FECAL INCONTINENCE: EVALUATION & SURGERY

Dr. Budi Iman Santoso, SpOG(K)

Division of Urogynecology Reconstructive
Department of Obstetrics and Gynecology
Faculty of Medicine University of Indonesia
Jakarta
What is continence?

The ability to defer and control the call to passage of gas, liquid or solid material to an appropriate time and place.
Fecal incontinence

- 2.2% incidence of incontinence
- 30% over age 65
- 63% female

Nelson et al, 1995

- Only 34% of pts with incontinence have discussed with physician

Johansen et al 1996
# FECAL INCONTINENCE PREVALENCE

Meta-analysis of over 26,000 people surveyed from the general population

<table>
<thead>
<tr>
<th>Country</th>
<th>Year</th>
<th>Patients</th>
<th>Prevalence</th>
</tr>
</thead>
<tbody>
<tr>
<td>United Kingdom</td>
<td>2001</td>
<td>2818</td>
<td>3%</td>
</tr>
<tr>
<td>Nigeria</td>
<td>2002</td>
<td>3963</td>
<td>6.96%</td>
</tr>
<tr>
<td>Australia</td>
<td>2002</td>
<td>660</td>
<td>9%</td>
</tr>
<tr>
<td>United Kingdom</td>
<td>2002</td>
<td>10116</td>
<td>1.40%</td>
</tr>
<tr>
<td>New Zealand</td>
<td>2001</td>
<td>717</td>
<td>12.70%</td>
</tr>
<tr>
<td>United Arab Emirates</td>
<td>2001</td>
<td>450</td>
<td>11.30%</td>
</tr>
<tr>
<td>Switzerland</td>
<td>2001</td>
<td>984</td>
<td>4.40%</td>
</tr>
<tr>
<td>United States</td>
<td>1995</td>
<td>6959</td>
<td>2.20%</td>
</tr>
</tbody>
</table>
Fecal Incontinence Prevalence

Δ Prevalence of fecal incontinence as high as 17% in pts with urinary incontinence

Jackson et al, Obst Gynec, 1997

Δ 26% of women in urogynecology clinics have fecal incontinence

Khullar et al, BJ Obst Gynaecol, 1999
BIRTH-RELATED ANAL SPHINCTER TRAUMA

△ After forceps delivery
  - 81% defects
  - 38% symptomatic

△ After vacuum extractor
  - 21% defects
  - 12% symptomatic

△ Normal delivery
  - 36% defects
  - 4% symptomatic

(Sultan et al., IJGO 1993)
EVALUATION

Δ History & Physical
Δ Incontinence Score
Δ US
Δ Manometry
Δ EMG
Δ PNTML
HISTORY

△ Detailed Bowel History
  – Passive soiling
  – Unwanted loss of stool without pts awareness internal sphincter pathology

△ Urge incontinence
  – Unwanted loss of stool despite attempts to inhibit defecation
  – External sphincter pathology

△ Postdefecation soiling
  – Unwanted loss of stool immediately after bowel movement with normal continence other times
  – Incomplete emptying, perianal disease
# FECAL INCONTINENCE SCORING SYSTEM

<table>
<thead>
<tr>
<th>Type of incontinence</th>
<th>Never</th>
<th>Rarely</th>
<th>Some times</th>
<th>Usually</th>
<th>Always</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>&lt; 1/mo</td>
<td>&gt;1/month</td>
<td>&lt;1/week</td>
<td>&gt;1/week</td>
<td>&gt;1/day</td>
</tr>
<tr>
<td>Solid</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Liquid</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Gas</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Wears Pad</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
<tr>
<td>Lifestyle Alteration</td>
<td>0</td>
<td>1</td>
<td>2</td>
<td>3</td>
<td>4</td>
</tr>
</tbody>
</table>
PHYSICAL EXAMINATION

Prone Jack-Knife position

Δ Inspection
  – Excoriation
  – Skin tags
  – Scars
  – Dermatitis
  – Patulous Anus

Digital examination
  – Resting tone
  – Voluntary squeeze pressure
    • Exclude accessory muscle contraction
  – Perineal bulk
  – Sphincter defect
PHYSICAL EXAMINATION

Δ Examination on straining
   – Perineal descent
   – Rectocele
   – Cytocele
   – Perineal hernia

Δ Examination on squatting
Δ Vaginal-anal bi-digital exam
   – Rectovaginal septum
ANOSCOPIC EXAMINATION

