MRI and perianal fistulae

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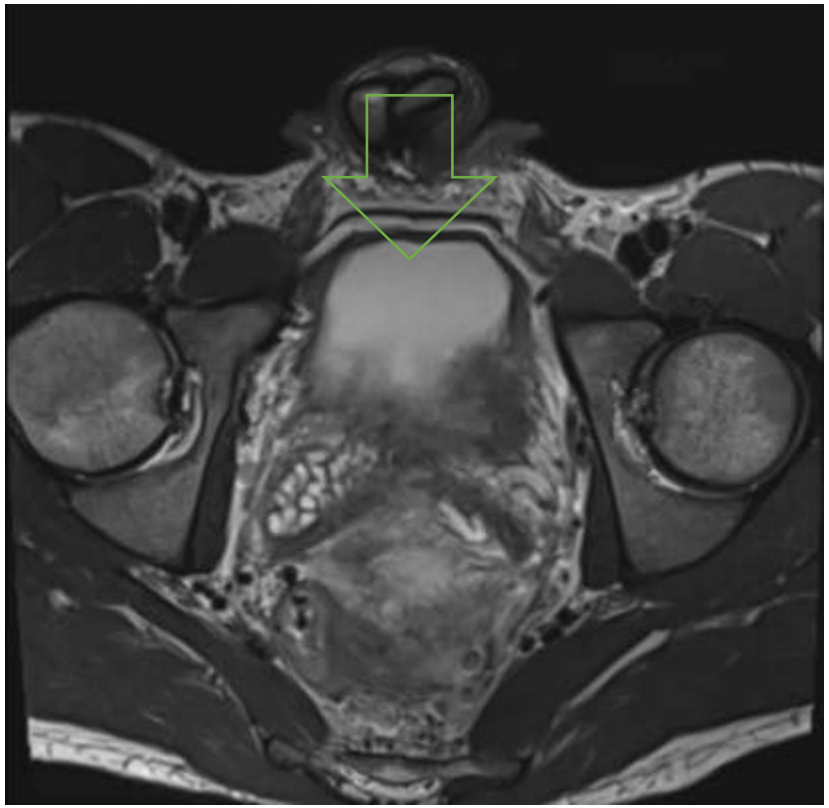
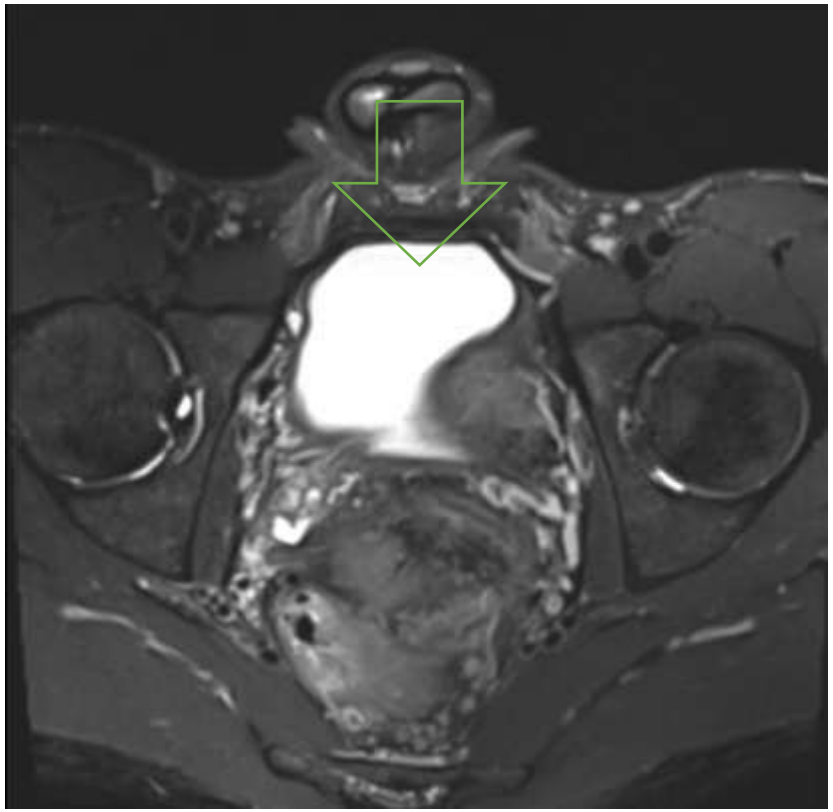
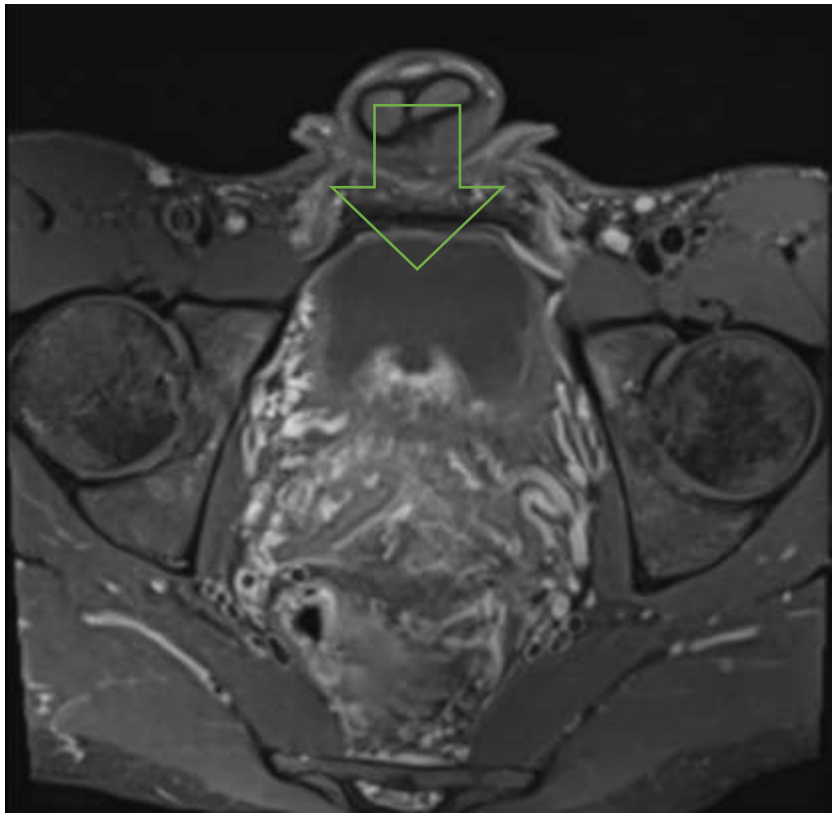
Outline

- Basic MR sequences

- Basic anatomy

- Key elements of fistulas
- Fistula tracts
- Collections / inflammatory mass

Basic sequences

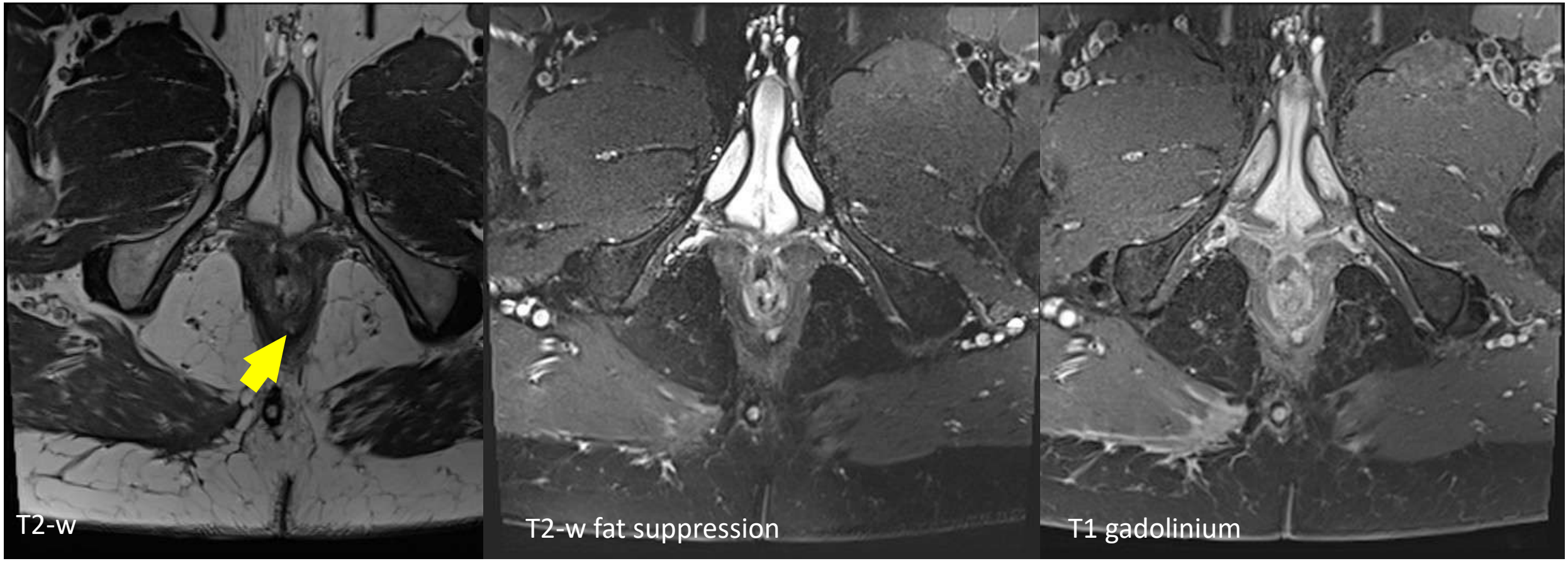




T2 sequences

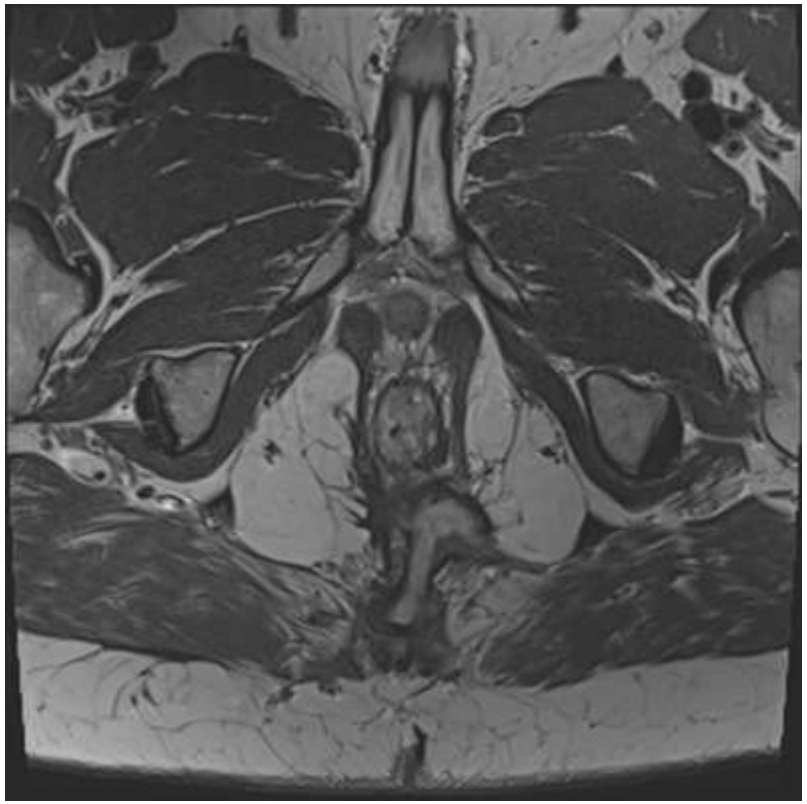
T1 sequence

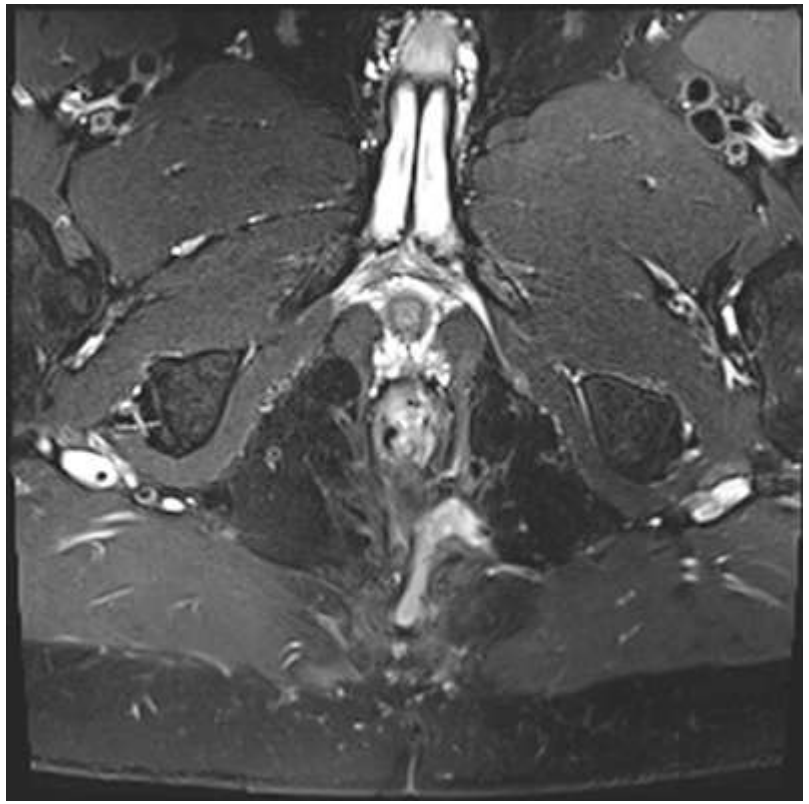
Fat suppression signal

Why do we need fat suppressed sequences?

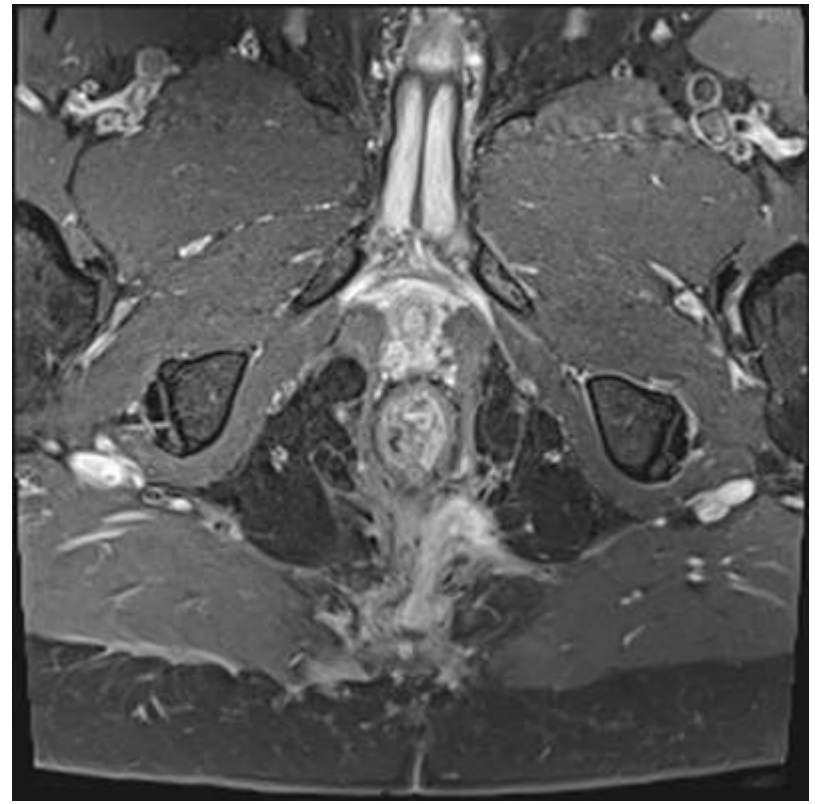


Basic sequences





T2 sequences



T1 sequence

Bright on T2?

Fluid

Inflammatory tissue

Collections/inflammatory mass

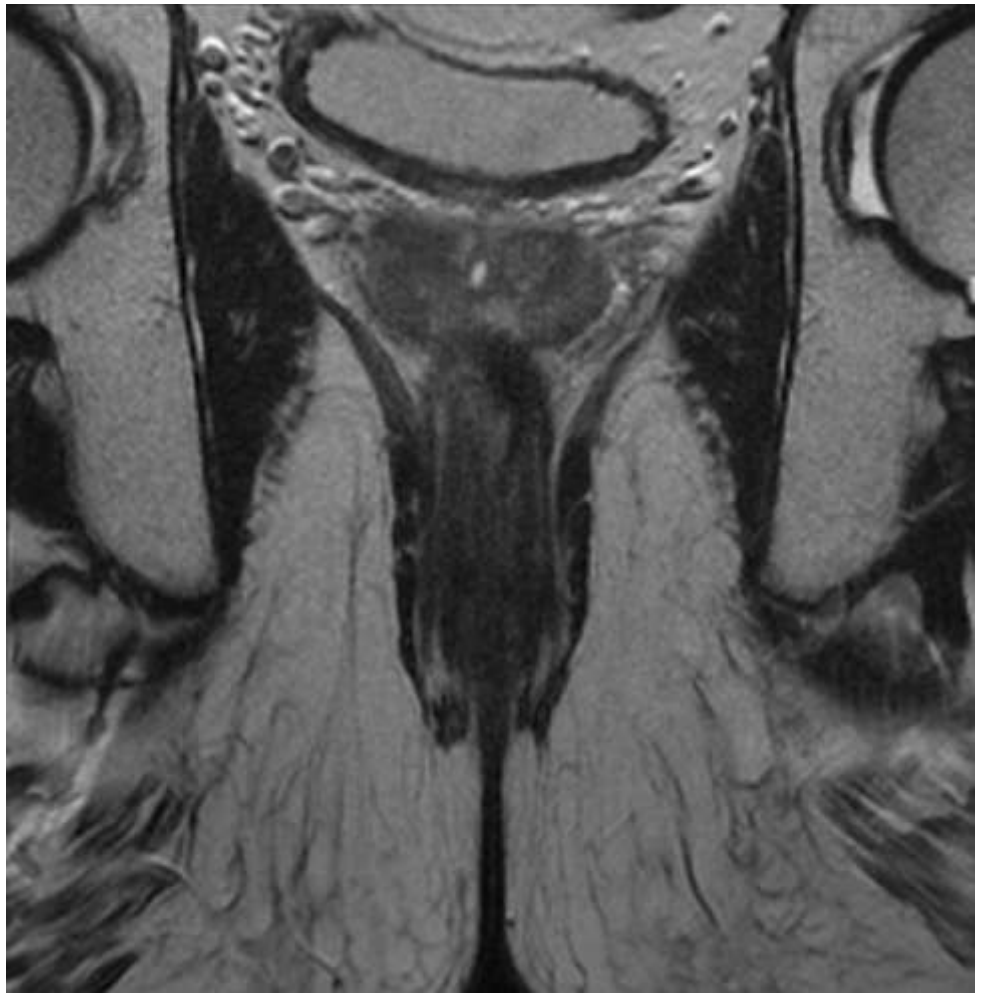
Bright on T1-Gado?

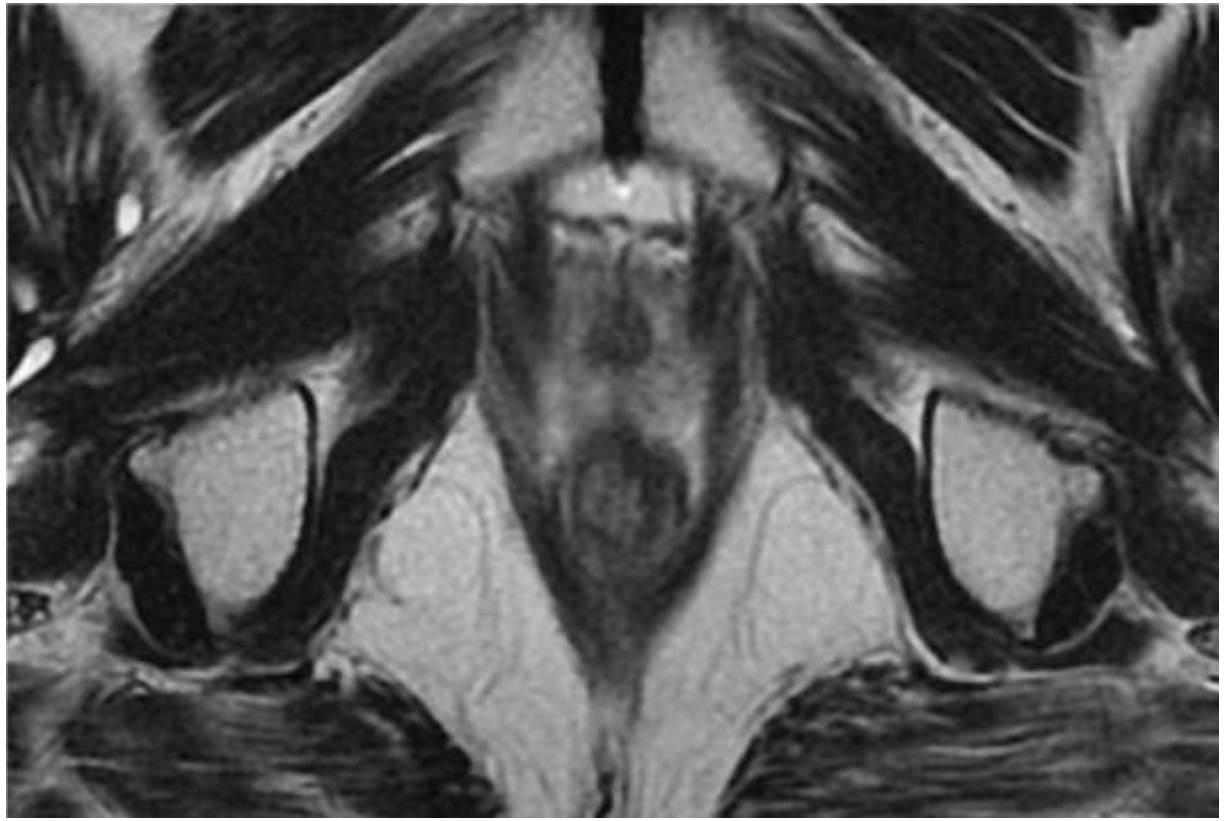
Collection wall

Inflammatory tissue

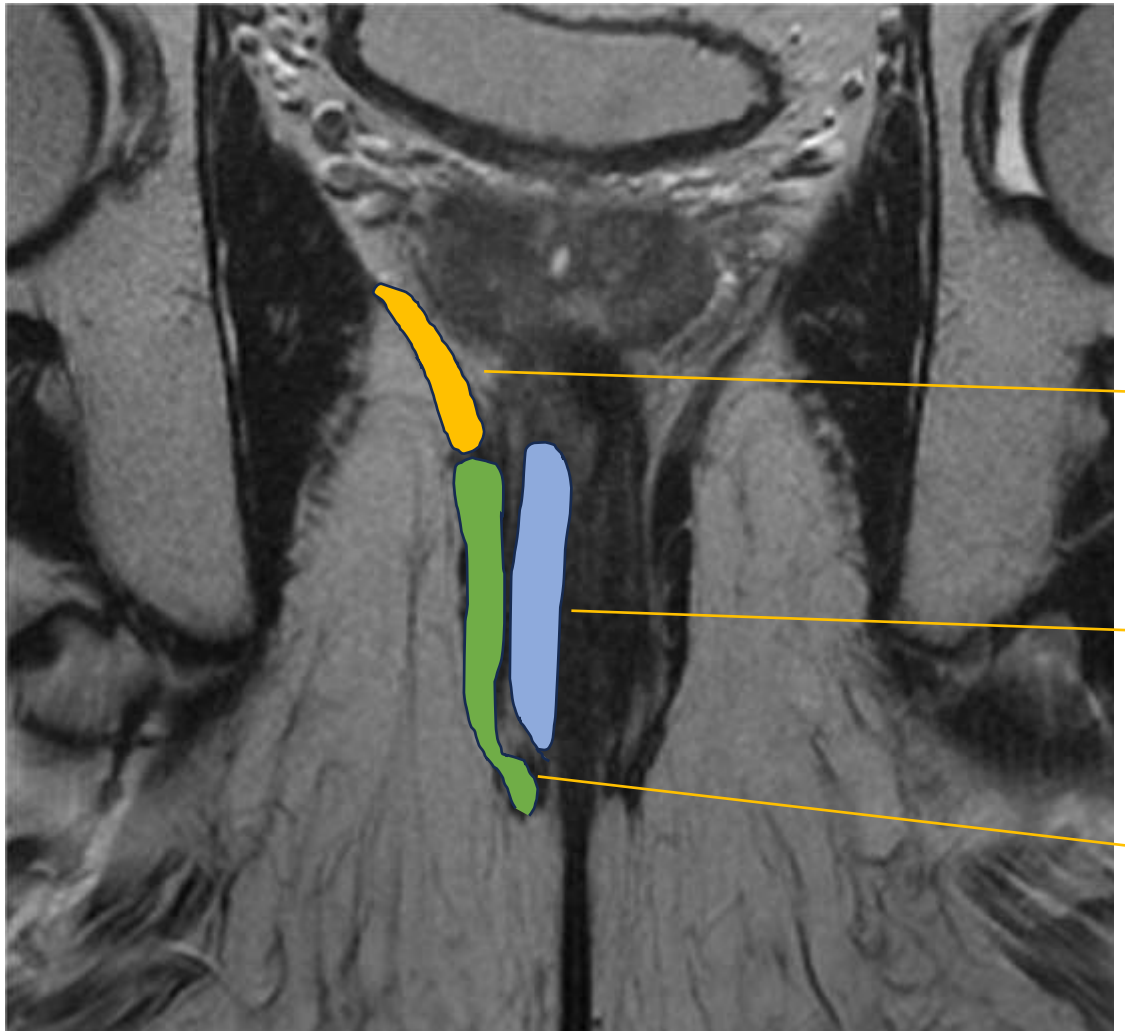
Vessels

Best view for colo-recal surgeons





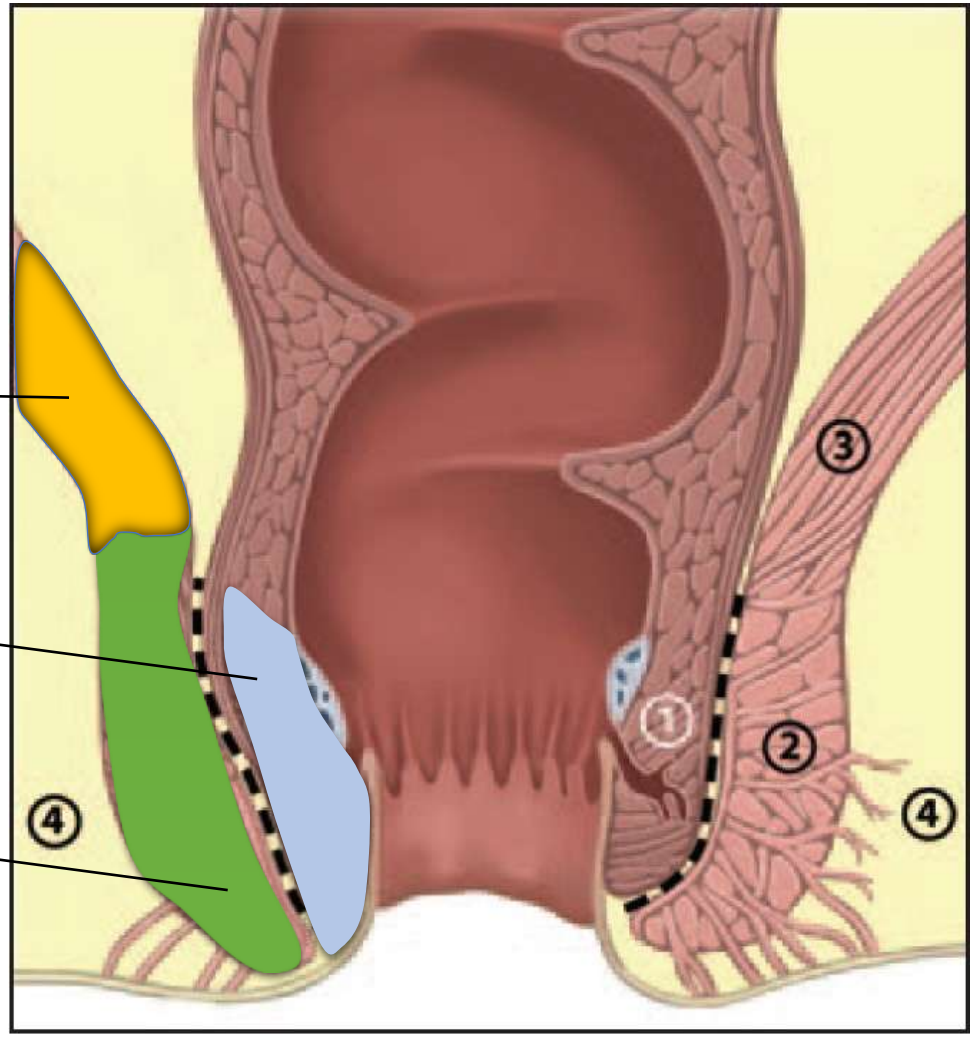
Anatomy



Elevator Ani

Internal sphincter

External sphincter



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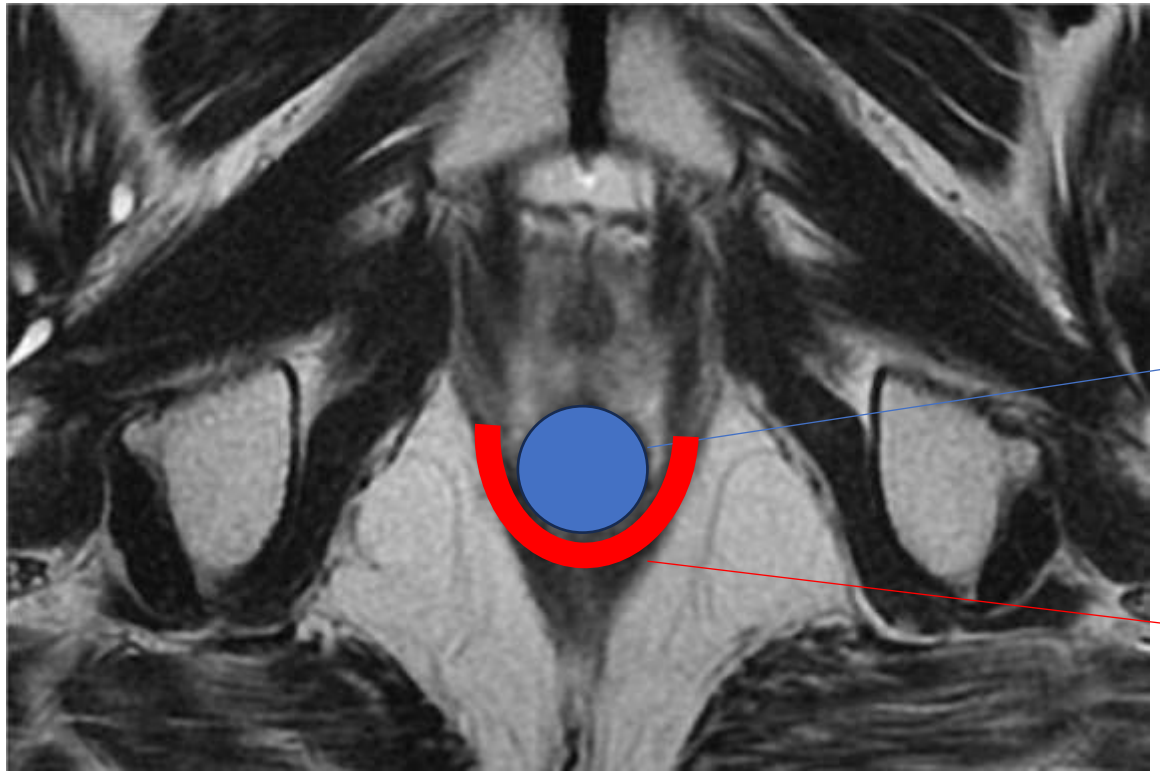
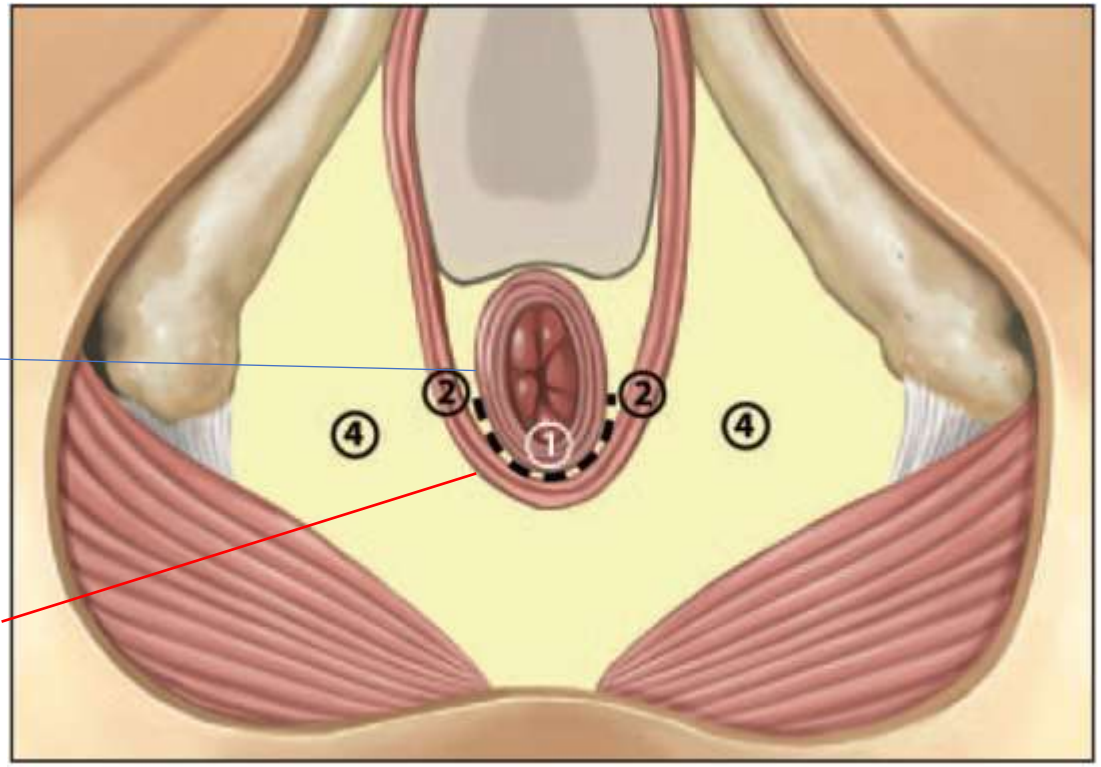


Internal sphincter

External sphincter

Adapted from AJR Am J Roentgenol. 2012;199(1):W43-53



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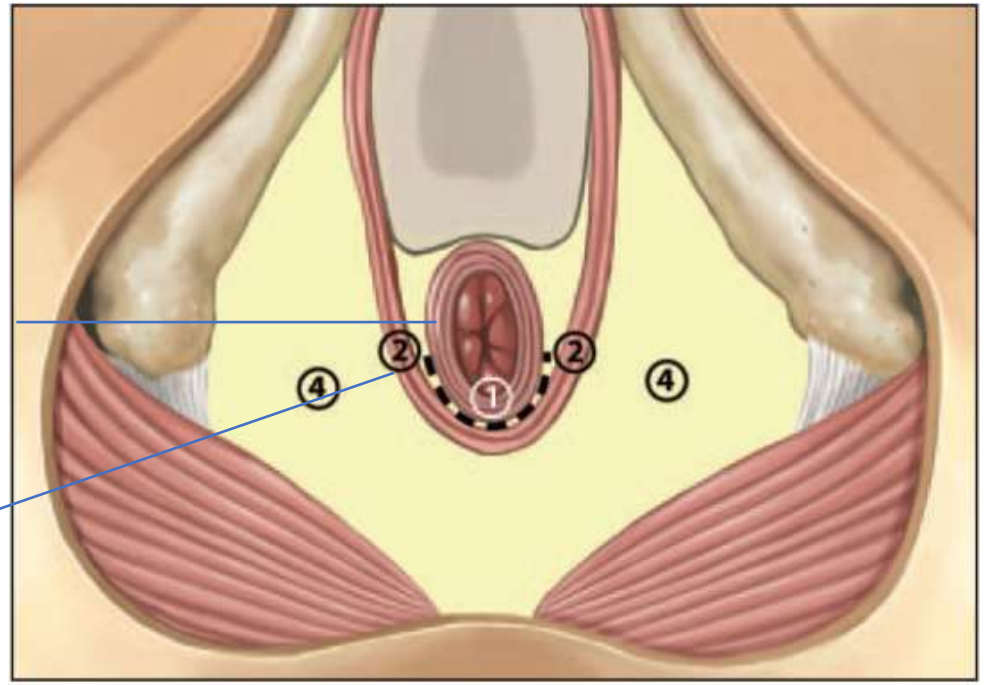
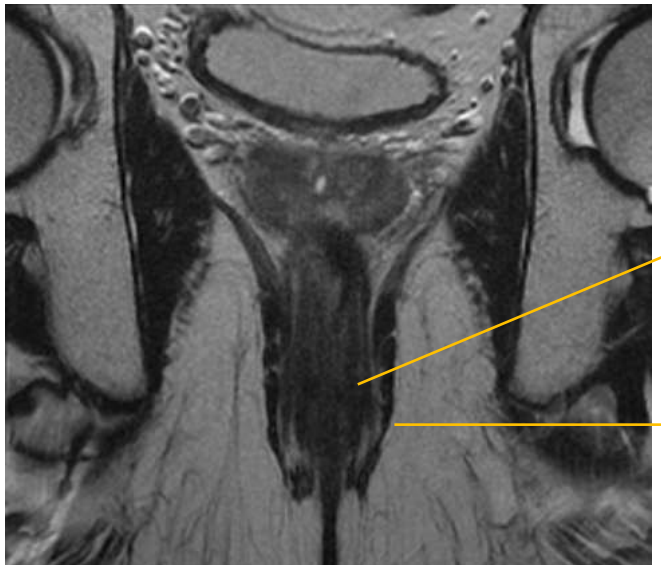
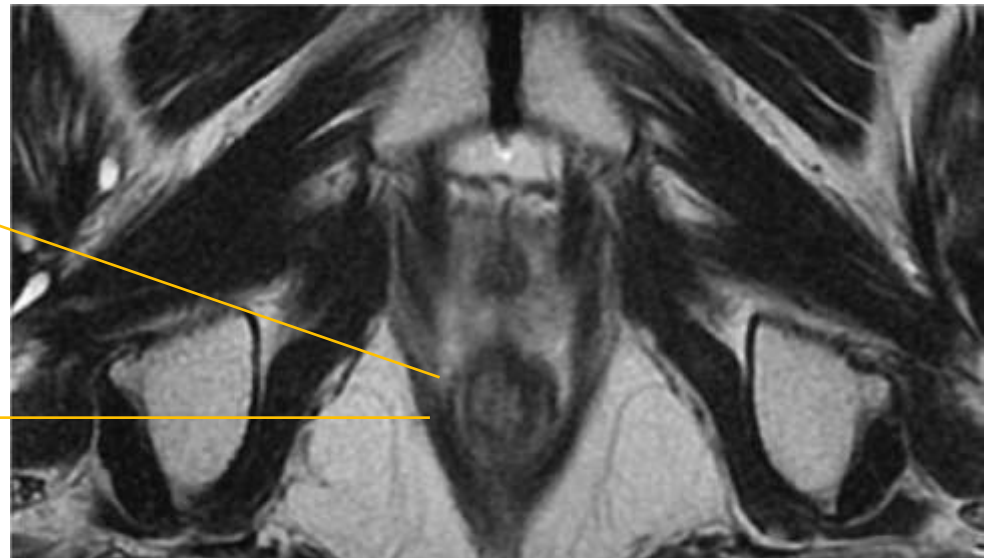




