Balloon Examination
- Pudendal nerve latencies
- Electromyography
- Endoanal ultrasound
- Motility Studies
- Defecography
Evaluation of Incontinence

- History and Physical
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- Defecography

Incontinence

- Patient reluctance
- Symptomatic evaluation difficult
- Interpersonal variability

- Validated instruments
  - Fecal Incontinence Quality of Life Index (FIQL)
  - Fecal Incontinence Severity Index (FISI)

FIQL

Evaluation of Incontinence

- History and Physical
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- Manometry
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- Defecography
Evaluation of Incontinence

- Medications
- Diet
- Teas

Always Evaluate the Stool

- Bulking agents can cure incontinence
- R/O constipation with overflow
- Children

“That’s not quite the stool sample we had in mind, Mr. O’Donnell.”

Evaluation of Incontinence

- Bristol Stool Scale

1 2 3 4 5 6 7
Look at the Bottom!

Incontinence
OR
drainage from fistula in ano?

Look at the Bottom!

Incontinence
OR
Crohn’s Disease?
History and Physical

- Inspect undergarments
- Assess perineum in women
- Additional anorectal pathology
  - Fistula, fissure, hemorrhoids
- Change position
  - Commode
- Exam under anesthesia

Look at the Bottom!

Exam Under Anesthesia
Look at the Bottom!

Anal Cancers

Evaluation of Incontinence

- History and Physical
- Proctoscopy / Colonoscopy
- Manometry
- Balloon Examination
- Pudendal nerve latencies
- Electromyography
- Endoanal ultrasound
- Motility Studies
- Defecography
Change in Bowel Habits

Rule out colorectal cancer!!!!!!

- Post operative changes
- Colorectal anastomosis
- Colon/small bowel shortened/diseased
- Crohn's
- Ulcerative colitis
- Radiation injury
- Irritable bowel syndrome
- Cancer / Polyps
- Malabsorption syndromes

Evaluation of the Colon

- History and Physical
- Proctoscopy / Colonoscopy
- Manometry
- Balloon Examination
- Pudendal nerve latencies
- Electromyography
- Endoanal ultrasound
- Motility Studies
- Defecography

Evaluation of Incontinence
Manometry

- Anorectal manometry is an objective means of assessing the resistance to spontaneous defecation provided by the sphincter mechanism and the sensory capabilities of the rectum to provide a feeling of imminent defecation.

- Manometry measures pressures.

Anal Manometry

- Balloon tipped catheter
- 4 channel air charged system

Normal Resting Pullout
Normal Resting Pressures = 40-80 mmHg

Normal Values - Squeeze
• Squeeze pressures should be approximately double resting
• Change in squeeze pressure more important than actual squeeze pressure obtained
• Resting 40-80 mmHg
• Squeeze 80-160 mmHg

Evaluation of Incontinence
• History and Physical
• Proctoscopy / Colonoscopy
• Manometry
• Balloon Examination
• Pudendal nerve latencies
• Electromyography
• Endoanal ultrasound
• Motility Studies
• Defecography
Balloon Examinations

- Rectal Sensation
- Capacity
- Defecation Mechanics
  - Balloon expulsion
  - Obstructed defecation
- Recto-Anal Reflex

Recto-Anal Reflex

Evaluation of Incontinence

- History and Physical
- Proctoscopy / Colonoscopy
- Manometry
- Balloon Examination
- Pudendal nerve latencies
- Electromyography
- Endoanal ultrasound
- Motility Studies
- Defecography
Pudendal Neuropathy

- Obstetrical injury
  - Traction injury
    - high birth weight
    - prolonged labor
    - forceps delivery
  - Perineal descent > 3-4cm
- Rectal prolapse
- Diabetic neuropathy
- Aging

Pudendal Nerve Terminal Motor Latency (PNTML)

St. Marks Electrode

Normal PNTML = 2.2±0.2 ms
Evaluation of Incontinence

- History and Physical
- Proctoscopy / Colonoscopy
- Manometry
- Balloon Examination
- Pudendal nerve latencies
- Electromyography
- Endoanal ultrasound
- Motility Studies
- Defecography

EMG

- Needle EMG not commonly used
- Plug
- Surface electrode

Normal EMG
Nonrelaxing Puborectalis

Evaluation of Incontinence
- History and Physical
- Proctoscopy / Colonoscopy
- Manometry
- Balloon Examination
- Pudendal nerve latencies
- Electromyography
- Endoanal ultrasound
- Motility Studies
- Defecography