- 360 degree view
- Hemorrhoidal pathology
- Anal fissure
- Anal fistulae
ANORECTAL PHYSIOLOGIC EVALUATION

Δ Anal manometry
Δ Anal ultrasound
Δ Pudendal nerve terminal motor latency
Δ Anal EMG
ANAL MANOMETRY

△ Not standardized: Each facility has its own protocol and normal values

△ Measurement devices
- Fluid / air filled balloon systems
- Open tipped perfused catheters
- Microtransducers
- 4 channel continuously perfused probe

△ Continuous or stationary pull through techniques

△ Method of measurement
- Static
- 24 hour ambulatory
ANAL MANOMETRY EQUIPMENT
ANAL MANOMETRY
TECHNIQUE
ANAL MANOMETRIC RESTING PRESSURE

Δ 50-70 mmHg
Δ Lower in women and elderly
Δ Highest pressures 1-2cm cephalad to anal verge

Δ 55-60% from IAS tone
Δ 25% from EAS tone (low sacral reflex) (EAS, cricopharangeal and paraspinous)
Δ 15% from expansion of anal cushions
ANAL MANOMETRY
SQUEEZE PRESSURE

Δ 100-180 mmHg (2-3x resting tone)

Δ Generated by EAS and puborectalis contraction

Δ Rapid fatigue
ANAL MANOMETRY HIGH PRESSURE ZONE

Δ High pressure zone

Length of the IAS where pressures are greater than $\frac{1}{2}$ of the maximum pressure at rest

Normal 2-3.5 cm
ANAL MANOMETRY HIGH SENSATION

△ First rectal sensation 10-20cc air

△ No receptors in the rectum

△ Proprioceptors in the rectum
  Puborectalis and anal sphincters

△ Greater than 25% of pts with fecal incontinence have abnormal sensation
ANAL MANOMETRY

Δ Rectal compliance

Δ Compliance = \( \Delta V / \Delta P \)

Δ Impaired in ulcerative colitis, hirschsprung’s, radiation therapy
Rectoanal inhibitory reflex

Described by Gowers 1877

Sampling mechanism of the anal canal

Rectal distension causes reflex EAS contraction transient IAS relaxation
<table>
<thead>
<tr>
<th>Parameter</th>
<th>Normal Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Resting pressure</td>
<td>50-70 mmHg</td>
</tr>
<tr>
<td>Squeeze pressure</td>
<td>100-180 mmHg</td>
</tr>
<tr>
<td>RAIR</td>
<td>Present</td>
</tr>
<tr>
<td>Compliance</td>
<td>2-6cc H2O/cm</td>
</tr>
<tr>
<td>First sensation</td>
<td>10-30cc</td>
</tr>
<tr>
<td>Capacity</td>
<td>100-300cc</td>
</tr>
<tr>
<td>HPZ length</td>
<td>2-3cm (female)</td>
</tr>
<tr>
<td></td>
<td>2.5-3.5cm (male)</td>
</tr>
</tbody>
</table>
ANAL MANOMETRY REPORT

**Radial Pressure Analysis**

<table>
<thead>
<tr>
<th>Resting pressures</th>
<th>Pressure increase during squeeze</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Post.</td>
</tr>
<tr>
<td>6</td>
<td>17</td>
</tr>
<tr>
<td>5</td>
<td>17</td>
</tr>
<tr>
<td>4</td>
<td>22</td>
</tr>
<tr>
<td>3</td>
<td>48</td>
</tr>
<tr>
<td>2</td>
<td>104</td>
</tr>
<tr>
<td>1</td>
<td>18</td>
</tr>
</tbody>
</table>

**Pressure increase during squeeze**

<table>
<thead>
<tr>
<th>Post.</th>
<th>Right</th>
<th>Anus</th>
<th>Left</th>
<th>HPZ</th>
</tr>
</thead>
<tbody>
<tr>
<td>6</td>
<td>0</td>
<td>0</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>0</td>
<td>0</td>
<td>14</td>
<td></td>
</tr>
<tr>
<td>4</td>
<td>44</td>
<td>12</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>3</td>
<td>15</td>
<td>3</td>
<td>23</td>
<td>0</td>
</tr>
<tr>
<td>2</td>
<td>14</td>
<td>14</td>
<td>12</td>
<td>15</td>
</tr>
<tr>
<td>1</td>
<td>0</td>
<td>14</td>
<td>12</td>
<td>15</td>
</tr>
</tbody>
</table>

**RectoAnal Inhibitory Reflex (R.A.I.R)**

Present for 10 ml at 2.5 cm from anal verge with sensation.