Internal sphincter

External sphincter



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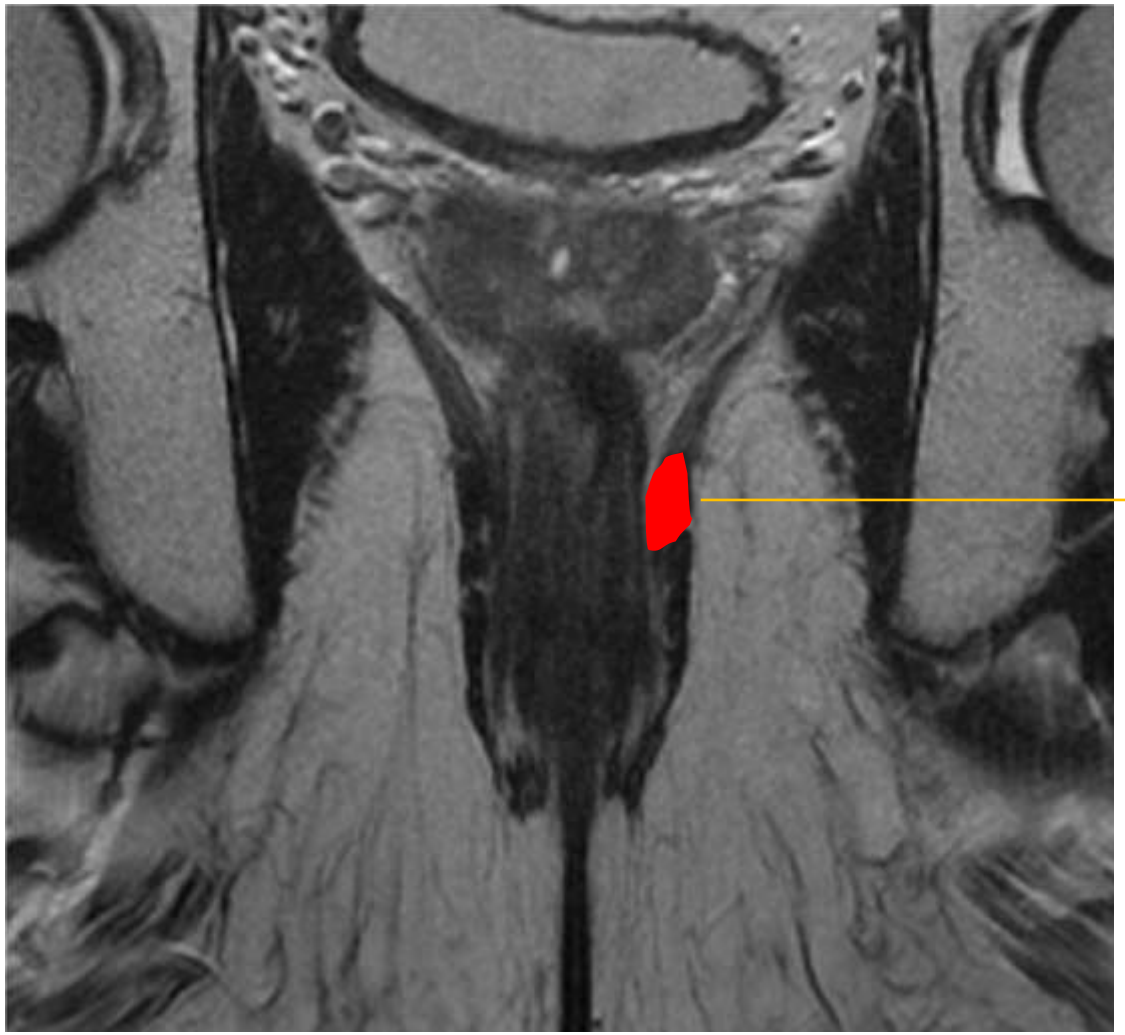

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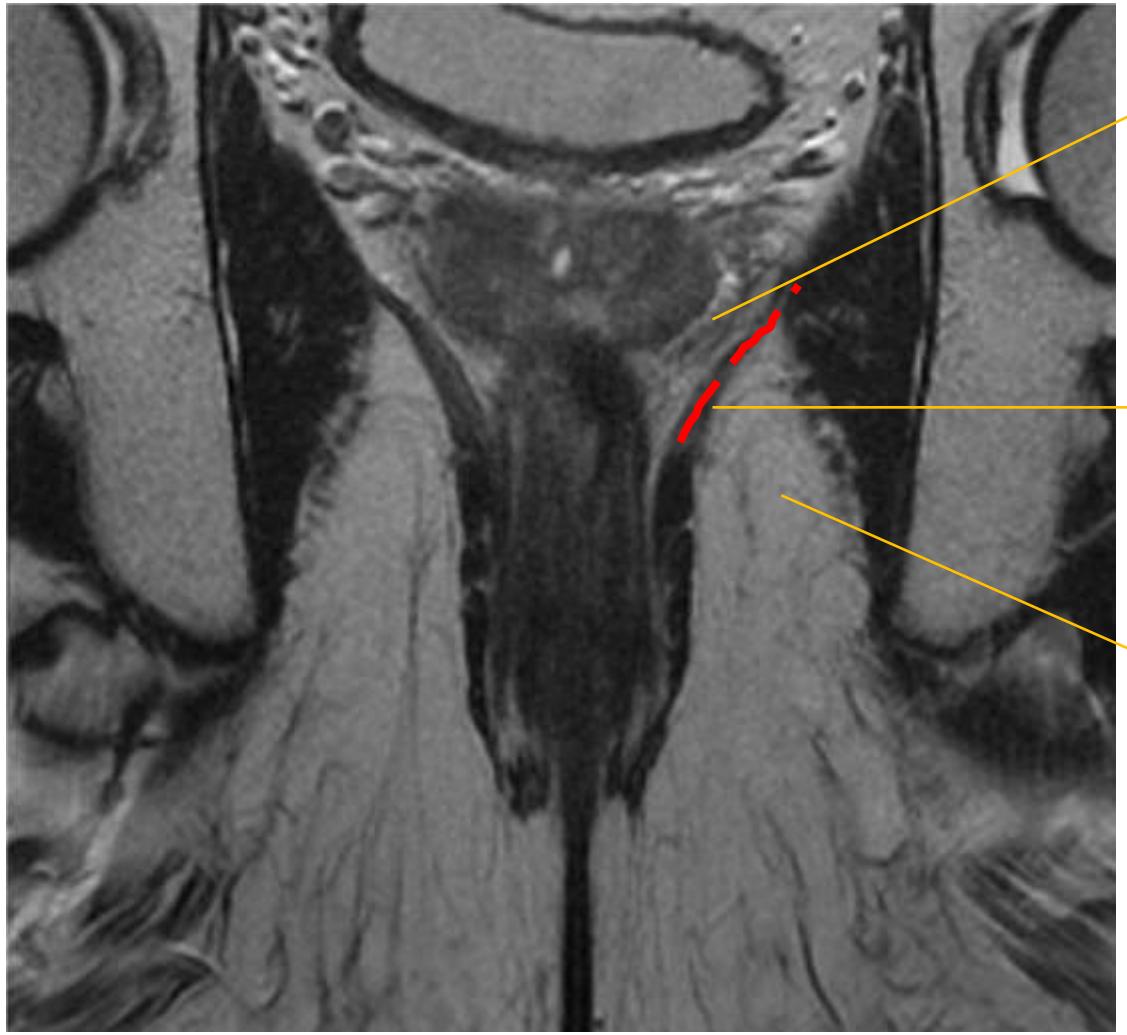

Supralevatoric space

Elevator Ani

Infralevatoric space

Ischiorectal fossa

Standardarization – improving communication

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ECCO Topical Review

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ECCO-ESGAR Topical Review on Optimizing Reporting for Cross-Sectional Imaging in Inflammatory Bowel Disease

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Journal of Crohn's and Colitis, 2022, 523–543
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ECCO Topical Review

Table 3. Perianal CD—definitions of abnormalities

Subject	Definition
Fistula	Tracts connecting the anus or rectum and the perianal skin or other organs[6]
Complex fistula	High fistula or with one or more of the following characteristics: extensions, multiple external openings, complicated by an abscess, urogenital involvement or anorectal stricture[2]
Sinus	Blind-ending tract without either an external or an internal opening[131]
Abscess [or collection]	US: hypo-anechoic structures [≥10 mm], containing echoic fluid and sometimes gas bubbles, with posterior echo enhancement and internal echoes[127] MRI: ≥10 mm fluid signal component in the cavity of a collection[6]; exhibits rim enhancement after contrast
Fistula type: Intersphincteric	Fistula between the internal and external sphincter[132,133]
Transphincteric	Fistula crossing the anal sphincter muscle. A high transsphincteric fistula crosses the upper two-thirds of the anal sphincter [mainly puborectal muscle, upper part of external sphincter] to the ischioanal fossa, while a low transsphincteric fistula crosses the lower third of the anal sphincter [i.e. external sphincter][132,133]
Suprasphincteric	Fistula passing upward in the intersphincteric plane to a point above the puborectalis muscle where it tracks laterally and caudally into the ischioanal fossa[132,133]
Extrasphincteric	Fistula not originating in the anal canal and sphincter complex that passes directly from the rectum to the perineal skin through the ischioanal fossa[132,133]
Superficial	Fistula that involves the distal anal canal and does not involve the anal sphincters[124]
Recto- or anovaginal	Hypoechoic tract [US] or high-signal/enhancing or low-signal structure between the rectum or anus and vagina [MRI][127]
Internal opening	Defect in the internal anal sphincter and the subepithelial space[134,135]
External opening	Visible external opening to the skin surface[6,136]
Extension	An additional secondary tract or branch of a fistula, which may be blind ending or connect to other organs or skin[6]
Abscess type: Superficial	A subcutaneous abscess lying directly beneath the skin
Perianal	A subcutaneous abscess close to the anal verge.
Ischioanal	An abscess that passes through the external anal sphincter into the ischioanal space
Intersphincteric	An abscess lying between the internal and external sphincter muscles
Intralevator	An abscess lying within the levator muscle
Suprasphincteric	An abscess lying in the supralevator space
Horseshoe	A semilunar region of sepsis that spreads in the horizontal plane either side of an internal opening, to involve two or more adjacent quadrants affecting the ischioanal, intersphincteric or supralevator compartments[6]

What to look at…?

Table 2 The minimum dataset for MRI reporting of anal fistula and associated subsets

Feature	Always report	Report if remarkable or relevant to clinical scenario**
Classification	• Parks classification subtype	
General characteristics	• Number of tracts • If tract is single, single-branched or multiple	
Internal opening	• Anal clock location • Height in upper/middle/lower thirds of anal canal* • If internal opening is anal or rectal • Number of internal openings	• Diameter
Path of the fistula tract through the sphincters	• Location where tract crosses EAS or puborectalis • Height that tract crosses EAS or puborectalis in upper/middle/lower thirds of anal canal*	• General characteristics of IAS/EAS • Course of IS fistula through IS space
External opening	• Anal clock location • Anatomical location (e.g. gluteal, labial)	
Extensions	• Presence of extensions, even if absent • If extensions are single or multiple • Anatomical location • Location relative to levator ani (supra/infralevator) • Location of point of communication to primary tract • Shape (e.g. horseshoe, blind tract)	• Description of course of extensions
Collections	• Presence of collections, even if absent • Connection to the primary tract • Anal clock location • Anatomical location (e.g. perianal, ischioanal) • All collections should be reported, with size defined as [34]: • Small (3–10 mm, not including tracts > 3 mm diameter) • Medium (11–20 mm) • Large (> 20 mm) • Large collections should be notified to the referring team	• Height of collections
Measurements		• Tract length • Tract diameter
Other features	If present, comment on: • Fistula activity: fibrotic, healed or scarred tract • Rectum and large bowel: presence of proctitis, presence of small- and large-bowel inflammation • Features of previous surgery: setons, drainage catheters, air foci, gas in fistula • Other pathologies: rectal wall thickening, involvement of pelvic organs, pelvic abscess with fistulous tracts, inflammation of adjacent tissues, retrorectal cysts, bone marrow oedema, osteomyelitis, anogenital fistulation, lymphadenopathy, malignant transformation of fistula, peritoneal pseudocysts, unilateral thickening of levator ani, tuberculosis, diverticulitis • Other perianal pathology: pilonidal sinus, hydradenitis suppurativa, haemorrhoids, fissure	
Surgical subset** (report when planned surgical intervention is indicated on request) • Angulation through EAS/IS space • Direction through EAS (cephalad/caudad) • Angulation of branches • Distance between external opening and anal verge		
• Distance between extensions and primary tract • Height of extensions • Features of previous surgery: if present, comment on fat containing grafts, scarring		
Perianal Crohn's disease subset** (report when Crohn's disease is present or suspected on request) • Tract activity: active vs inactive tract		

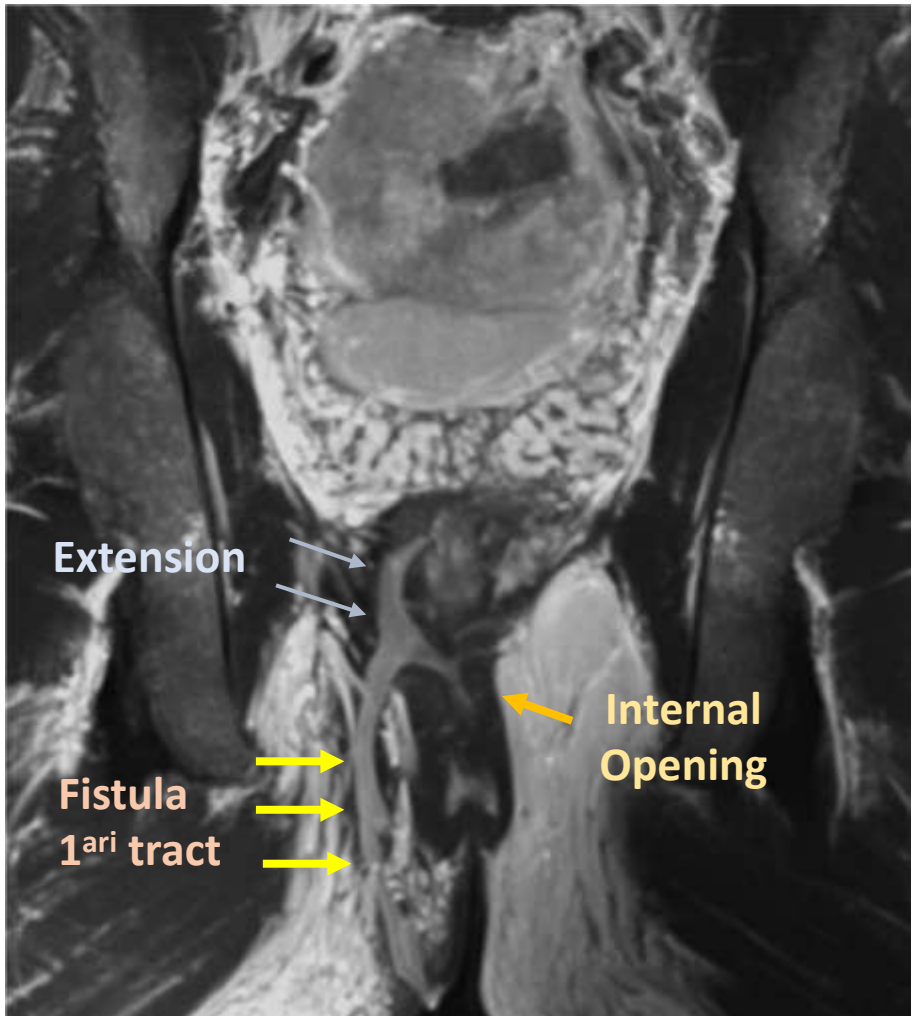
*Length of the anal canal is defined as the length of striated muscle inclusive of puborectalis. The plane in which the canal is measured should be clearly stated

**See explanatory notes in Table 3

EAS external anal sphincter, *IAS* internal anal sphincter, *IS* intersphincteric

Iqbal N et al European Radiology (2022) 32:8306–8316

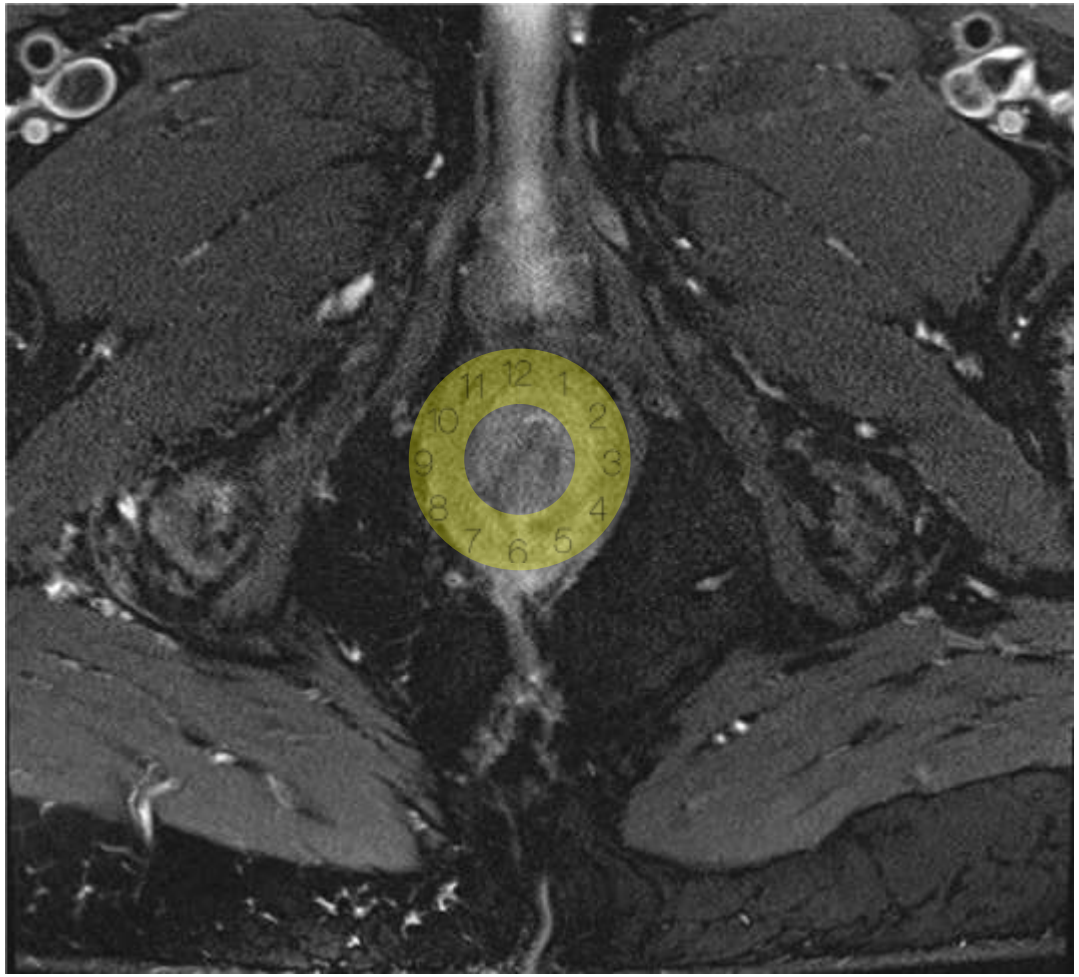
Magnetic Resonance Imaging



- Essential points

Gecse KB, et al. Gut 2014; Schwartz DA et al IBD 2015; Samaan MA et al APT 2017; Halligan S et al Eur Radiol 2020

Internal opening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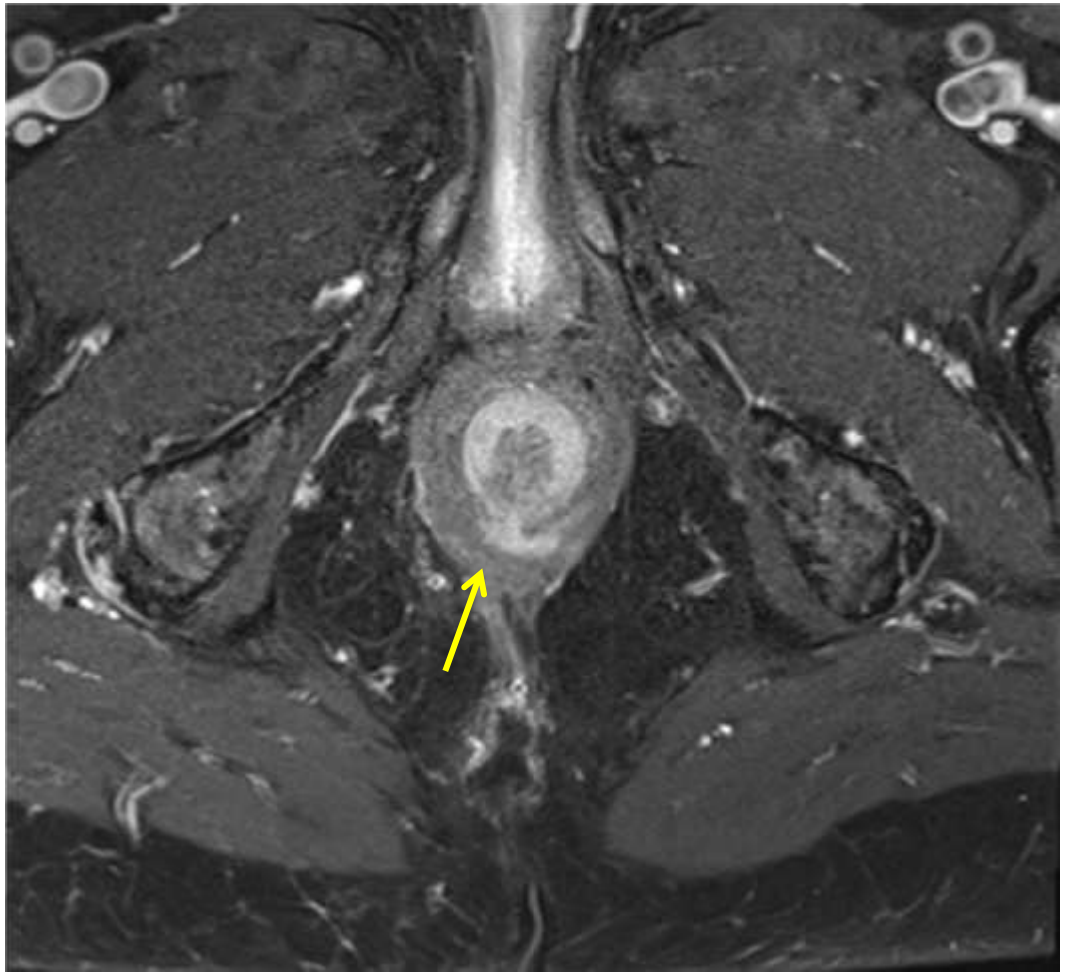
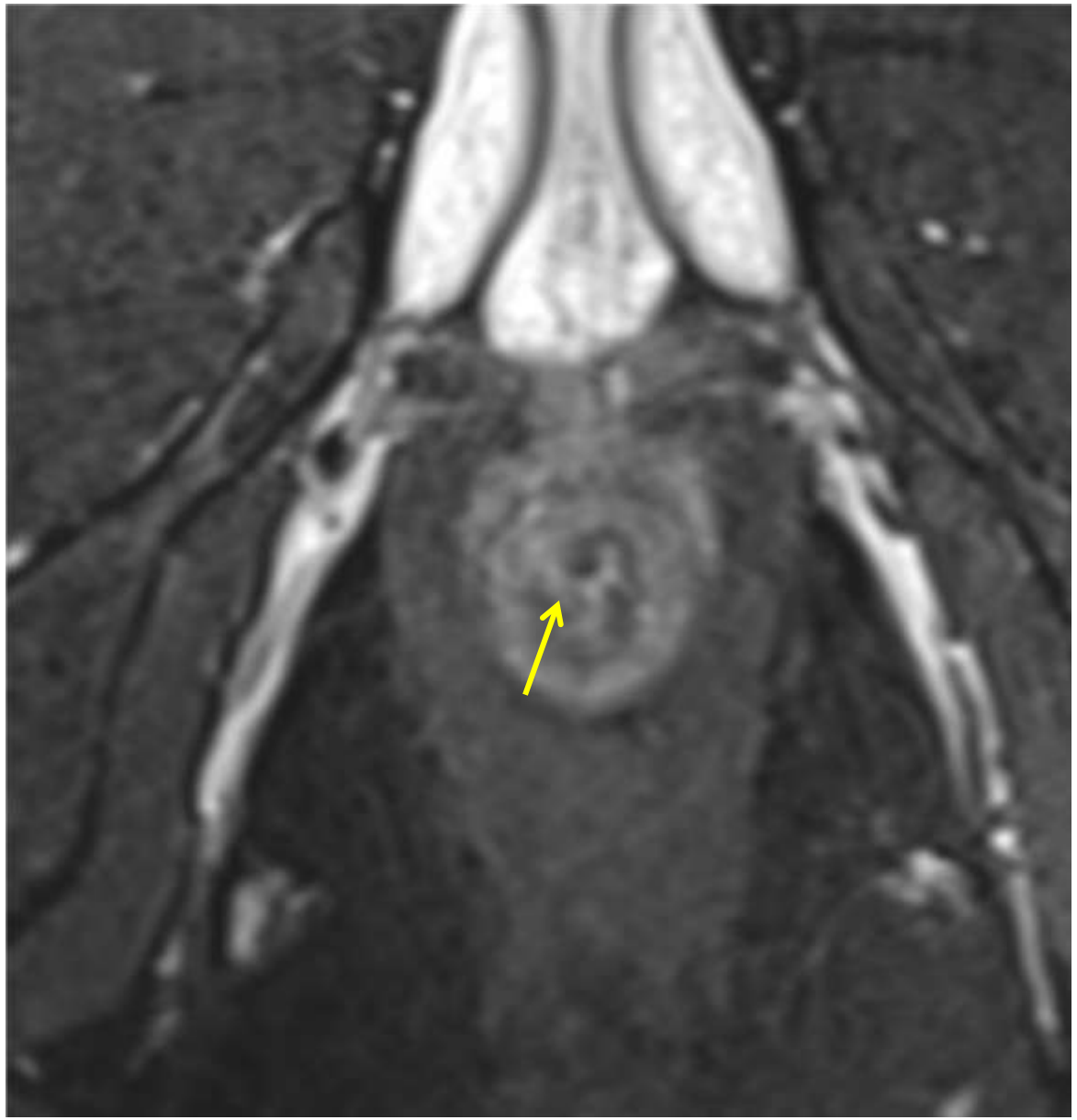


Internal opening



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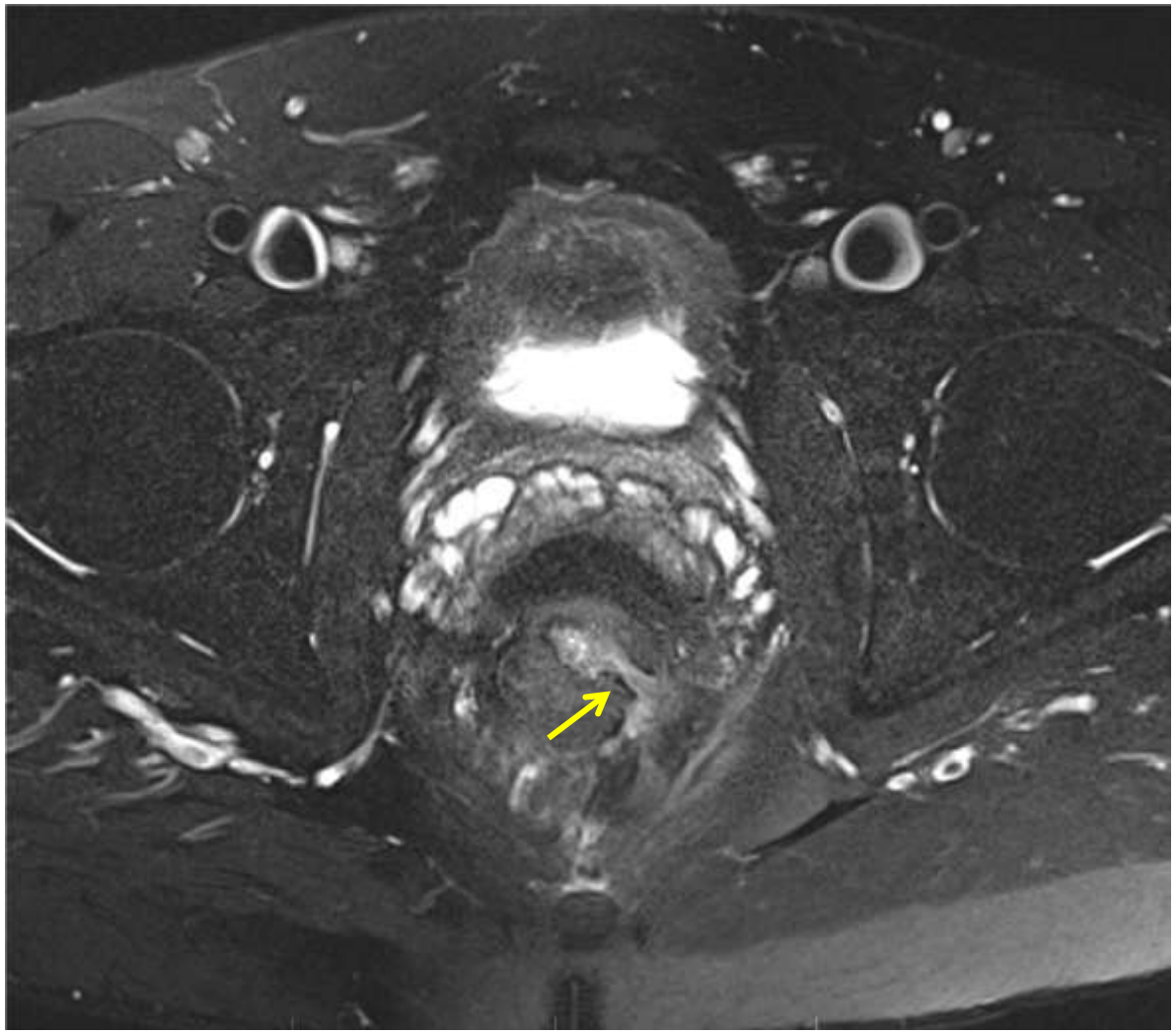
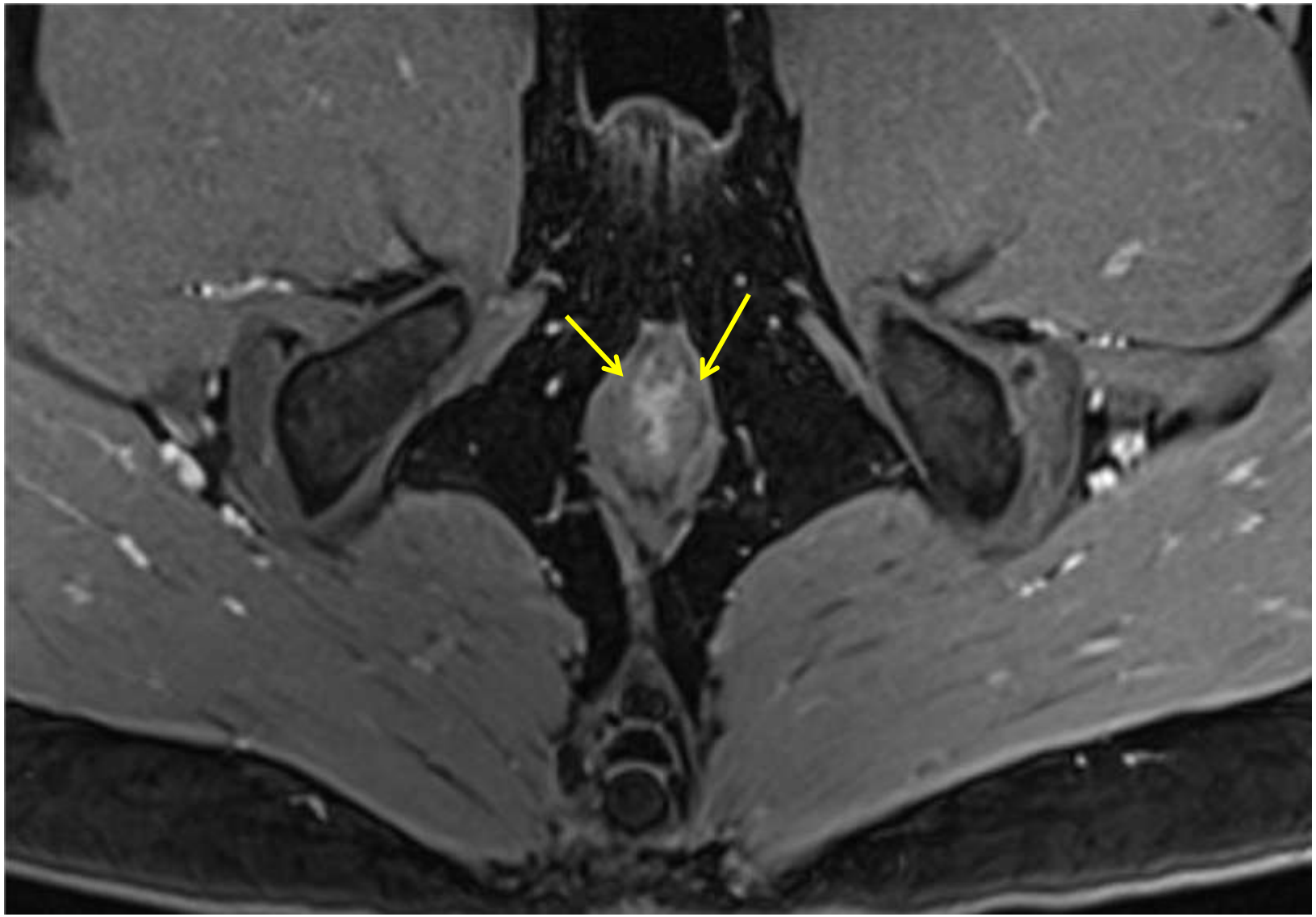
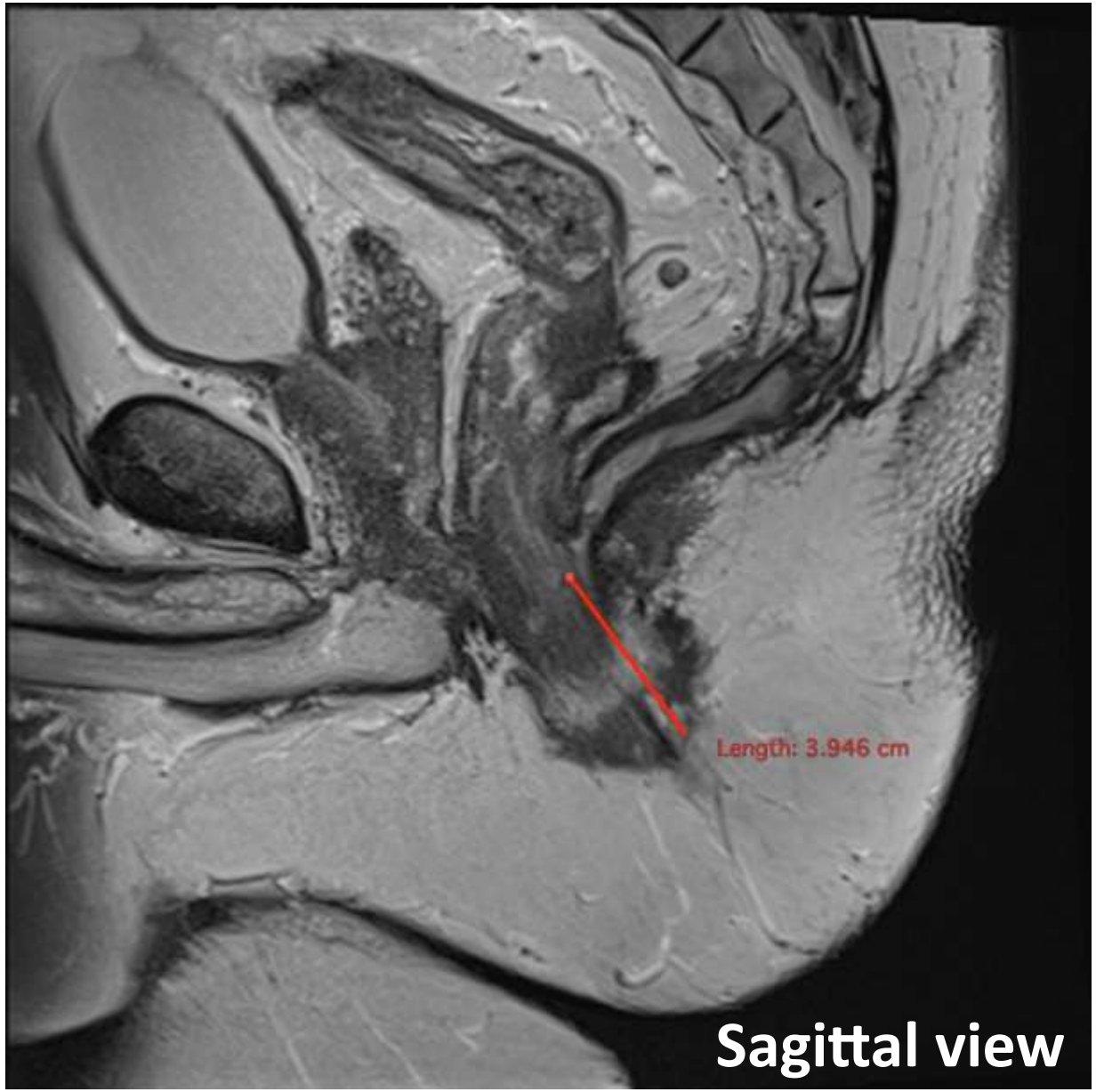


