IBS
With Slow Transit Constipation and Pelvic Floor disorder

Dr S B Daschakraborty

DM (Gastro)(SGPGI)

Consultant Gastroenterologist, Hepatologist, Interventional endoscopist

Constipation

- Most constipation is self-managed by patients, 22% seek health care, mostly to primary care physicians (>50%) and gastroenterologists (14%), resulting in large expenditures for diagnostic testing and treatments
- Constipation may be primary alone or secondary to an underlying disorder
- The American Gastroenterological Association criteria utilize colonic transit and anorectal tests to classify constipated patients into 1 of 3 groups: normal transit constipation (NTC), slow-transit constipation (STC), and pelvic floor dysfunction or defecatory disorders (DD)
- Defecatory disorders are define by bowel symptoms and anorectal test results indicative of impaired rectal evacuation

Constipation

- Rome criteria and the inclusion criteria for pharmacological studies in FC and IBS-C do not specify that anorectal test results should be normal, it is conceivable, perhaps likely, that many patients with FC and IBS-C actually have an unrecognized DD
- STC and impaired defecation (ie, DD), which may occur in isolation or coexist
- Health care costs were higher in constipated patients with abdominal symptoms

Colonic motility

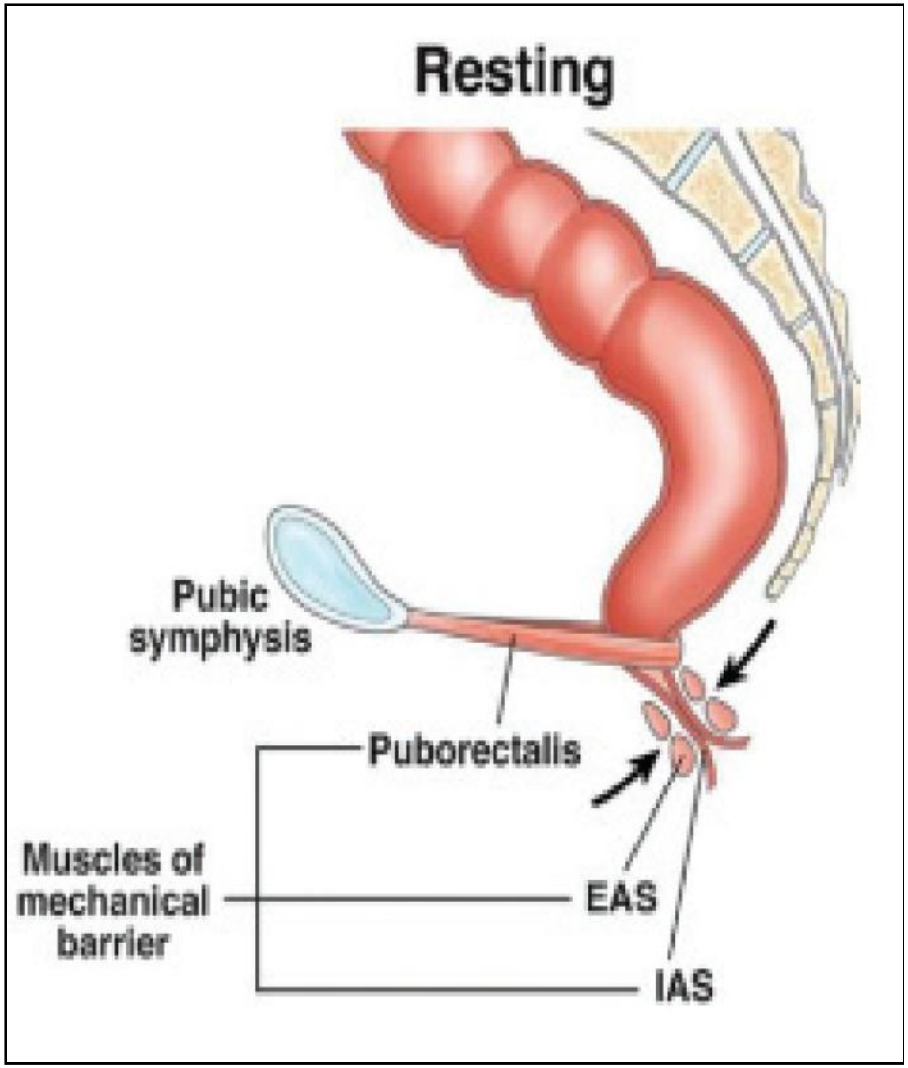
- Two characteristic movements in the colon achieve the absorptive and transport functions
- Repetitive nonpropulsive contractions move stool in a manner that aids in absorption and mixing of content
- Larger, coordinated contractions (known as high amplitude propagated contractions [HAPCs]) bring stool forward in mass movements from the ascending colon down to the left colon
- Propagated contractions, categorized as low (5–40 mmHg) or high-amplitude propagated contractions (HAPCs, >75 mmHg), occur an average of 6 times per day, originate predominantly in the cecum or ascending colon, cause mass movement of colon contents, and often precede defecation.
- HAPCs typically occur in the morning soon after awakening, and may be accentuated by other cues or triggers such as eating or drinking (related to the gastrocolic reflex in infants), mirroring the common experience of the urge to defecate during this time
- Normal colonic transit in adults ranges from 20 h to 72 hours

Colonic motility

- When a food or stool bolus distends the gut wall, enterochromaffin cells release 5HT. This causes a local reflex mediated through enteric nerves, releasing stimulating neurotransmitters (such as acetylcholine, which causes muscle contraction) behind the bolus and inhibitory neurotransmitters (such as nitric oxide, which causes muscle relaxation) in front of the bolus; thus, the bolus is propelled forward along the gastrointestinal tract
- The 5HT4 receptor drives the gut's peristaltic response to 5HT, and 5HT4 agonists such as cisapride, tegaserod and prucalopride are, or have been, widely used enterokinetic medications.
- The 5HT3 receptor, on the other hand, is more predominantly involved in gut sensation and central processing of this information, with 5HT3 antagonist drugs such as ondansetron being commonly used in antiemetic therapy

Physiology of defecation

- Normal defecation and maintenance of continence is a sophisticated process requiring rectal filling, awareness of rectal filling, and the ability to propel the stool and relax the pelvic floor muscles in a coordinated fashion
- The puborectalis maintains the rectoanal angle at rest, and contracts further to reduce the angle when subjects squeeze
- Rectal distension from stool or gas induces reflex relaxation of the internal anal sphincter, known as the rectoanal inhibitory reflex (RAIR)
- The RAIR is mediated through the enteric nervous system and does not require any external control from the peripheral or central nervous system



Physiology of defecation

- During normal defecation, stool distends the rectum, causes reflex relaxation of the internal anal sphincter and produces the perception of the need to defecate. Sensory mechanisms in the anal canal, which are not well understood, enable determination of whether rectal content is gas or stool.
- If defecation is inconvenient, the desire to defecate prompts voluntary contraction of the EAS.
- Desire to defecate dissipates as the rectum relaxes, allowing more stool to be accommodated.
- If the time is appropriate, the subject sits or squats, holds his or her breath, contracts the diaphragm, the abdominal and rectal muscles, and simultaneously relaxes the EAS and puborectalis muscle

Slow Colonic Transit Constipation

- Isolated STC is defined as slow colonic transit in the absence of a defecatory disorders or megacolon
- Isolated STC is regarded as a manifestation of colonic motor dysfunction

- However, only some patients with STC have colonic motor dysfunction as evaluated with manometry
- Perhaps this discrepancy between transit time and motor assessment → the limited fidelity of manometry catheters for detecting propagation of motor events and colonic microbiome may affect colonic transit

Slow Colonic Transit Constipation

- Multiple hypotheses have been proposed to explain STC
  - Decrease in the number of interstitial cells of Cajal, the colonic pacemaker cells, required for normal colonic motility and transfer of signals between nerves and muscles
  - Abnormalities in the enteric nervous system
  - High-amplitude propagated contractions, responsible for colonic mass migration, have also been found to be decreased in number and duration
  - Autonomic nervous system dysfunction
- Rule out endocrine or metabolic abnormalities