**Rectal Sensation Thresholds**

- First sensation: 25 ml
- Constant sensation/urge: undefined
- Maximum tolerable volume: 13 ml

**Rectal Compliance Analysis**

Units for compliance are millimeters

From first sensation to M.T.V.: 2.4
DRE vs MANOMETRY

△ How reliable is digital examination for the evaluation of anal sphincter tone?

△ 64 pts, 1 physician

- IAS pathology - DRE 63% sensitivity
  57% specificity

- EAS pathology   - DRE 84% sensitivity
  57% specificity

Eckardt et al., Int J Colorectal Dis. 1993
ENDOANAL ULTRASOUND

- Circumferential images using rotating probe
- 5,7 or 10Mghz probes available
- Acoustic coupling via a hard cap filled with water
- Limit of images is to the puborectalis muscle
- Evaluates-anal sphincters, anorectal spaces including fistula tracts
ENDOANAL ULTRASOUND EQUIPMENT
ENDOANAL ULTRASOUND PROCEDURE

- Cleansing enema (s)
- Left lateral decubitus position
- Digital rectal examination
- Endoanal ultrasound
- Image review
ANAL ULTRASOUND NORMAL ANATOMY-ANAL CANAL LEVELS
ANAL ULTRASOUND NORMAL ANATOMY-ANAL CANAL LEVELS
ANAL ULTRASOUND NORMAL ANATOMY-ANAL CANAL LEVELS
ANAL ULTRASOUND NORMAL ANATOMY-ANAL CANAL LEVELS
ENDOANAL ULTRASOUND MID ANAL CANAL LEVELS
Anal US and correlation with in vitro and in vivo anatomy

- 14 fresh specimens (APR and post mortem)
- Ultrasound correlated with anatomic dissection
- Anatomic dissection confirmed by pathologic examination

Sultana et al, Br J Surg. 1993
FECAL INCONTINENCE

△ Abnormal findings on US
  – External anal sphincter defects
  – Internal anal sphincter defects
  – Scarring
  – Thin perineal body
SPHINCTER DEFECTS
US vs EMG

Δ Confirmation of US detected EAS defects by simultaneous EMG mapping

- 13 US detected traumatic defects
- Simultaneous EMG recording of defect and normal muscle
- 11/13 had correlation of US defect and EMG activity

Bumett et al, Br J Surg 1991
NEUROPHYSIOLOGIC ASSESSMENT

Anal electromyography (EMG) physiologic assessment of function at the level of the external anal sphincter

- Determine if the muscle contracts/relaxes
- Identify areas of injury-mapping
- Identify denervation/reinnervation potentials

Pudendal Nerve terminal motor latency time from stimulation of pudendal nerve at level of ischial spine to muscle response at the anal sphincter
EMG DATA

**Δ** Localized quadrant activity
- Normal signal
- Absent signal (no activity)
- Injury and healing (scar)
  - Reduced activity
  - Polyphasic motor unit potentials

**Δ** Can locate sphincter defect
US vs EMG

△ Confirmation of US detected EAS defects by simultaneous EMG mapping

- 13 US detected traumatic defects
- Simultaneous EMG recording of defect and normal muscle
- 11/13 had correlation of US defect and EMG activity

Bumett et al, Br J Surg 1991
PUDDENAL NERVE TERMINAL MOTOR LATENCY (NORMAL 2.0 ± 0.2MSEC)

St. Marks Electrode
PUDENDAL NERVE TERMINAL MOTOR LATENCY
PUDDENDAL NEUROPATHY

- PNTML greater than 2.2ms
- Stretch injury
  - Chronic straining
  - Perineal descent
  - Vaginal delivery
- 31.4% incidence in 395 consecutive studies
- More frequent in pts over 70
Several authors have proposed a direct correlation between pudendal neuropathy and poor outcome after sphincter repair.

Controversy still exists.