Internal opening

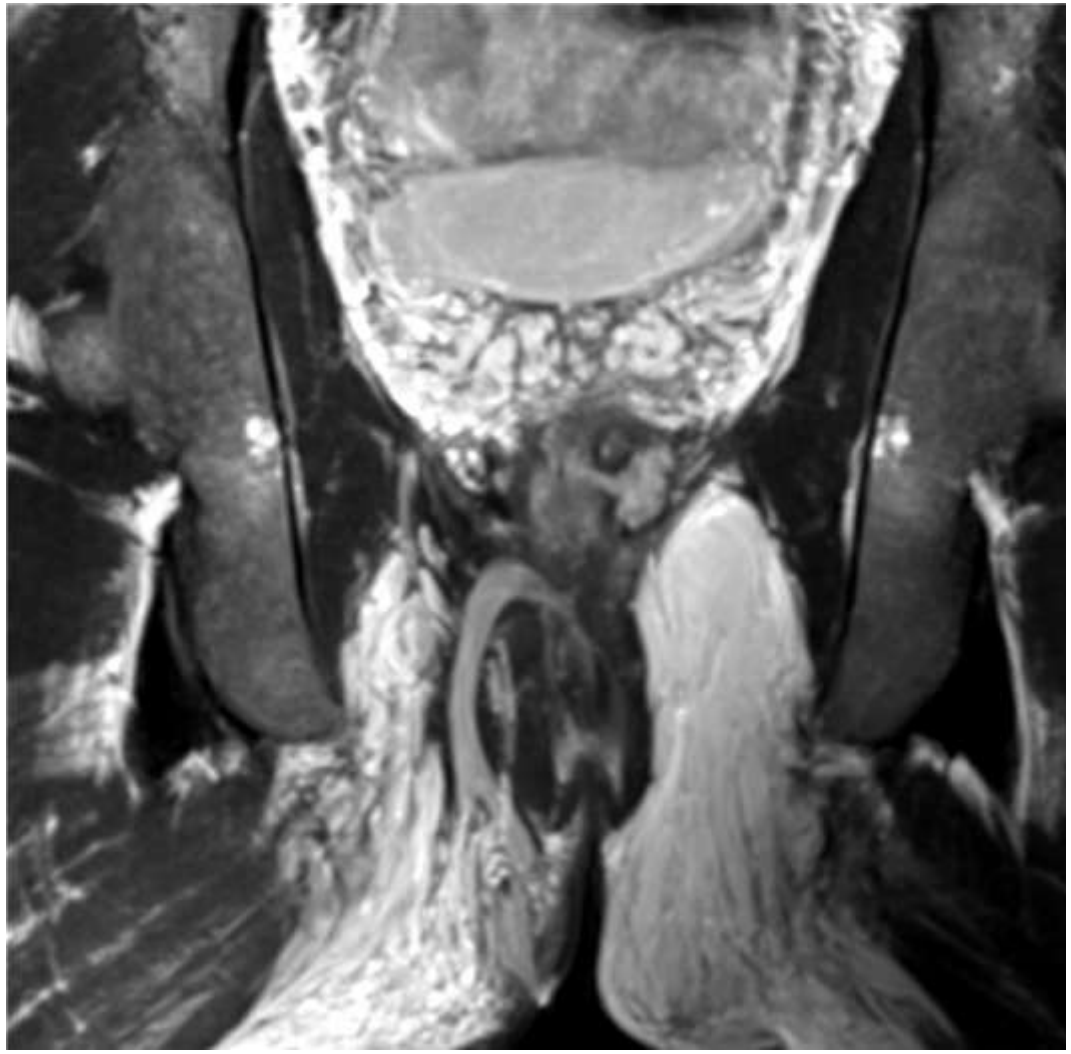


Internal opening: distance from anal merge

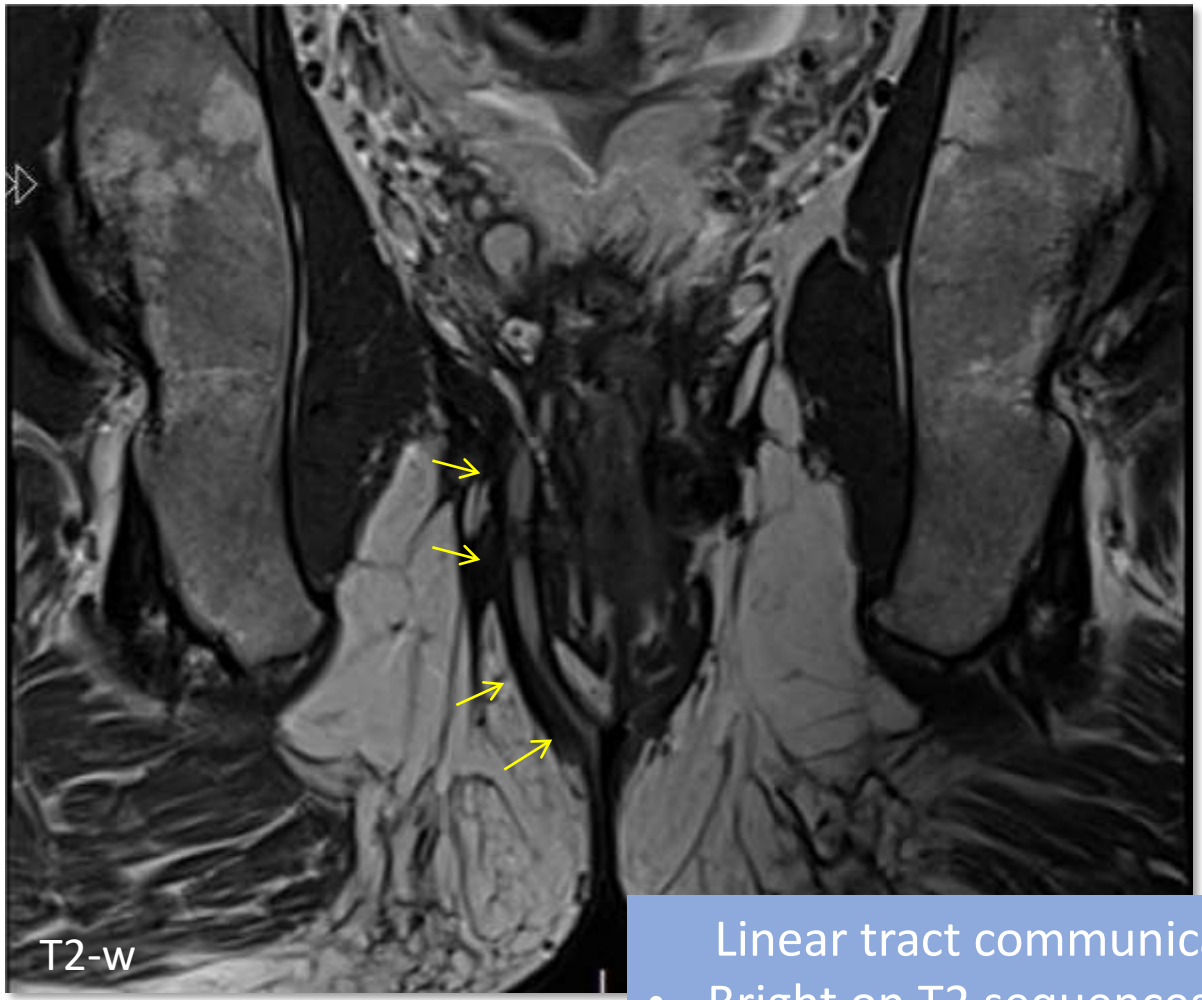

Length: 3.946 cm
Sagittal view

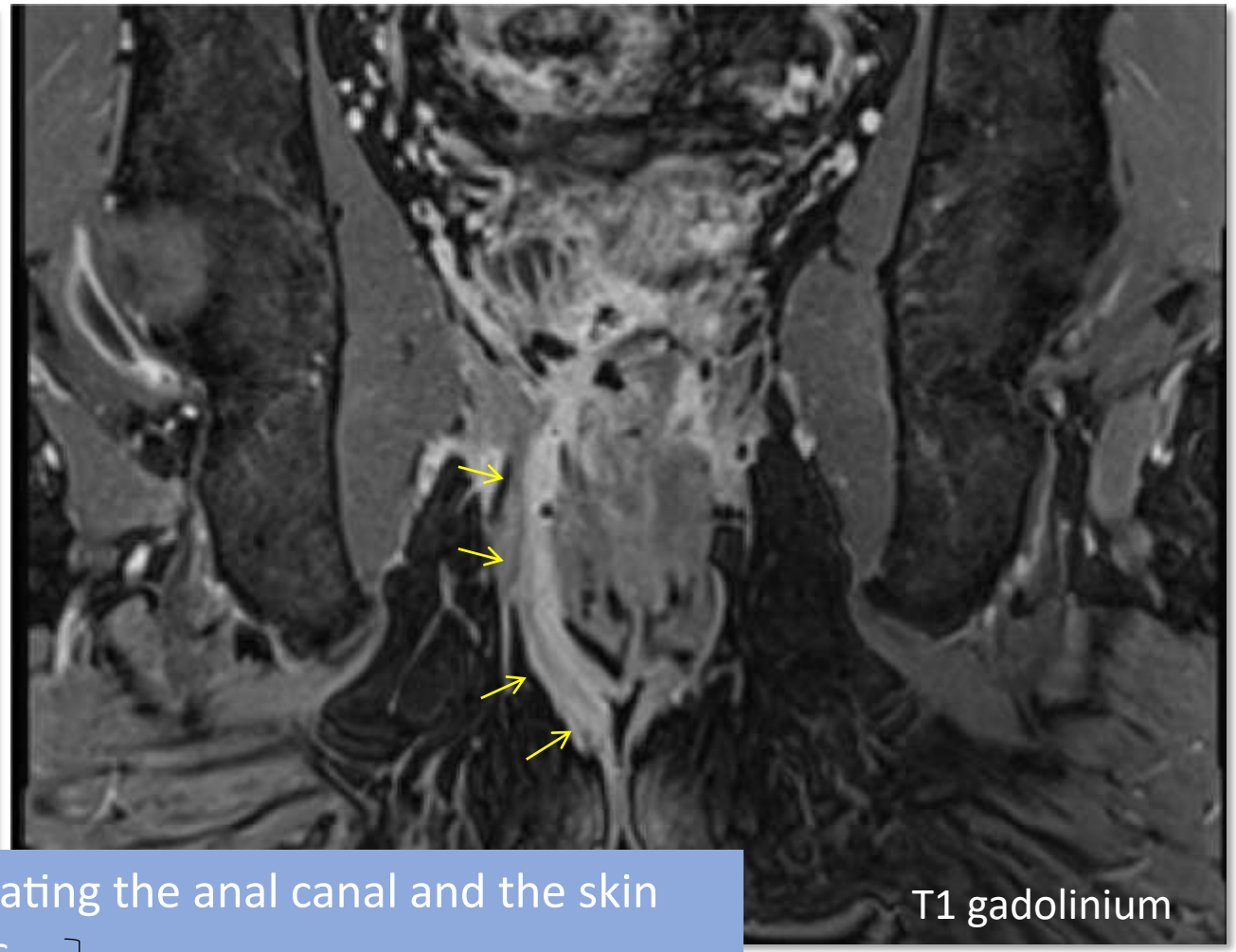
Main fistula tract

Main tract and sphincter



Primary fistula tract



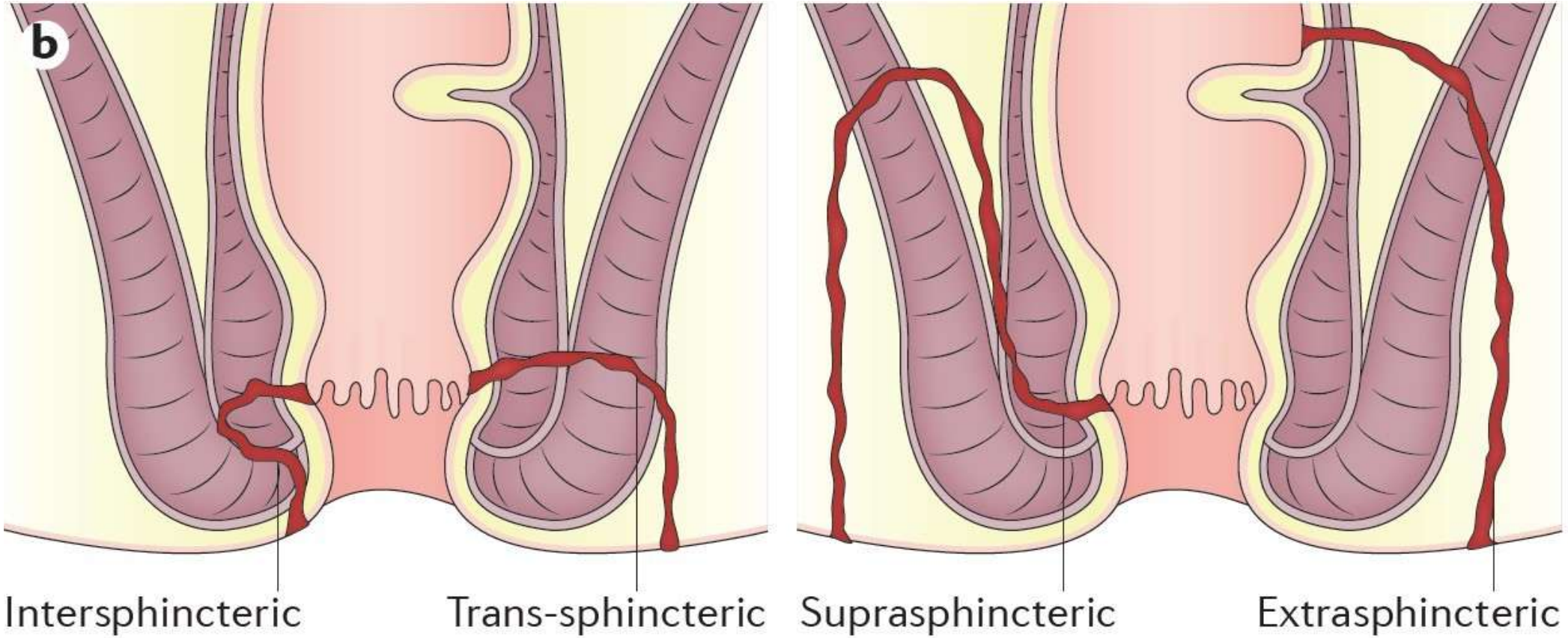


Linear tract communicating the anal canal and the skin

- Bright on T2 sequences
- Enhancing on T1-Gado

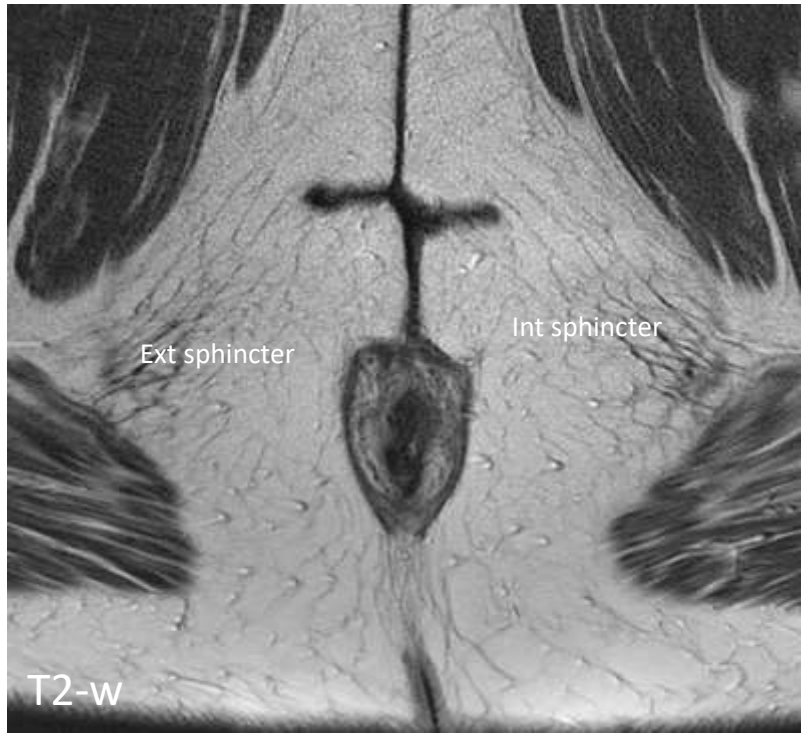
} Indicative of activity on MRI

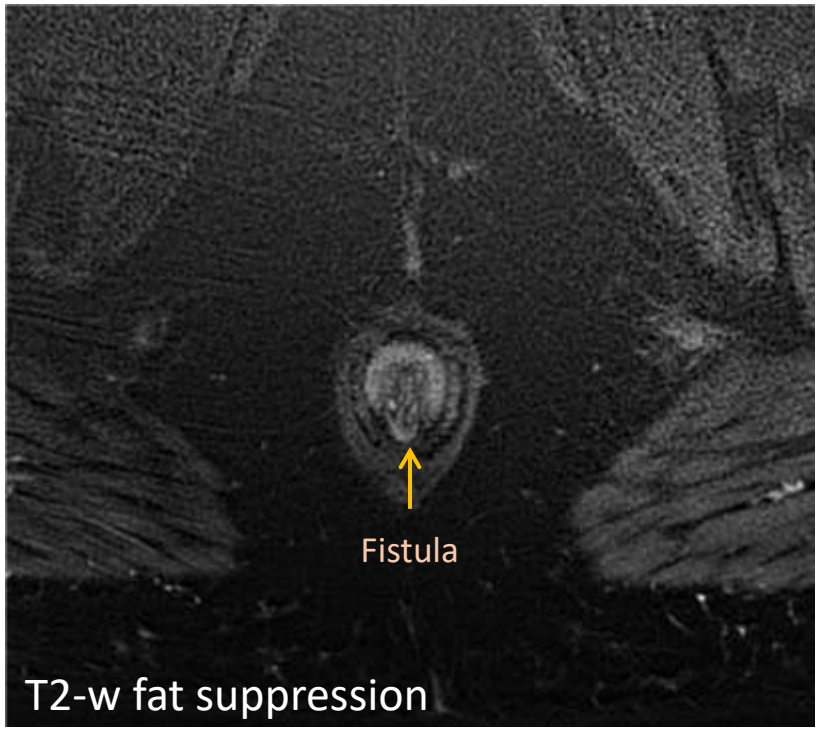
Anatomical classification - Parks

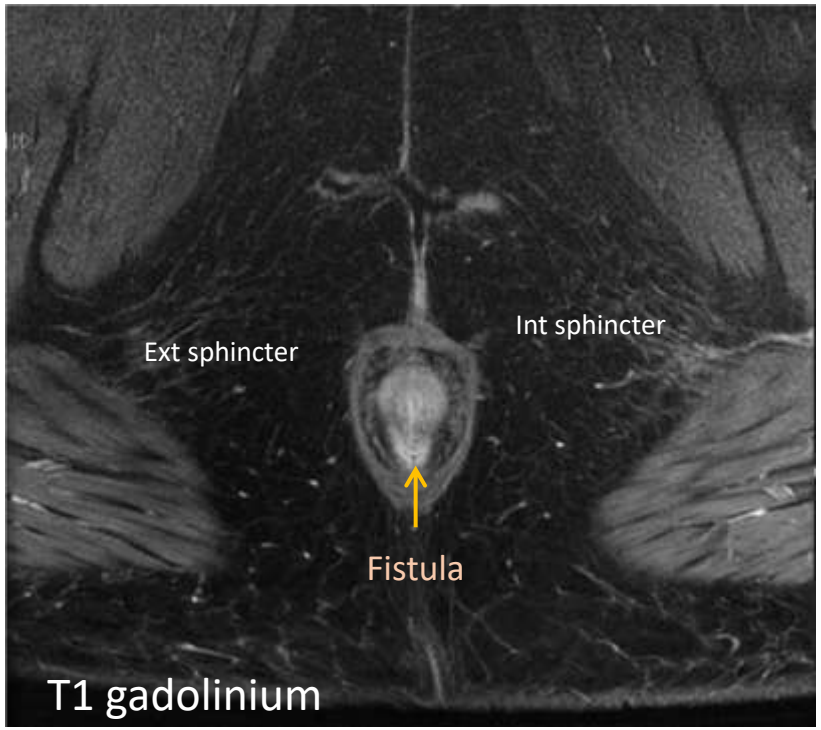


From: Panés J, Rimola J. Nat Rev Gastroenterol Hepatol. 2017