Normal Colonic Transit Constipation

- Normal-transit constipation is not synonymous with IBS-C because 23% of patients with IBS-C had delayed colonic transit in one study

Defecatory disorders

- defined by symptoms of constipation and objective evidence of impaired rectal evacuation
- Impaired evacuation may result from
  - increased resistance to evacuation

    and/or
  - inadequate rectal propulsive forces
- increased resistance to evacuation
  - Dyssynergia - Patients unable to coordinate the abdominal, rectoanal and pelvic floor muscles during defecation - High resting anal pressure, paradoxical increase in anal sphincter pressure [anal contraction] or less than 20% relaxation of the resting anal sphincter pressure, incomplete relaxation, or paradoxical contraction of the puborectalis
  - Structural disturbances (eg, rectal intussusception or prolapse, rectocele and excessive perineal descent)

Pelvic floor dysfunction

- The pelvic floor is made up of muscles, ligaments, and tissues that surround the pelvic bone
- People with pelvic floor dysfunction may have weak or especially tight pelvic floor muscles.
- When the muscles tighten, or spasm, people may have trouble urinating or passing stool.
- When they weaken, the organs within the pelvis may drop and press down on the rectum and bladder.

Type of pelvic floor dysfunction	Description
Obstructed defecation	This occurs when stool enters the rectum, but the body cannot fully evacuate the bowels.
Rectocele	This involves tissue from the rectum protruding into the vagina. Stool may get caught in this pocket, forming a bulge in the vagina.
Pelvic organ prolapse	This refers to the pelvic floor stretching and the pelvic organs dropping as a result of age, childbirth, or a collagen disorder.
Paradoxical puborectalis contraction	This involves a pelvic floor muscle called the puborectalis contracting. When it happens, trying to pass stool may feel like pushing against a closed door.
Levator syndrome	This involves the pelvic floor muscles spasming after bowel movements. It can cause lasting dull pain or achy pressure high in the rectum.
Coccygodynia	This refers to pain in the tailbone that worsens during and after bowel movements.
Proctalgia fugax	This involves painful spasms of the rectum and muscles in the pelvic floor.
Pudendal neuralgia	This refers to irritation or damage to the pudendal nerves, which help the pelvis function.
Urethrocele	This refers to the urethra pressing into the vagina.
Enterocele	This involves the small intestine descending and pushing into the vagina, forming a bulge.
Cystocele	This involves the bladder dropping and pushing into the vagina.
Uterine prolapse	This refers to the uterus descending and pushing into the vagina.

Evaluation

- History
- Clinical Examination including P/R exam
- Routine blood test – CBC, Blood sugar, TSH, Calcium,

- Colonic Transit time
- Anorectal Manometry
- Balloon expulsion test
- Defecogram

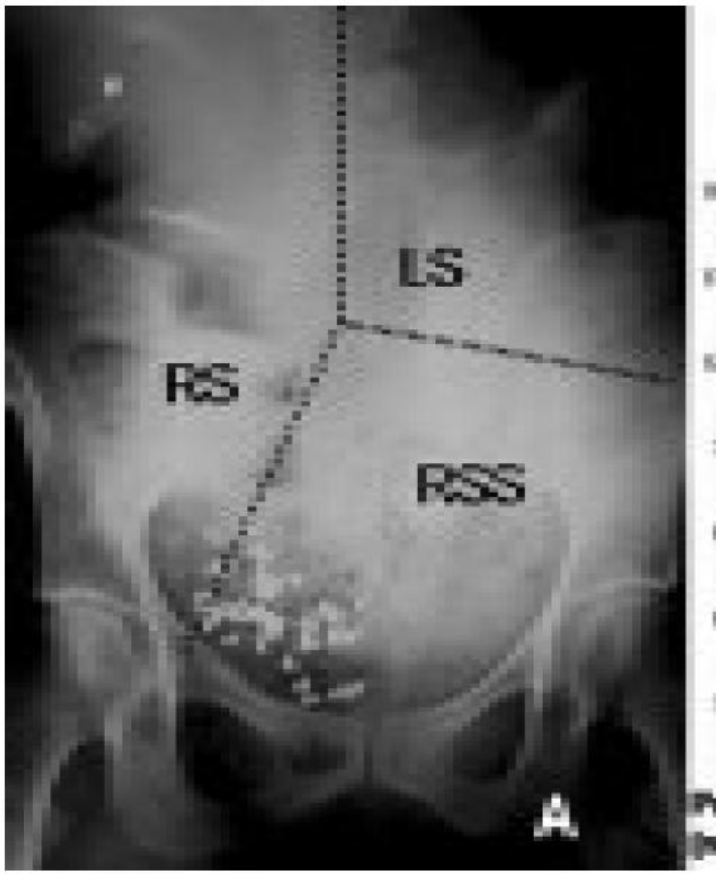
Colonic transit time

- **Colonic transit time** is the amount of **time** that it takes for a substance to move through your **colon**
- **Normal CTT: 24 to 72 hours**
- In Western study → using 20 radio-opaque markers ingested at 0, 24 and 48 hours each, followed by an abdominal X-ray at 72 hours
- However, the western protocol is not appropriate for Indian subjects as Indians have a rapid colonic transit

western.

Colonic transit time

- 20 markers at 0, 12 and 24 hours. All the markers at 0 hours were circular, at 12 hours rectangular and at 24 hours triangular. → abdominal X-ray at 36 and 60 hours in the erect posture
- The best cut-off by ROC curves at 36 and 60 hours were 30 and 14 markers, respectively



- To assess segmental transit
  - a line was drawn vertically from the mid-point of the sacral promontory
  - another from the midpoint of the sacral promontory to the mid-point of the inner pelvic brim on the right side
  - third from the mid-point of the sacral promontory to the left anterior superior iliac spine
- These lines divided the abdomen into right, left and rectosigmoid

Ghoshal UC, Natl Med J India. 2007;20(5):225-229.

Colonic transit time

- 50 functional constipation patients and 25 healthy controls
- 20 radio-opaque markers at 0, 12 and 24 hours.
- An abdominal X-ray was taken at 36 hours.
- Total or segmental CTT was measured after calculating the number of markers remaining in each segment at 36 hours on abdominal X-ray.

- CTT (or segmental transit time) = {12/20 × (n)} hours

- Mean CTT in healthy controls in this study was 15.4 h

Prasad A. Bhate et al, Gastroenterol Res. 2015;8(1):157-159

Anorectal Manometry

- Resting anal pressure: >20mmHg
  - High in Anal fissure and patient with anal pain
- Anal Squeeze pressure:
  - Squeeze 30 seconds, followed by a 1-minute rest
  - Note that Rectal pressure should not increase
- Cough reflex test:
  - assess the integrity of spinal reflex pathways in patients with incontinence
  - increased abdominal pressure triggers external sphincter contraction
- **RAIR:** Inflate intra-rectal balloon and look for relaxation of anal sphincter

Anorectal Manometry

Simulated Defecation:

- asked to bear down as if to defecate
- without and with distention of a 50-mL rectal balloon
- interval of 30 seconds
- Measure rectal pressure and anal pressure
- Relaxation of anal sphincter
- Rectal pressure should exceed anal pressure, as manifest by a recto anal index (ie, the ratio of rectal to anal pressure) greater than 1 or a positive rectoanal pressure gradient (RAPG)