May be helpful in preoperative counseling.
FECAL INCONTINENCE
SURGICAL MANAGEMENT

- Overlapping sphincteroplasty
- Injectables
- Radiofrequency ablation
- Artificial bowel sphincter
- Sacral nerve stimulation
- Stoma
ANTERIOR OVERLAPPING SPHINCTERoplasty
FECAL INCONTINENCE:
OBSTETRIC
OVERLAPPING SPHINCTERoplasty
OVERLAPPING SPHINCTEROPLASTY
OVERLAPPING SPHINCTEROPLASTY
OVERLAPPING SPHINCTERoplasty
OVERLAPPING SPHINCTEROPLASTY
LONG TERM RESULTS

Cleveland clinic florida experience
- 25 pts
- 5 year follow-up
- Evaluated with fecal incontinence scoring system
  - Preop = 17.7
  - Postop = 4.1 (9 mos)
  - Long term score = 10.8 (87 mos)
- No patient was completely continent at long term follow-up
ANTERIOR SPHINCTER REPAIR
LONG TERM RESULTS

- Cleveland clinic florida experience
- No correlation between long term continence and:
  - Age
  - # Vaginal delivery
  - Episiotomies
  - Previous sphincter repair
  - Manometric data
  - PNTML
  - EAUS findings
ANTERIOR SPHINCTER REPAIR
LONG TERM RESULTS

Δ 46 pts with obstetric related anterior sphincter defects
Δ 5 year follow up
Δ 17% required further surgery (failure)
Δ 38 pts evaluated for long term functional outcome
  – 71% improved
  – 13% no improvement
  – 16% deteriorated

• Malouf et al. Lancet, 2000
ANTERIOR SPHINCTER REPAIR
LONG TERM RESULTS

Cleveland clinic foundation experience

- 63 patients
- 5 year follow up
- 57% incontinence to solid or liquid stool
- 14% totally continent
- 2 pts with colostomy

INJECTABLES
INJECTABLES

Δ Autologous fat
Δ Silicone
Δ Collagen
Δ Carbon beads
ACYTS™ OR DURASPHERE FI™

△ Carbon beads

△ Ice Syringe
ACYTS™ OR DURASPHERE FI™

- Microscopic picture of pyrolitic carbon beads
- Each carbon bead is 212-500µm
- Suspension of carbon bead in a gel consisting of water and beta-D glucan
ACYTS
ACYTS
ACYTS INJECTION

Δ Prospective open label trial
Δ Local anesthesia
Δ Outpatient setting
Δ Fecal incontinence score = 13 (7-15)
Δ 80% of patients improved following ACYTS™ injections
Δ 23% improvement in incontinence scores mean of 13 preprocedure to 10 at 3 mos
Δ 30% improvement in incontinence scores at 6 mos 6 pts, score=9.3

DURASPHERE® FI PHASE II IDE STUDY

- Prospective, multicenter, sham controlled study for subjects with fecal incontinence
- 2:1 randomization
- Failed at standard options of treatment
RADIOFREQUENCY SECCA
RADIOFREQUENCY ABLATION
SECCA PROCEDURE
SECCA PROCEUDRE
extended Two-Year Follow-up

Δ 10 patients

Δ CCF fecal incontinence score
  – Pretreatment 13.8
  – 2 year F/U 7.3
  \[P<0.002\]

Δ Social and mental component of SF-36 improved at 24 mos

Δ No decease in efficacy from 12-24 mos

Results: 2 year follow-up
cleveland clinic Florida-Incontinence score
SECCA PROCEDURE

- Multi-center, open label, prospective trial
- Five centers enrolled 50 patients
- At 6 months, the mean CCF-FI score improved significantly (14.5 to 11.1, p<0.0001)
- All FIQL parameters improved
- 60% (n=30) of the patients improved after therapy
- RF energy delivered for treatment of FI safely improves CCF-FIS, FIQL, and quality of life

Efron, Song Tecknol Int 2004
FIQL SCORES

*p<0.0001, ITT analysis
SECCA

- Relatively simple procedure
- Well tolerated
- No need for general anesthesia

Consider for patient with mild fecal incontinence or those who cannot tolerate more invasive procedures
ARTIFICIAL BOWEL SPHINCTER

![Artificial Bowel Sphincter](image-url)
ARTIFICIAL BOWEL SPHINCTER

- Originally introduced in late 1970s
- Reintroduced 1996
- European series
  - 24 pts
  - 20 month follow-up
  - 20 pts had active device in place
  - 4 definitive failures
  - Clinical success in 18/24 pts
  - Lehur et al, Dis Col Rectum 2000
ARTIFICIAL BOWEL SPHINCTER