Endoanal Ultrasound
- Rotating endoluminal probe
- 16 MHz transducer
- Probe introduced to 8 cm and withdrawn
- Finger inserted into vagina to assess rectovaginal septum, anterior defects
Endoanal Ultrasound

- Delineate the anatomy of the IAS and EAS
- Gives a picture of the sphincter complex
  - 2D or 3D images
- Avoids painful needle EMG sphincter mapping

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Endoanal Ultrasound

- Superior for evaluation of sphincter defects
- Sensitivity up to 100%
  - EMG 89%, ARM 67%, Exam 56%
  - Sultan AH, Br J Surg 1993
  - MRI may be as sensitive with experience
- Intraobserver differences
Evaluation of Incontinence

- History and Physical
- Proctoscopy / Colonoscopy
- Manometry
- Balloon Examination
- Pudendal nerve latencies
- Electromyography
- Endoanal ultrasound
- Motility Studies
- Defecography

Colonic Motility Study

Sitz Marker Study

- Primarily to evaluate constipation
  - Colonic inertia vs obstructed defecation
  - Overflow incontinence

- Ingest capsules (20)
- KUB days 3 & 5
  - Normal > 80% of markers evacuated

Sitz Marker Transit Study

Colonic Inertia  Obstructed Defecation
Evaluation of Incontinence

- History and Physical
- Proctoscopy / Colonoscopy
- Manometry
- Balloon Examination
- Pudendal nerve latencies
- Electromyography
- Endoanal ultrasound
- Motility Studies
- Defecography

Technique

- Patient upright, sitting on specialized commode
- Lateral cine videofluoroscopy
- Thickened contrast per rectum
  - Barium mixed with methylcellulose
  - Administered with caulking gun

Ikenberry. Radiology 1996
Defecography

Non-Relaxing Puborectalis

- Surgical intervention?
- Treated with biofeedback

Intussusception

- Invagination of the rectal wall which begins as a circular fold and extends as a funnel shaped defect into the proximal or distal rectum

- Can cause obstruction of rectum
  - Rectal pressure
  - Incomplete evacuation
  - Prolonged straining
  - Incontinence
Intussusception

Rectocele

• Anterior or posterior bulge beyond the line of the extrapolated rectal wall
• Trapping
  • retained contrast after evacuation

Rectocele
Rectocele

Now What???

Treatment of Incontinence

• Medical
• Plugs
• Biofeedback
• Operative
Dietary Therapy?

- Fiber (25 – 30g / day)
- The quality and quantity of stool impacts the ability to defer defecation
- Bowel evacuation program
  - Metamucil
  - Kondremul
  - Glycerine Suppositories

Treatment of Incontinence

- Diet modification
  - Fiber
- The quality and quantity of stool impacts the ability to defer defecation
- Bowel evacuation program
  - Metamucil
  - Kondremul
  - Glycerine Suppositories

Medical Treatment of Incontinence

- Dietary changes
- Bulking agents
  - Fiber
- Antidiarrheal agents
  - Loperamide (Imodium)
  - Diphenoxylate (Lomotil)
- Anticholinergic agents
- Narcotics
  - Tincture of opium
  - Paregoric
  - Codeine
**Fiber**

<table>
<thead>
<tr>
<th>Fiber Supplement</th>
<th>Brand Name Products</th>
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<tbody>
<tr>
<td>Psyllium</td>
<td>Metamucil, Konsyl, FibeMax, Hydromelt, Perdiem, Sensilac</td>
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<tr>
<td>Methylcellulose</td>
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<td>Calcium Polycarbophil</td>
<td>FiberCon, Fiber-lax, Equibiotic, Metolax</td>
</tr>
<tr>
<td>Inulin</td>
<td>Benefiber, FiberChoice</td>
</tr>
</tbody>
</table>

**Treatment of Incontinence - Plugs**

- Disposable anal continence plugs
- 82% effective
  - Mortensen N. Lancet 1991

**Treatment of Incontinence - Biofeedback**

- Exercise of external sphincter
- Training the discrimination of rectal sensations
- Training the synchrony of internal and external sphincter responses during rectal distention
- Visual cues to physiologic stimuli/responses
Treatment of Incontinence - Biofeedback

- Reports of success variable (35-100%)
- Ryn et al report 60% success
  - Ryn et al DCR 2000
- Pager et al demonstrated 75% improvement
  - Pager CK DCR 2002
- Significant improvement even if sphincter defect
  - McHugh Gastro 1986