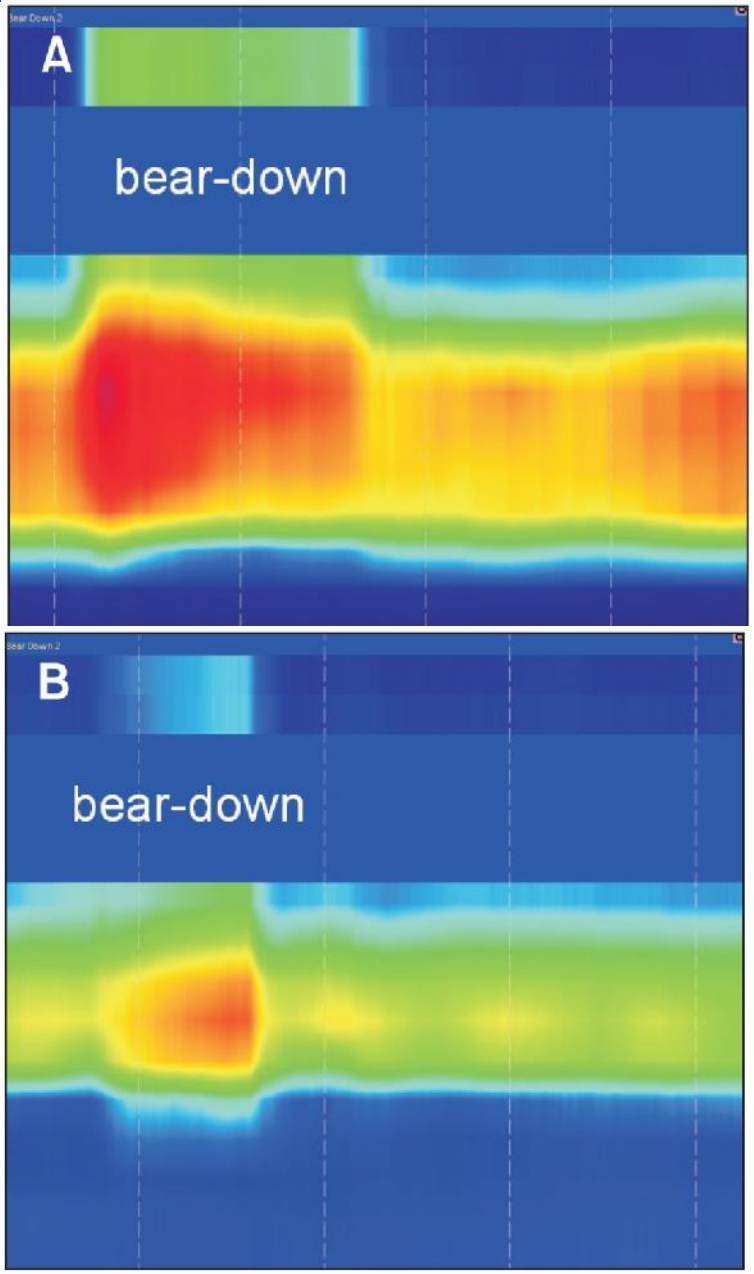
- Reduced rectoanal pressure gradient during evacuation ← from reduced rectal propulsive force and/or impaired anal relaxation

Anorectal Manometry

Dyssynergia

HR-ARM had a sensitivity of 77% and a specificity of 85%

- **Type I dyssynergia:** an adequate increase in rectal pressure (≥40 mmHg) accompanied by a paradoxical simultaneous increase in anal pressure.
- Type II dyssynergia: an inadequate increase in rectal pressure (<40 mmHg; poor propulsive force) accompanied by a paradoxical simultaneous increase in anal pressure.