- Multicenter, prospective, non-randomized
- 112 patients were implanted
- Mean age 49 (range 18-81) years
- 384 device related adverse events in 99 patients
- 246 required either no or non-invasive intervention
- 73 revisional operations in 51 (46%) patients
- Infection requiring surgical revision was 25%
- 41 (37%) patients had devices completely explanted
  - 7 had successful reimplantations

Wong et al. DCR. 2002
ARTIFICIAL BOWEL SPHINCTER

° 85% of patients with a functional device had successful outcome

° 53% intention to treat success rate

Wong et al. DCR. 2002
ARTIFICIAL BOWEL SPHINCTER

△ Infection is the major challenge
△ Once device is implanted successfully, long term success is common
△ Newer series show decreased infection rates with changes in antibiotic regimen
ARTIFICIAL BOWEL SPHINCTER

- Complex device
- Patient selection is important
- Can avoid a stoma in patients with severe fecal incontinence who are not candidates for or who have failed other therapies
SACRAL NERVE STIMULATION
SACRAL NERVE STIMULATION

Initially described for treatment of urinary incontinence

Patients with dual incontinence noted improvement in fecal incontinence
SACRAL NERVE STIMULATION

∆ Technique

- Acute percutaneous nerve evaluation
  Establishes integrity of nerves
  Tests relevance of each sacral nerve root
  General or local anesthesia
Permanent implantation

Remove percutaneous extension

Permanent generator

Pulse frequency 210 usec

Frequency 15 Hz

Amplitude adjusted to pts sensation of contraction
SNS
LEAD DEPLOYMENT
SACRAL NERVE STIMULATION
RESULTS

- Multicenter prospective trial
- 37 patient test stimulation
- 34 permanent implantation
- Daily bowel-habit diaries
- Disease-specific ASCRS scale and in 7/8 SF-36 scales
- Frequency of incontinent episodes per week
  - 16.4 vs 3.1 and 2.0 at 12 and 24 months
- Mean number of days per week with incontinent episodes
  - 5.5 vs 1.4 and 1.2 at 12 and 24 months

Matzel KE. Et al Lancet. 2004 Apr 17. 363(9417):12706
SACRAL NERVE STIMULATION
RESULTS

- UK experience
- 3 centers
- 12 month follow-up
- 59 patient peripheral nerve evaluation
- 46 (78%) permanent implantation
- 44/46 had improved continence at a median of 12 months
- Median of 7.5 to 1 incontinent episodes/week
- Ability to defer defecation improved from 1 to 10 min
- Significant improvement occurred in general health, mental health, emotional role, social function, and vitality subscales of the SF 36

SACRAL NERVE STIMULATION
RESULTS

- 43 of 45 patients had a muscular response to sacral nerve stimulation and had electrodes implanted for the three-week test period
- 37 permanent implantation
- Median of six months follow-up
- CCF incontinence score (0-20) reduced from median 16 to 6

SACRAL NERVE STIMULATION RESULTS

△ 106 potentially relevant reports
△ Six patient series and one crossover study of SNS for fecal incontinence
△ 19 adverse events among 149 patients
△ SNS results in significant improvement in fecal incontinence in patient resistant to conservative treatment
△ Early data also suggest benefit in the treatment of constipation

SACRAL NERVE STIMULATION

- 34 patients (31 women)
- 57 (33-37) years old
- Double-blind multicenter crossover trial
- 27/34 “on” or “of” x1 month periods
- 89% patients felt significant improvement in incontinence episodes
- Significant decrease in frequency of FI episodes
- Improvement of Cleveland clinic score
- QOL score improved in all domains
- With stimulator ON mode-increase in resting and squeeze pressures

Lerol et al, Ann Surg 2005
SACRAL NERVE STIMULATION

△ Promising new treatment
△ Still in FDA trials in the US
△ Consider for patient with severe fecal incontinence and no sphincter defect
Isolated sphincter defect

Yes

- Pudendal neuropathy
  - Consider
    - Sphincteroplasty
      - Success
      - Failure
        - Persistent defect
        - Intact repair

No

- Alternative procedures
  - Simple procedures
    - Injectable agents
      - Success
      - Failure
    - Failure
  - complex procedures
    - Sacral nerve stimulation
    - Stimulation graciloplasty
    - Artificial bowel sphincter
    - Failure
      - Stoma
There are many therapeutic options for the patient with fecal incontinence.

The decision of which is best for a particular patient depends on:

- The etiology of the incontinence
- The severity of the symptoms
- The patient’s overall health and ability to undergo treatment