The use of conventional defecography in clinical practice

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Learning objectives

To introduce defecography procedure in adults to a general radiologist, to give information about indications, patient preparation and common pathological findings.

Background

Defecography is radiological study, well known since 1953.

Defecography allows in real time to evaluate anorectal and pelvic floor disorders related to obstructive defecation, incomplete evacuation and perineal pain. Significantly is that defecography is dynamic (functional) examination controversially to static (anatomical) examinations like colonoscopy, rectoscopy, barium enema, CT colonoscopy, etc.

Defecography has high accuracy and is cost-effective examination and can be used for follow-up of treated patients.

Every examination is performed by the same protocol and certain parameters are measured.

Indications: constipation (hard stool), obstructive defecation syndrome (proved with colonic transit time), incomplete evacuation, difficulties to evacuate, unclear pain in anorectal (perineal) region. Also fecal incontinence and fecal smearing.

Findings and procedure details

Patient preparation includes fasting for 4 hours, peroral contrast for small bowel enhancement and cleansing enema before examination. Immediately before examination patient is placed in the left lateral decubitus position and rectum is filled with barium contrast. For female patients for vaginal enhancement contrasted tampon or thick barium paste is used.

Patient is seated on a radio-transparent commode and is asked to contract the pelvic floor and then empty the bowel. Process is evaluated and images are obtained with fluoroscopy machine. Images are generally taken at rest, on contraction of the pelvic floor muscles and during defecation.

Normal findings: rectum has two curves: sacral and anorectal (perineal) - both of them should be seen on X-ray in sagittal plane. Extent of anorectal curve depends on preserved
function (strength) of pelvic floor muscles. Function of pelvic floor can be estimated with two parameters - anorectal angle and anorectal junction.

The anorectal angle is measured between the longitudinal axis of anal canal and the line drawn parallel to the posterior wall of the rectum. Average value in rest is 80°-100° Fig. 1 on page 5, without remarkable differences between male and female. During maximal contraction of pelvic floor (squeezing) anorectal angle become more acute 65-80° and anorectal junction moves cranially Fig. 2 on page 5. The puborectal impression appears more evident as the levator ani muscle contracts. Anorectal angle is an indirect indicator of the puborectal muscle function. During defecation, anal sphincter and puborectal muscle relaxes and anorectal angle opens in average 110-150° Fig. 3 on page 6. At the end of defecation rectum should be empty and it’s walls collapsed.

Another important parameter is anorectal junction - area between anal canal and rectum. Craniocaudal movement of the anorectal junction represents the elevation and descend of pelvic floor. The level (or height) of anorectal junction can be measured if compared to fixed reference point - pelvic bones. There are several measuring methods, but in our practice we prefer two of them: bi-ischiatic line and pubococcygeal line. The bi-ischiatic line is drawn between the ischial tuberosities; pubococcygeal line is drawn between lower margin of symphysis and the coccyx.

Normally at rest and during defecation anorectal junction should not move lower than ischial tuberosities.

Common imaging findings include: descending perineum (pelvic floor) syndrome, rectocele, rectal intussusception, dyskinetic pelvic floor syndrome (anismus), enterocele and sigmoidocele.

**Descending pelvic floor syndrome** is characterised by decreased pelvic floor muscle tone, probably, because of damage of pudendal nerve or levator ani muscle.

On X-ray images syndrome is seen as descend of anorectal junction, lower than ischial tuberosities Fig. 5 on page 8. Furthermore, configuration of rectum changes - curves are reduced and rectum becomes straighten.

During pelvic floor muscle contraction (squeezing), decreased raising of the pelvic floor is usually seen. Descending pelvic floor clinically manifests with difficult evacuation, incomplete emptying of the rectum, and/or incontinence.

**Rectocele** is bulging of the rectal wall in supraanal region. Usually ventral rectocele is seen and typically during defecation. Ventral rectocele often combines with descending
pelvic floor syndrome Fig. 5 on page 8. Defecography allows a precise evaluation of the location, size and amount of residual contrast in a rectocele.

Bulging until 2 cm is considered as a normal finding, although some authors prefer to name it a small rectocele. Rectocele is considered to be moderate if it's size is 2 - 4 cm, and large if it's more than 4 cm.