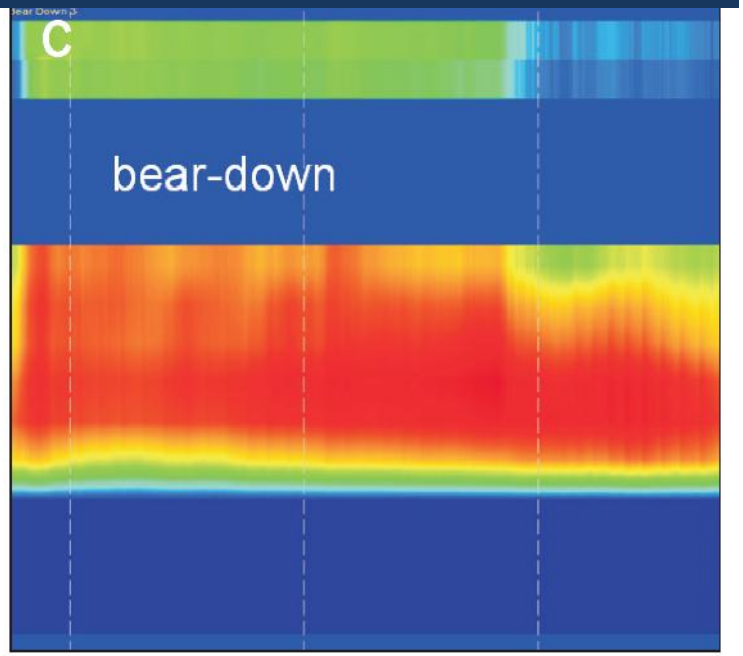


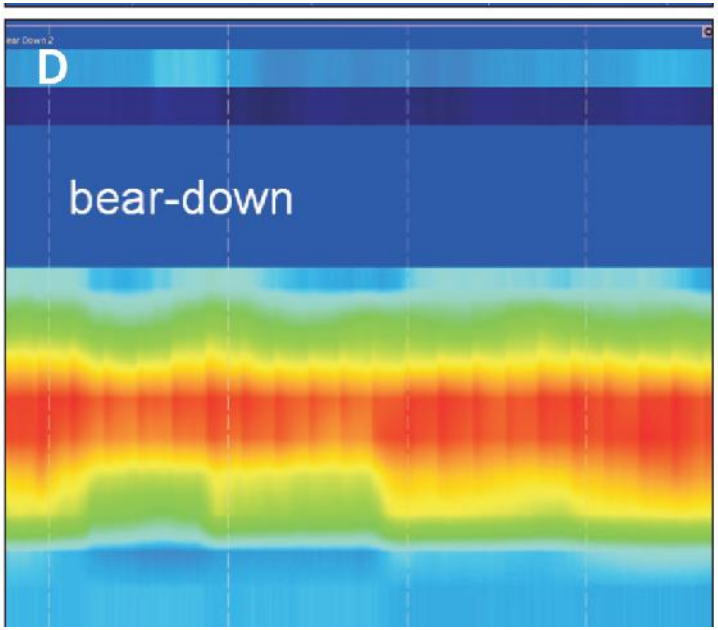
Anorectal Manometry

Dyssynergia

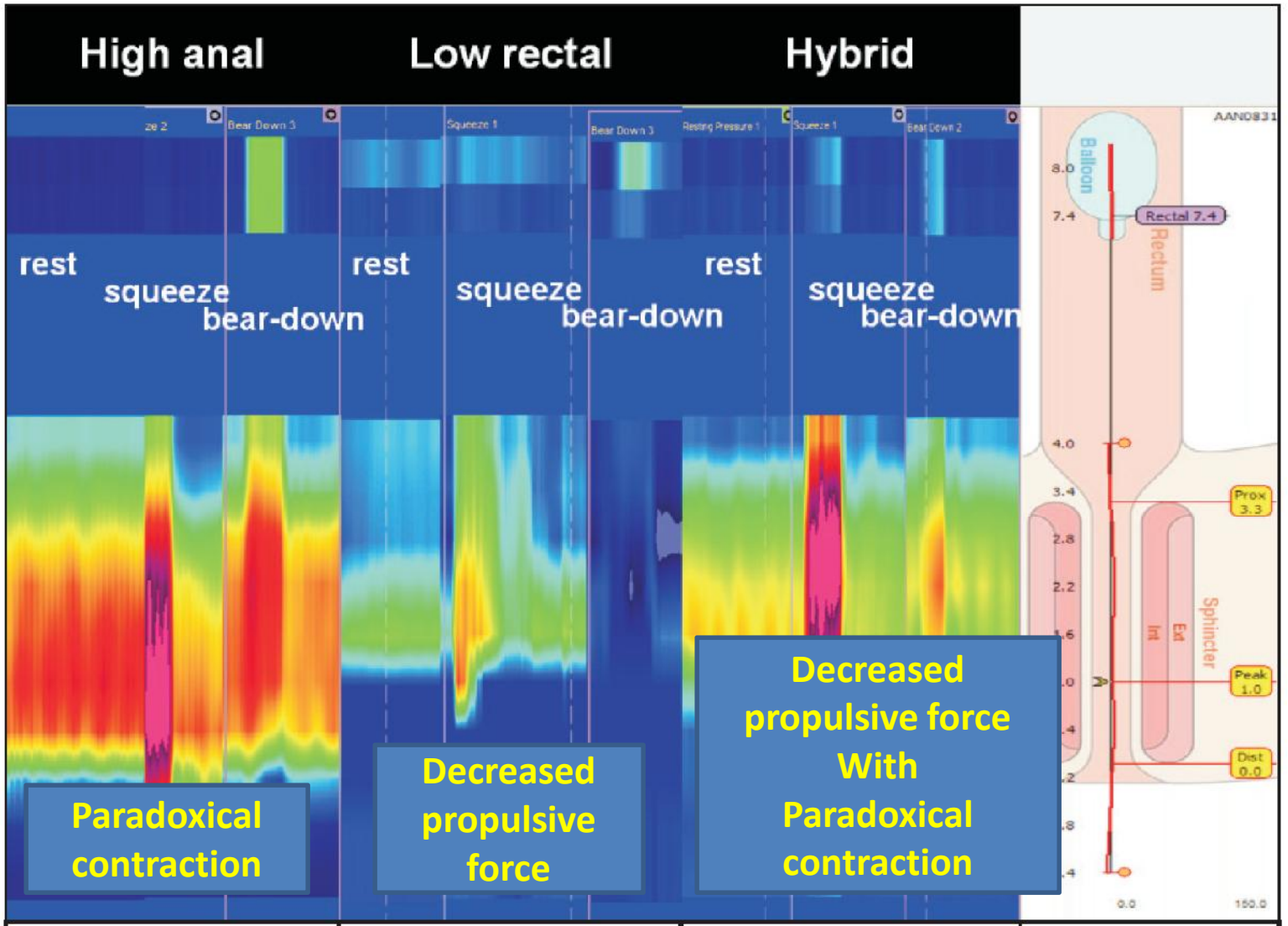
HR-ARM had a sensitivity of 77% and a specificity of 85%

- **Type III dyssynergia:** an adequate increase in rectal pressure (≥ 40 mmHg) accompanied by a failed reduction in anal pressure (≤20% baseline pressure).
- **Type IV dyssynergia:** an inadequate increase in rectal pressure of (< 40mmHg; poor propulsive force) accompanied by a failed reduction in anal pressure (≤ 20% baseline pressure).





Dyssynergia



Normal	Low	Low	Rectal pressure
No	Yes	No	Anal relaxation versus resting

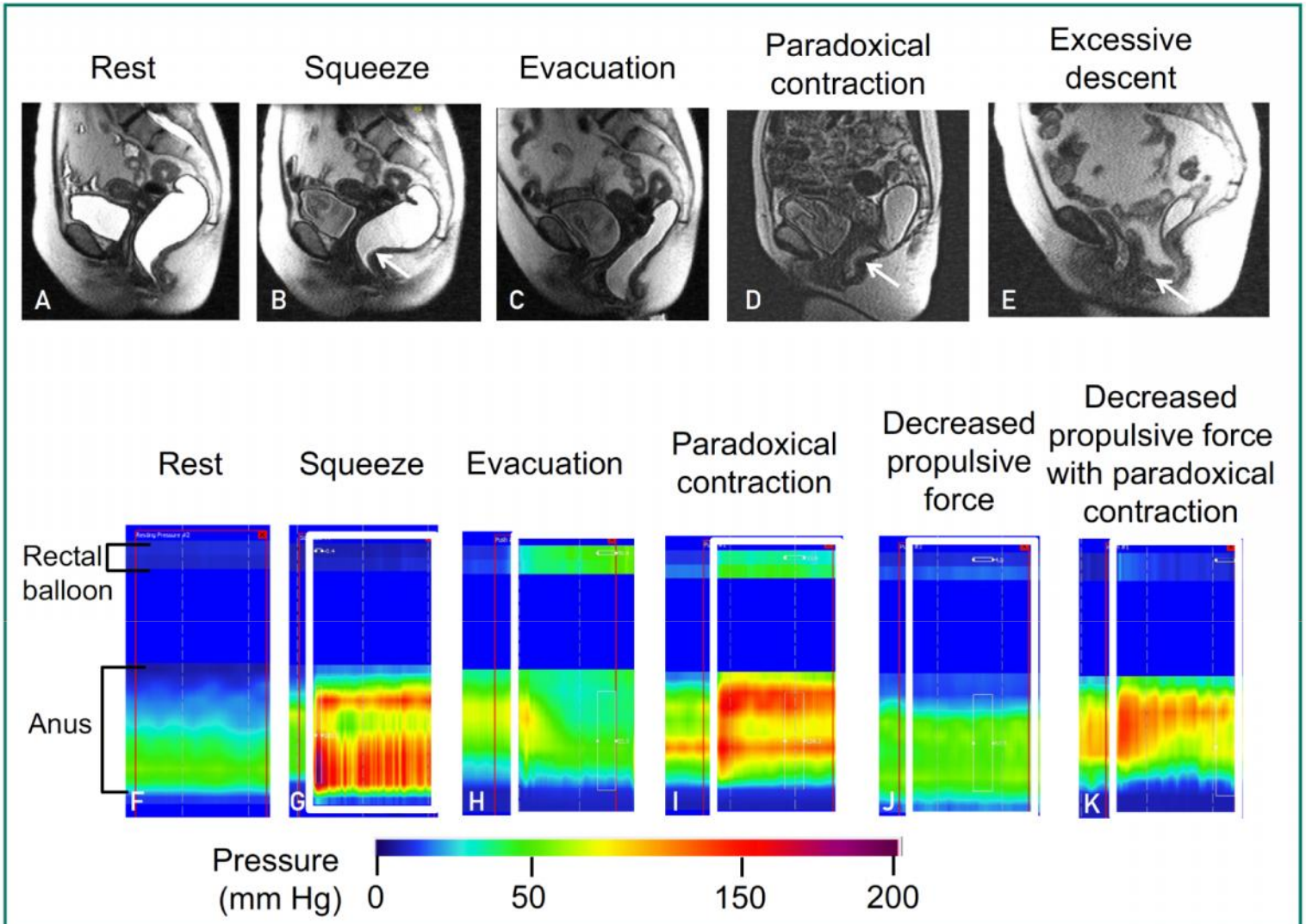


FIGURE 2. Representative examples of normal and abnormal anorectal evacuation recorded with magnetic resonance imaging (top row) and high-resolution manometry (bottom row). Magnetic resonance imaging shows increased puborectalis indentation during squeeze (B, arrow) and normal relaxation of the puborectalis, perineal descent, opening of the anal canal, and evacuation of ultrasound gel during evacuation (C). During evacuation in constipated patients, note paradoxical contraction of the puborectalis (D, arrow) and exaggerated perineal descent with an enterocele (E, arrow). High-resolution manometry shows anal pressure at rest (F) and increased anal pressure during squeeze (G) compared with rest (F). The white rectangle demarcates the duration of squeeze (G) and evacuation (H-K). Note the increased rectal pressure with anal relaxation during evacuation in a healthy person (H). By contrast during evacuation in constipated patients, note increased rectal pressure with paradoxical anal contraction (I), no change in rectal pressure vs rest (J), and no change in rectal pressure with paradoxical anal contraction (K).