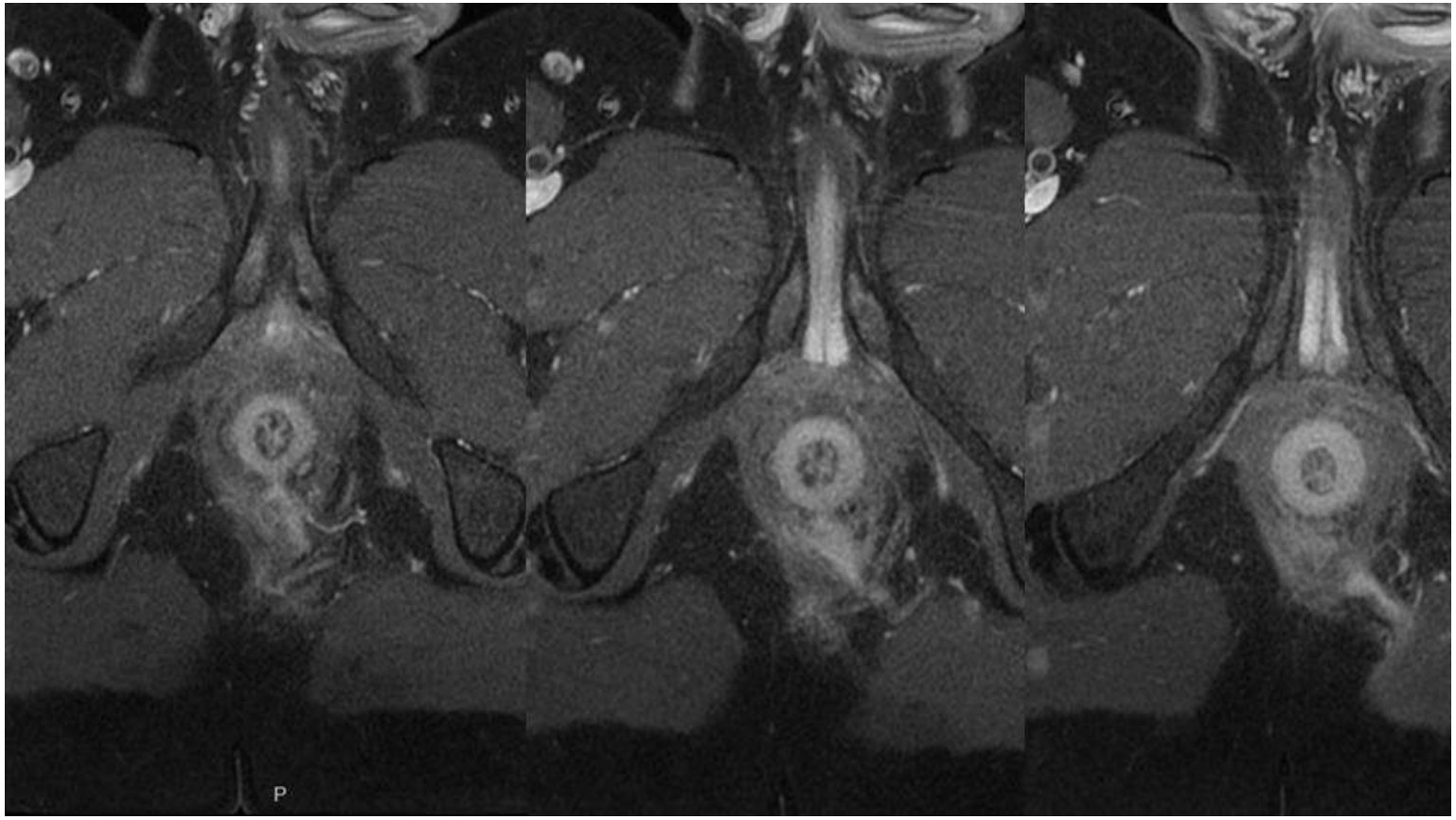
Intersphinteric

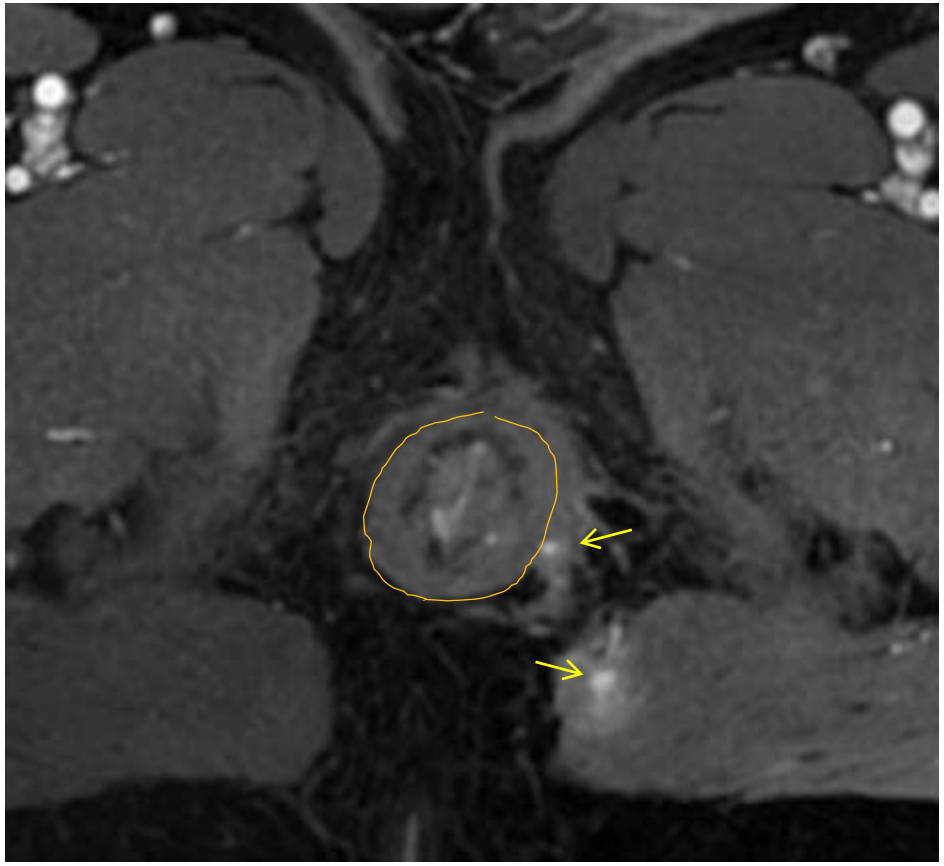




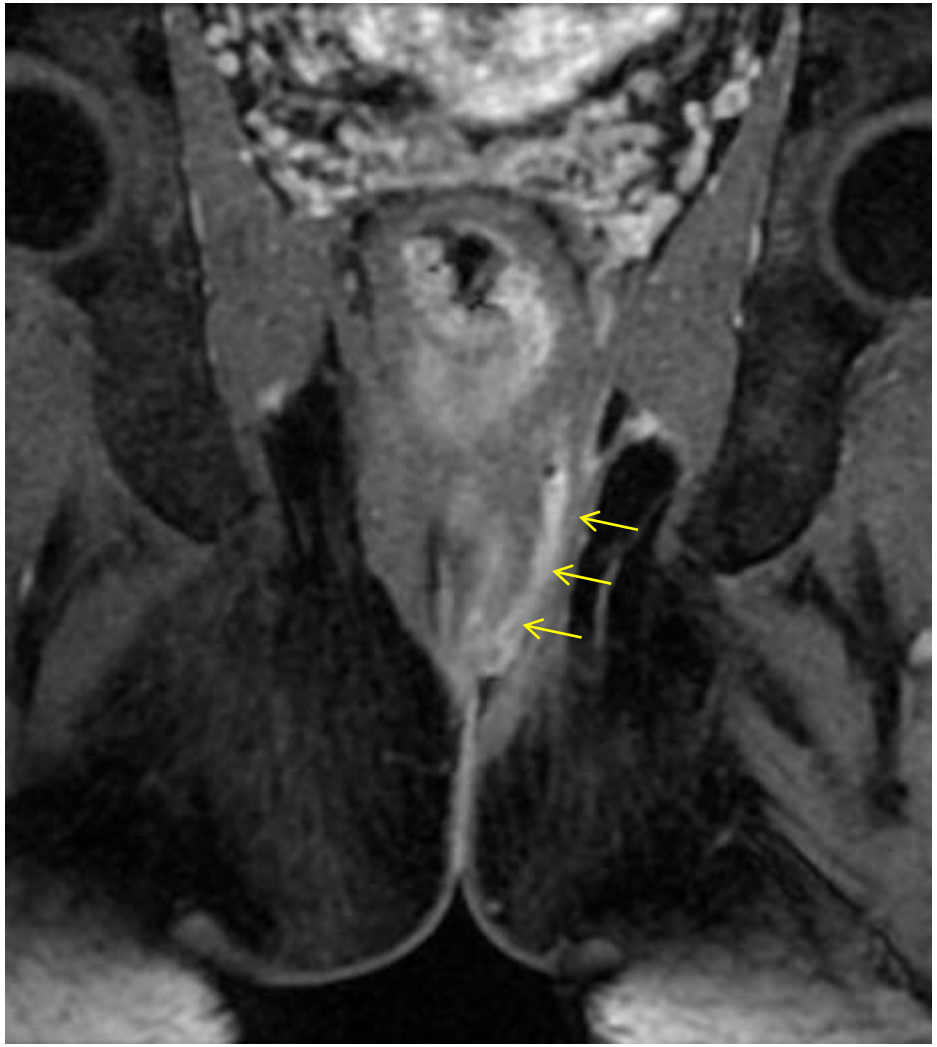


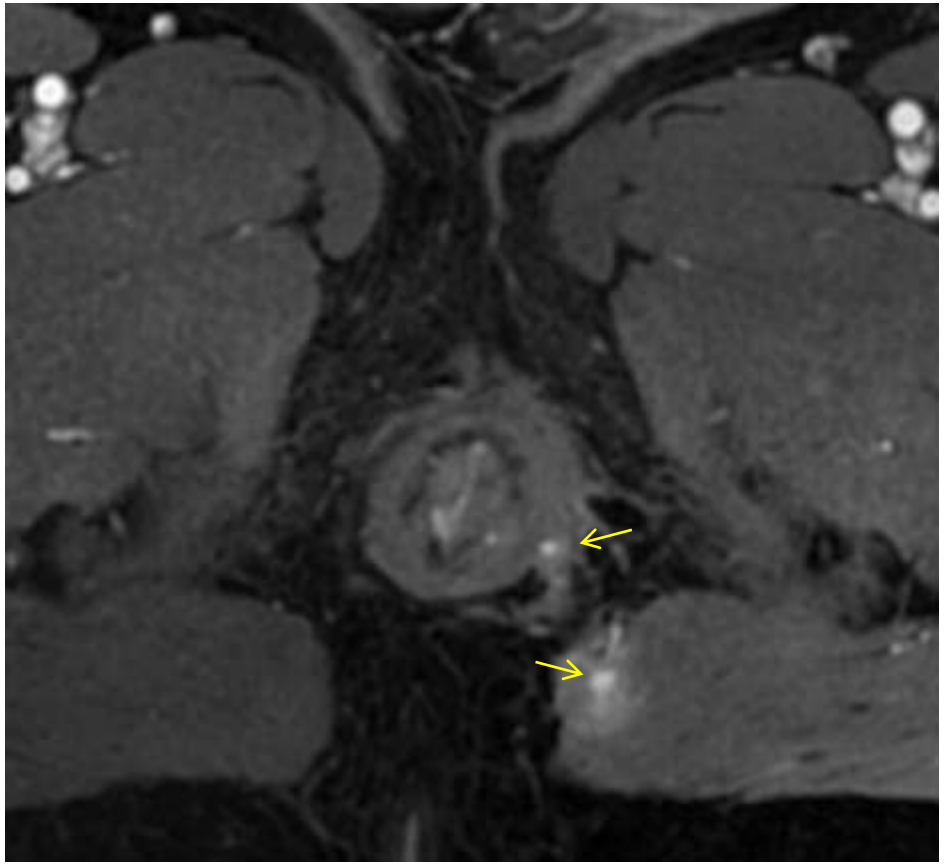
Transphincteric



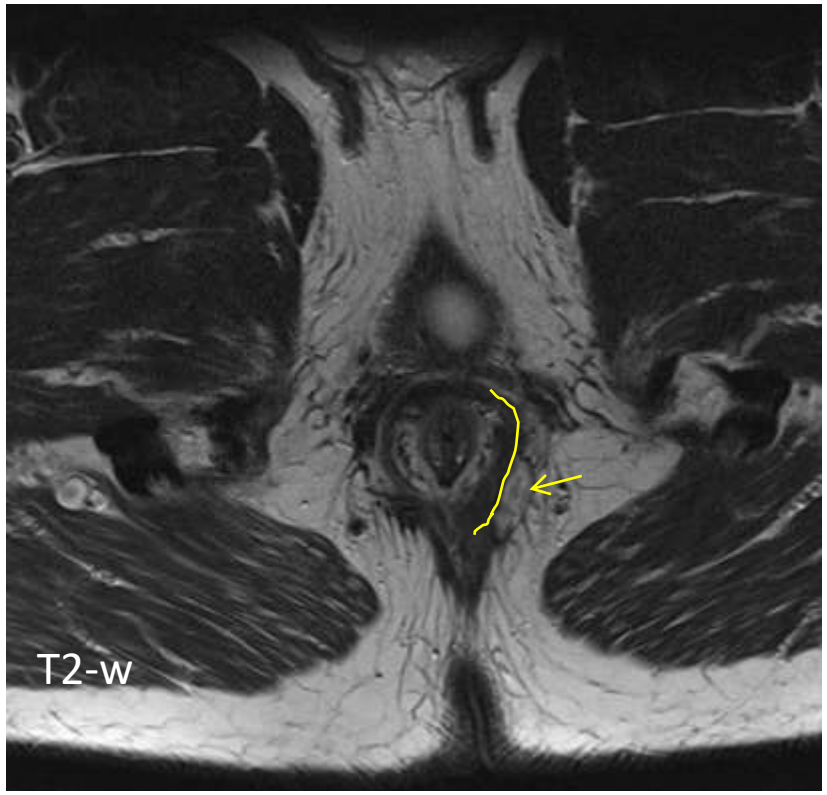


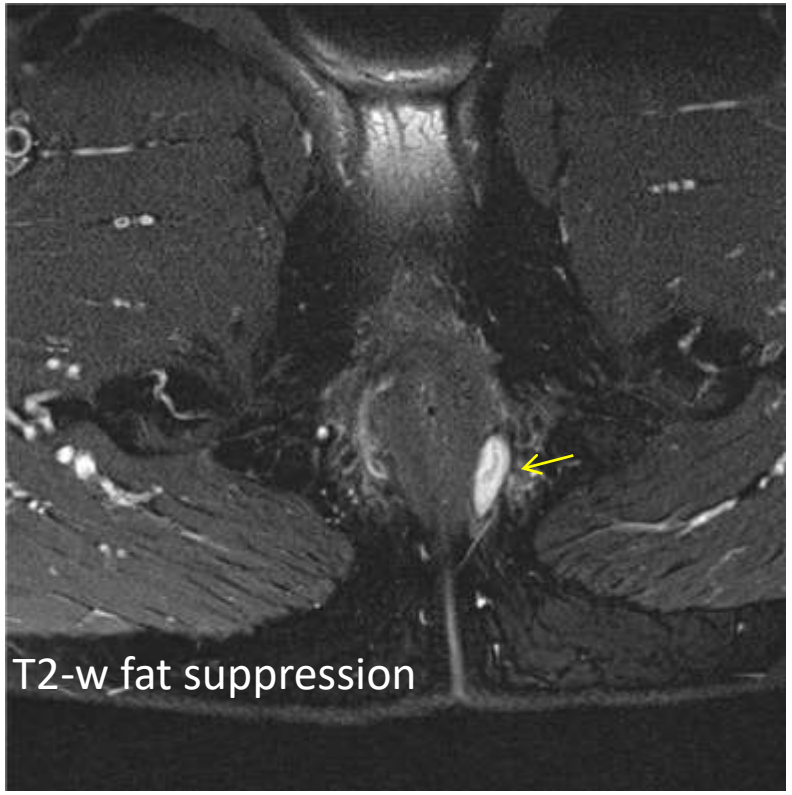
Transphincteric

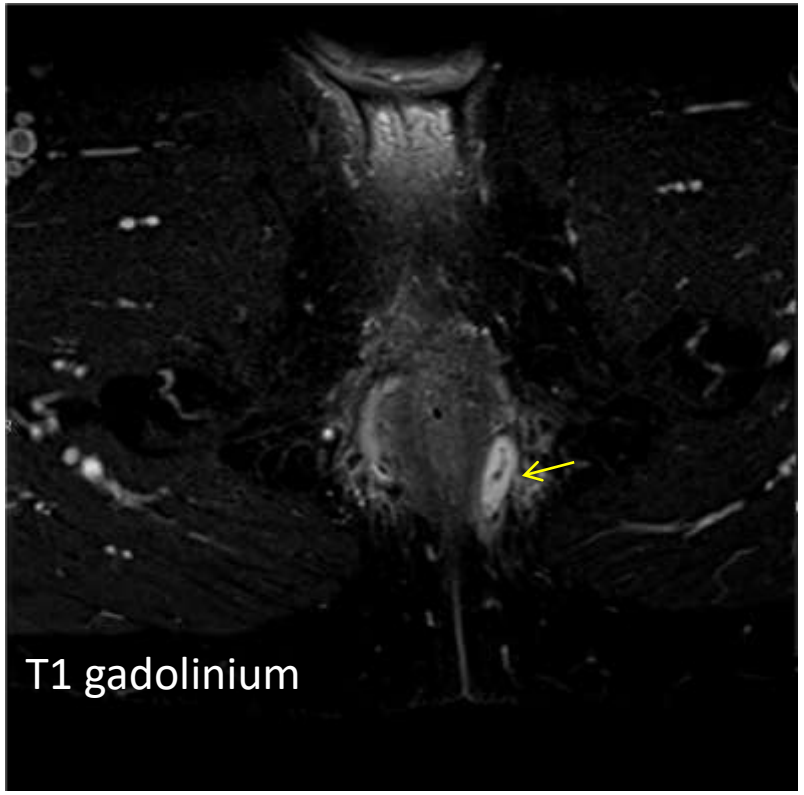




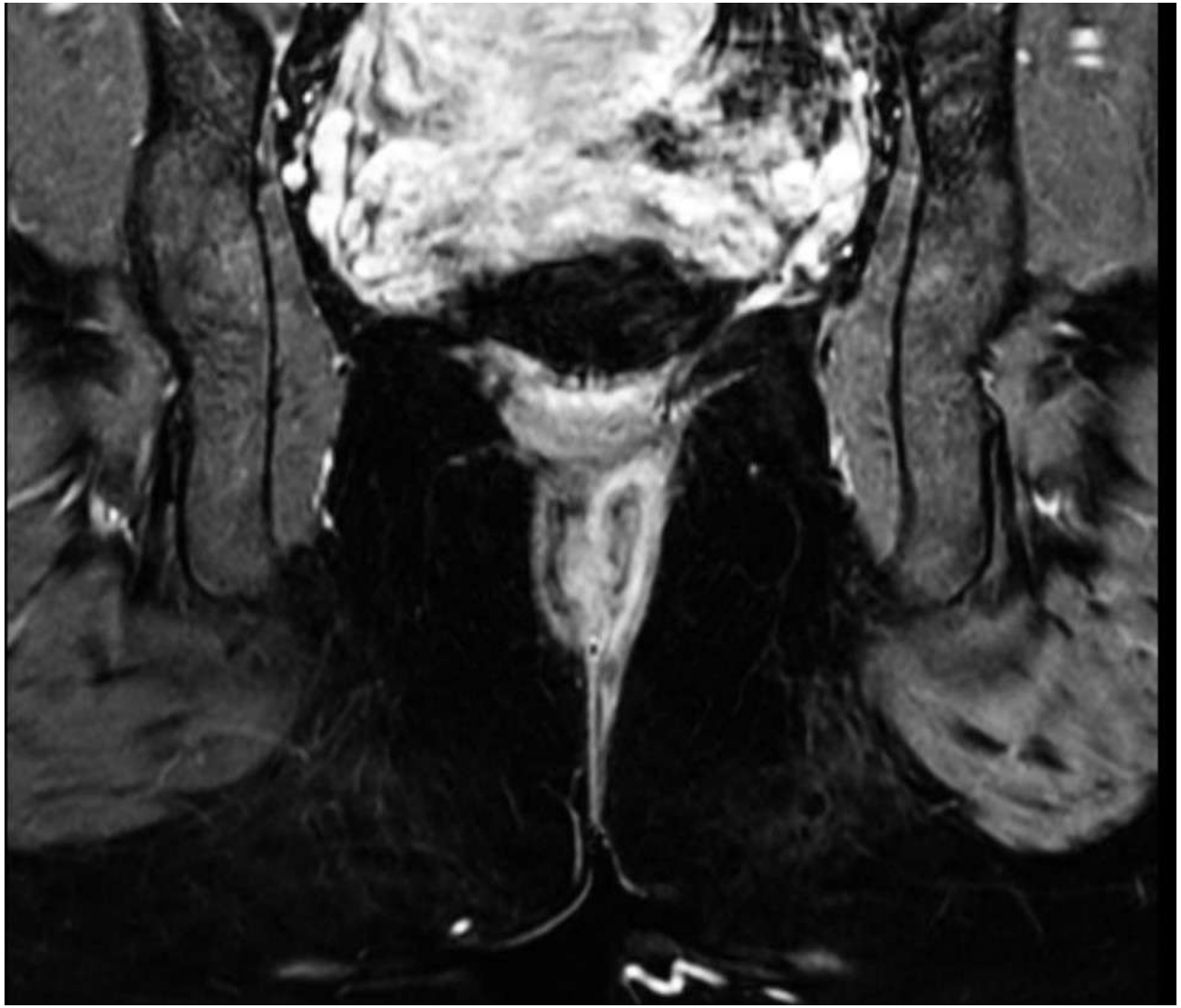
Transphincteric





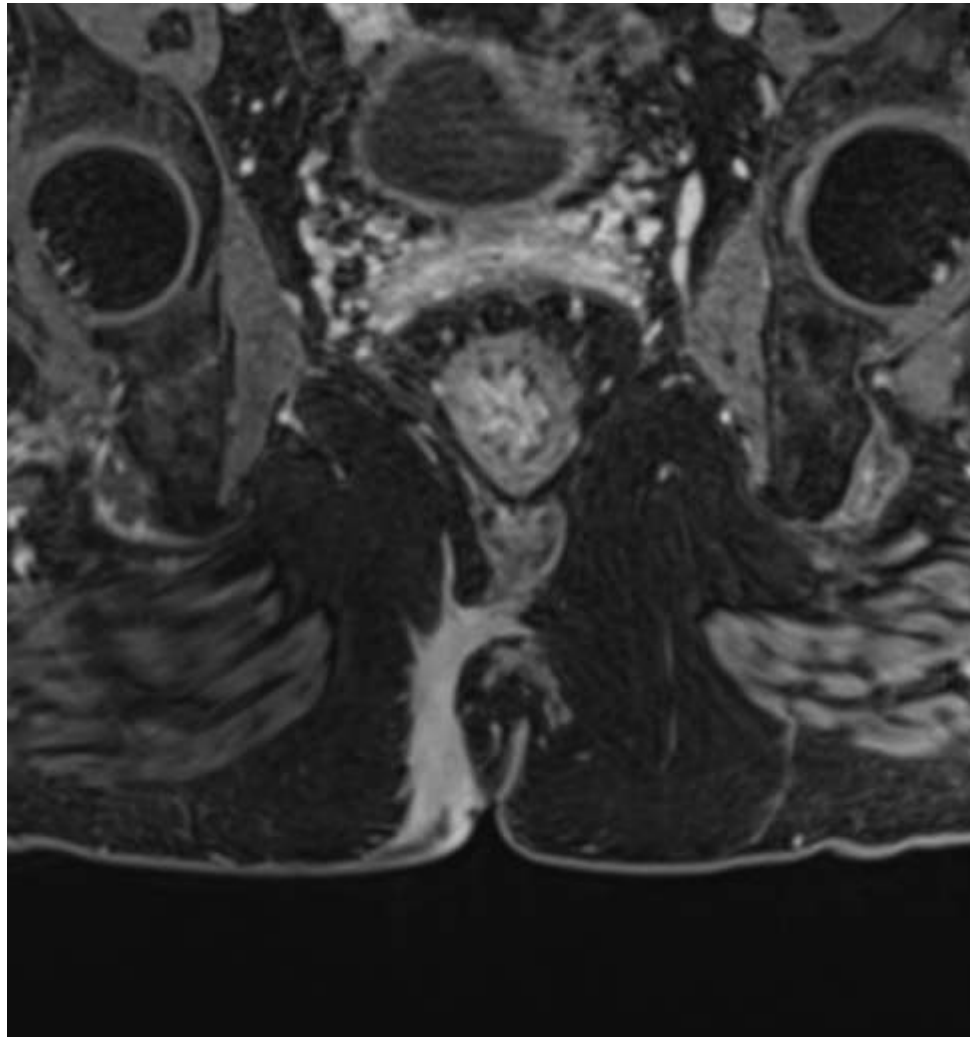


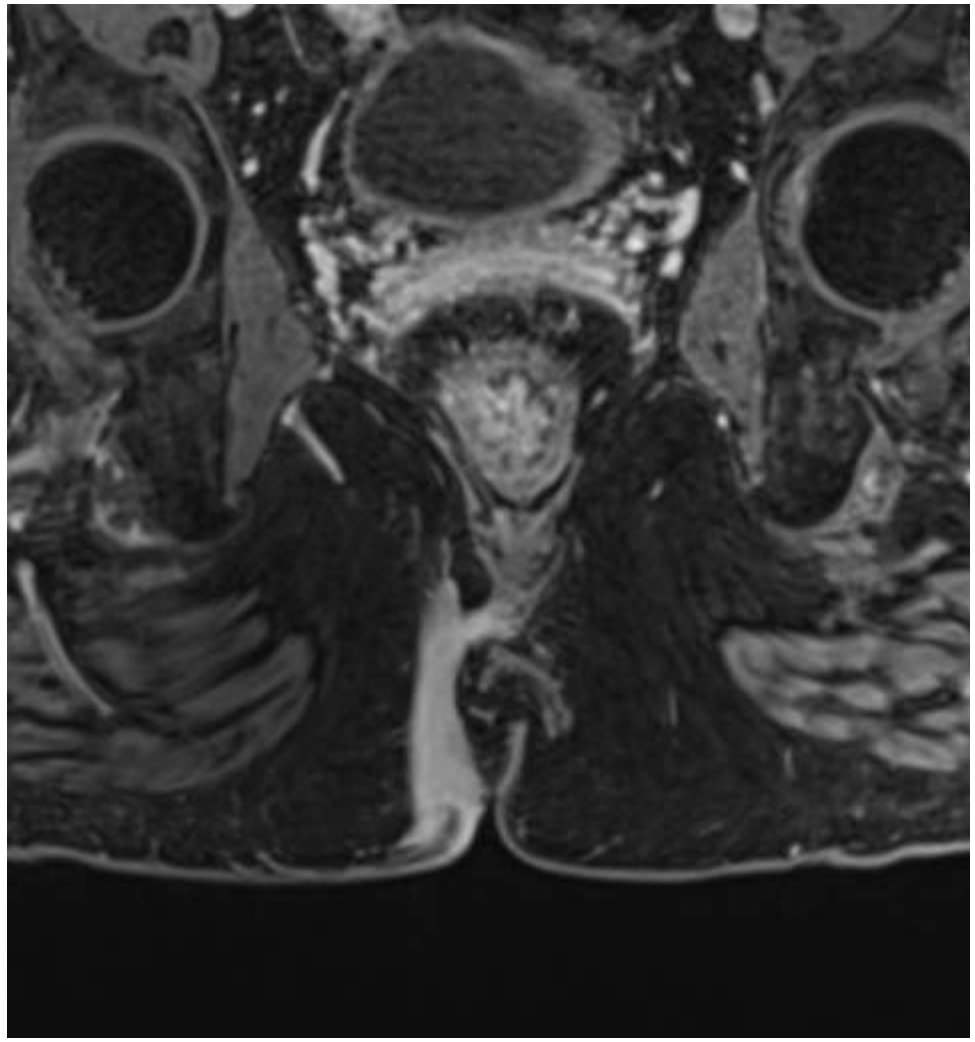
Supraspinteric

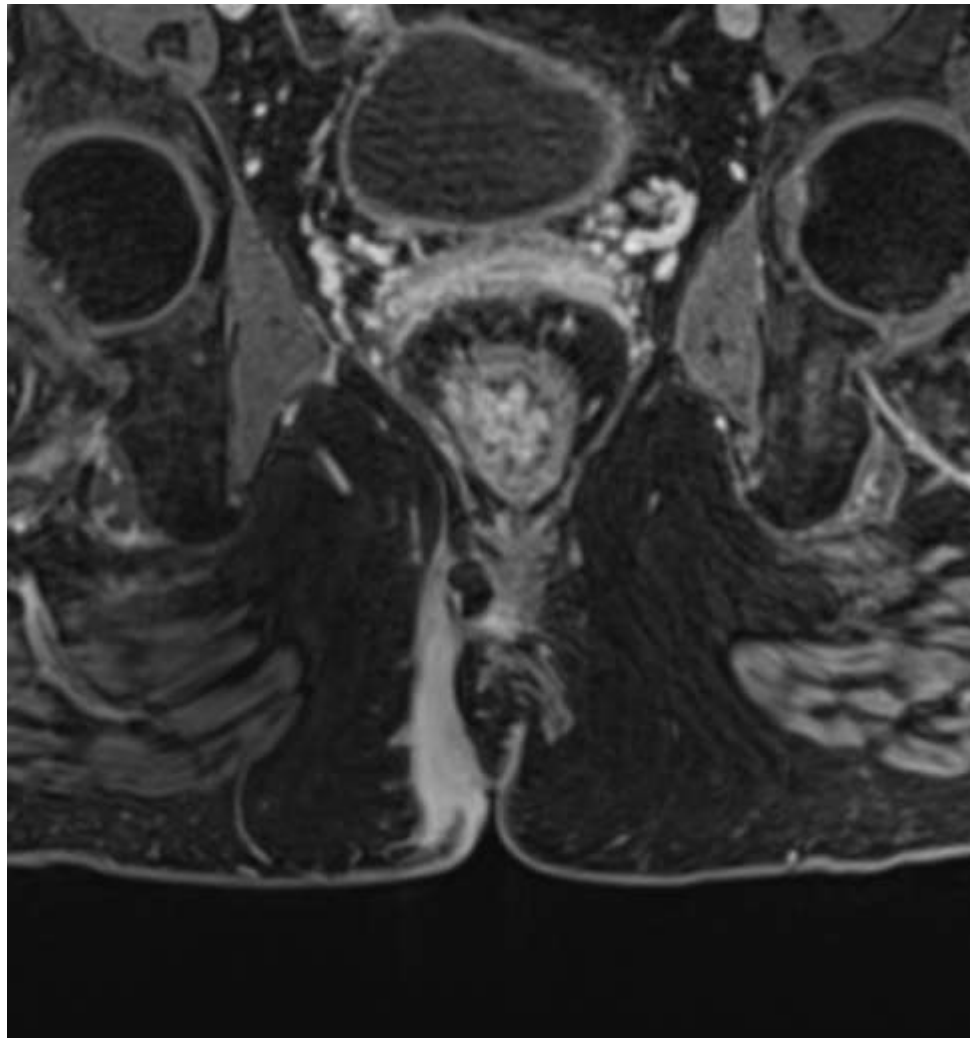


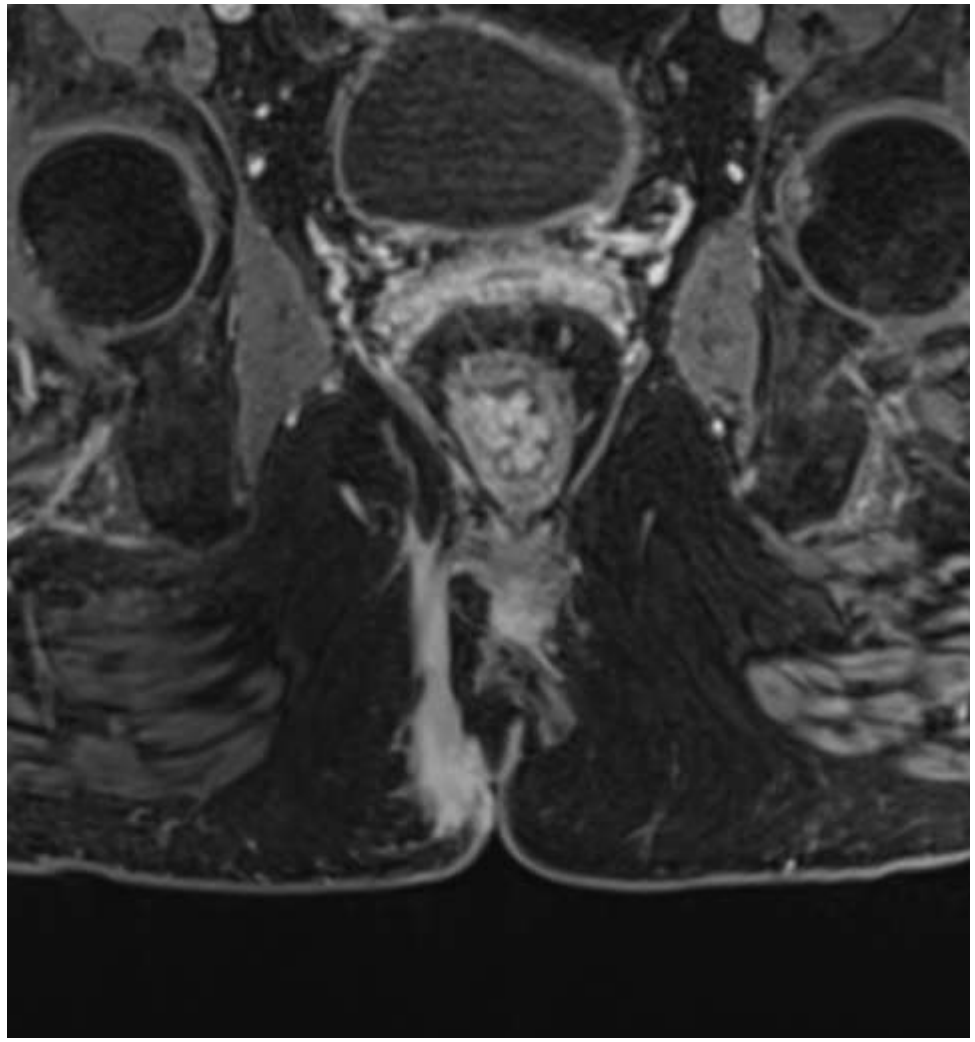
Extensions

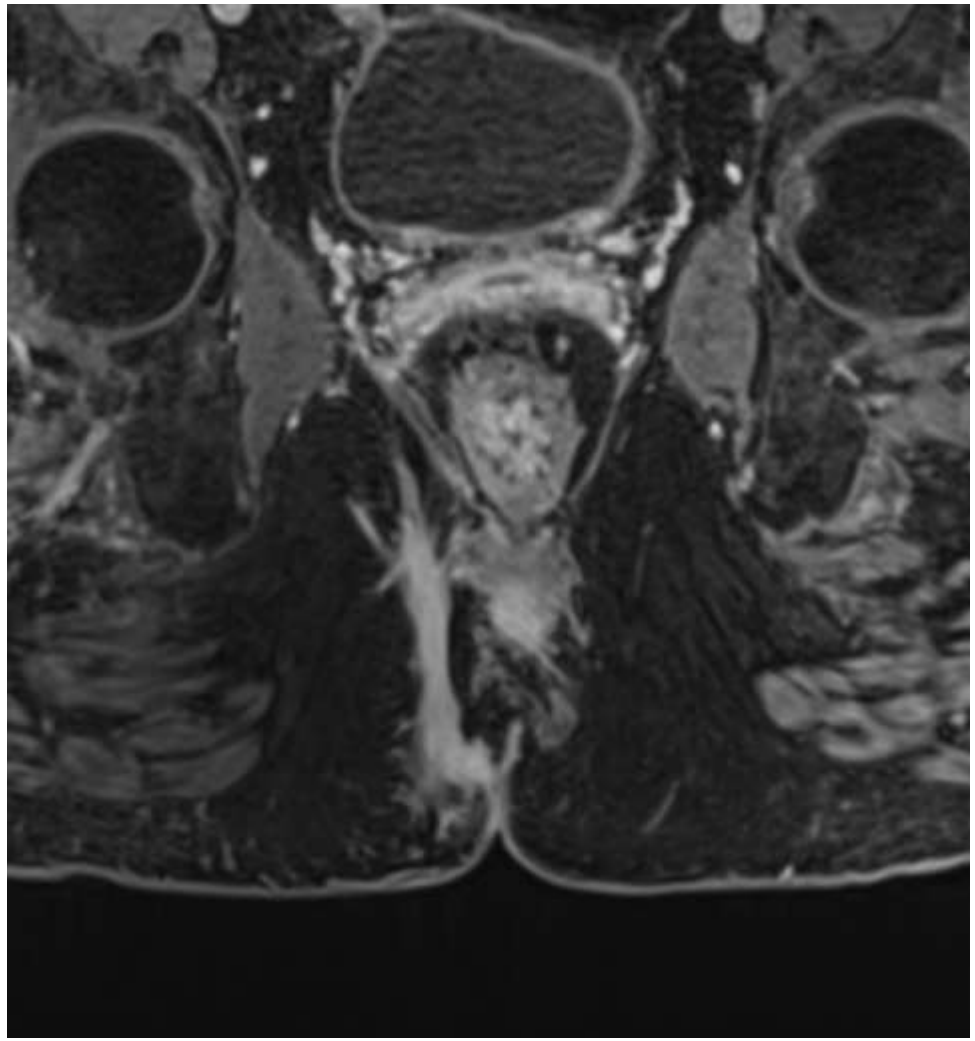
Complex fistulas - Extensions

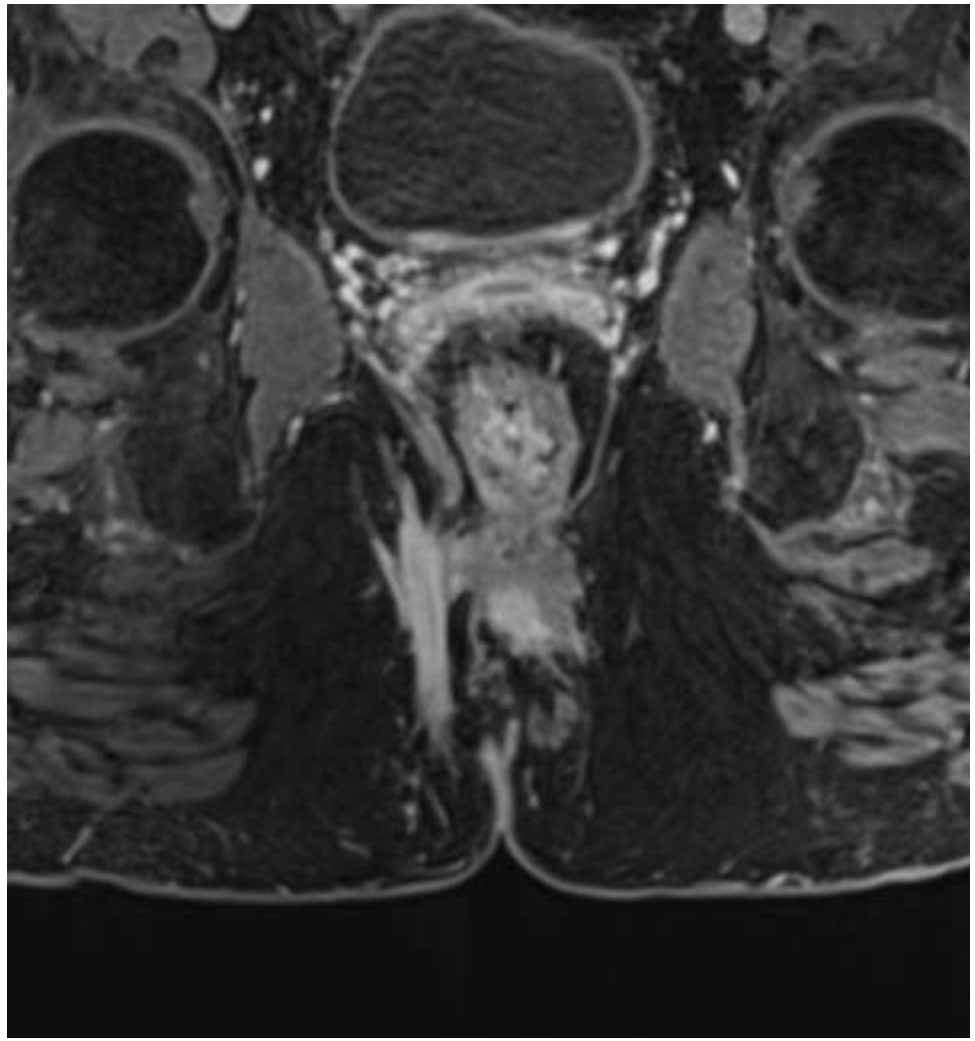