Treatment of Incontinence - Biofeedback

- Cochrane review
  - Norton et al. Cochrane 2000
- Insufficient evidence to assess adequacy of biofeedback as compared to surgical treatment for incontinence
  - Few studies
  - Variable techniques

Perioperative Biofeedback

- Routinely use perioperative biofeedback
  - Preoperative sessions
  - Postoperative sessions
- Establishes patient expectations
Surgical Treatment of Incontinence

- Overlapping Sphincteroplasty
- Artificial Sphincter
- Sacral Neuromodulation
- MACE
- Injectalbes
- Stoma
- Others

Surgical Treatment of Incontinence

- Overlapping sphincteroplasty
- Most common operation
- Gold standard
Overlapping Sphincteroplasty

Perineal Incision

Skin/mucosal Flap

Sphincter

Scar

Overlapping Sphincteroplasty

Overlapping Repair

NorthShore
Success of Sphincteroplasty

• **Short term success 70-100%**
  - Tan JJ DCR 2007
  - Madsen Lancet 2004
  - Rao SS Am J Gastroenterology 2004
  - Moller C Arch Surg 2005
  - Cook TA Br J Surg
  - Fang DT. DCR 1984
  - Abcarian DCR 1999
  - Fleshman DCR 1991

• **Long term results 25-50%**
  - Malouf 2000
  - Halverson 2002
  - Gutierrez 2004
  - Bansic 2006

Sphincteroplasty

• Disappointing long term results
  • 50% return to incontinence at 5-10 years
  • Repeat sphincteroplasty is possible

• Unclear if overlapping repair has disrupted or simply functional decline

Artificial Bowel Sphincter

• AMS Acticon Neosphincter
Artificial Bowel Sphincter

- Inserted under regional or general anesthesia
- Reservoir in retropubic space
- Pump subcutaneously in scrotum / labia
- Cuff remains filled
- Patient activates the pump to remove fluid from cuff

Complications frequent
- obstructed defecation, pain

Artificial Bowel Sphincter: Long-Term Experience at a Single Institution
- Parker SC. DCR 2003

- Prospective cohort of 45 patients
  - 14 explantations (infection or pain)
  - 13 patients required 21 revisions
  - 9 stoma
  - Overall 49% functional ABS

- If retain ABS, then significant improvement in function and Quality of Life
Sacral Nerve Stimulation

- Interstim® (Medtronic)

Mechanism not clear
- Low amplitude electrical current to sacral nerve
- 3rd sacral foramen
  - Mixed nerve root containing voluntary somatic, afferent sensory, and efferent autonomic motor nerves
- Modulation of nerves and muscles of PF
  - May not effect sphincter function
    - Mowatt G Cochrane Database 2007
  - Colonic motility

Tined electrodes placed via S2,3, or 4 foramina
- External generator continuously stimulates
- If continence regained after 7-14 days → permanent implantable electrode
  - 50% reduction incontinent episodes / week
Sacral Nerve Stimulation

- Sacral Nerve Stimulation for fecal incontinence: results of a 120 patient prospective multi-center study.
  - Wexner SD. ASCRS 2009

- 1 year, 83% achieved success
  - 41% perfect continence
- 2 years, 86% success
- Mean 9.4 episodes/week → 1.9/week (1 year) → 2.9/week (2 years)

Injectable Bulking Agents

- Solesta

- All times of injection
- Postinjection

- More control
- More confidence
- More
Efficacy of Injectables

• Solesta decreased median episodes of fecal incontinence 15 → 7.2

• Sham 12.5 → 10

• Not statistically significant
Acupuncture

- Fecal incontinence treated with acupuncture--a pilot study
  - Scaglia M. Auton Neurosci

- 15 women treated at the University of Turin with acupuncture weekly x 10 weeks

- Only increased resting pressures from 25 to 36 mmHg, but continence score changed from 10 to 0

- Perhaps same neuromodulation as SNS

Transcutaneous Posterior Tibial Nerve Stimulation

- Transcutaneous posterior tibial nerve stimulation for fecal incontinence in inflammatory bowel disease patients: a therapeutic option?
  - Vitton V. Inflamm Bowel Dis 2009

- 12 French patients with IBD
- TPTN stimulations daily x 3 months

- At 3 months 41% significant symptom
“Best” Treatment

- Know the cause
- Diagnose and treat systemic disease
- Evaluate all anorectal pathology
- Verify the presence of muscle and adequacy of nerve function before surgical reconstruction
- Go slow, be patient
Thank You!

Center for Pelvic Health
Highland Park Hospital