Anorectal Manometry

Graded Balloon Distension:

- Rectal sensation
  - Inflate balloon by step up (20-mL each time) to a maximum volume of 400 ml
  - Note first sensation, desire to defecate, urgency to defecate, and maximum tolerable sensation
- Recto-anal inhibitory reflex (RAIR)
  - Inflatation of balloon with 50 mL of air
  - Relaxation of anal sphincter
  - Absent in Hirschsprung disease

Rectal Balloon Expulsion Test

- This test measures the time required for a patient to evacuate a water-filled balloon in the seated position; the normal value depends on the technique

- highly sensitive and specific for identifying defecatory disorders and is generally less than 1 minute

- falsely normal in patients with pelvic laxity, for example, because in one study more than 90% of patients with a large rectocele, enterocele, peritoneocele, and/or sigmoidocele had a normal balloon expulsion test result

Defecography

- X-Ray test / MRI that shows the rectum and anal canal as they change during defecation
- **Defecography**

  Anorectal angle (ARA) – longitudinal axis of anal canal and the posterior rectal line, parallel to the longitudinal axis of the rectum

  – Average value is 95-96^{o}(physiologic range, 65-100^{o})without noticeable differences between men and women

  – Indirect indicator of the puborectal muscle activity

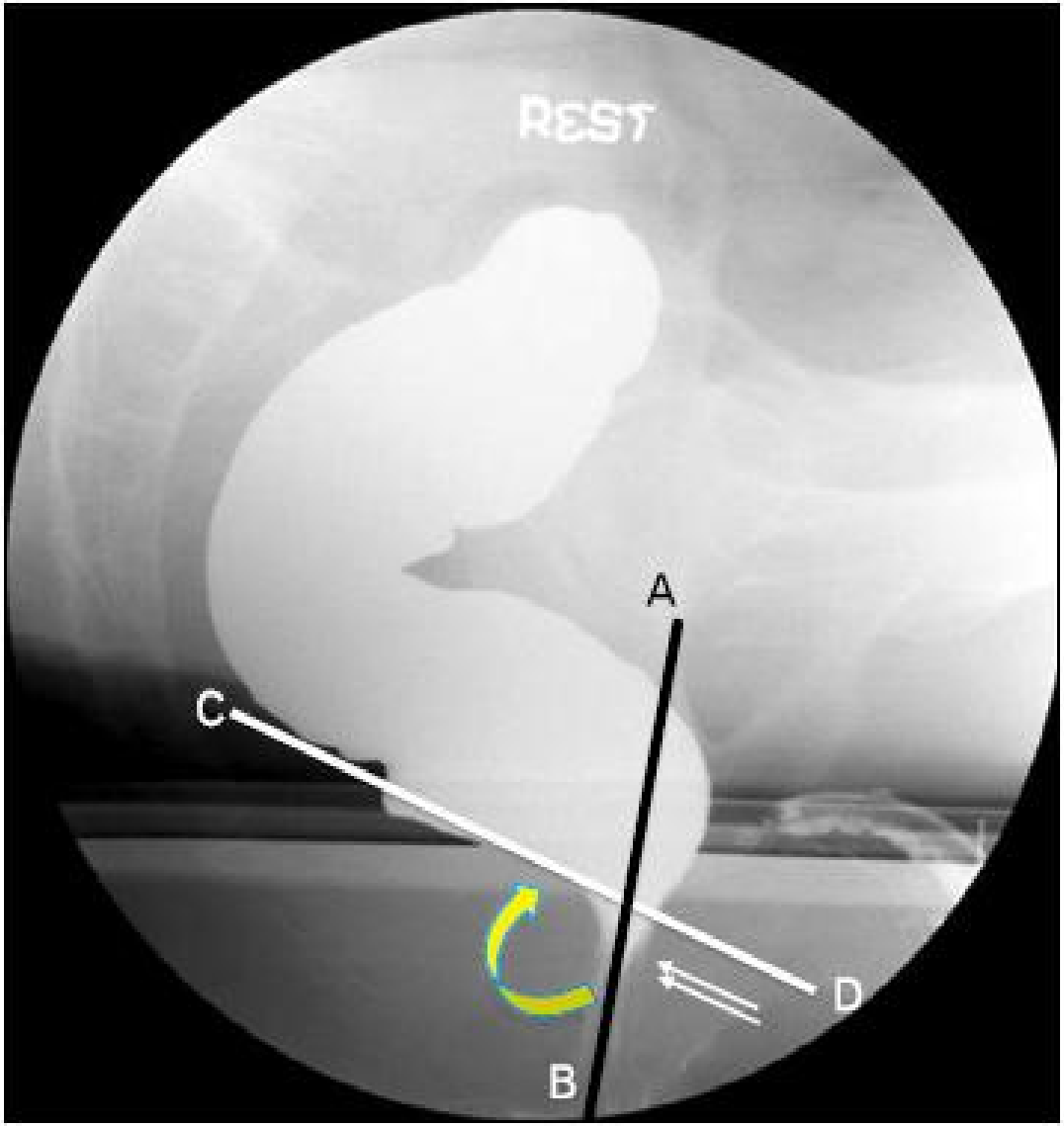
  – During muscle contraction, ARA becomes more acute, while during relaxing phase it becomes obtuse

  Anorectal junction (ARJ) - upper most point of the anal canal

  – Line between the ischial tuberosities is called the bis-ischiatic line

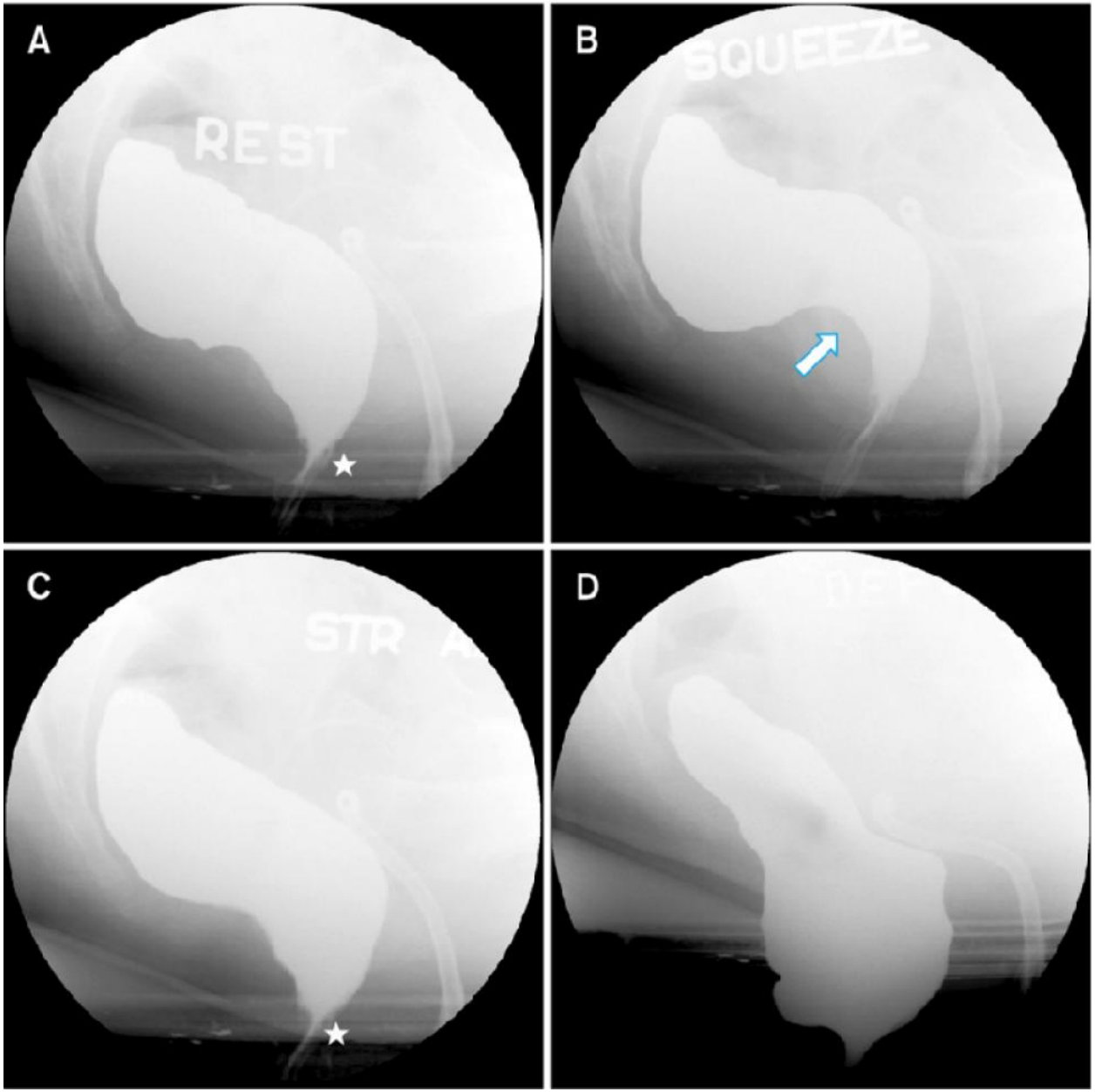
  – Tip of the coccyx

Defecography



- **Anorectal angle** (curved arrow) is measured between the longitudinal axis of anal canal (AB) and the posterior rectum line parallel to the rectum longitudinal axis (CD).
- Double thin arrows show the position of the **anorectal junction**.