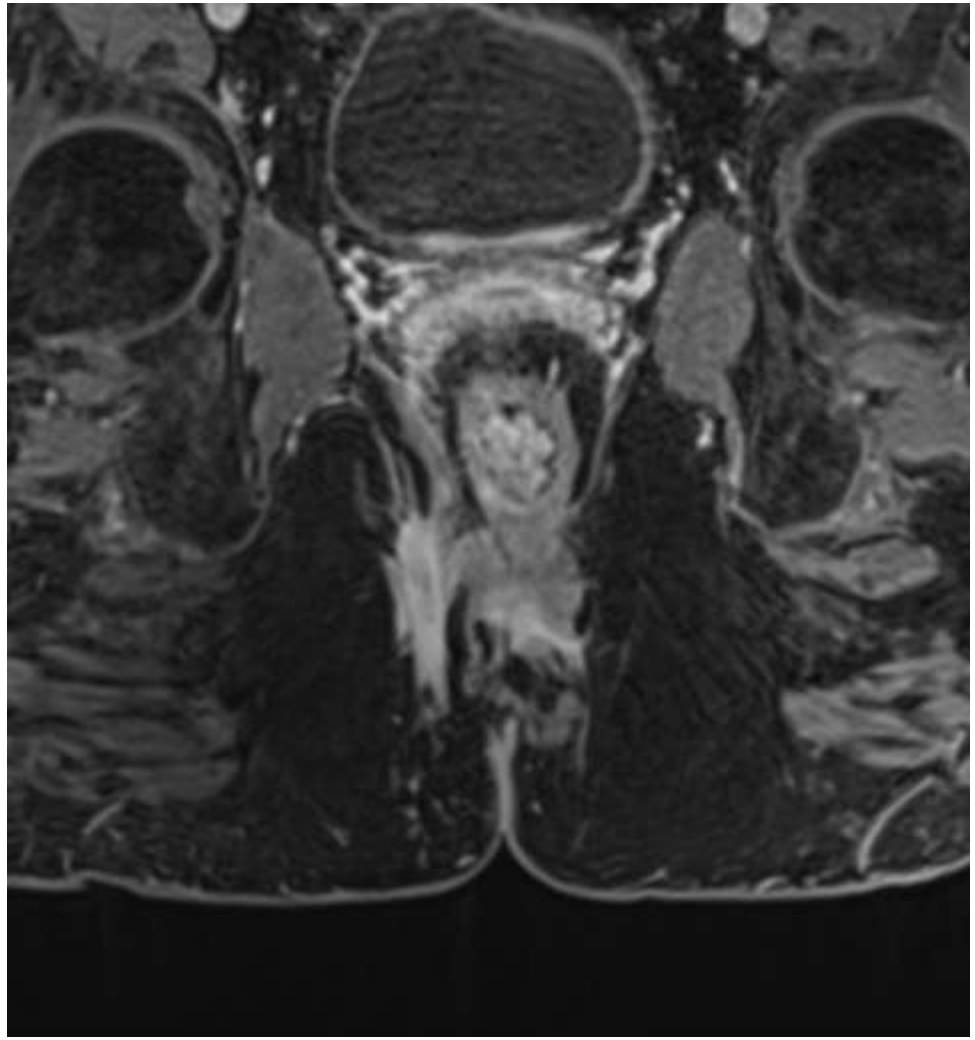




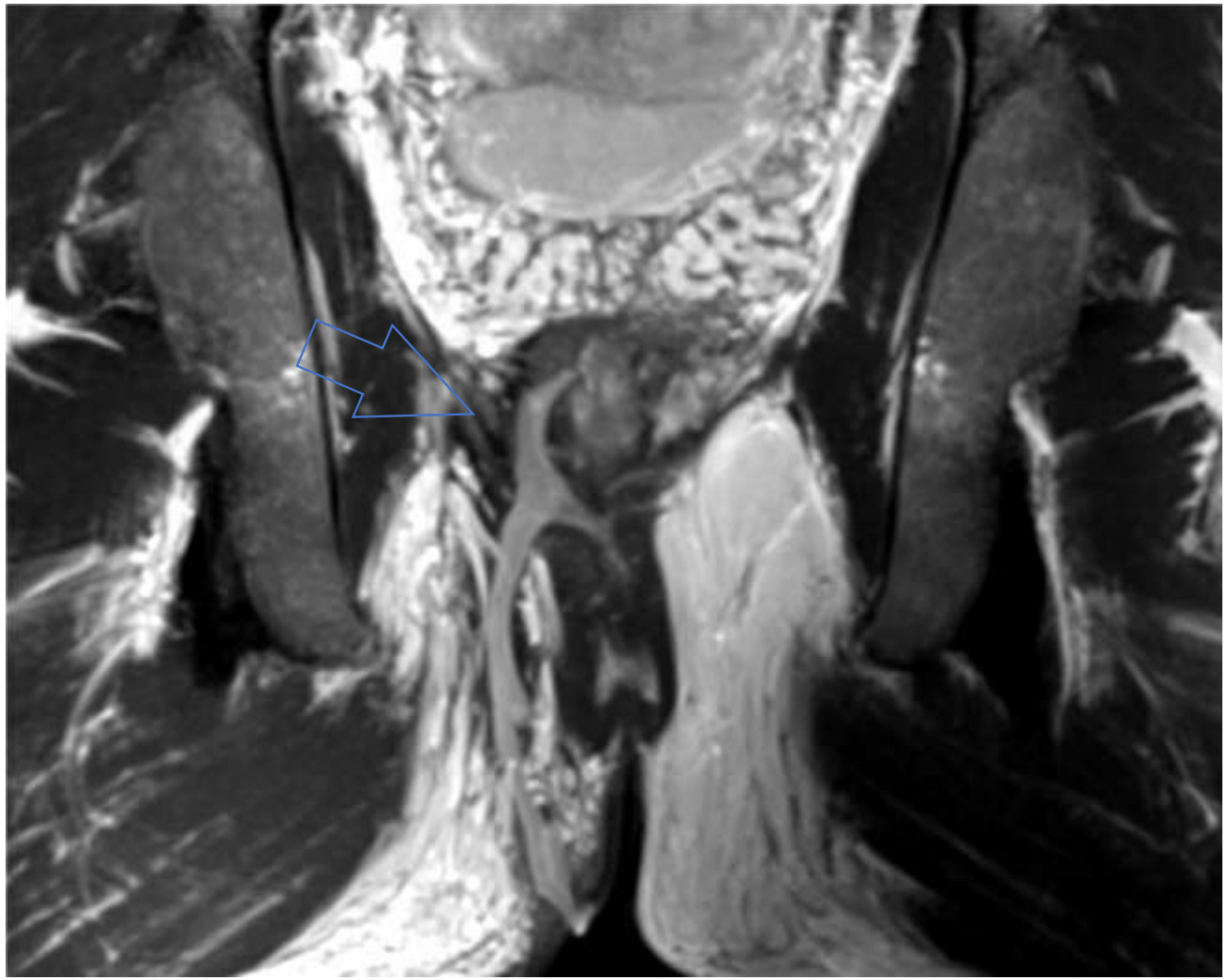




Infralevatoric

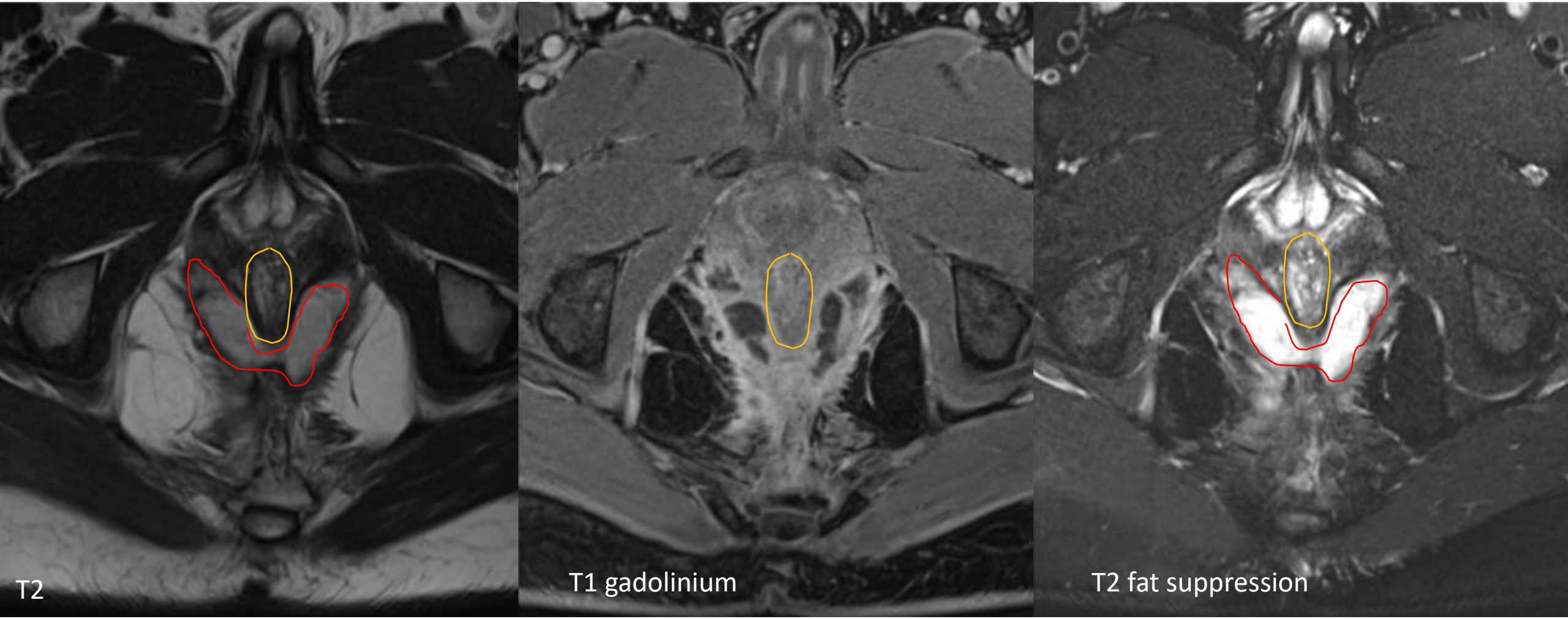


Extension - supralevatoric

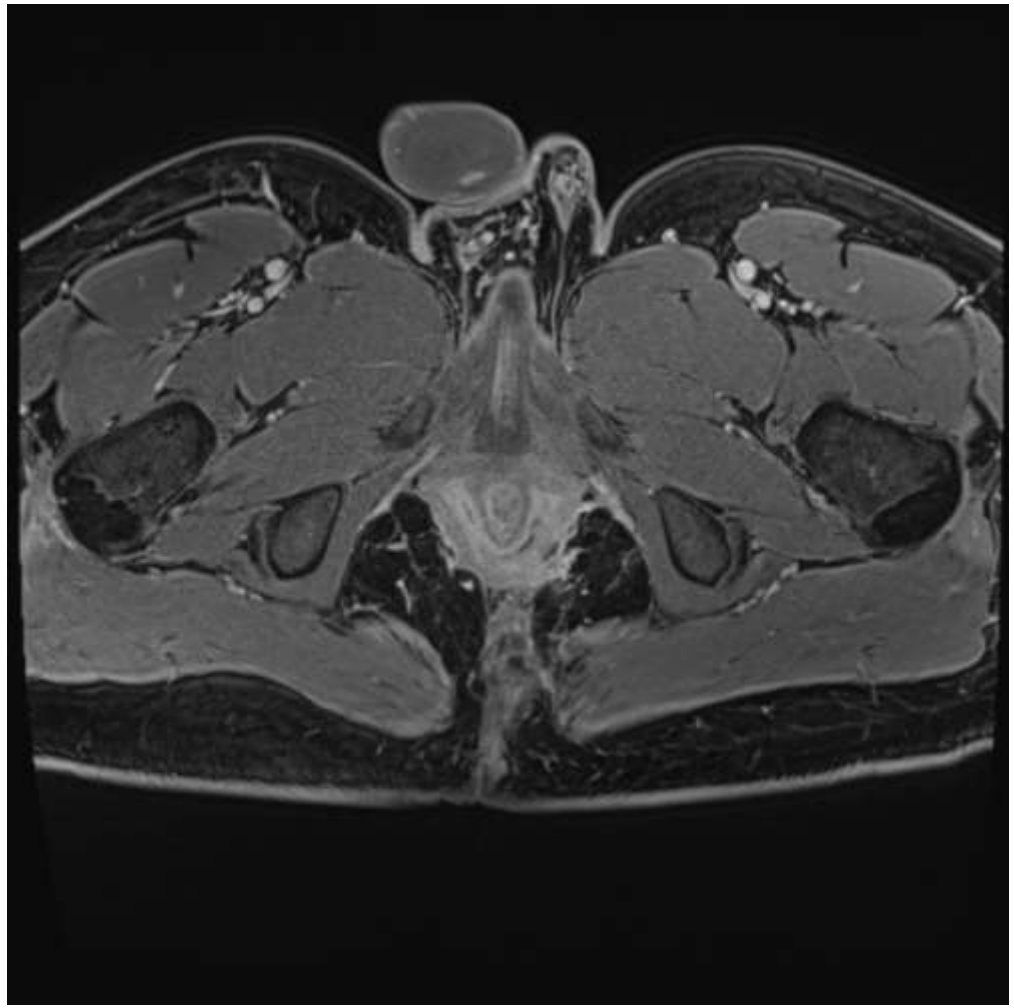


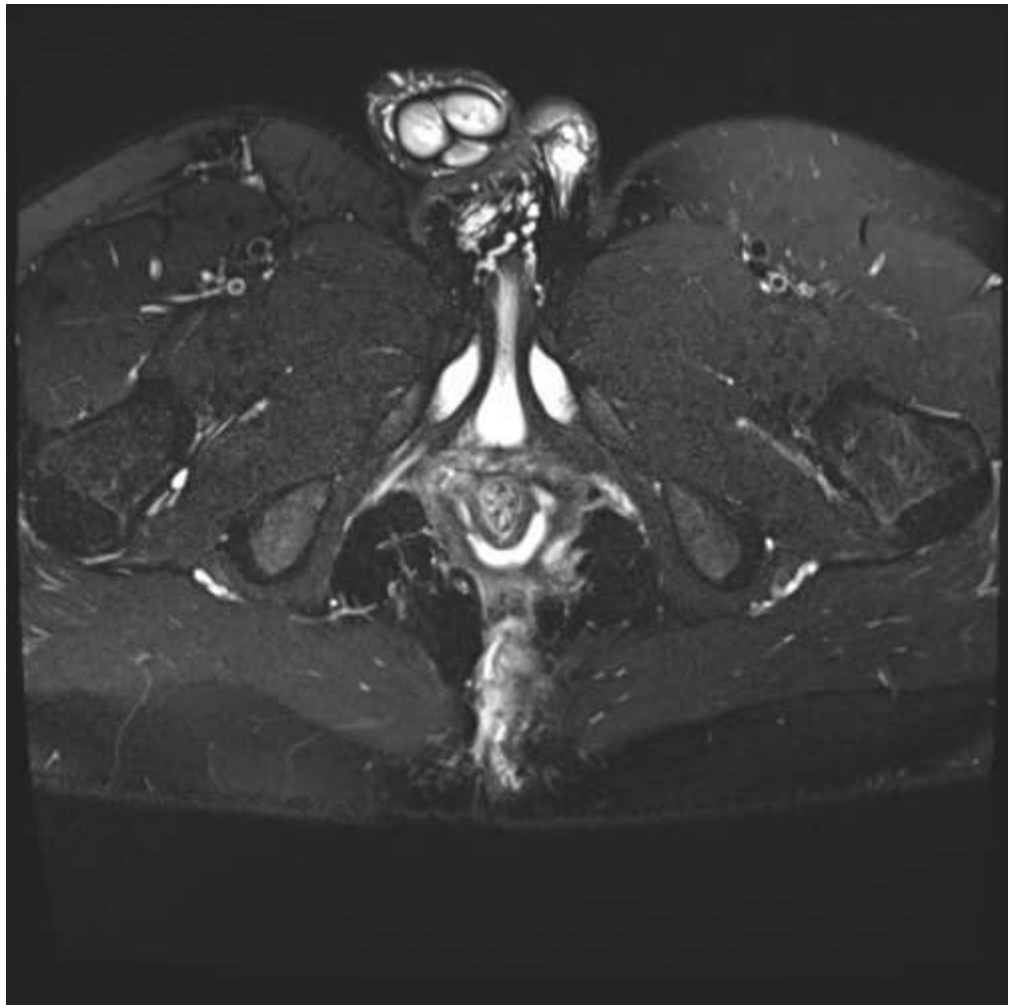
Horseshoe

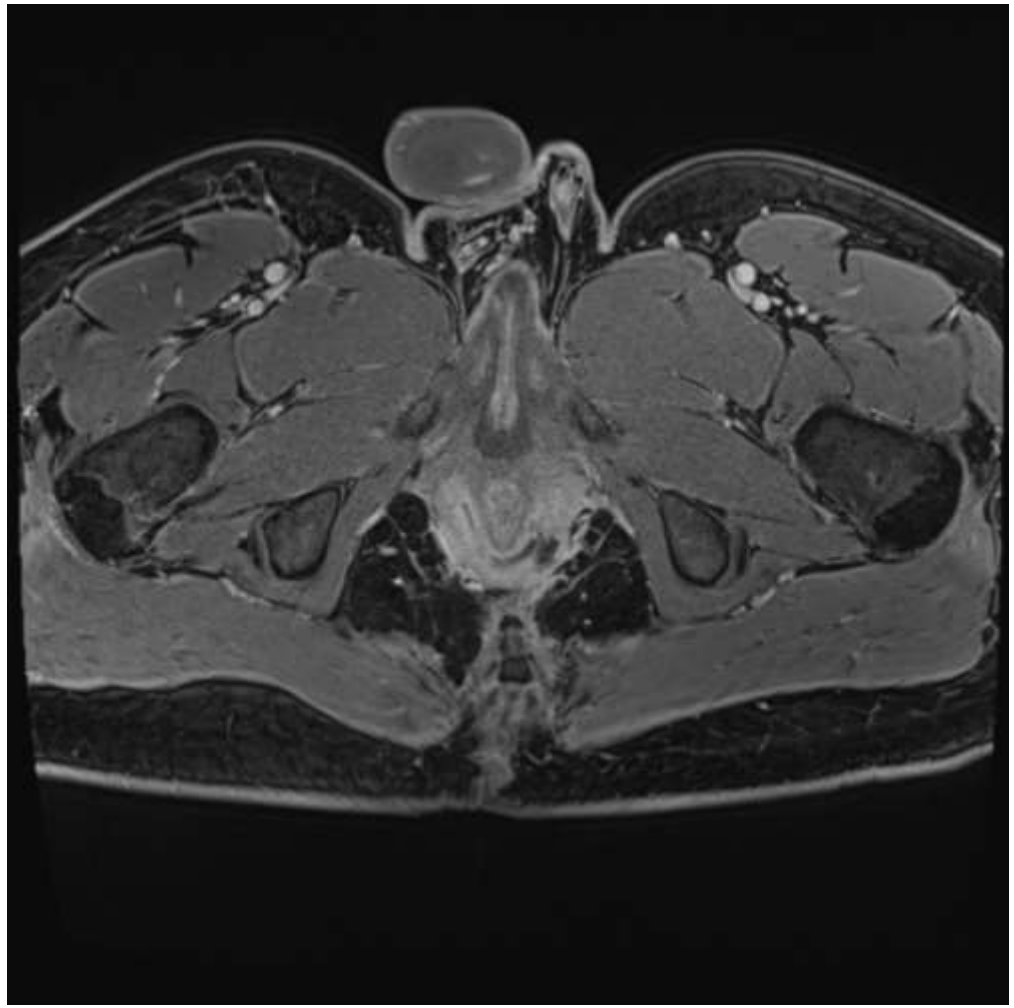
Both sides of the internal opening

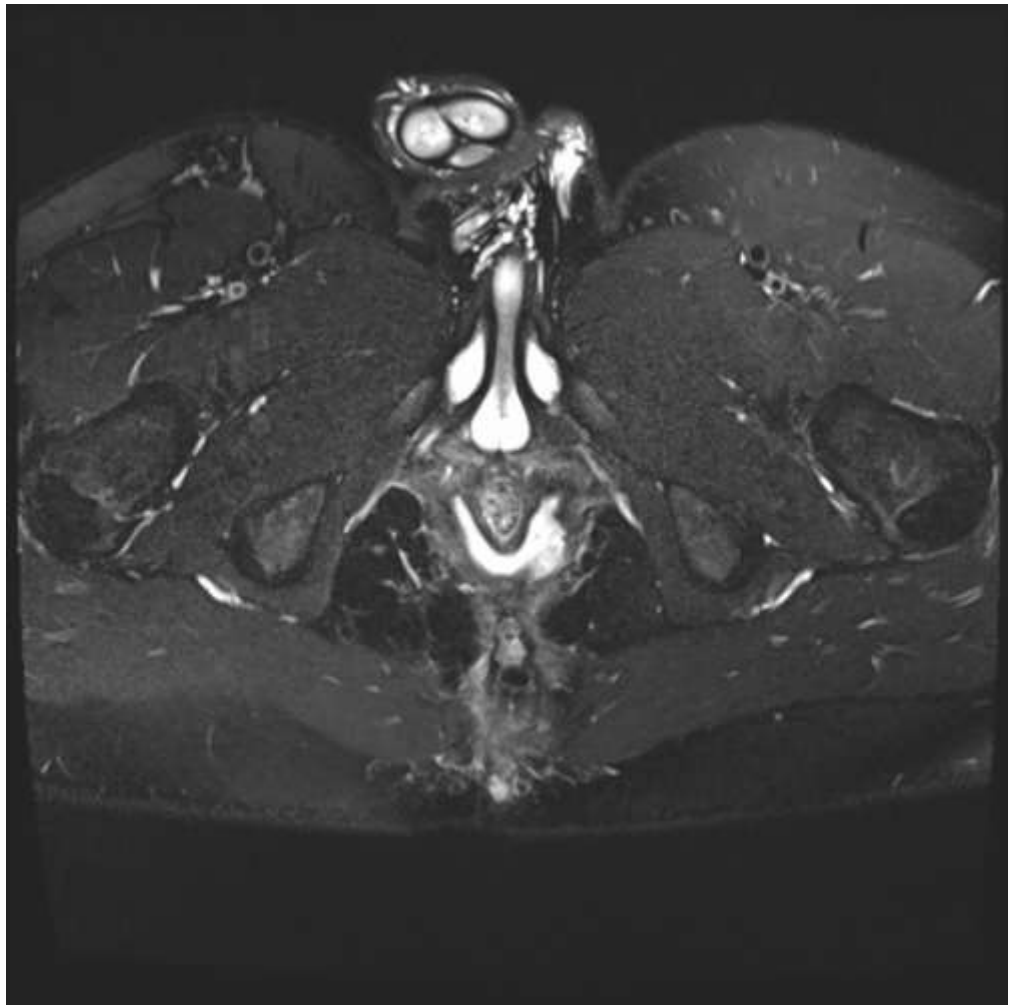


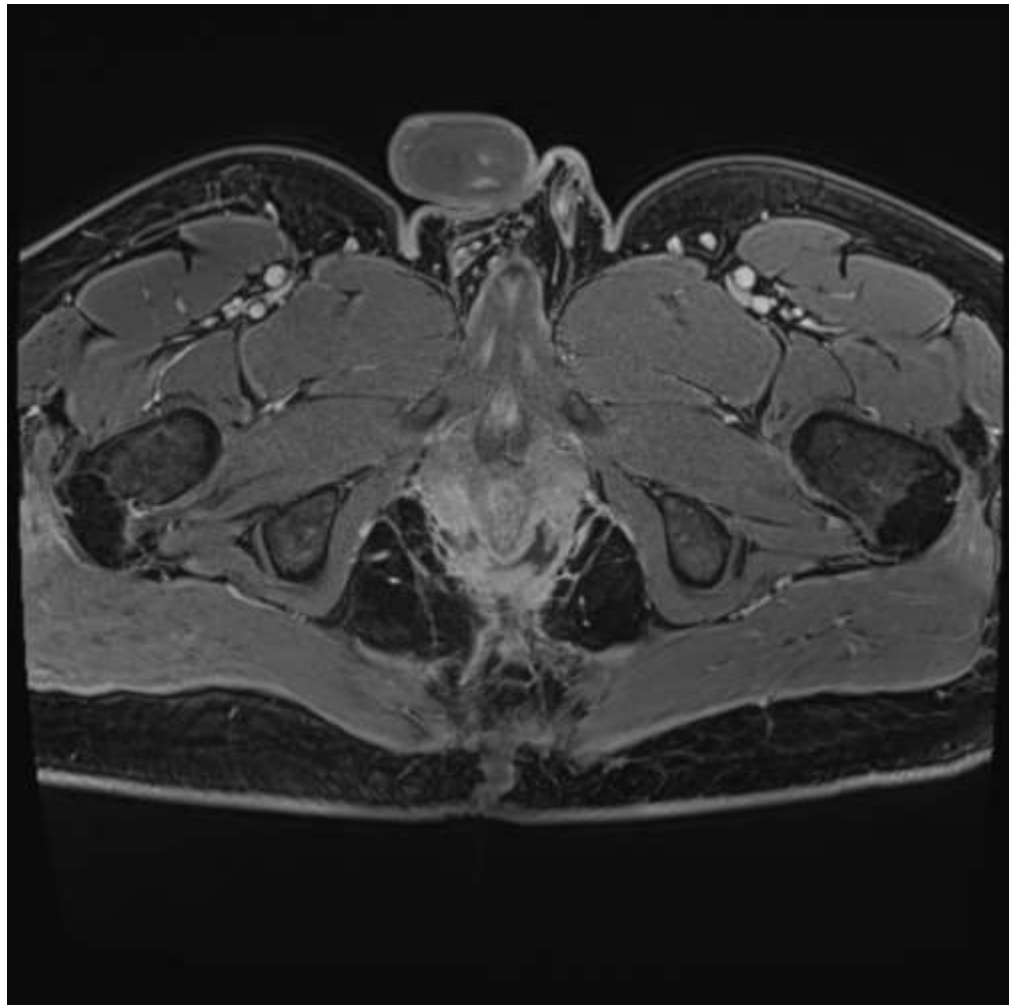
Horseshoe

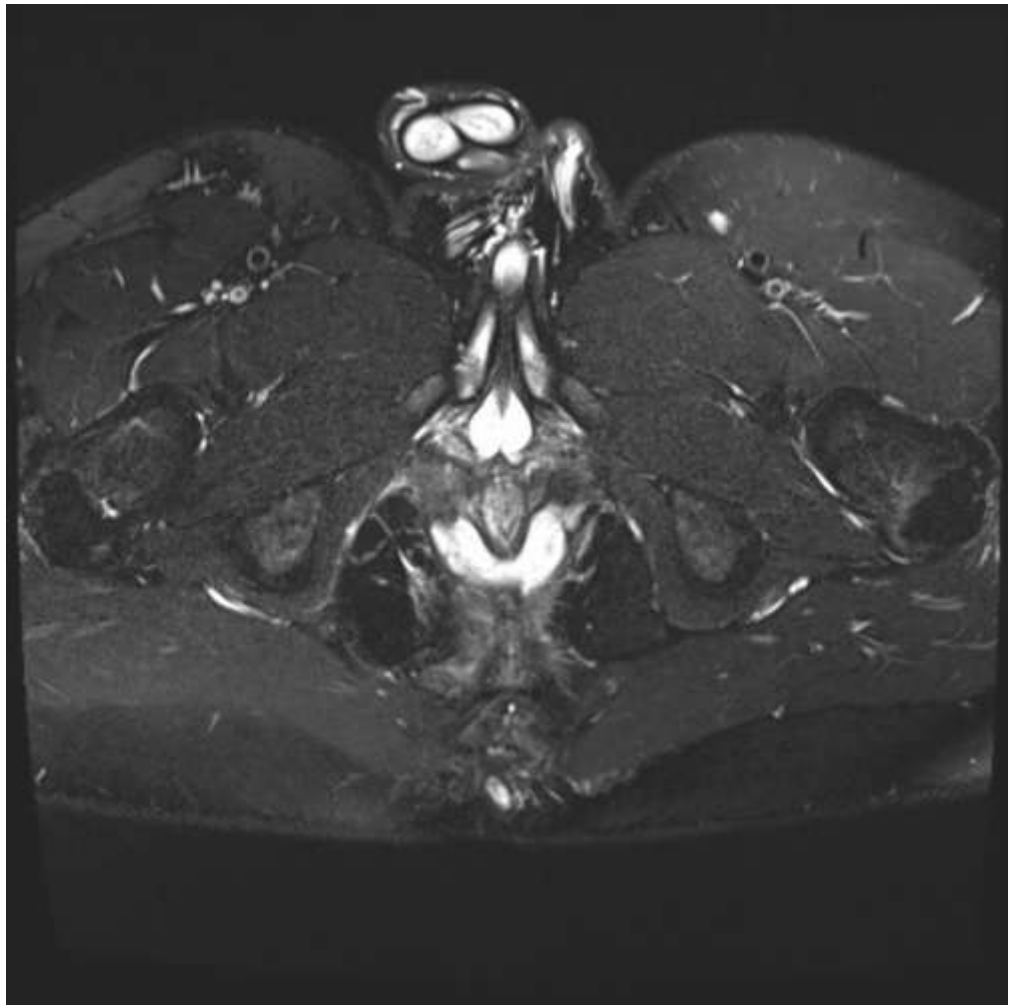


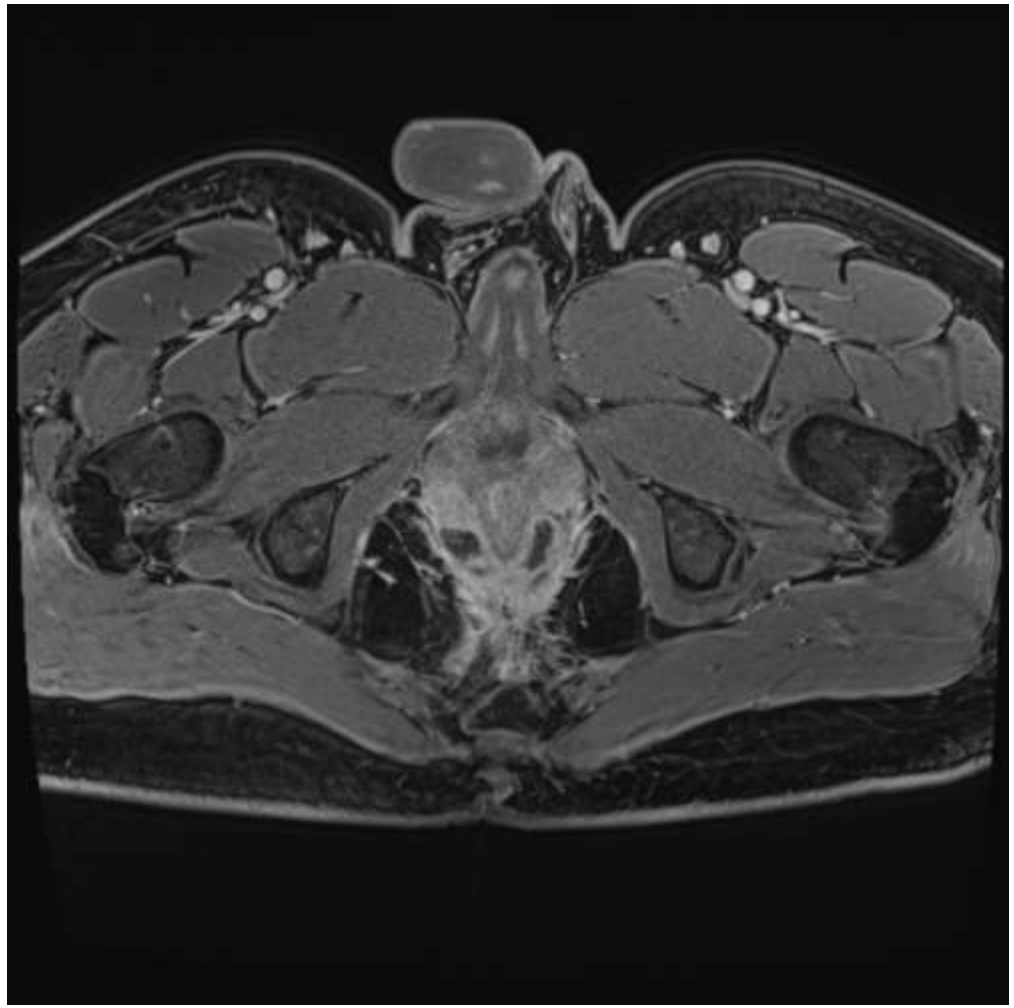


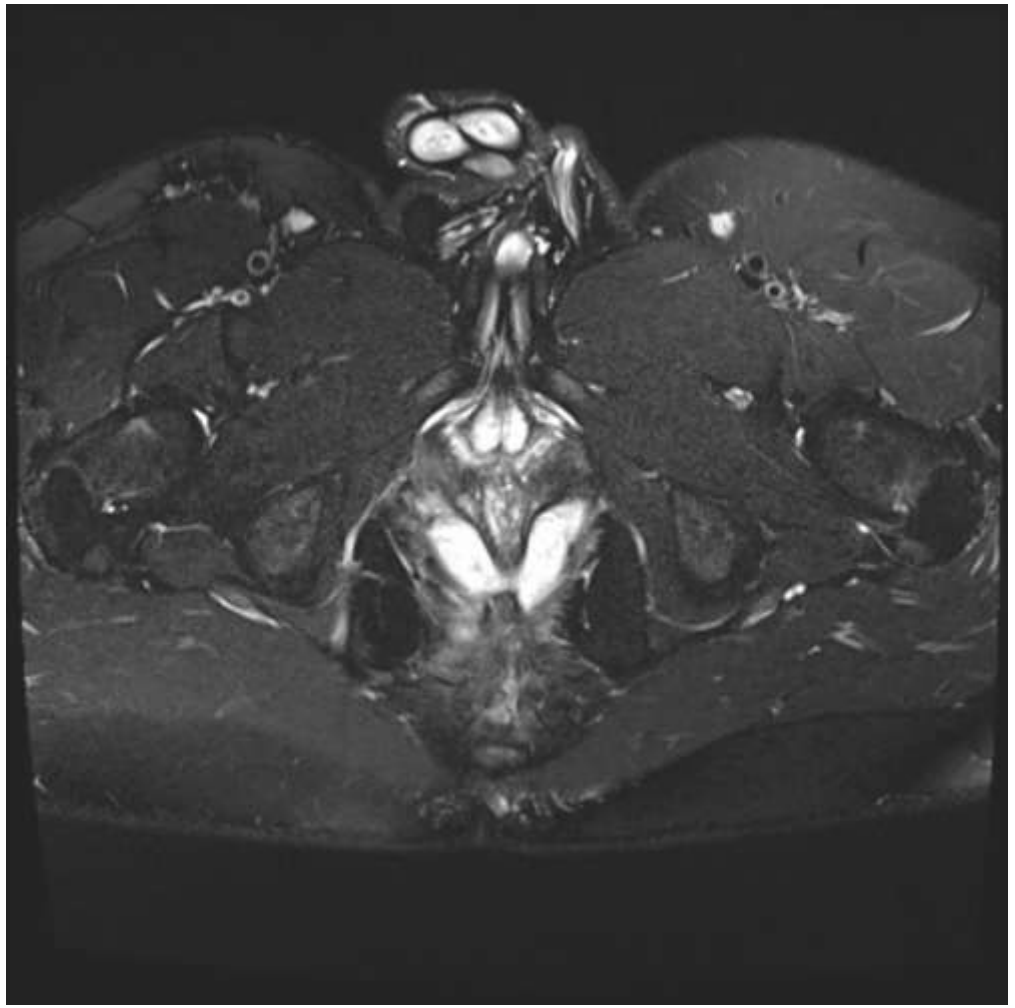


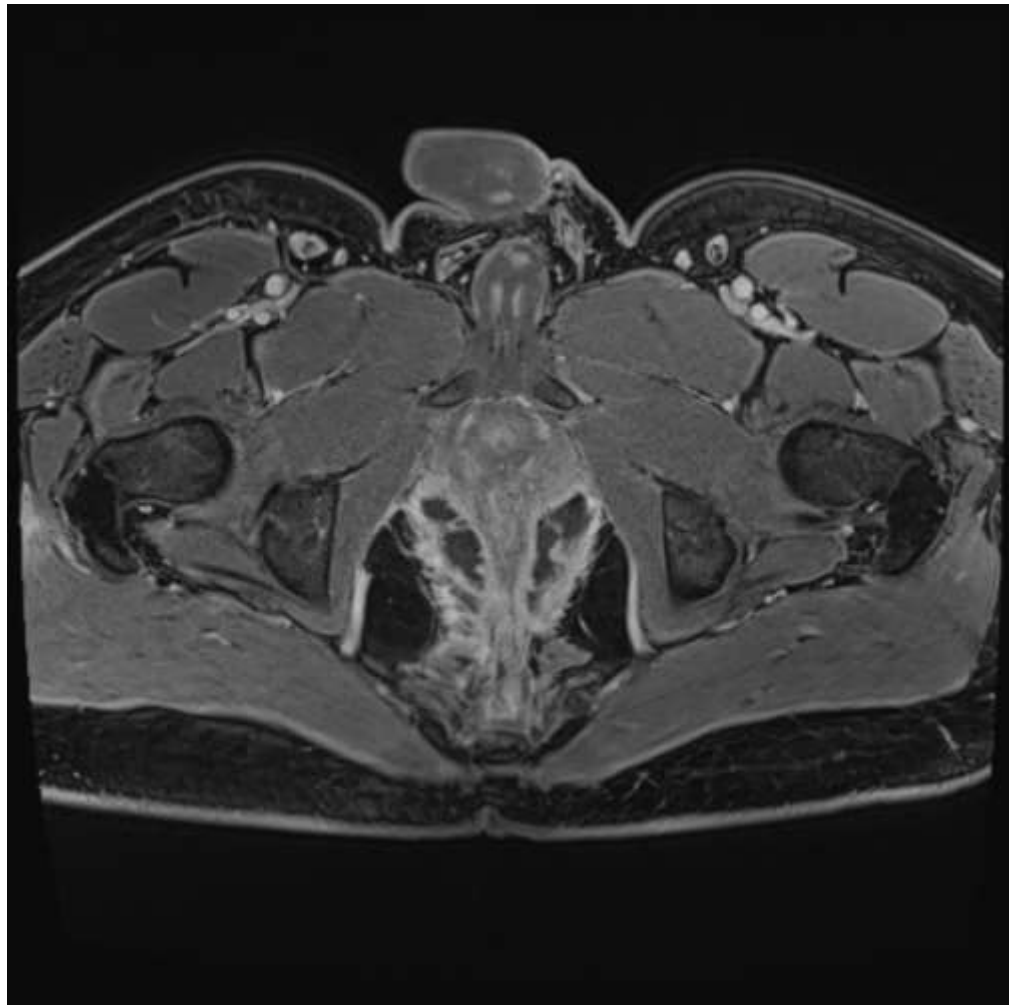


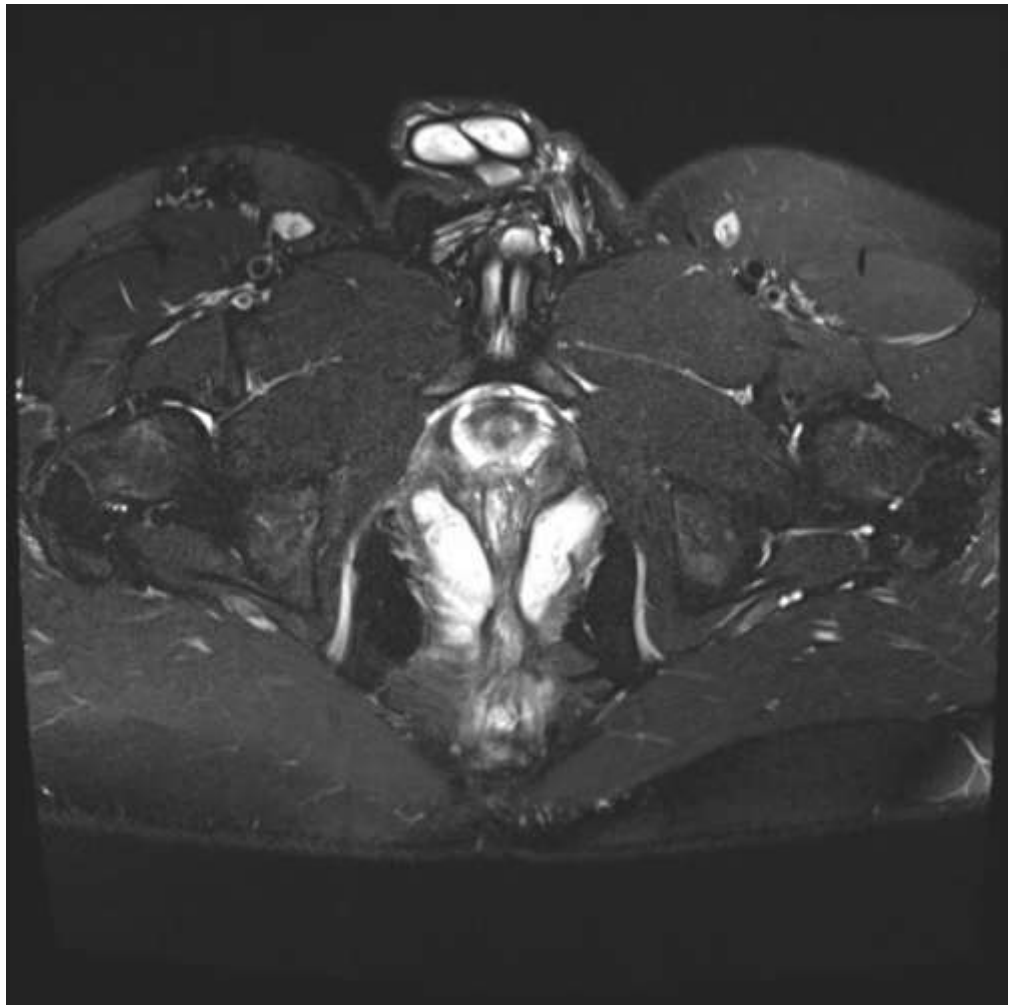


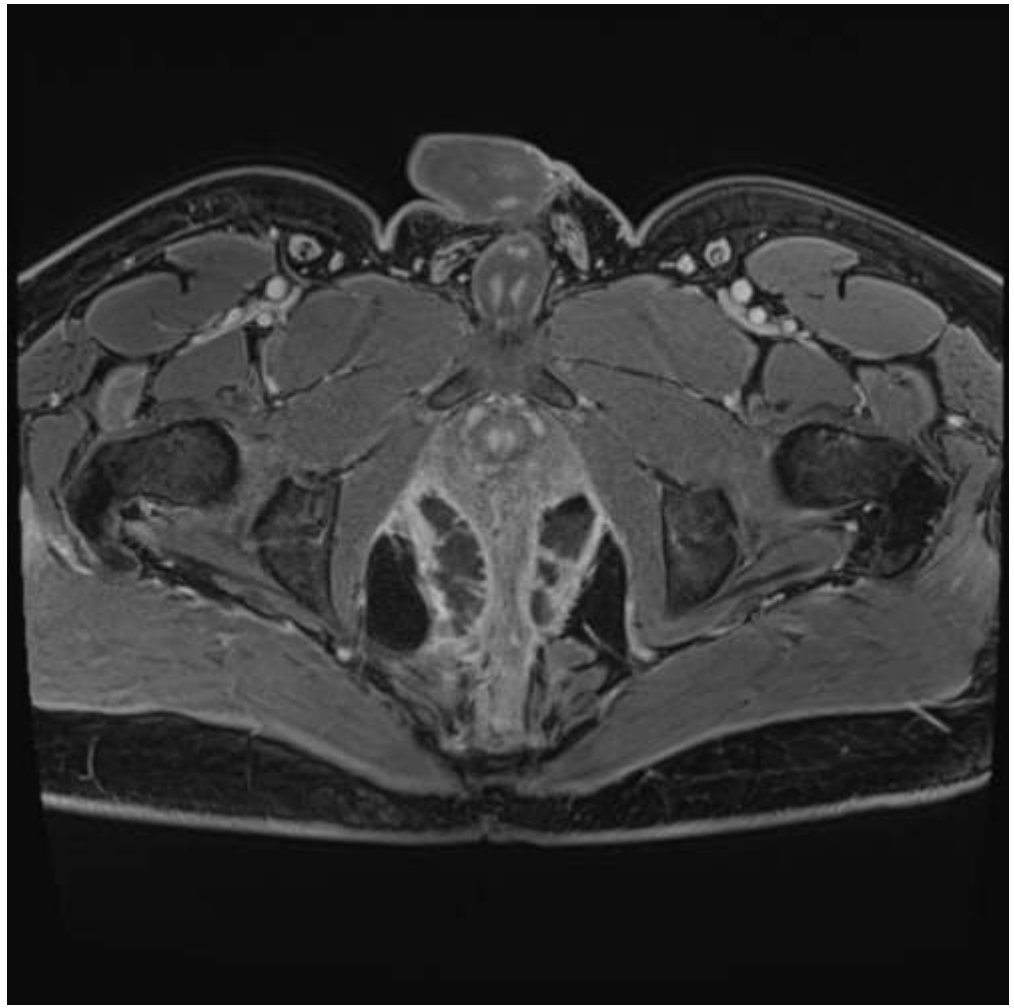