Patients may have symptoms like sense of incomplete evacuation and need for digital maneuver to empty the rectocele or supraanal region. Also female patients may feel bulging of something rounded throughout the vagina.

Rectocele is most common in females because of laxity of the rectovaginal septum, congenital conditions or caused by surgical operations or obstetrical traumas.

**Rectal intussusception** is common finding for constipated and also for asymptomatic patients. Intussusception means that upper part of rectum slides into the lower part of rectum (tube inside tube) or anal canal Fig. 6 on page 9. Intussuscepted folds may contain submucosa/mucosa layers, only or all layers of bowel wall, i.e., transmural. Mural involvement is important because on it depends tactics of surgery.

Intussusception is divided in three groups, depending on altered location: intrarectal, intraanal and transanal.

It is considered that rectocele may cause obstructive defecation syndrome (ODS) and is often found in patients with proved ODS by colonic transit time. Patients may feel sense of incomplete evacuation, pain in rectum; there may be also known solitary rectal ulcer.

**Dyskinetic puborectal muscle syndrome**

Also known as spastic pelvic floor syndrome, spastic puborectalis syndrome, paradoxical puborectalis contraction, levator ani syndrome or anismus.

Normally puborectal muscle during defecation relaxes and allows empty the bowel. This syndrome is characterized by contrary puborectalis action - it contracts during defecation and on X-ray images can be seen as deep impression in posterior rectal wall Fig. 7 on page 10. Patients usually complain about difficulties to empty the bowel.

**Enterocoele and sigmoidocele**

Enterocoele and sigmoidocele refers to herniation of a small bowel or sigmoid loop into the pouch of Douglas. Both pathologies can be seen if bowel loops are enhanced. Small bowel enhancement can be achieved by peroral contrast 2 hours before examination. Sigmoid colon can be filled by peroral contrast or by increased amount of rectal contrast.
Normally small bowel loops and sigmoid colon are not localized in small pelvis. But if there is descending pelvic floor or previous hysterectomy, during defecation appears "free" space in minor pelvis and enterocele occur Fig. 8 on page 11 Fig. 9 on page 12. Important, that enterocele and sigmoidocele does not cause mechanical obstruction of rectum.

Enterocele may cause symptoms like sense of fullness and incomplete evacuation.

Images for this section:

Fig. 1: Conventional defecography, sagittal plane. Anorectal angle during rest.
**Fig. 2:** Conventional defecography, sagittal plane. Anorectal angle becomes more acute during squeezing.
**Fig. 3:** Conventional defecography, sagittal plane. Anorectal angle becomes wide during defecation.
Fig. 4: Conventional defecography, sagittal plane, red line represents pubococcygeal line (PCL). There can be seen sacral and anorectal curves. Anorectal junction is located 1 cm below PCL.
Fig. 5: Conventional defecography, sagittal plane. Descending pelvic floor syndrome and rectocele. Yellow line represents pubococcygeal line and descend of anorectal junction below PCL. Red line marks rectocele size.
Fig. 6: Conventional defecography, sagittal plane, at the end of evacuation. Intraanal intussusception (black arrow), intussusceptum (red arrow), sigmoidocele (yellow arrow).
**Fig. 7**: Conventional defecography, sagittal plane. Dyskinetic puborectual muscle syndrome. During defecation puborectual muscle does not relax and prominent impression of that can be seen.
Fig. 8: Conventional defecography, sagittal plane, before defecation. Patient with huge enteroccele, what is not yet seen. Red line - small bowel loops, blue line- rectum, yellow line- vagina, green line -pubococygeal line.
**Fig. 9:** Conventional defecography, sagittal plane, at the end of defecation. Patient with huge enterocele, descending pelvic floor syndrome and transanal intussusception (prolapse). Red line - small bowel loops, blue line- rectum, yellow line- vagina, green line -pubococcygeal line.
Conclusion

Conventional defecography is powerful tool for analyzing bowel movement during evacuation process. Procedure allows to evaluate functional and morphological changes in the same time.

Defecography is not difficult to perform, but examination require particular circumstances for staff and patient.

The main limitations of this technique are one plane imaging and ionizing radiation.

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