Defecography



Normal defecography.

(A) At rest.

(B**) During forced contraction** - deeper impression exerted by the puborectal sling (arrow) and the cranial migration of the distal rectum.

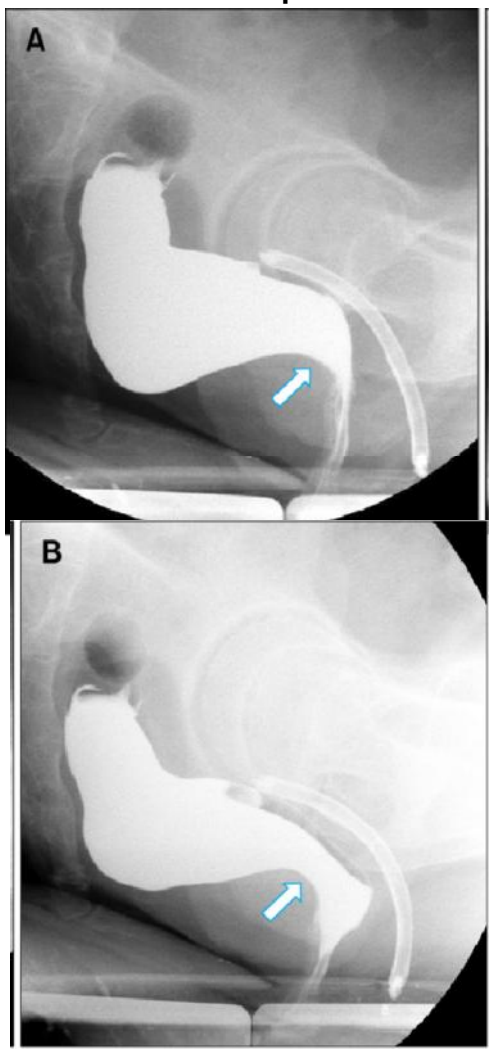
(C) **During straining with closed sphincters** - caudal migration of the anorectal junction is seen (asterisk)

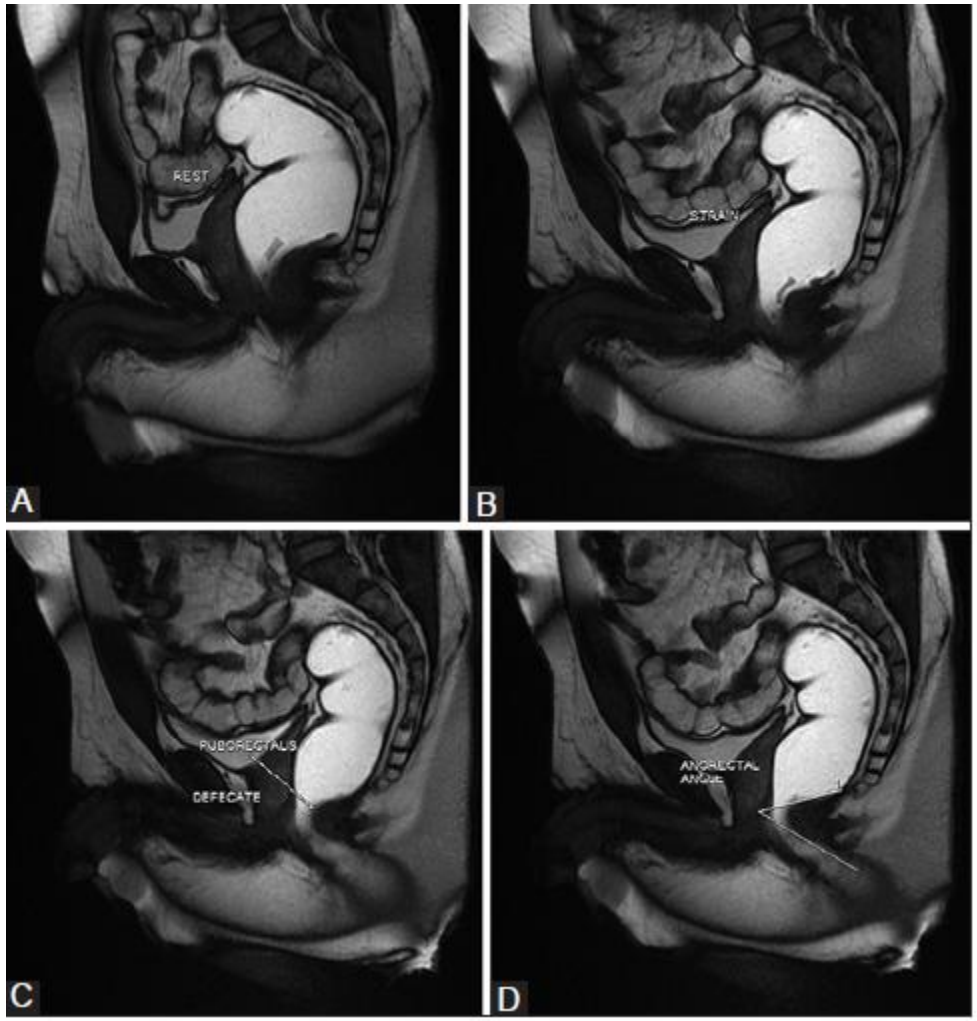
(D) **During evacuation** - the anal canal opens with loss of puborectalis impression.

Dyskinetic Puborectlis Muscle Syndrome

Inappropriate contraction of pelvic floor during defecation

Lack of pelvic floor descent and paradoxical contraction of the puborectalis muscle