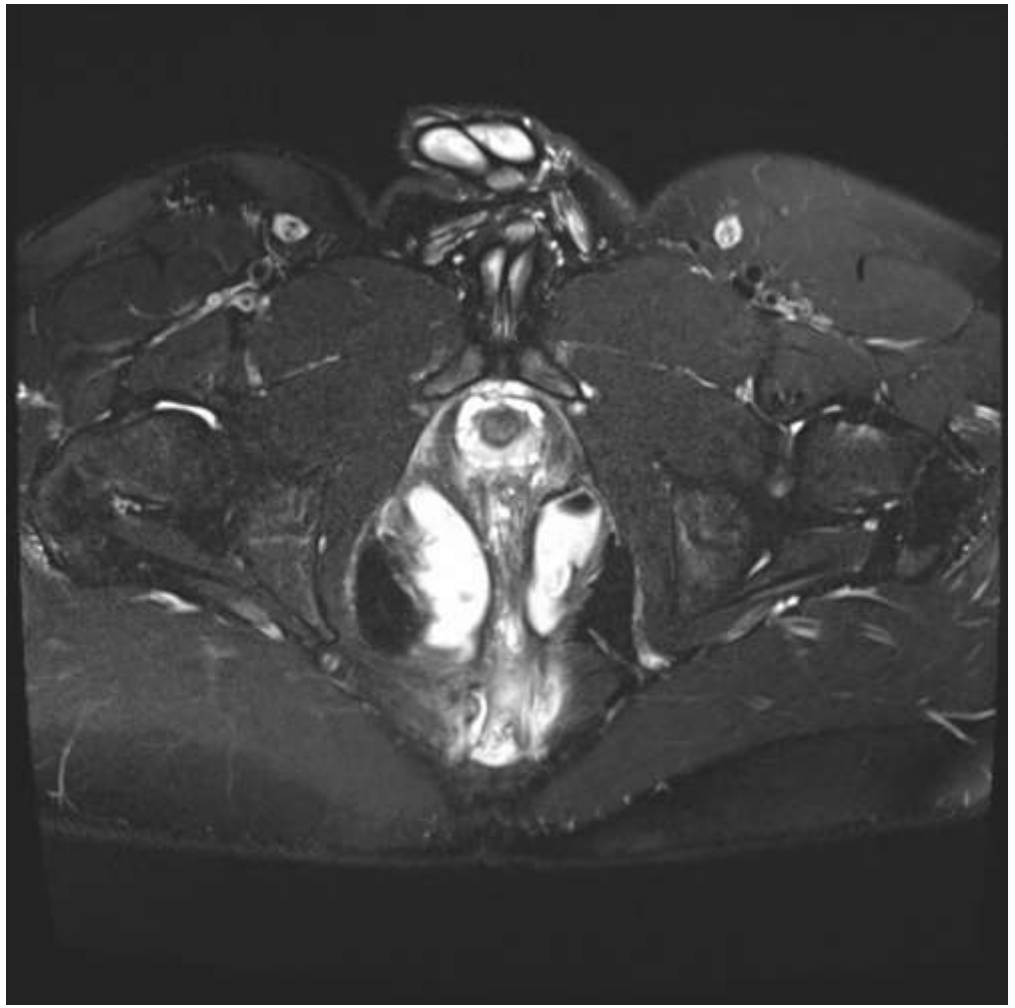


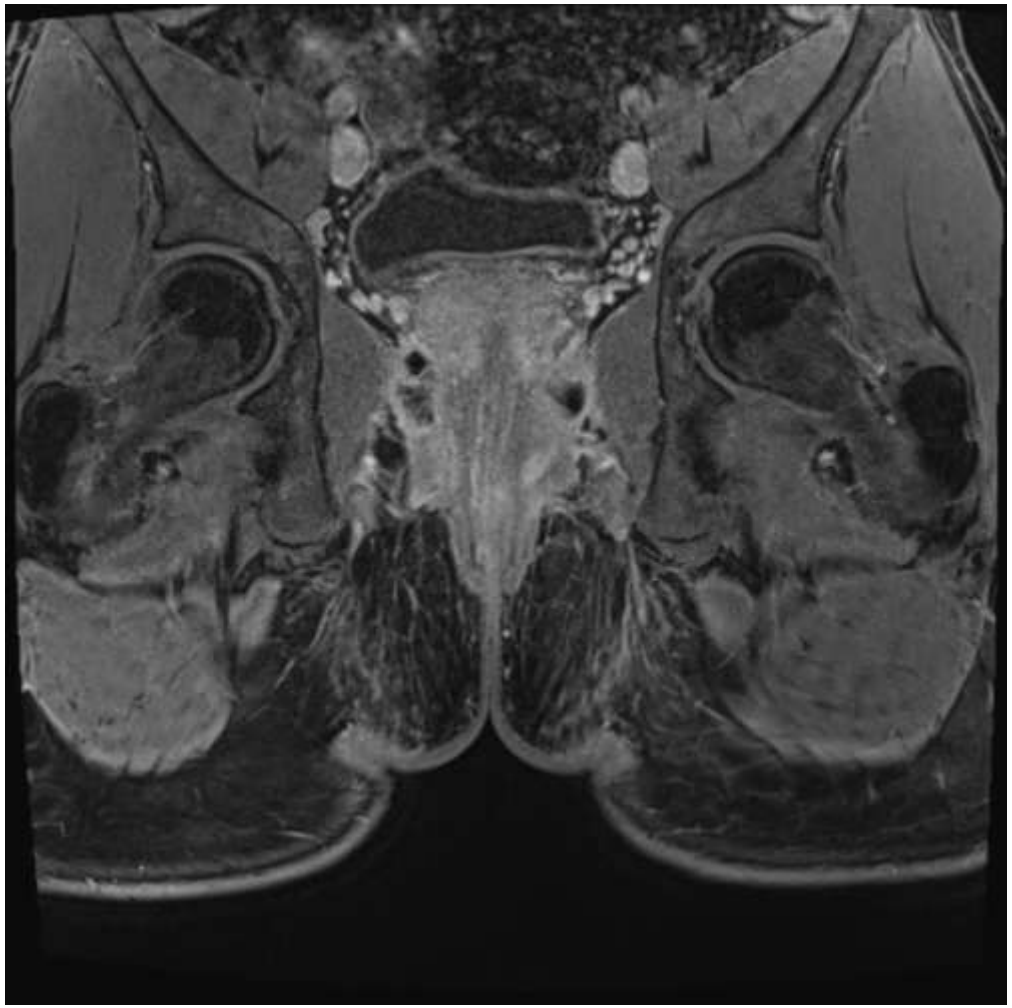


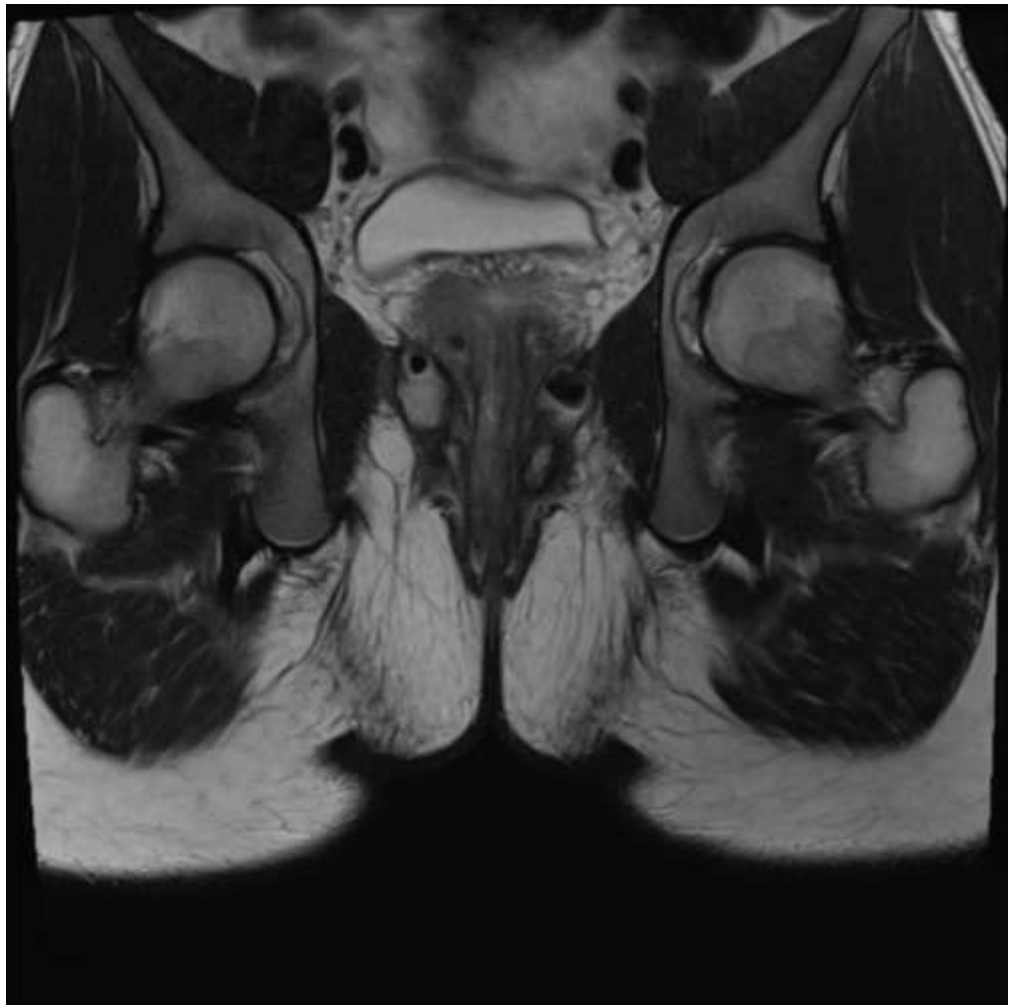


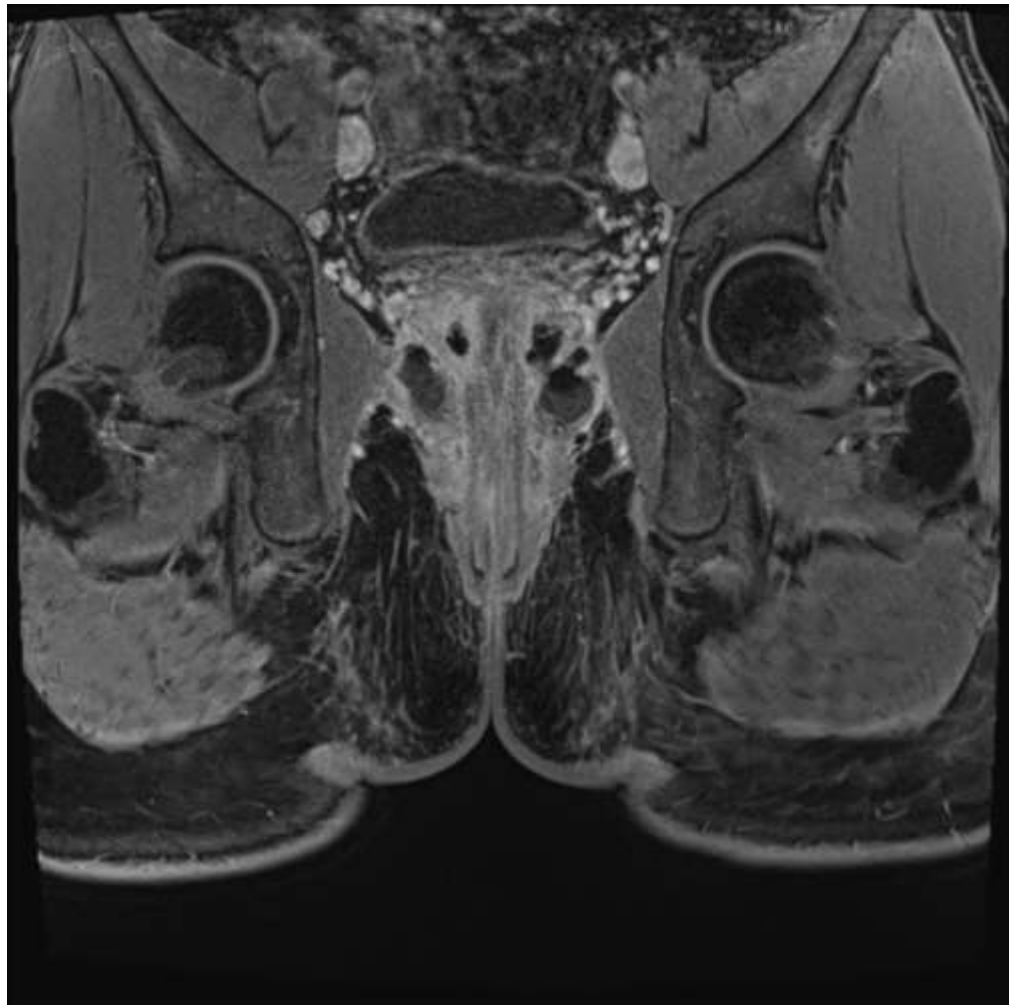


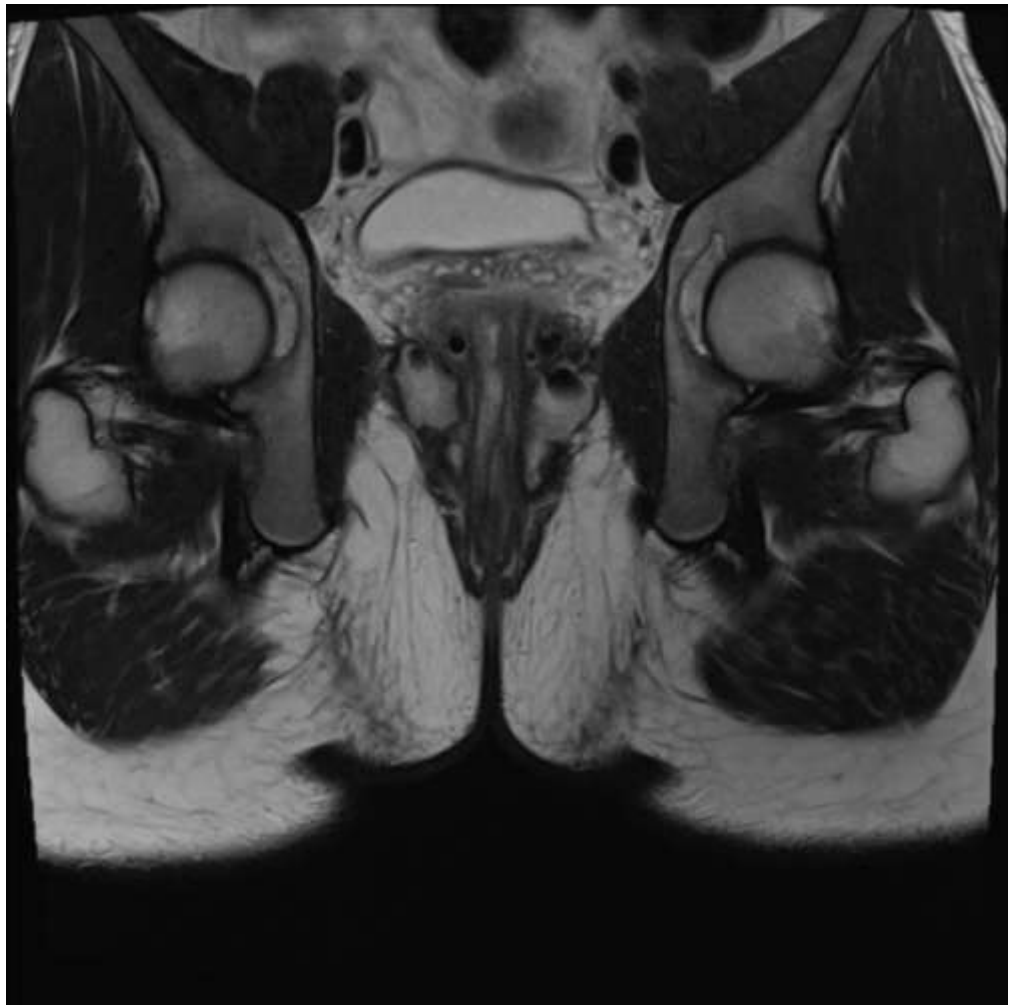


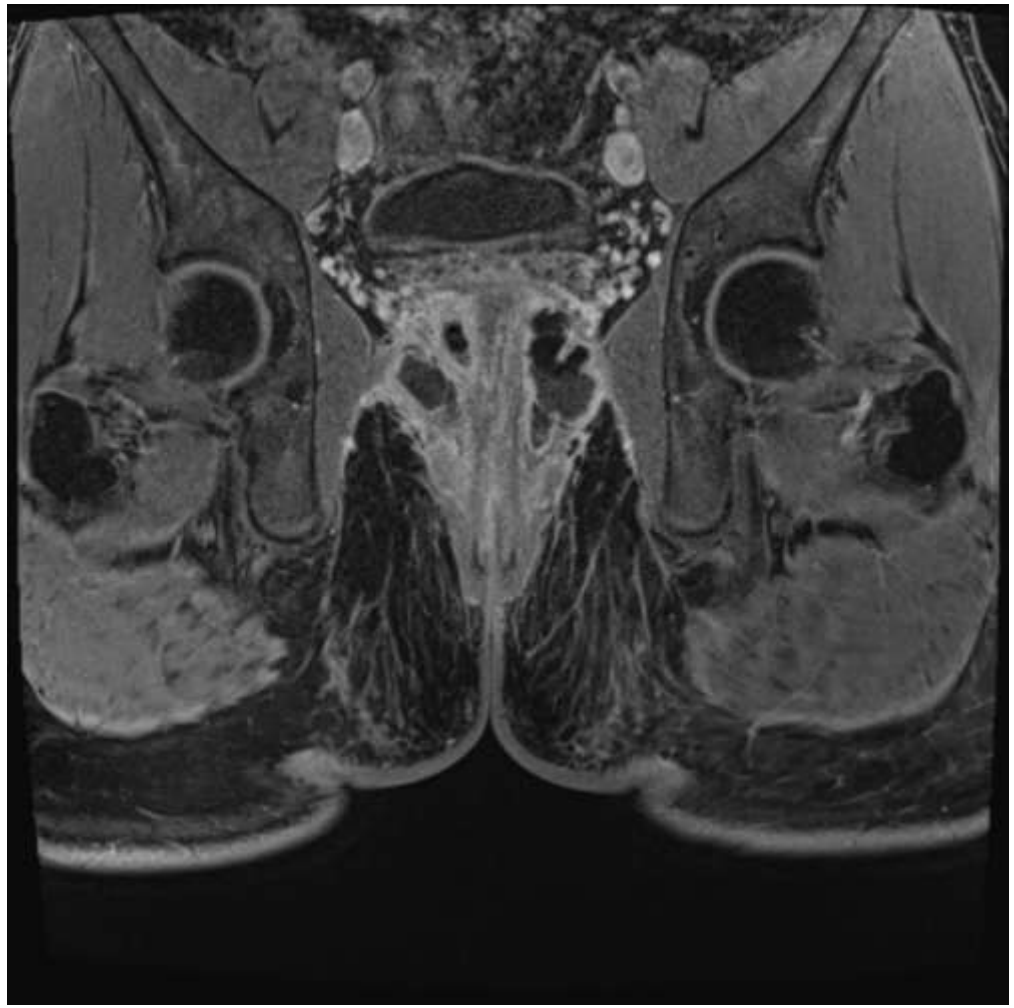


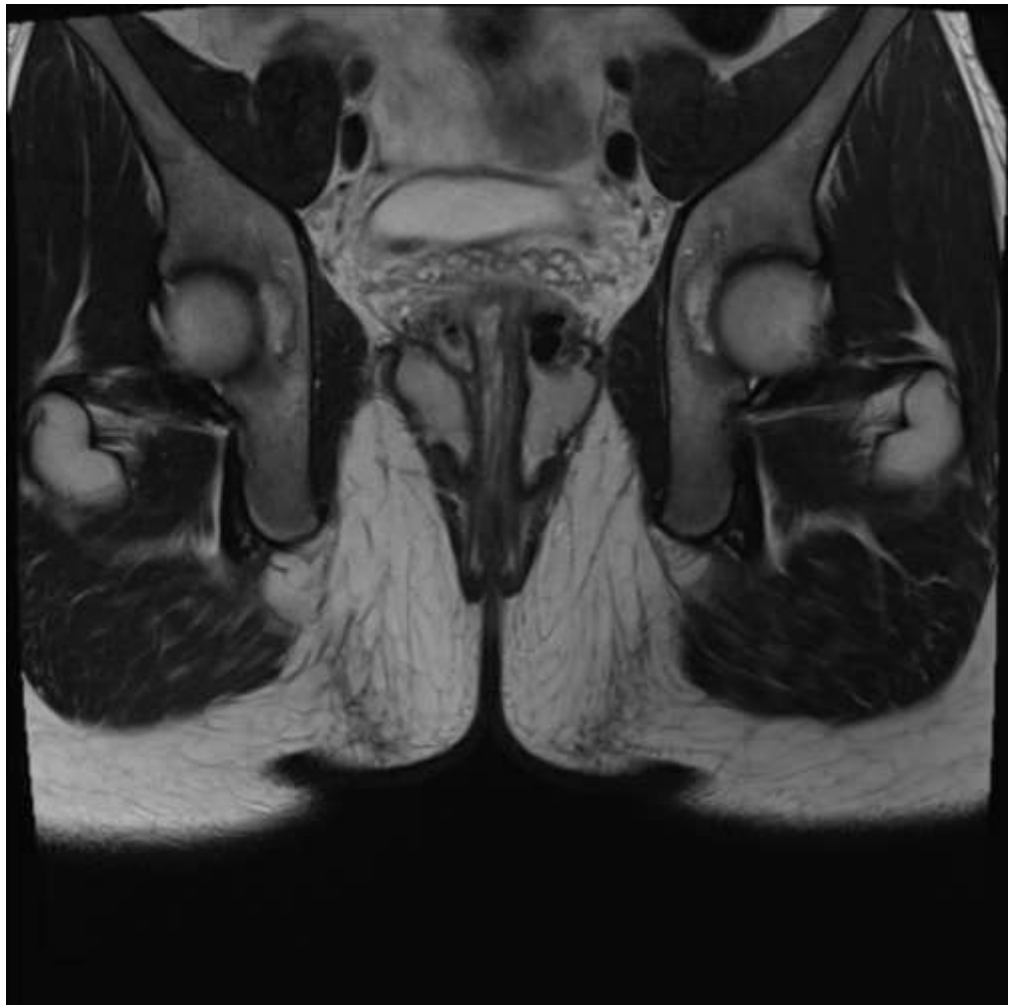


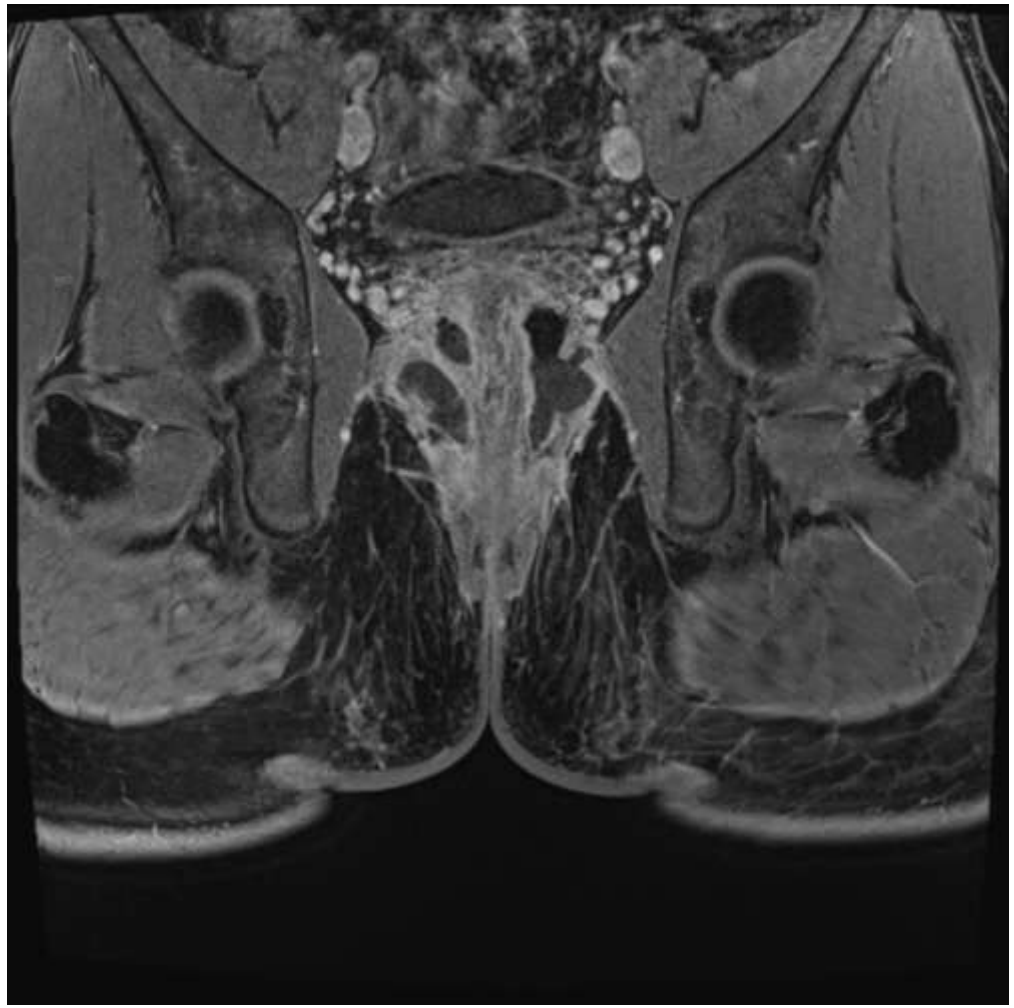


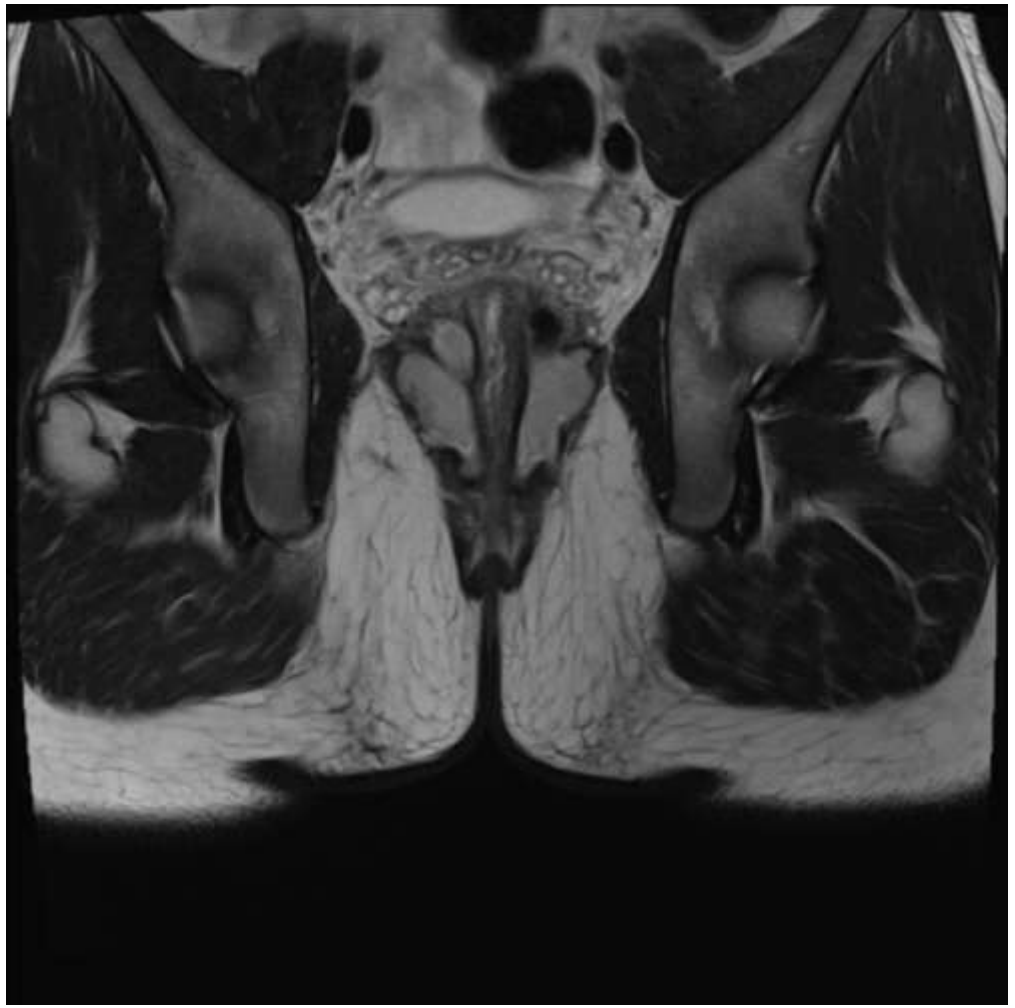


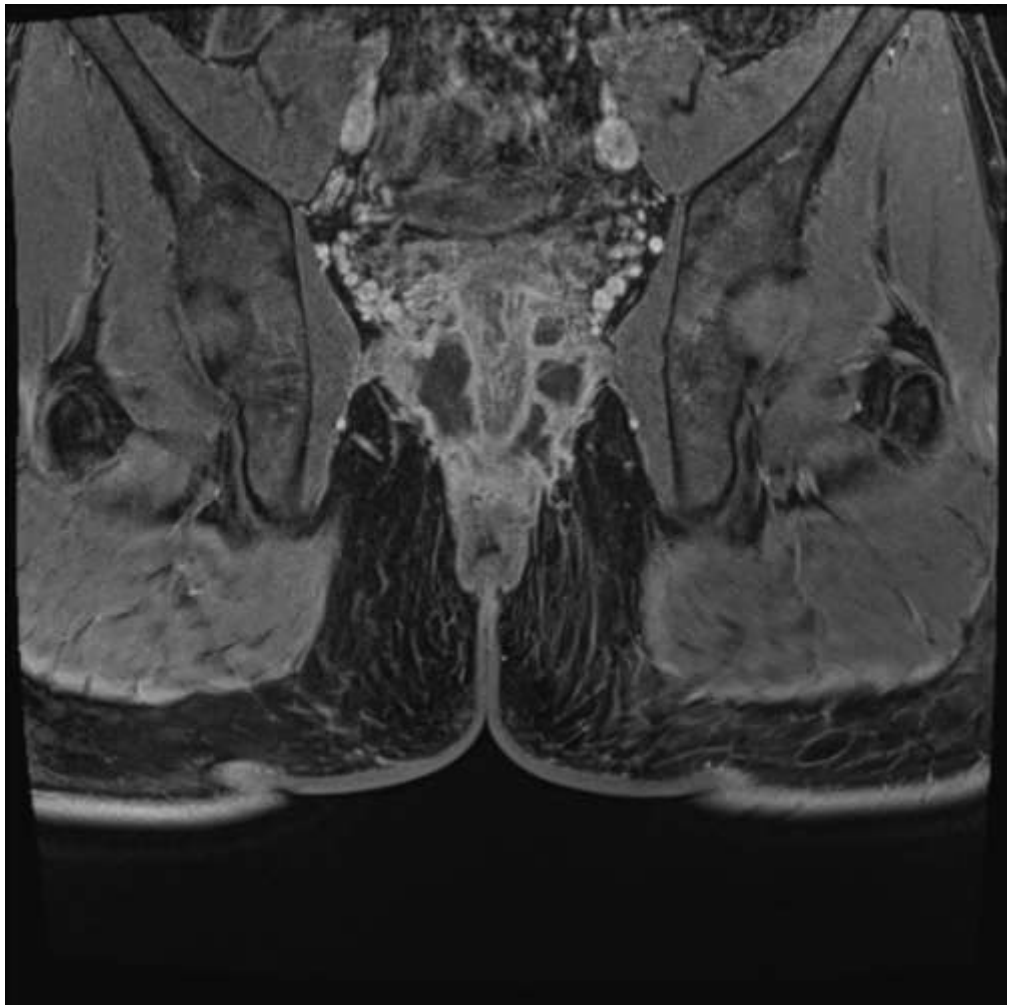


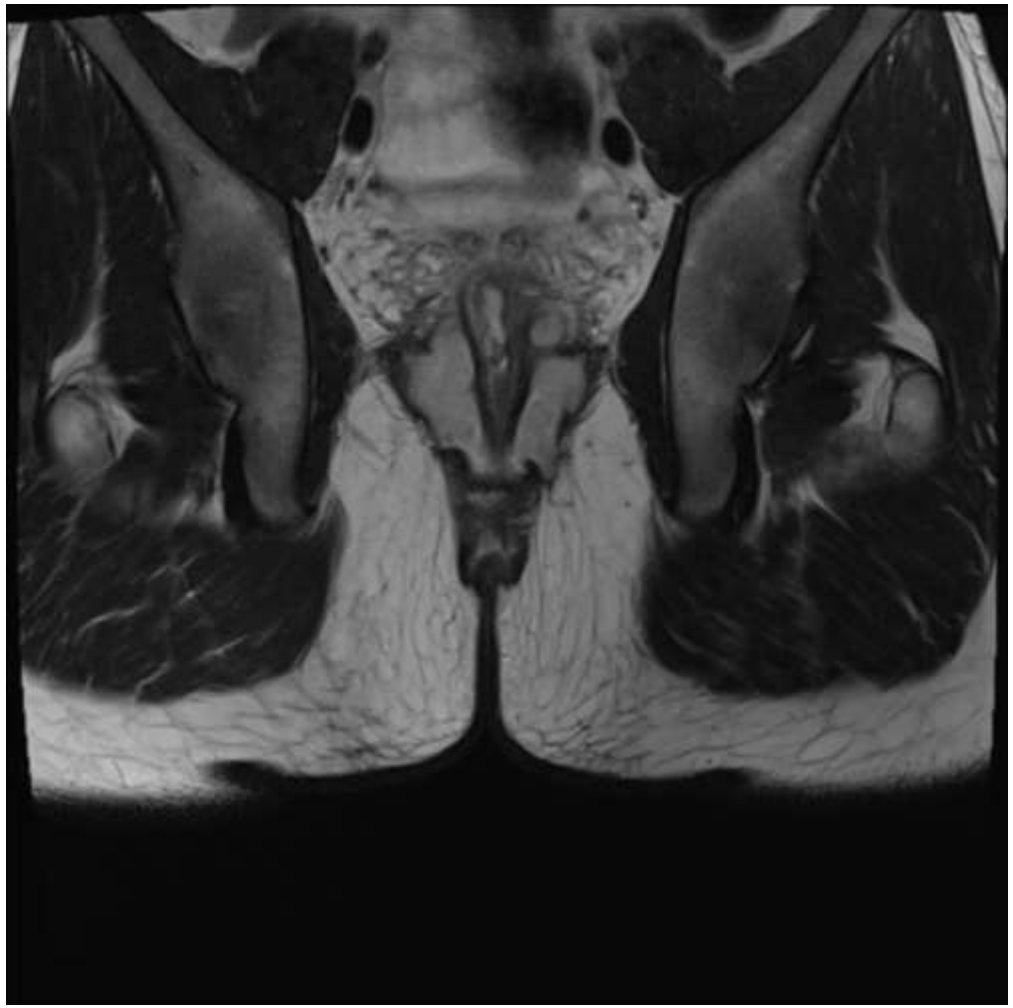


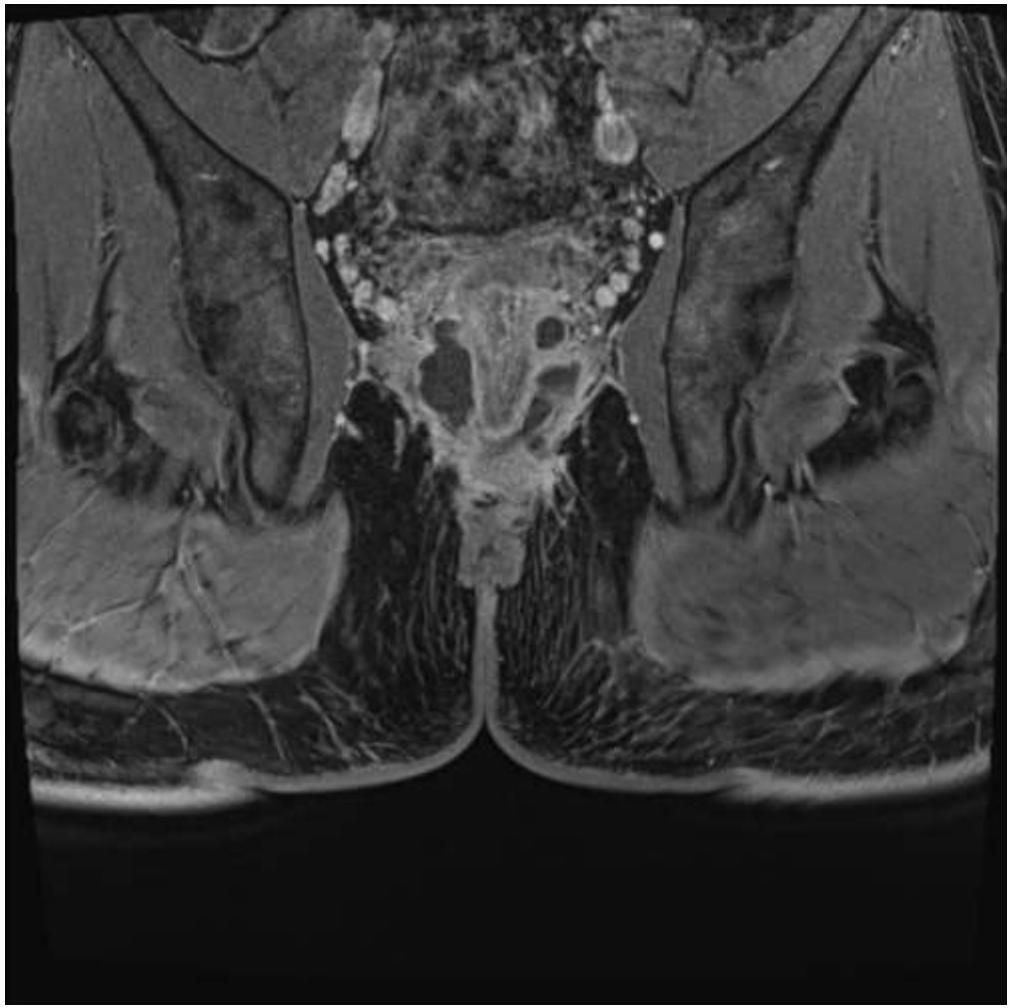


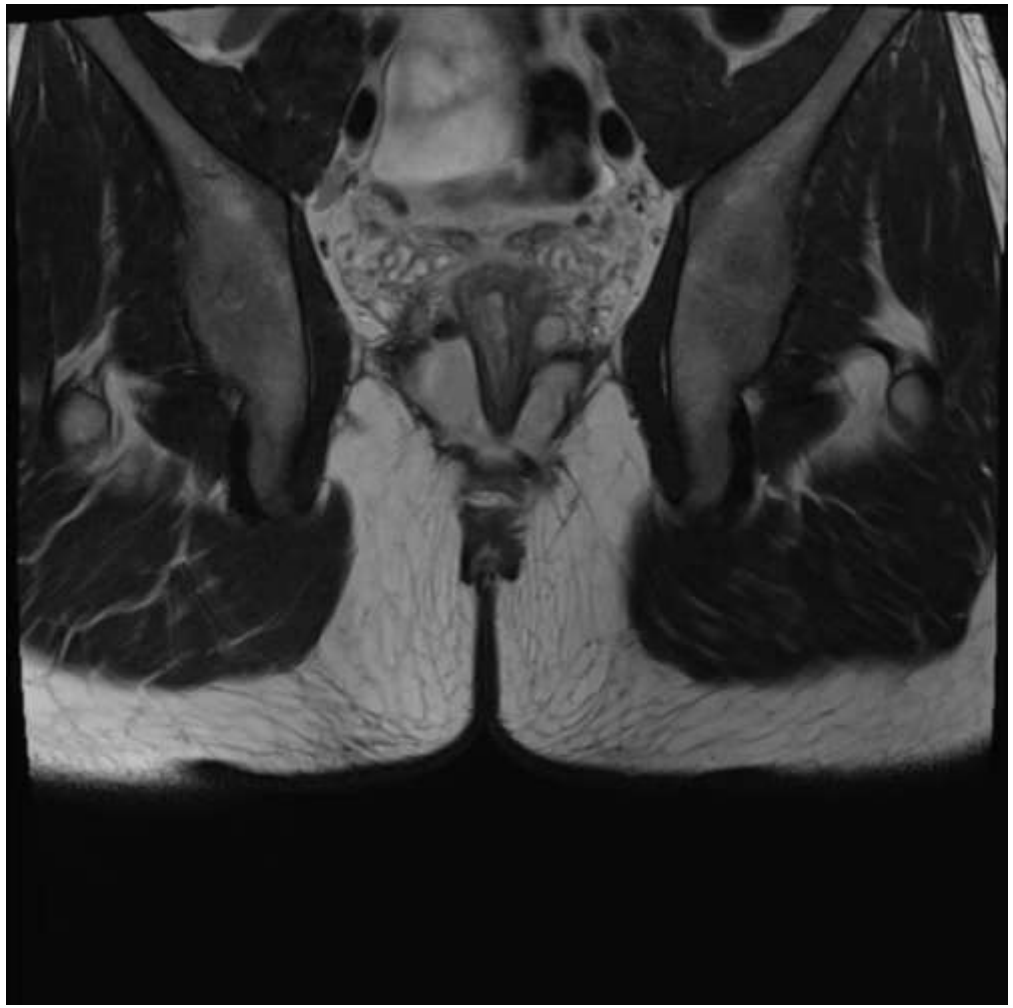




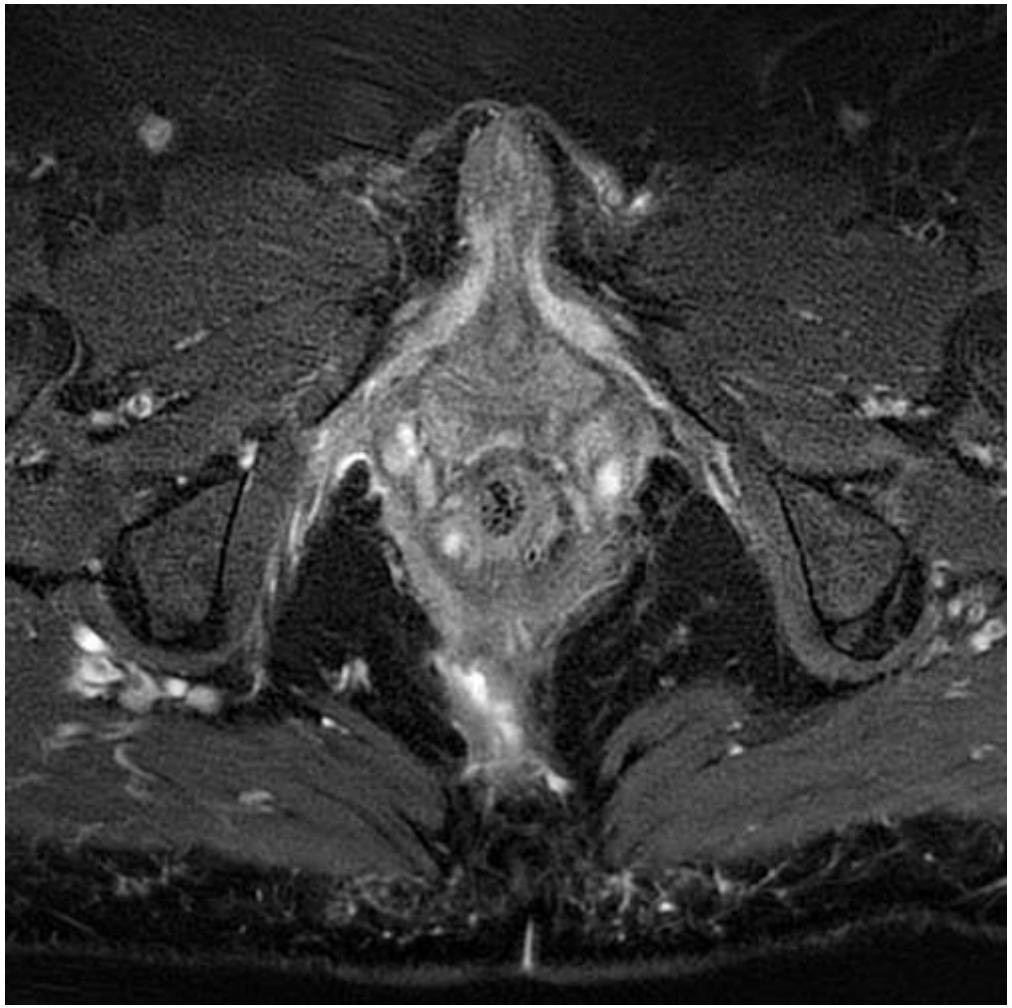


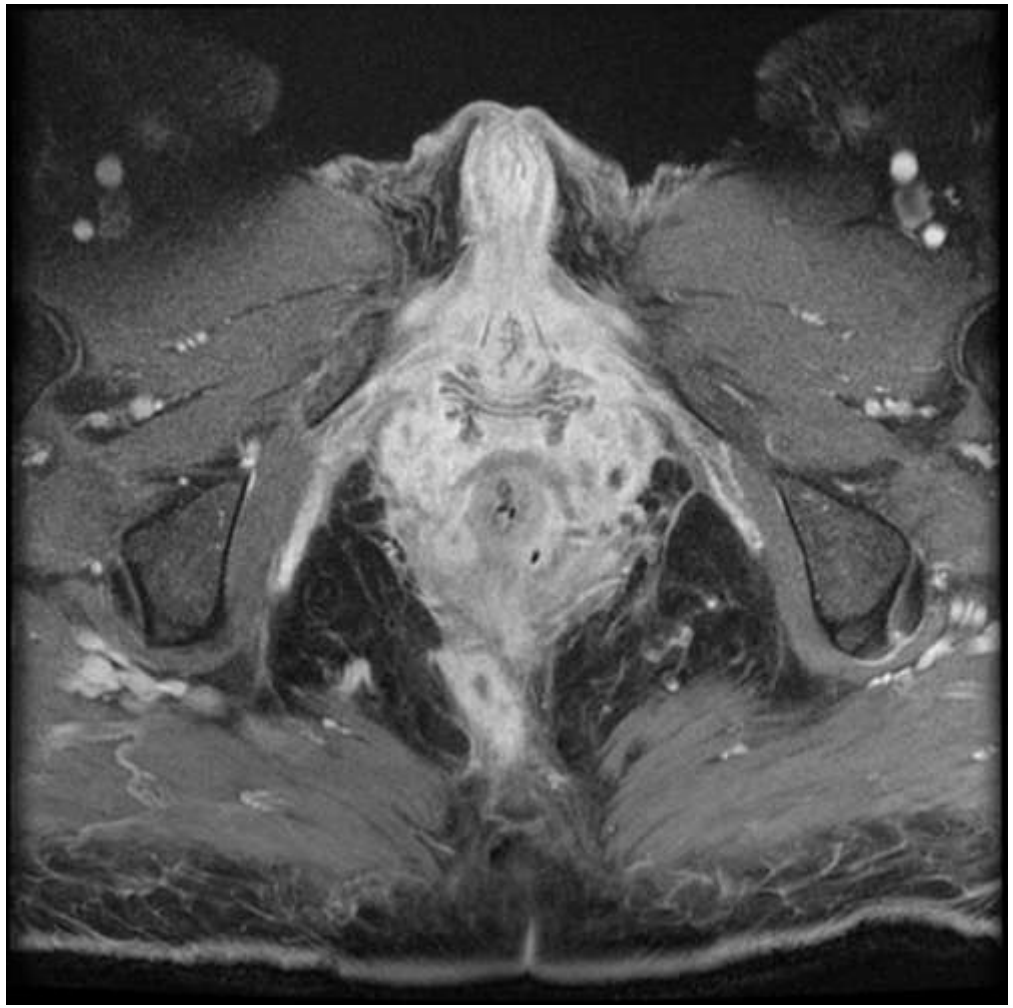


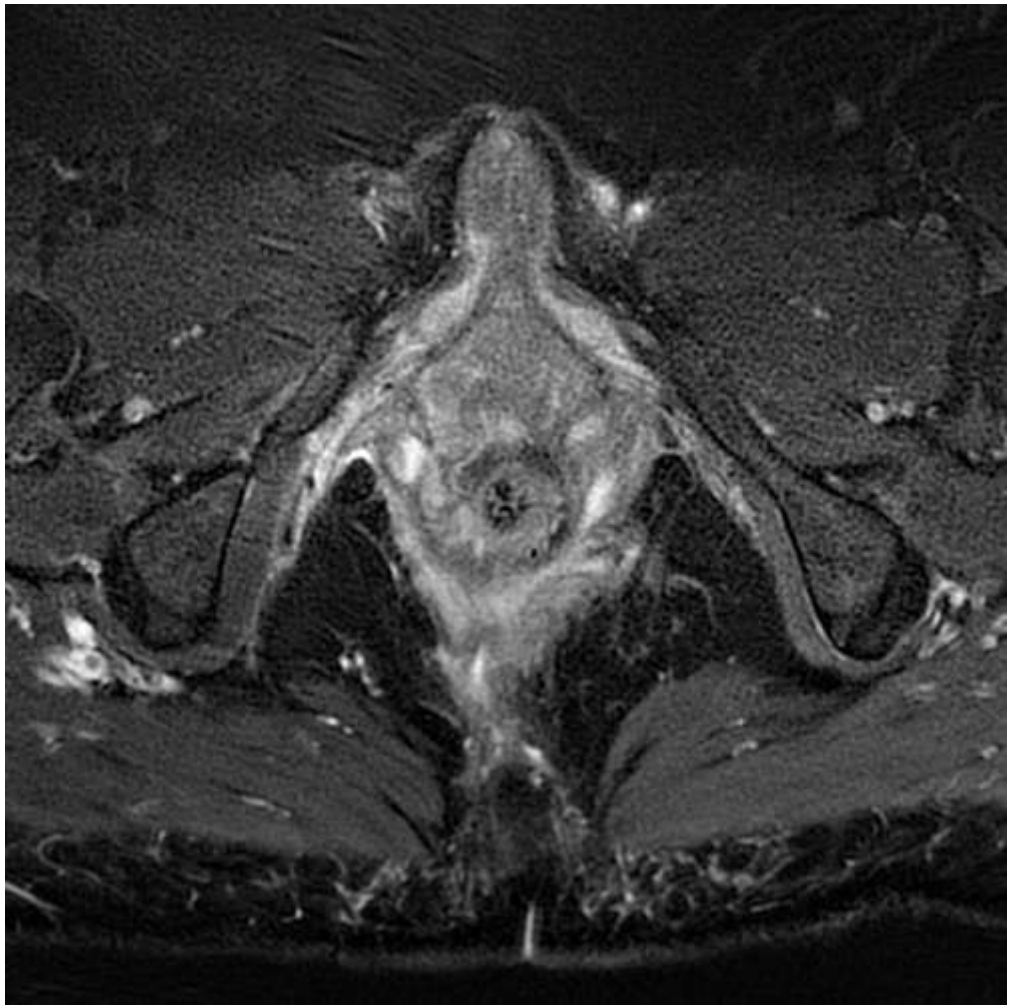


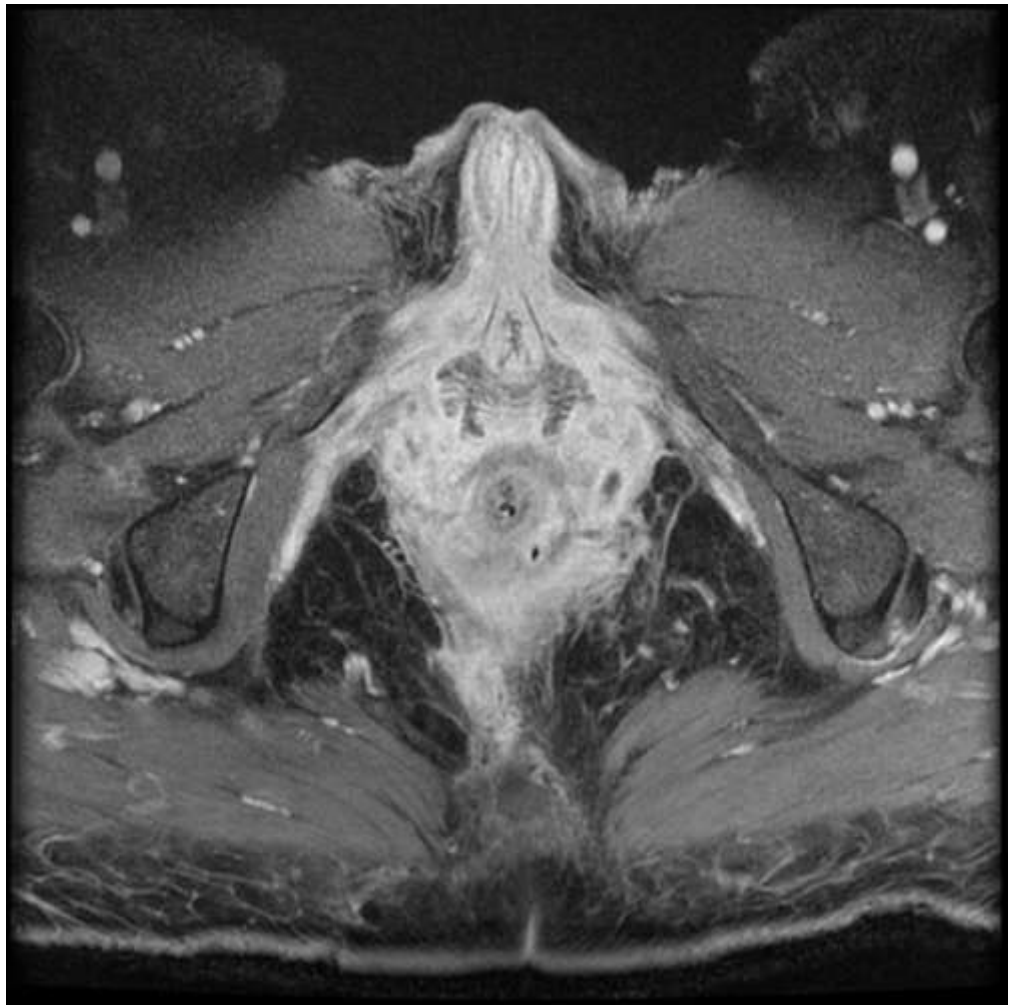