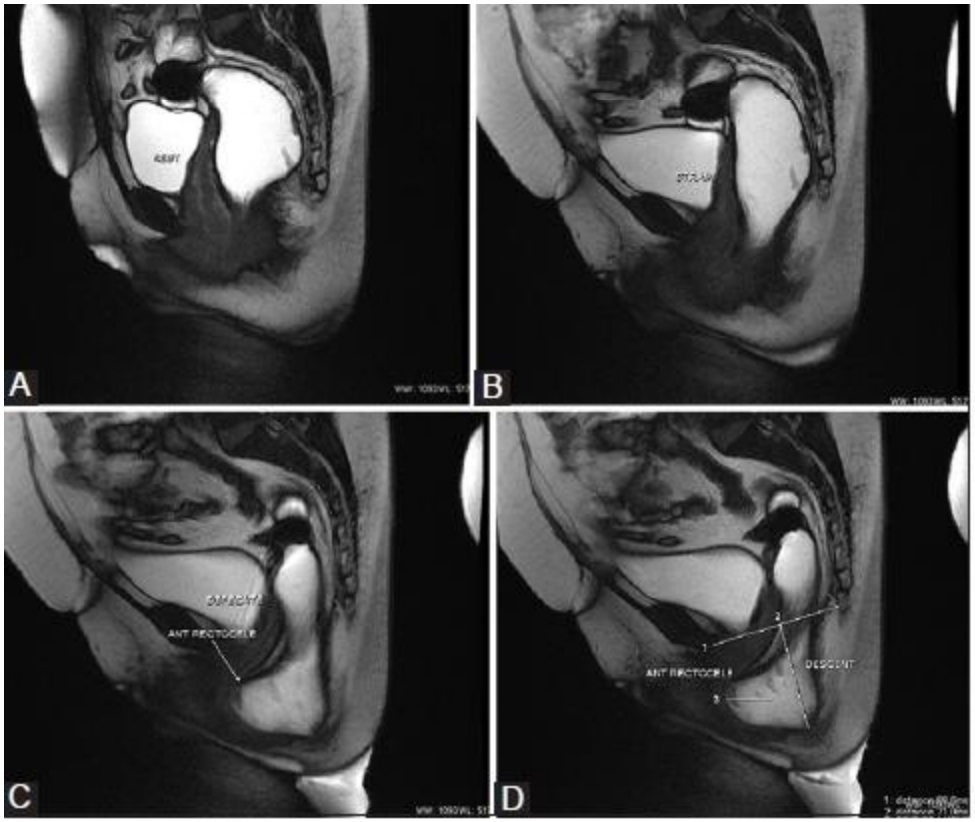


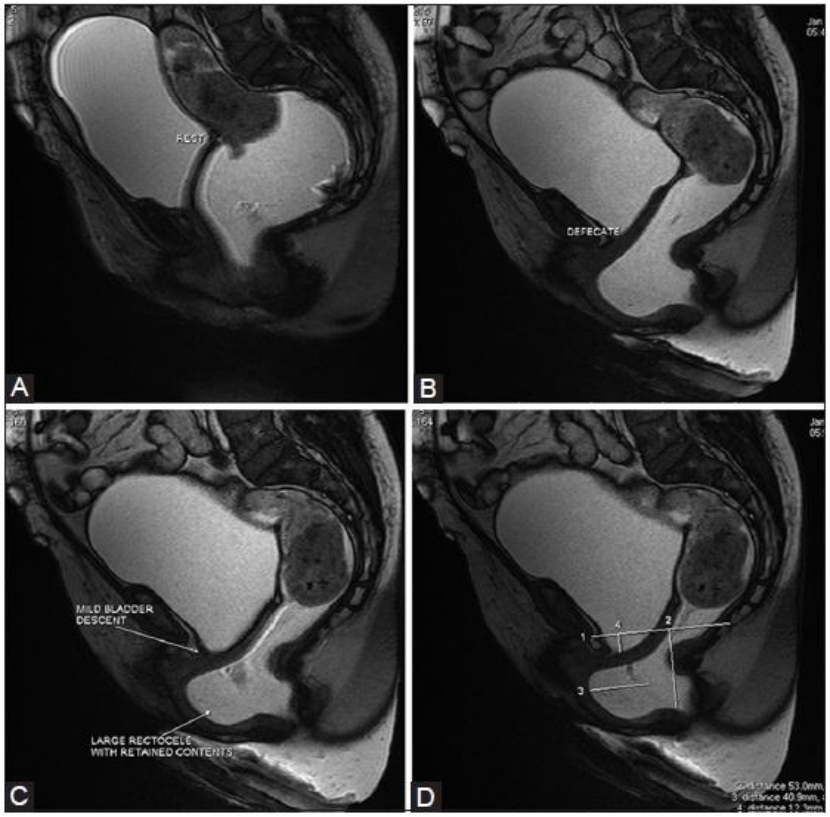
(A) Rest - Abnormally deep puborectal impression (arrow)

(B) Evacuation phase - there is lack of pelvic floor descent

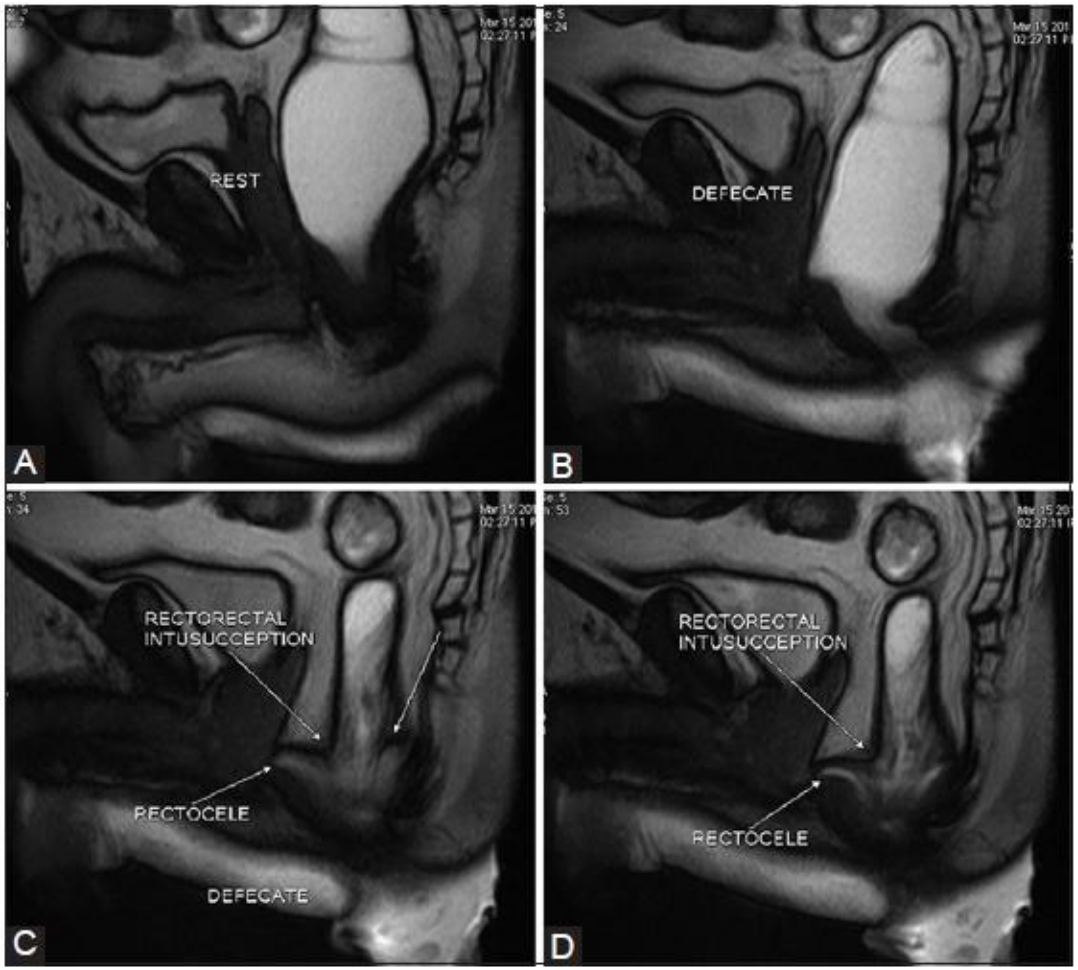
Descending pelvic floor syndrome

- caused by pudendal nerve injury resulting from a combination of obstetric trauma and chronic straining
- caudal migration of the anorectal junction more than 3.5 cm during straining anorectal angle is more than 130^{o} at rest and increases to more than 155^{o} during straining
- Incontinence is frequently associated with this syndrome





Rectorectal intussusception



- (A) Normal position at rest
- (B) Moderate anorectal descent on defecation
- (C and D) There is
- evidence of telescoping of the proximal rectum into the distal rectum representing rectorectal intussusception. Note the classical “arrowhead” configuration of the intussusception

Pelvic floor dysfunction Tt – Pelvic Muscle Rehabilitation

PMR Utilize of one or a combination of six possible therapeutic modalities. The modalities include the following:

1. *Muscle isolation: elimination of accessory* muscle substitution through identification and modulation of associated muscle groups
2. *Discrimination training: enhancement of sensory awareness of tension and* release variations to maximize conscious control of muscle contraction
3. *Pelvic floor muscle strengthening:* enhancement of PF muscle motor recruitment
4. *Endurance training: maintenance of isolated PF muscle* motor recruitment by sustained contractions (Figure 4);
5. *Down-training: inhibition of hypertonic muscle activity to* lower elevated resting tone
6. *Electrical stimulation: employed as the final therapeutic approach to* facilitate muscle motor recruitment and controlled fatigue

Pelvic floor dysfunction Tt – PMR

Exercises:

- They may particularly benefit pregnant women because the pelvic floor muscles can stretch and weaken during labor
- To exercise these muscles, a person should be sitting comfortably. Then, they should attempt to squeeze their pelvic muscles without holding their breath
- It is important to isolate the correct muscles without tightening those of the stomach, buttocks, or and thighs
- 10 long squeezes — holding each for 10 seconds — followed by 10 short squeezes

Pelvic floor dysfunction-Biofeedback

- Refers to use of various devices (mechanical, electrical) that are supposedly able to increase awareness of a biological response, so that patients can learn through a process of trial and error to improve their voluntary control of this response

- First proposed by Engel in 1974

- This involves electrical stimulation, ultrasound therapy, or massage of the pelvic floor muscles to help improve rectal sensation and muscle contraction
- Approximately two-thirds of constipated patients treated with biofeedback are reported to have successful results

Manometric Biofeedback

- Recording anal pressures coupled to visual/auditory signals proportional to pressures
- Anal pressures are recorded by balloon probes or water perfused catheters
- During manometric recording, patient squeezes as to prevent defecation under verbal and visual feedback to reach the goal
- Improving squeeze duration is more important than maximizing strength of squeeze

Patankar SK Dis Colon Rectum 1997;40:907-11

EMG Biofeedback

- Recording of integrated EMG activity from the activity from the striated muscles is shown
- Patient is asked to squeeze and relax pelvic floor muscles without rectal distension
- Kegel's exercises are added to further strengthen the muscles

Pelvic floor dysfunction – R/

- ***Botox*** – There have been anecdotal reports of botulin toxin (Botox) injection to alleviate non-relaxation or paradoxical contraction of the puborectalis muscle with straining. While some cases appear to have been successfully treated, no formal endorsement of this therapy can be offered until additional data become available.
- ***Surgery*** – Surgical options for outlet obstruction constipation are limited. Rectocele repair can be helpful in patients with large rectoceles who must support the back of the vagina with their fingers in order to effect defecation ("splinting"). Complete preoperative evaluation (preferably including defecography to demonstrate improved rectal emptying with vaginal support) and careful patient selection are critical to ensure optimal outcomes.

Treatment of STC

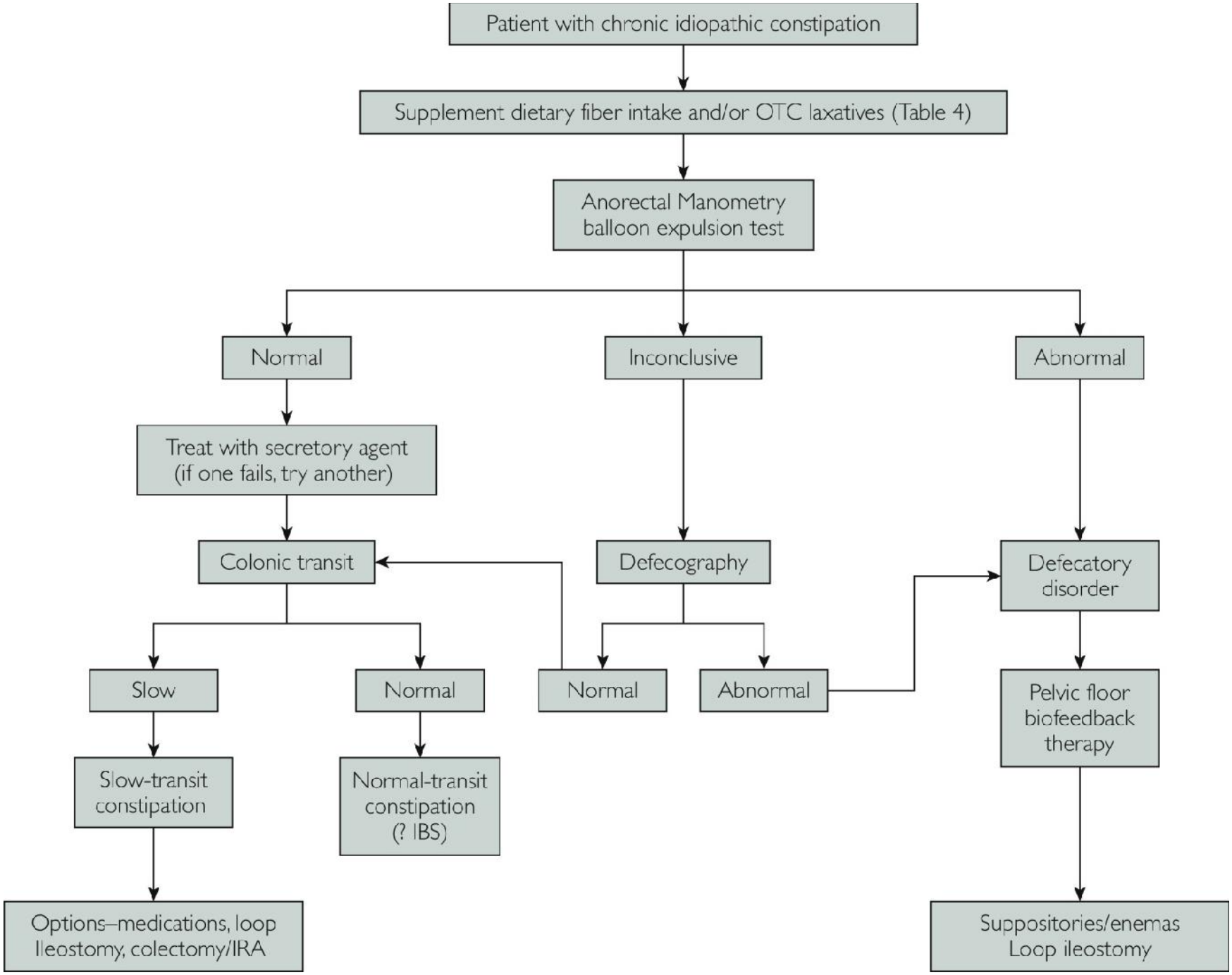
- Colchicine and misoprostol have both been shown to increase stool frequency and colonic transit
- Erythromycin, a motilin receptor agonist, can also stimulate colonic motility
- Prucalopride and tegaserod, both 5HT4 receptor agonists, increase colonic transit and improve symptoms in constipated patients

Treatment of STC

- Surgical
  - antegrade colonic enemas
  - subtotal colectomy with ileorectal or cecorectal anastomosis
  - Segmental colectomy
  - Ileal pouch anal anastomosis
  - Creation of a stoma
- Results of surgery
  - median satisfaction/success rate was 86%,
  - median small bowel obstruction rate was 18%
  - median reoperative rate was 14%
  - median number of bowel movements per day was 2.9
  - incontinence was 14%
  - diarrhea 14%,
  - recurrent constipation 9%

Outcomes based on the type of resection were better with the subtotal colectomy with ileorectal anastomosis than with either subtotal colec tomy with cecorectal or ileosigmoid anastomosis

Thank you


Patient with chronic idiopathic constipation
Supplement dietary fiber intake and/or OTC laxatives (Table 4)
Anorectal Manometry balloon expulsion test
Normal
Inconclusive
Abnormal
Treat with secretory agent (if one fails, try another)
Colonic transit
Defecography
Defecatory disorder
Slow
Normal
Normal
Abnormal
Pelvic floor biofeedback therapy
Slow-transit constipation
Normal-transit constipation (? IBS)
Options–medications, loop Ileostomy, colectomy/IRA
Suppositories/enemas Loop ileostomy