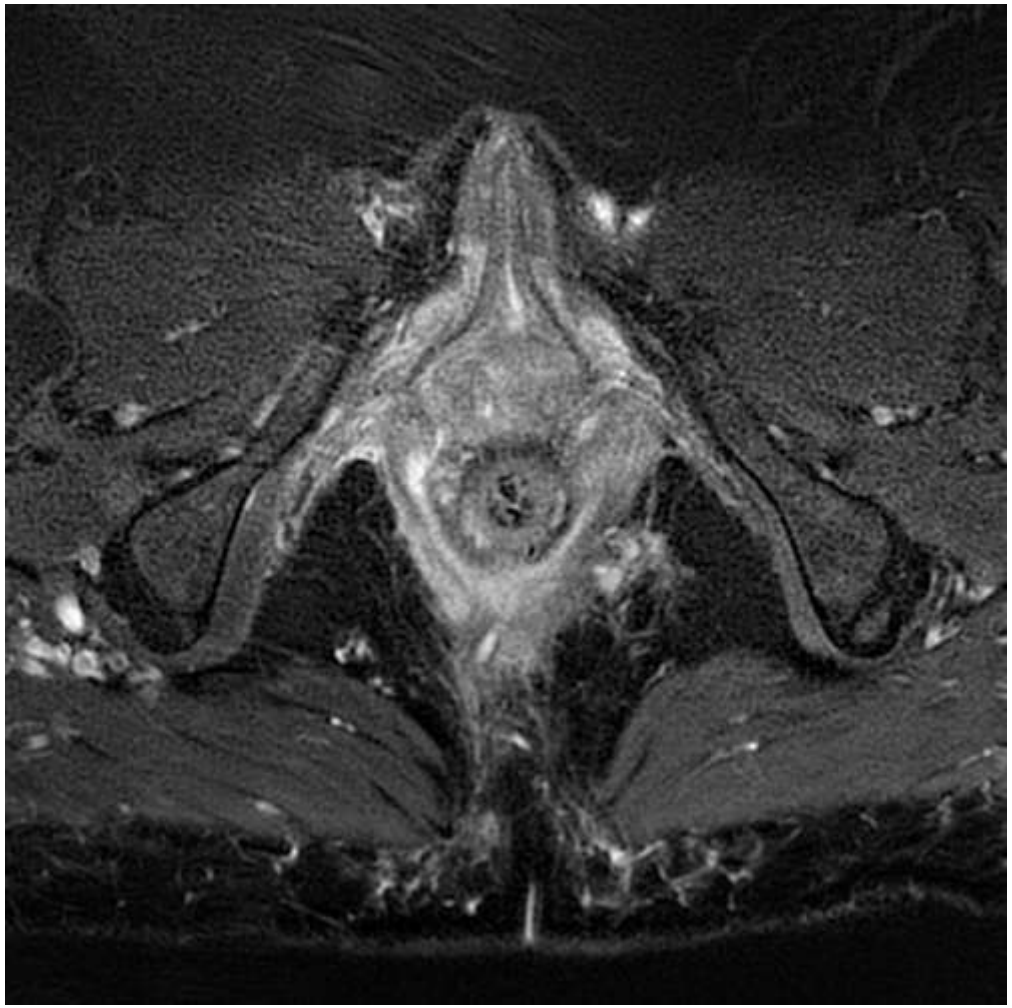
Another horseshoe

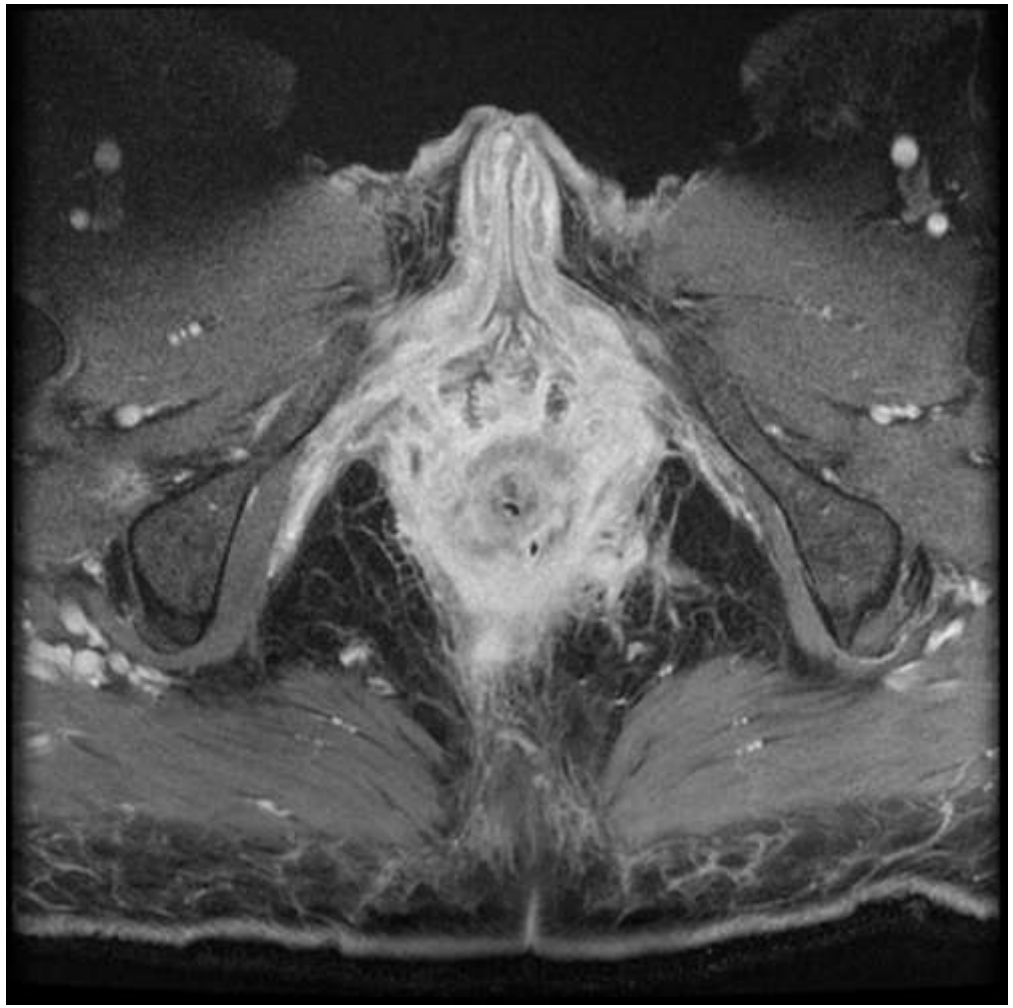


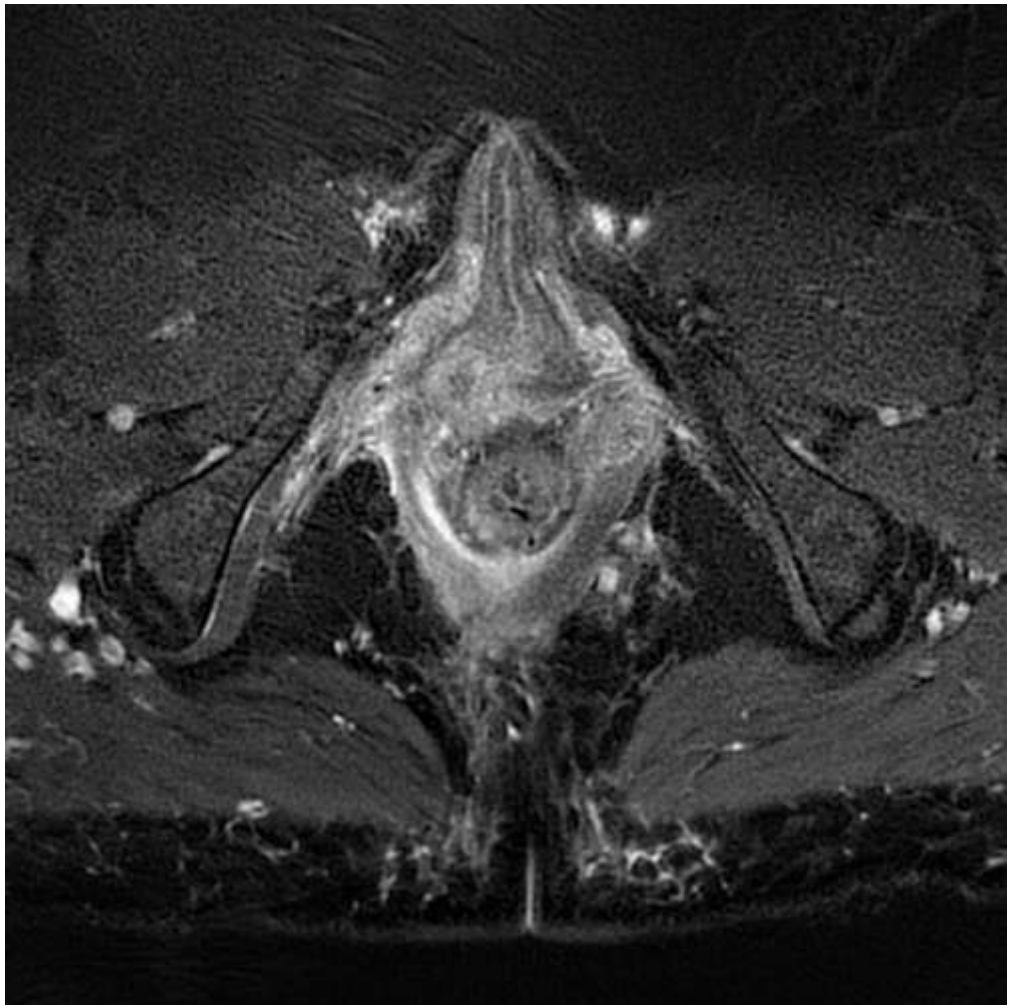


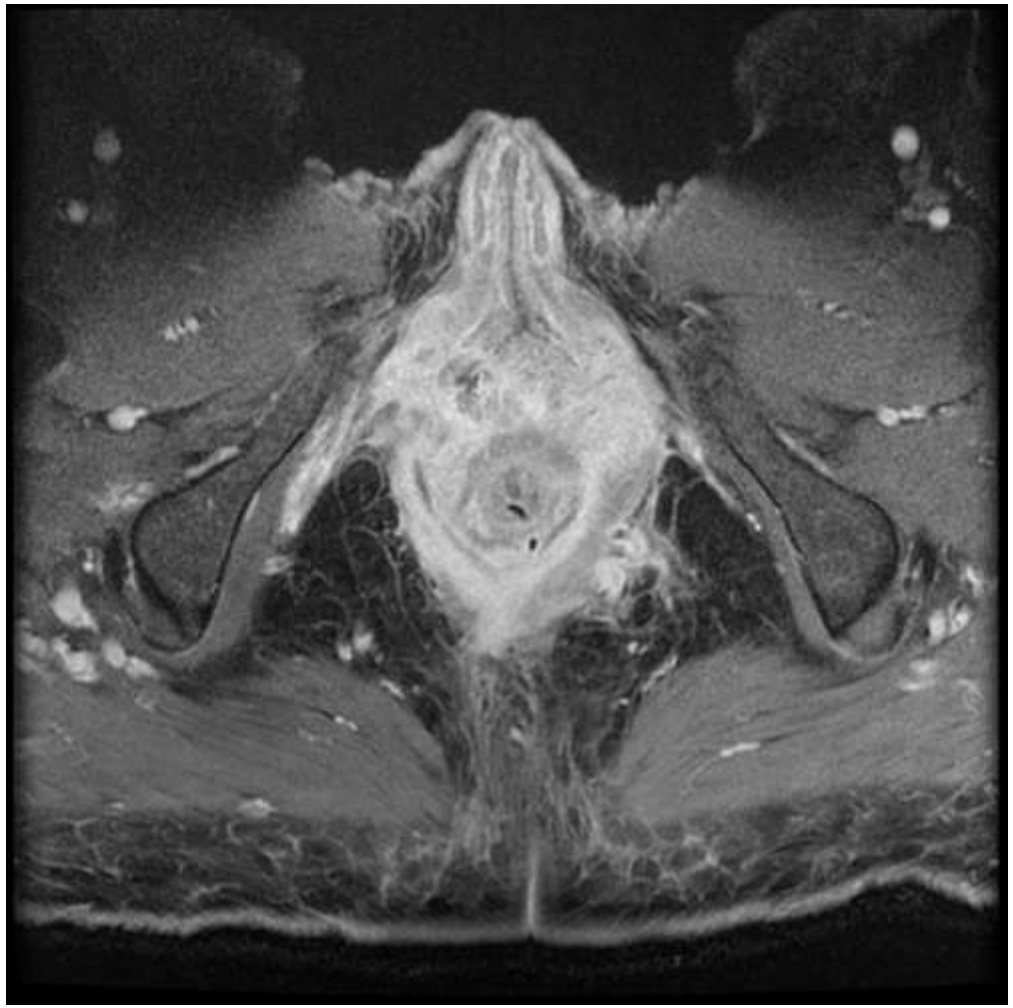


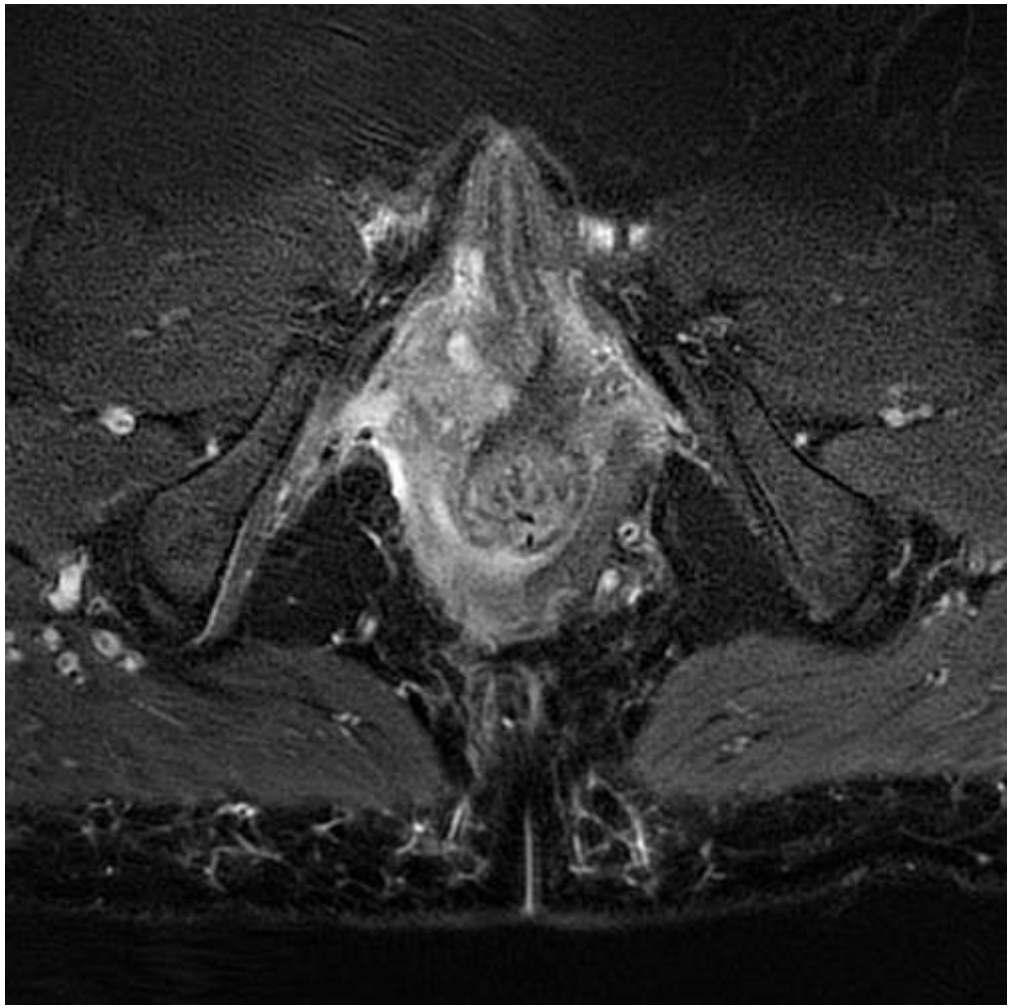


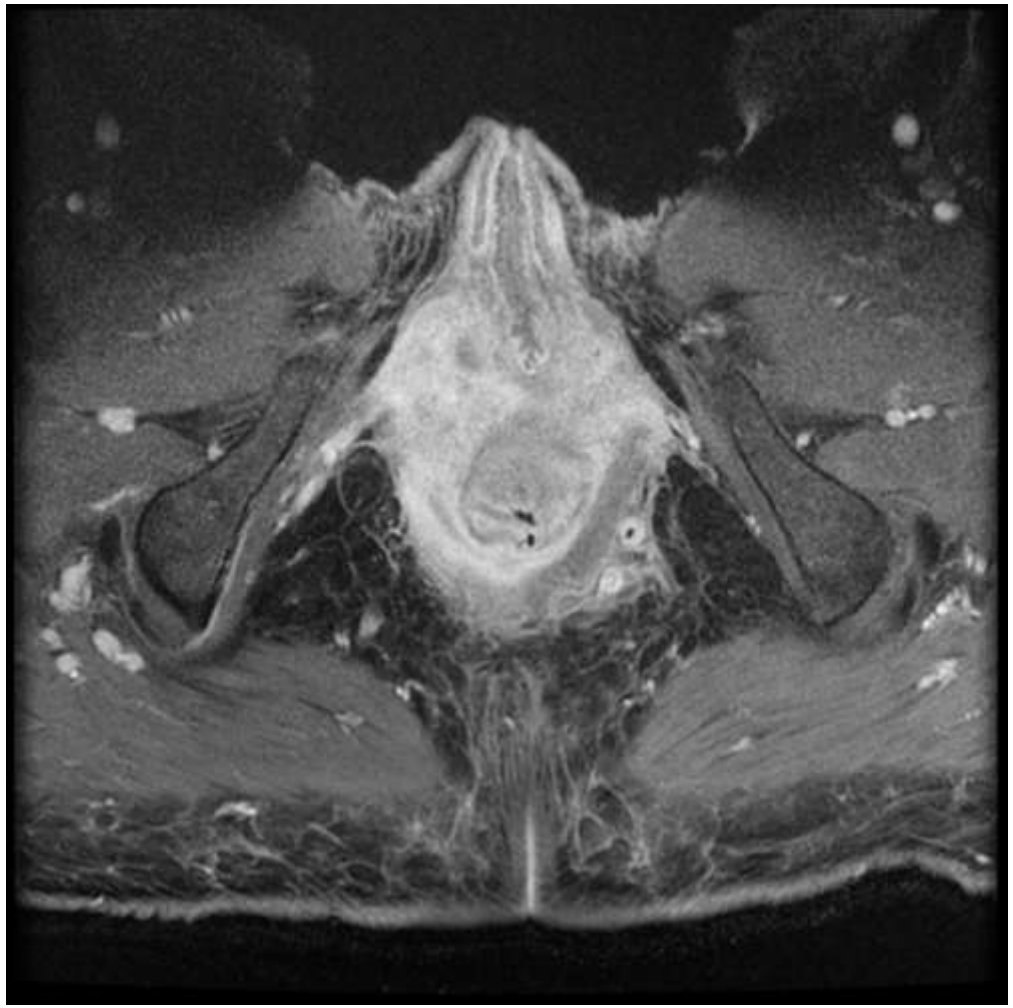


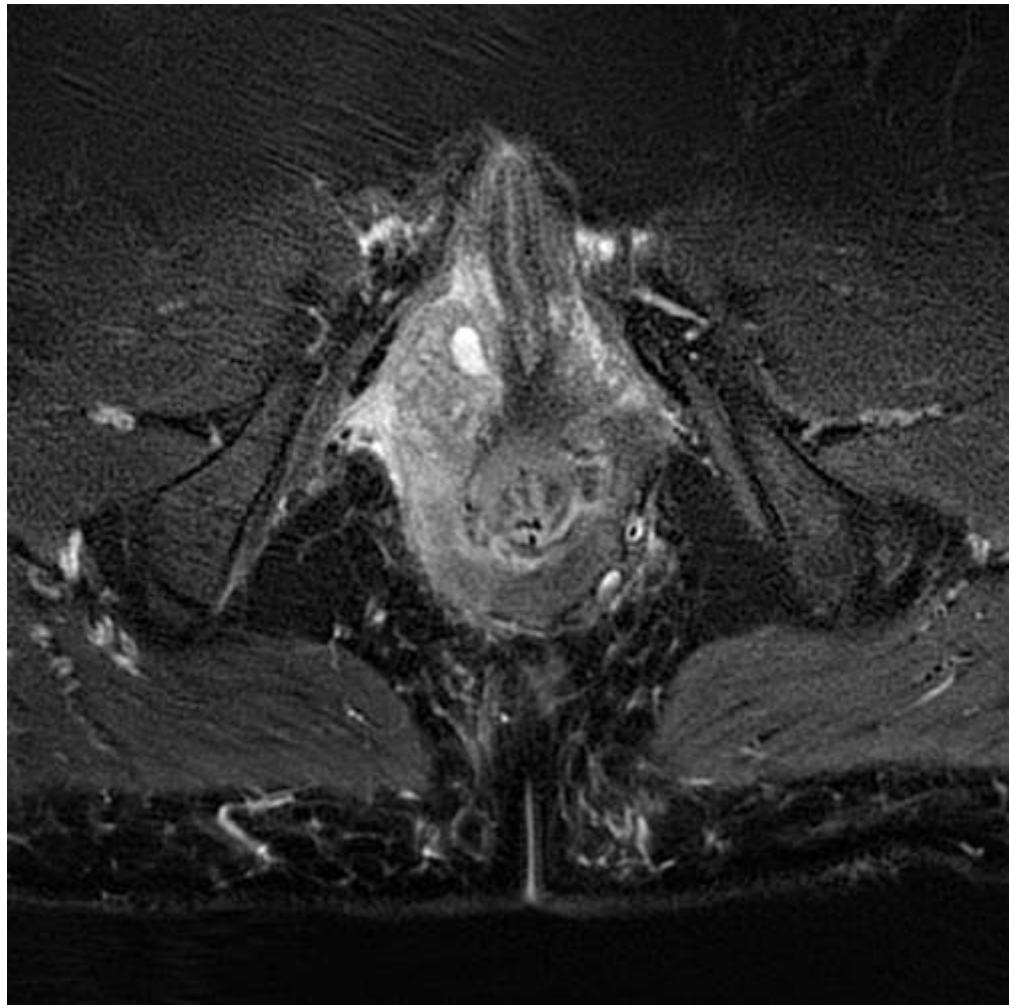


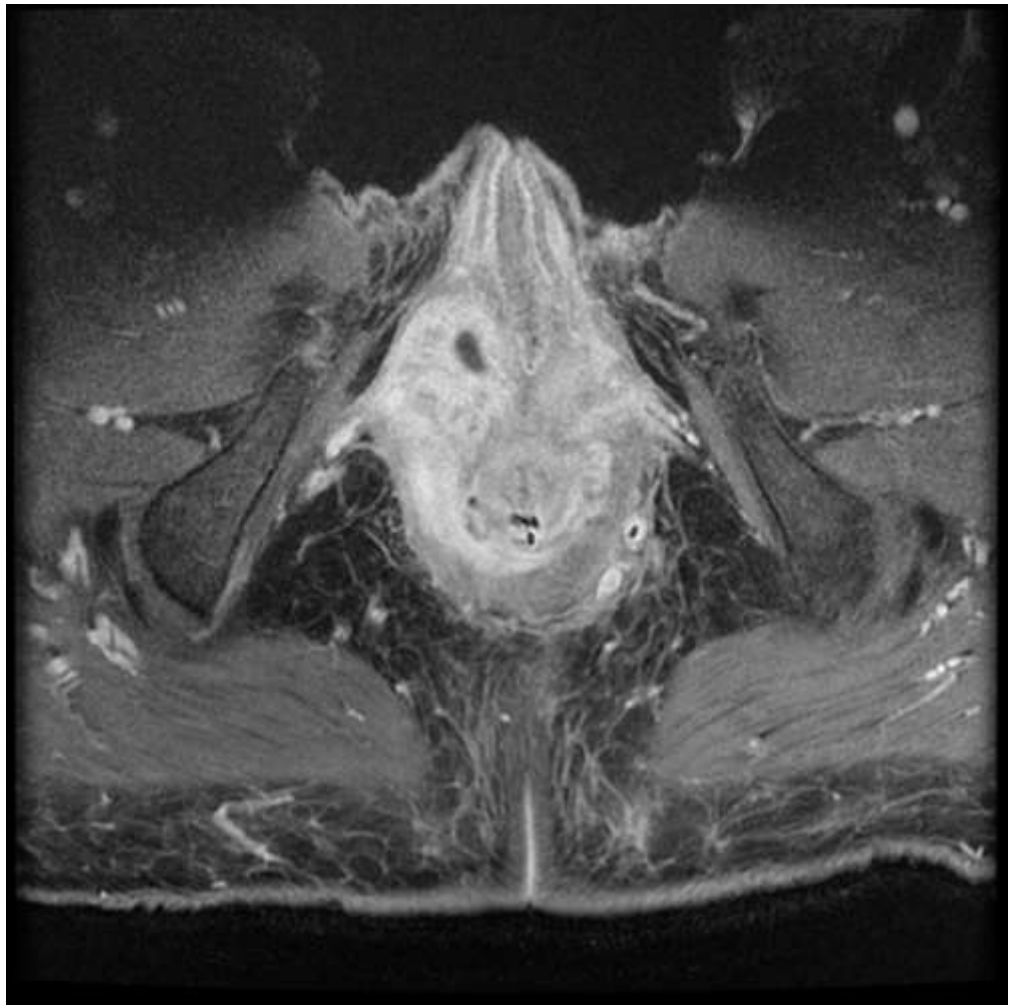


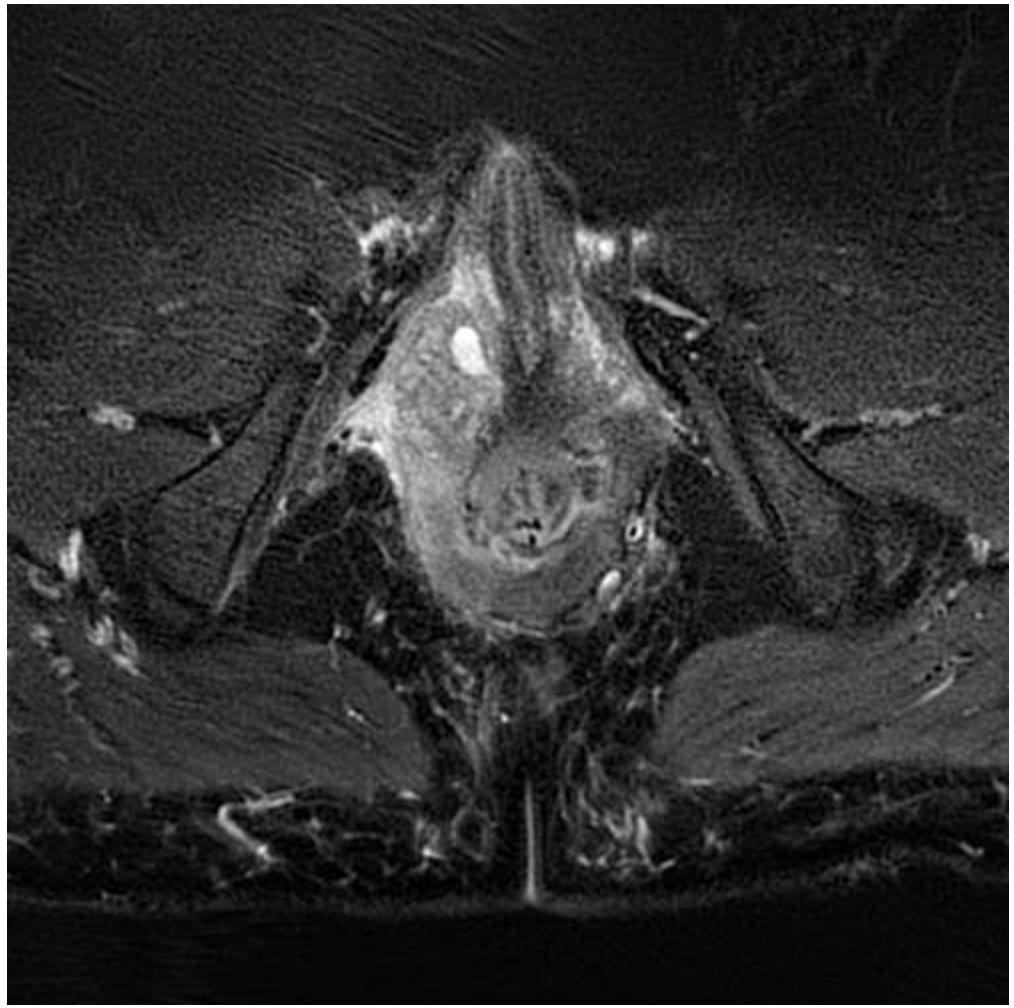


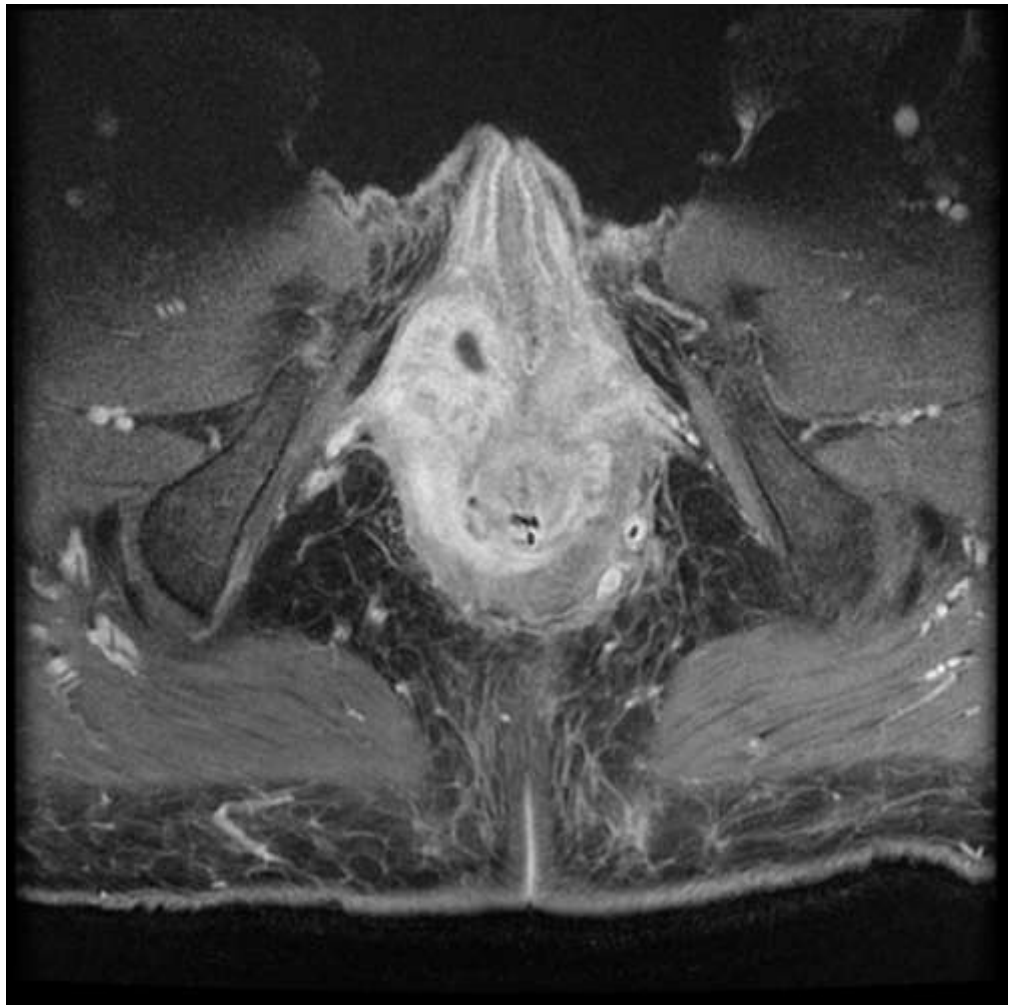








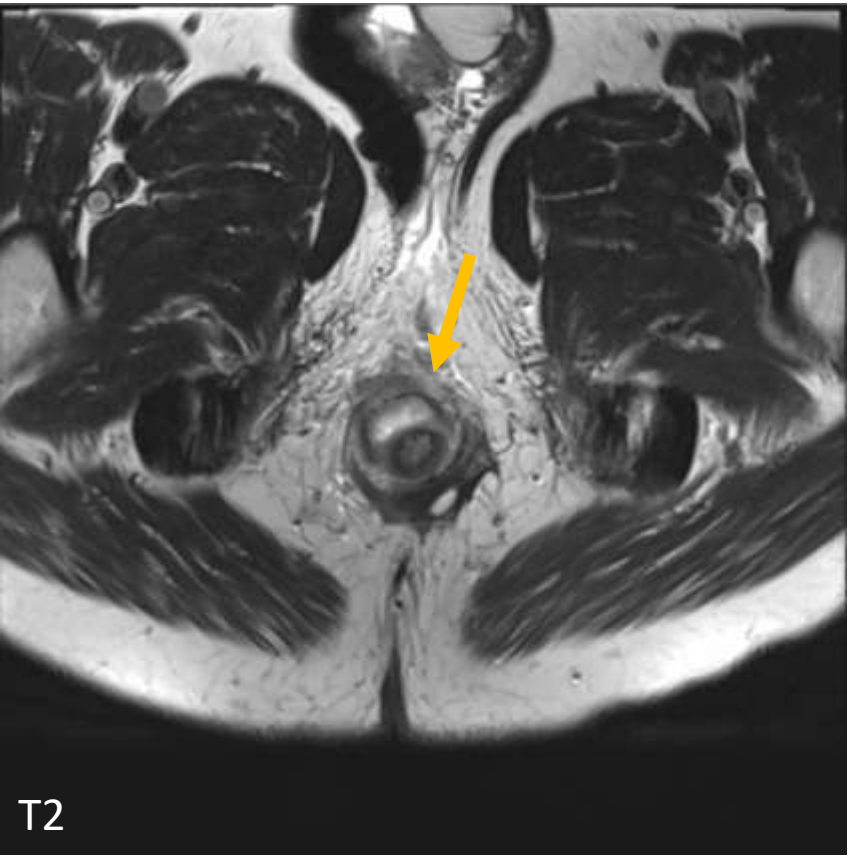


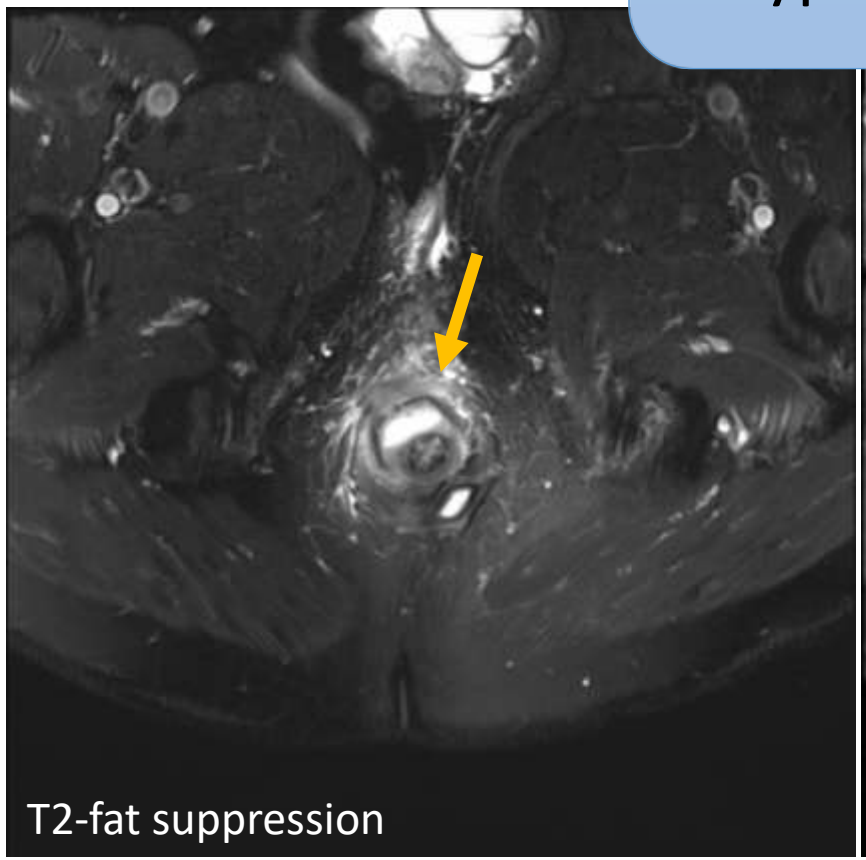


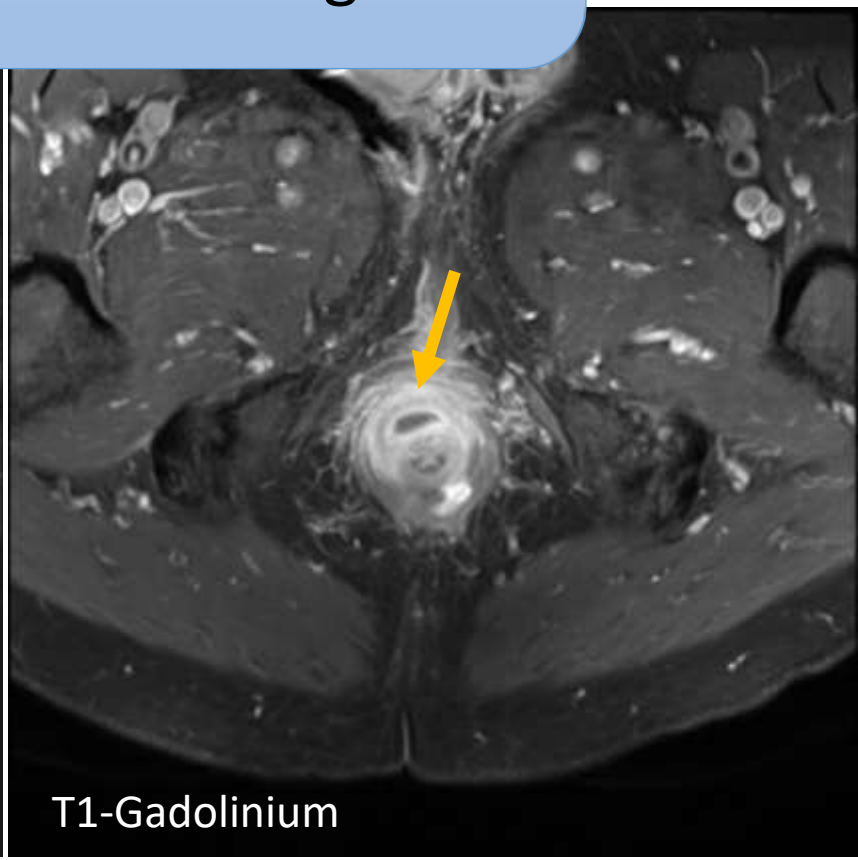
Collections

Fluid collections

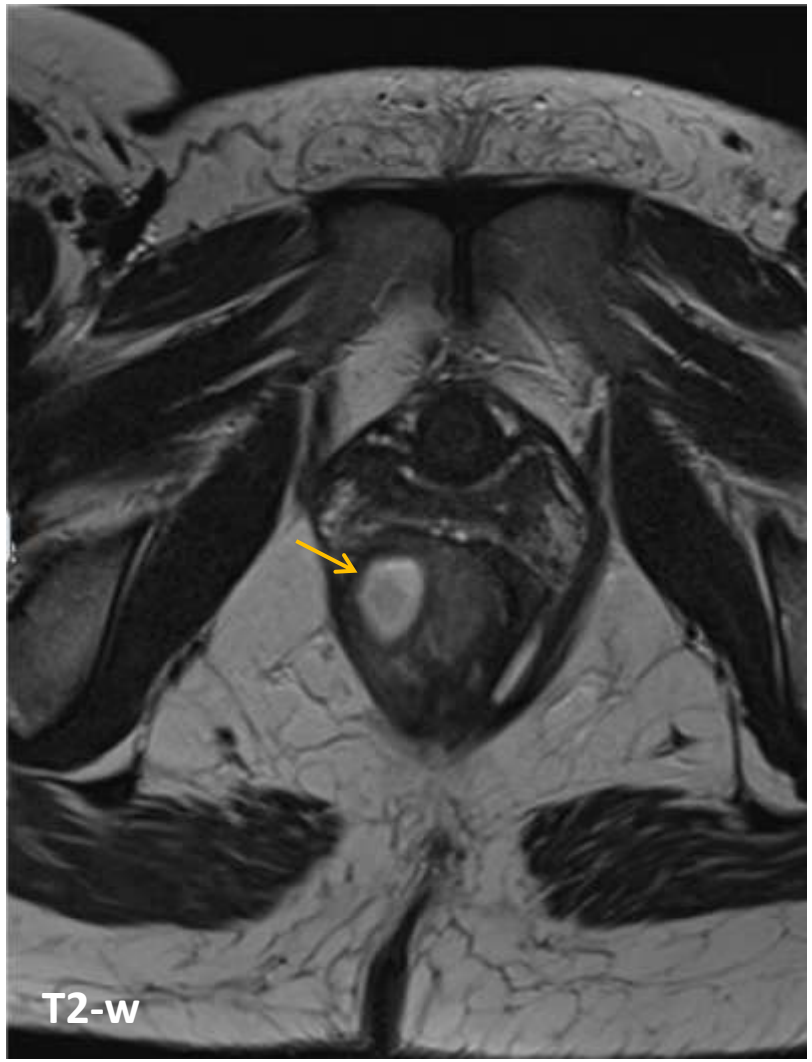
Spheric/ovoid
Fluid content
Hyperenhancing wall

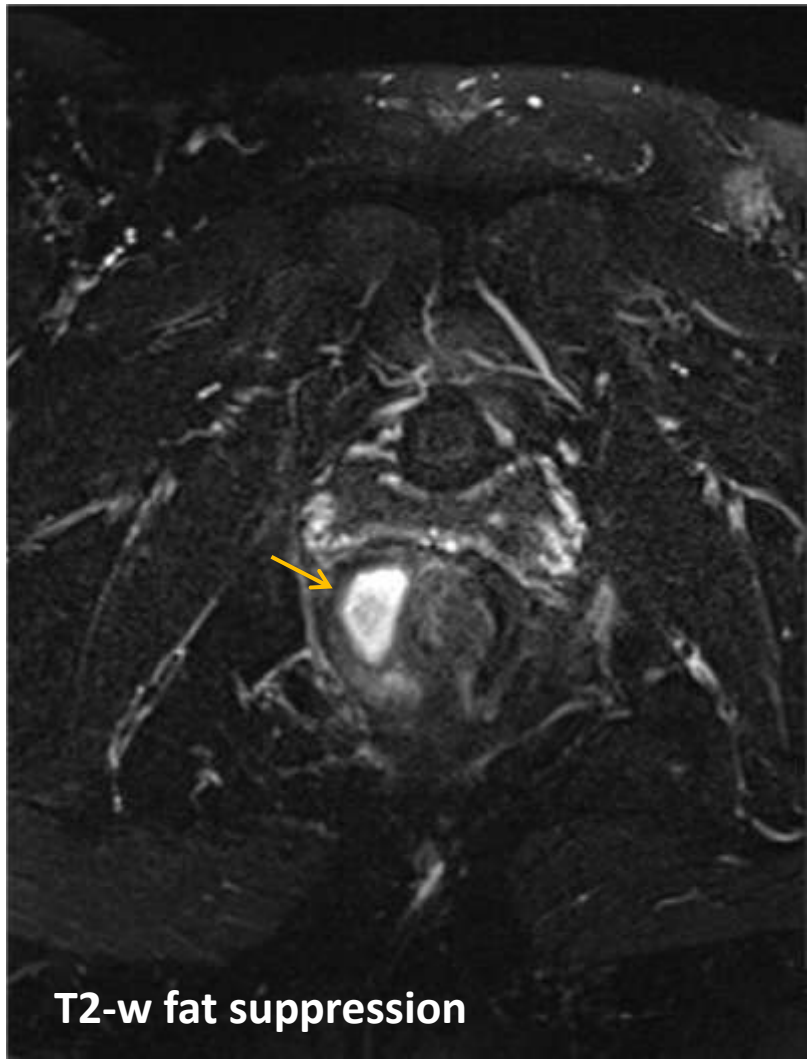


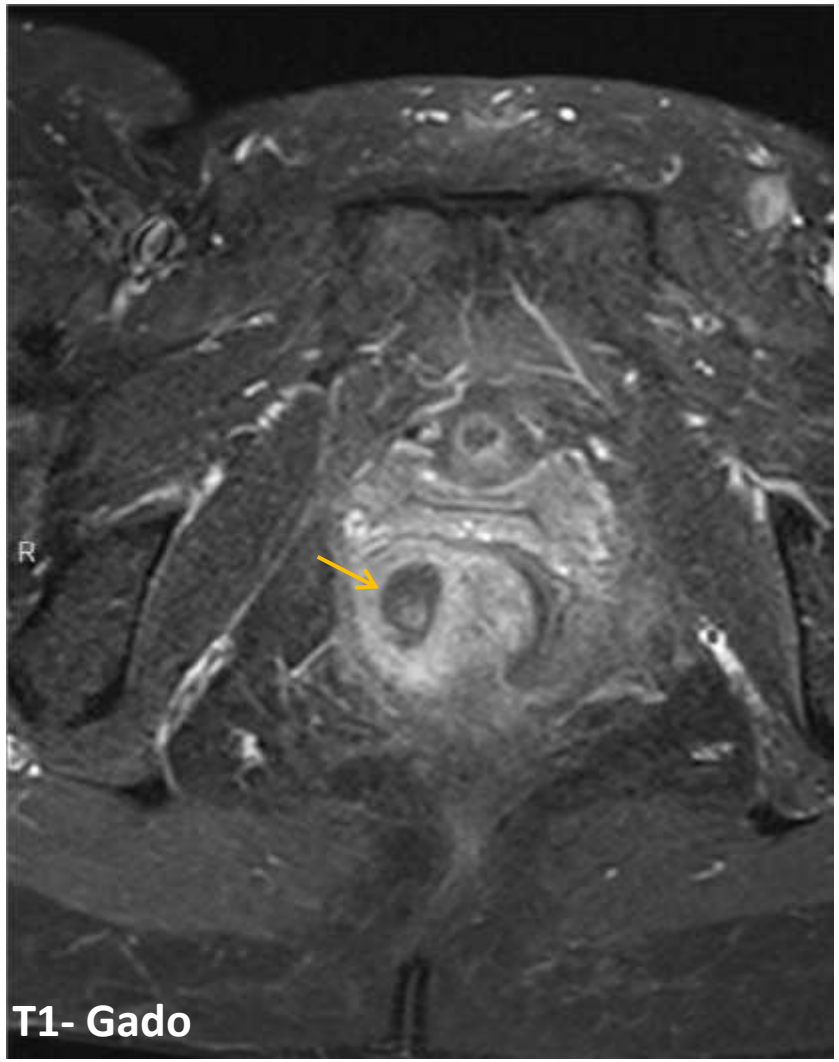




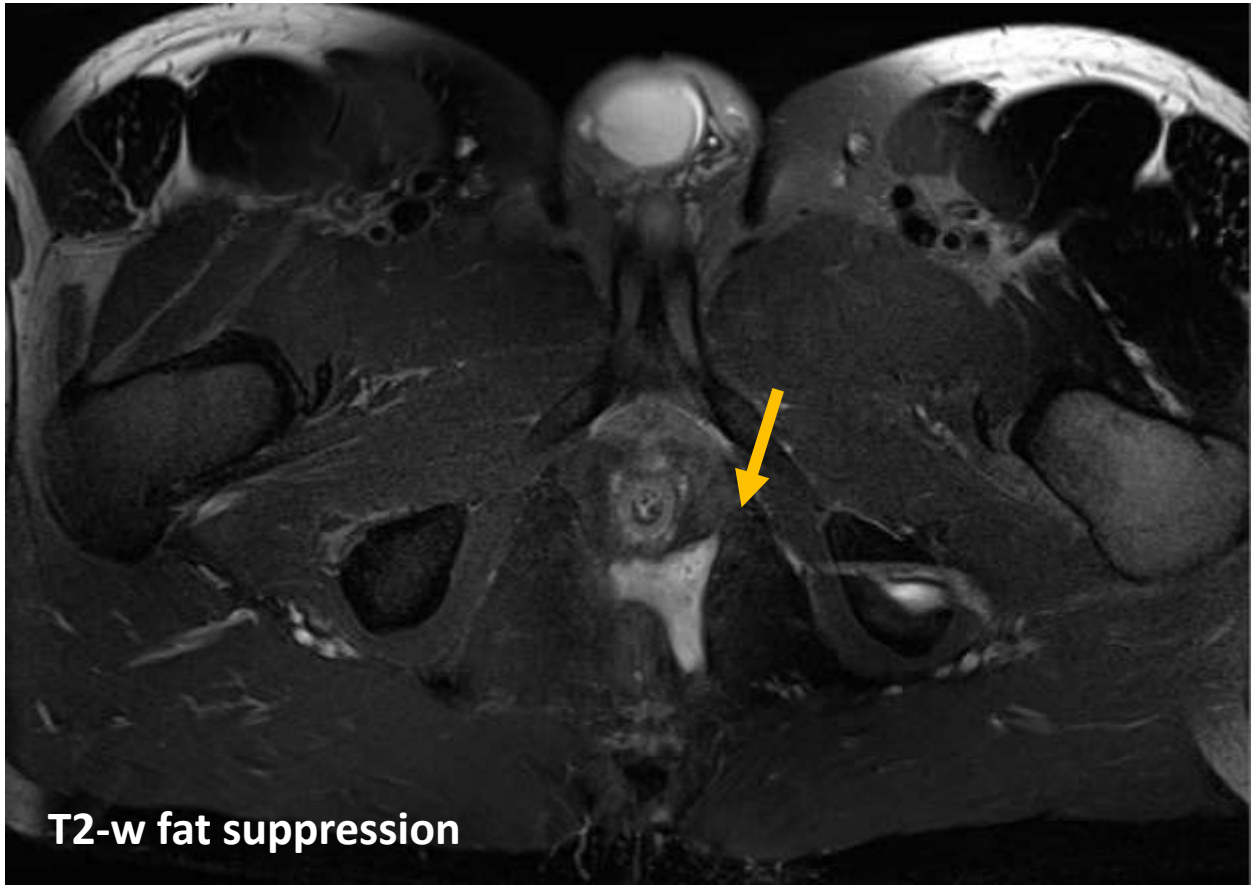
Fluid collection

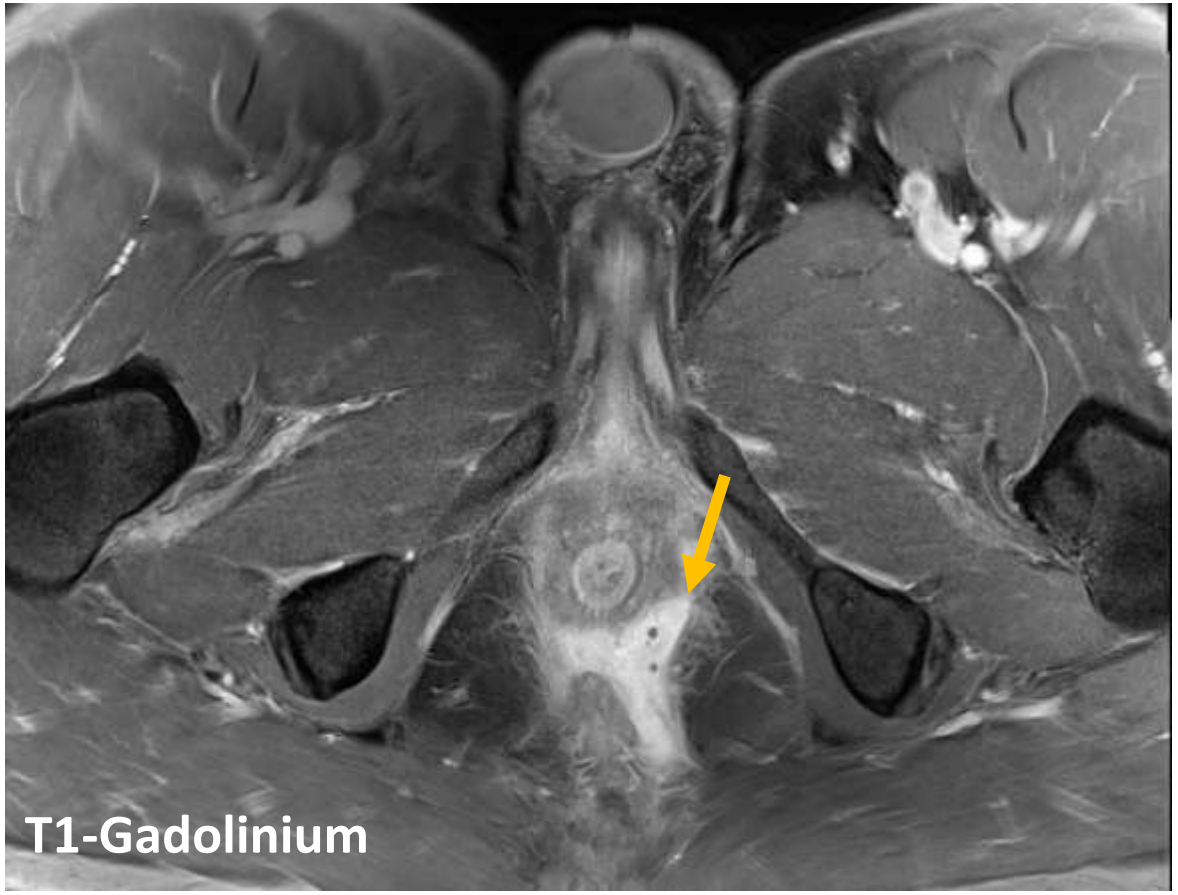

T2-w


T2-w fat suppression

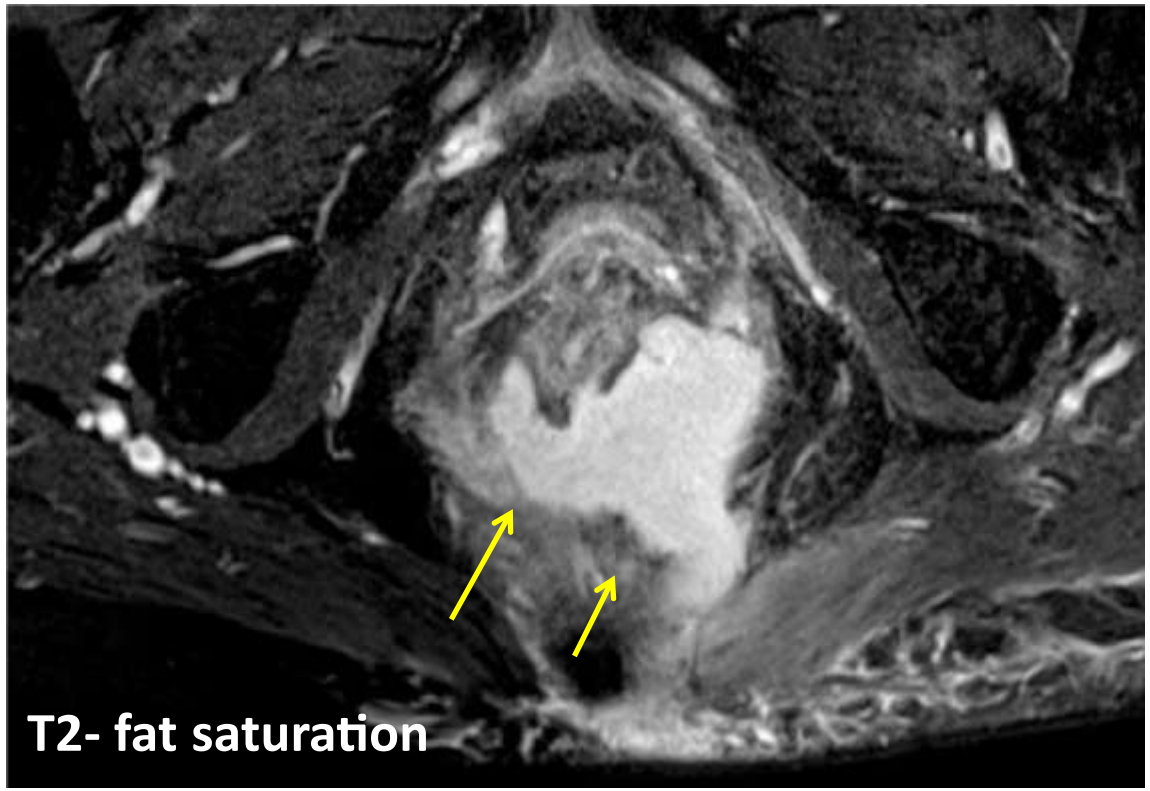

R
T1- Gado

Fluid collection?

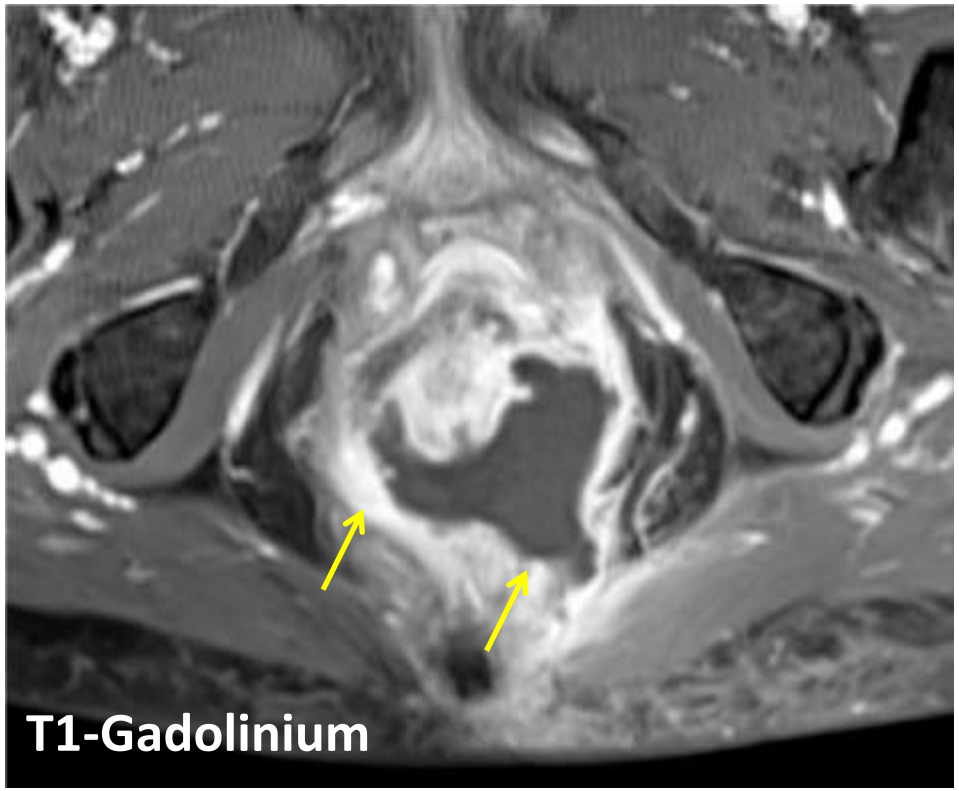




Fluid collection?

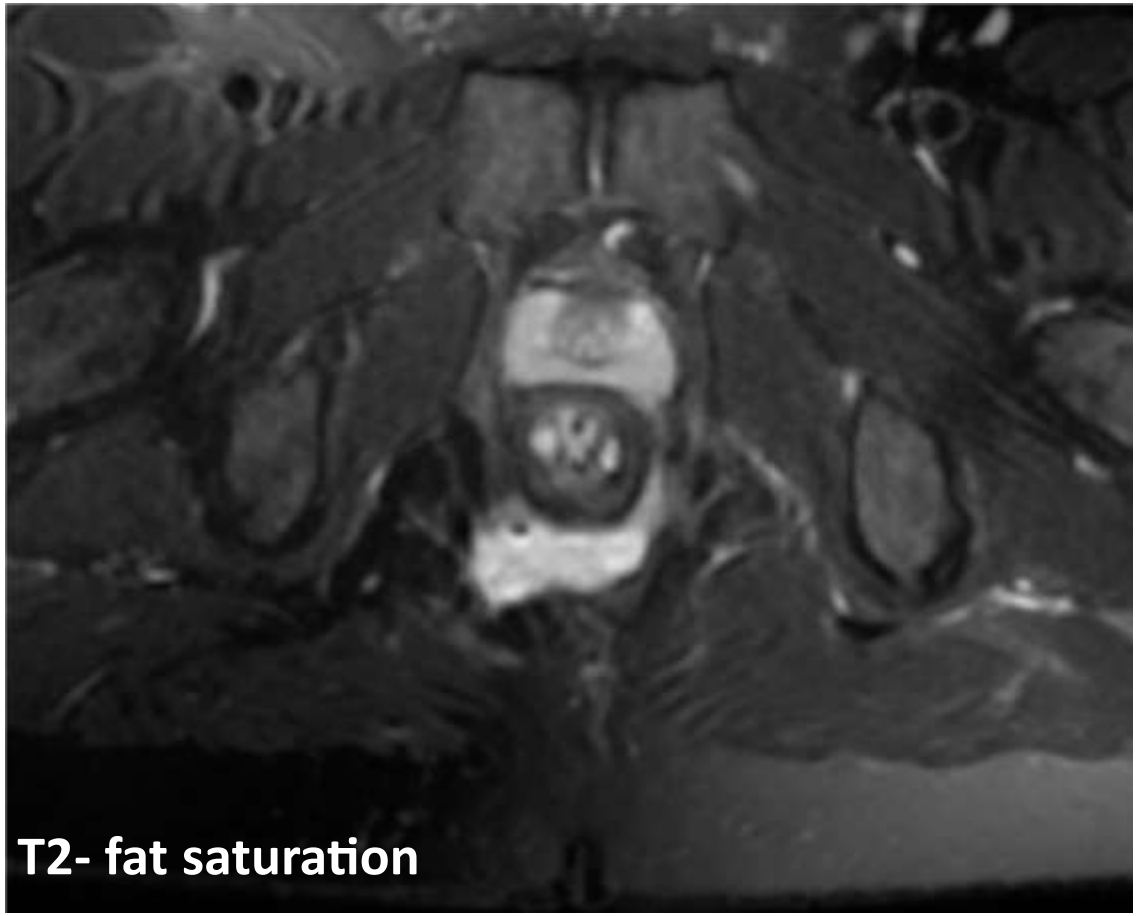


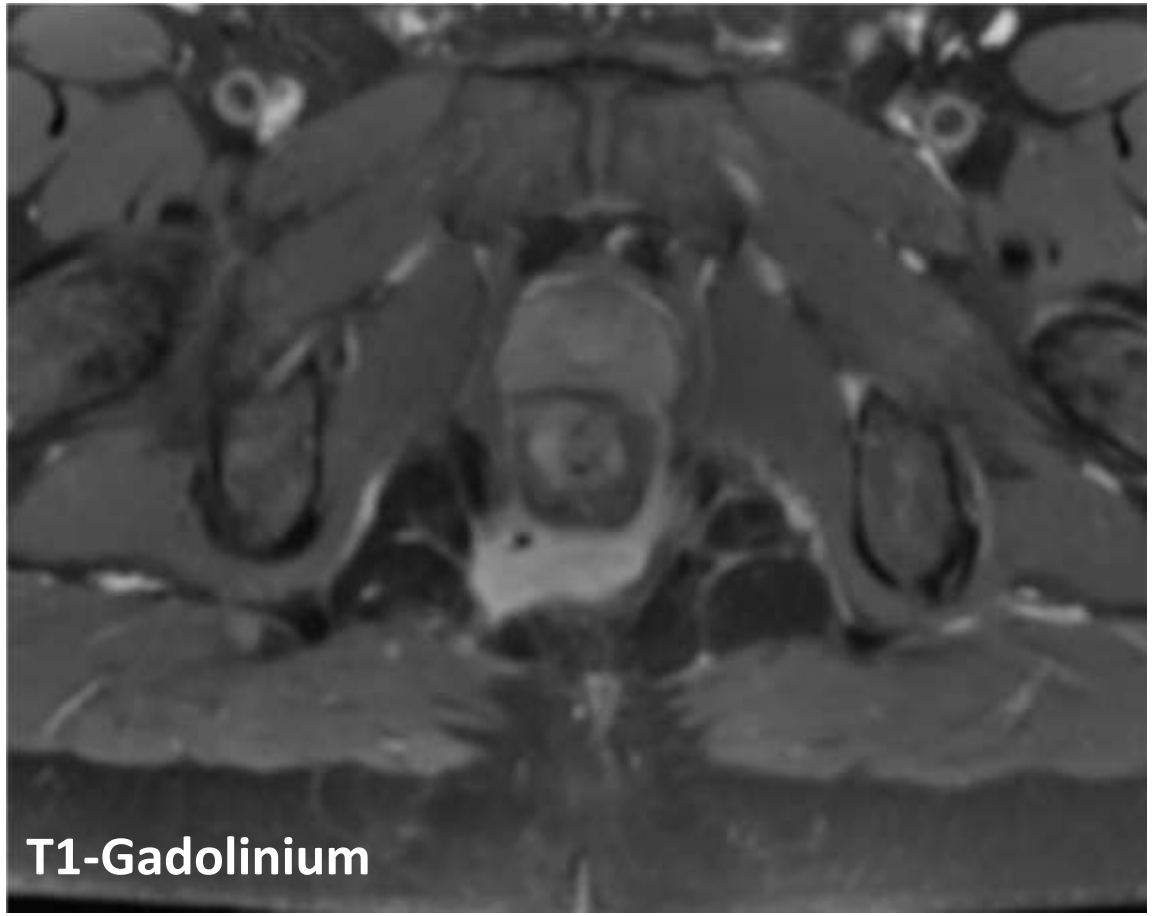
Diffuse enhancement:
Inflammatory mass



Fluid collection?

Spheric/ovoid fluid content + hyperenhancing wall

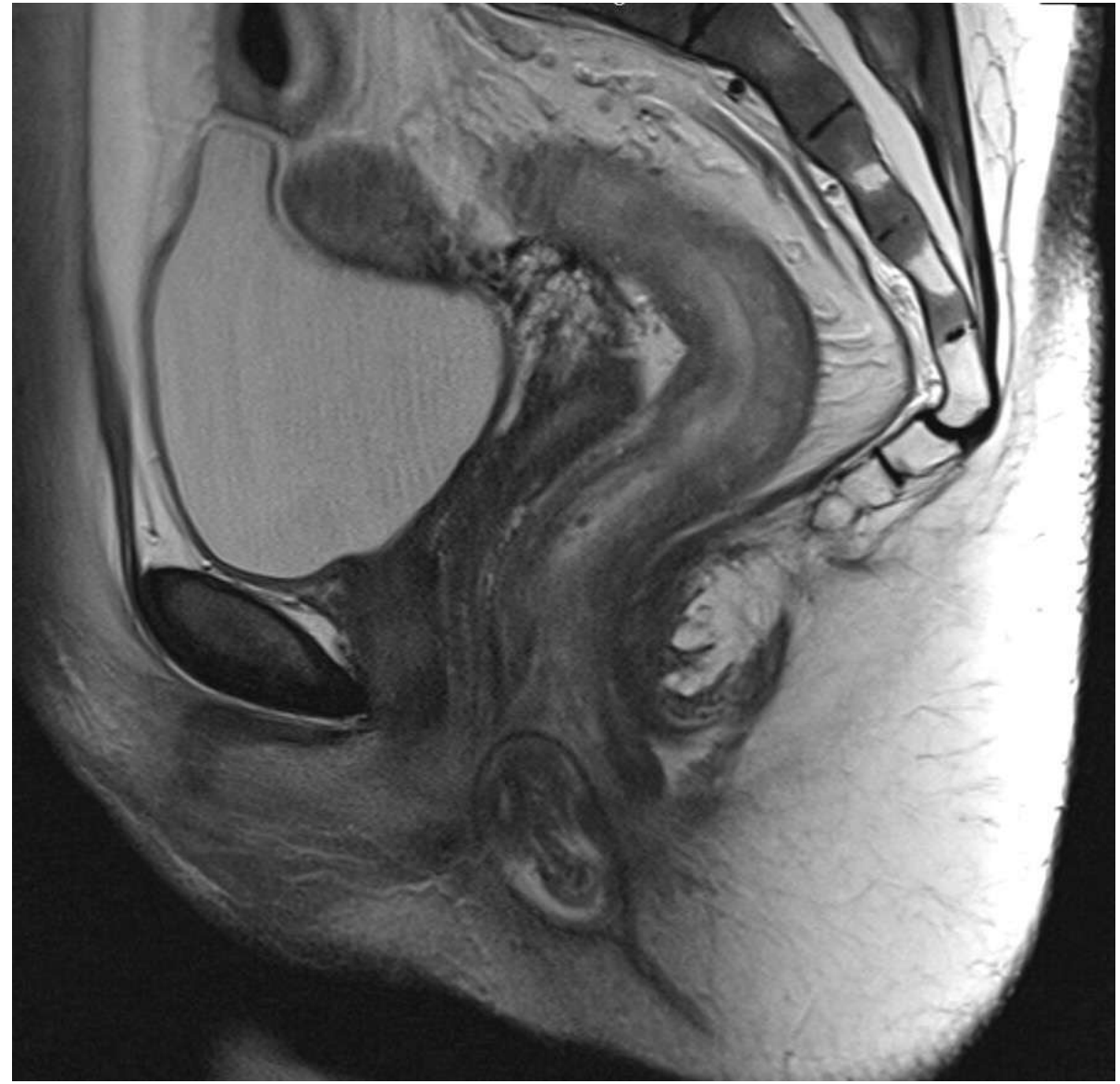




Fluid collection?

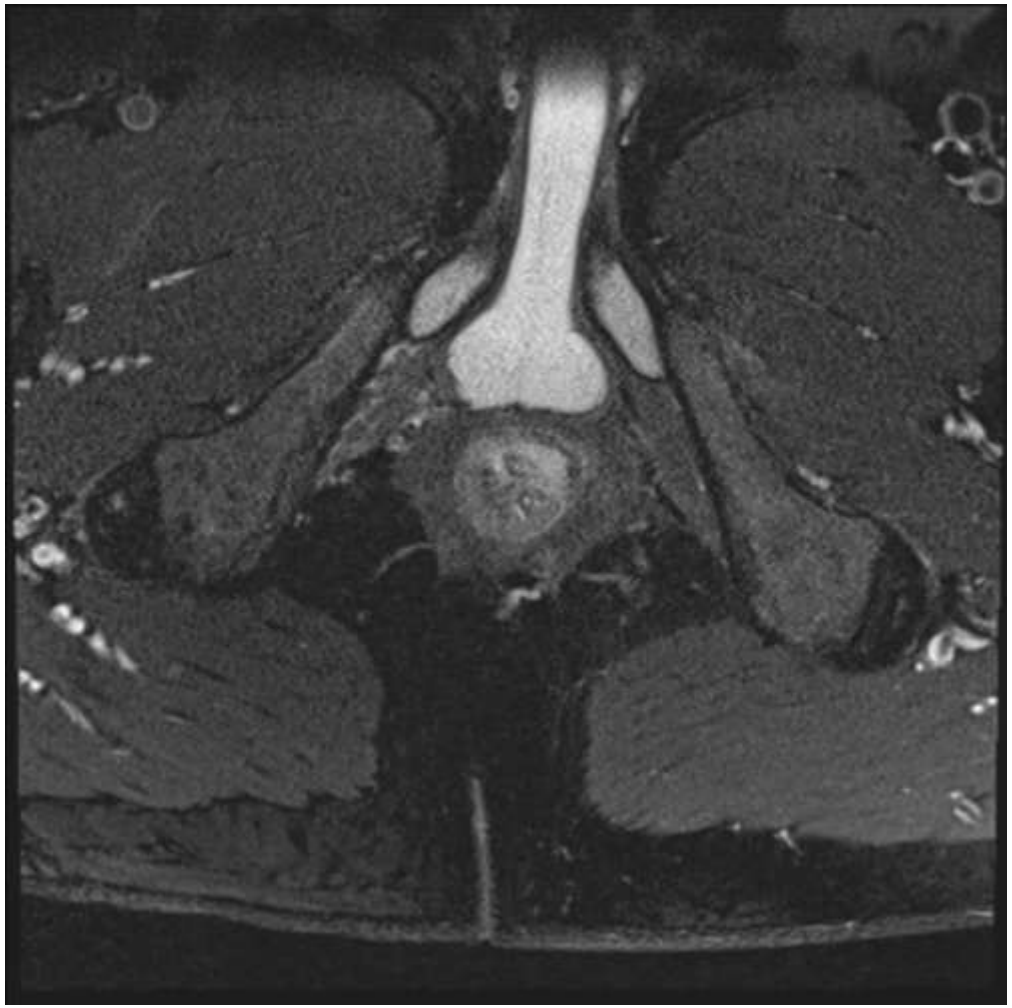
Diffuse enhancement: solid lesion
Inflammatory mass

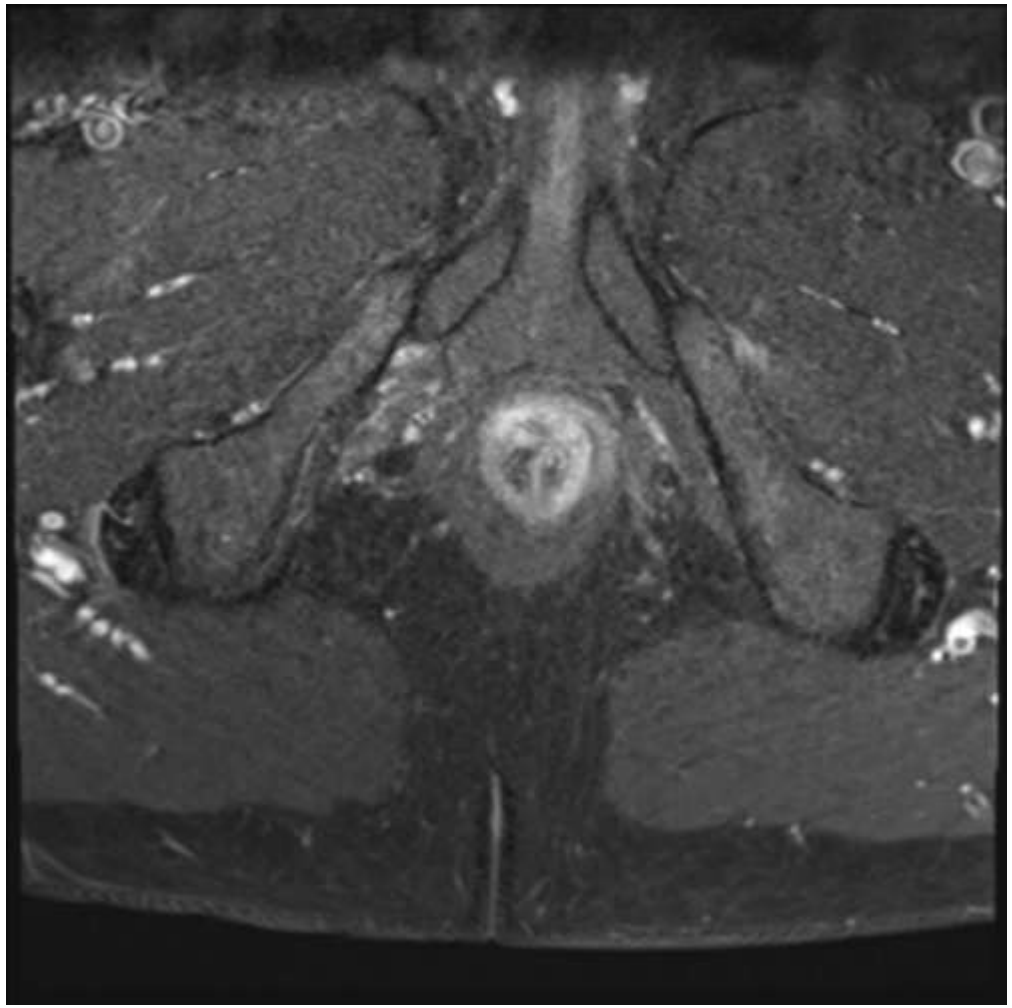
Seton

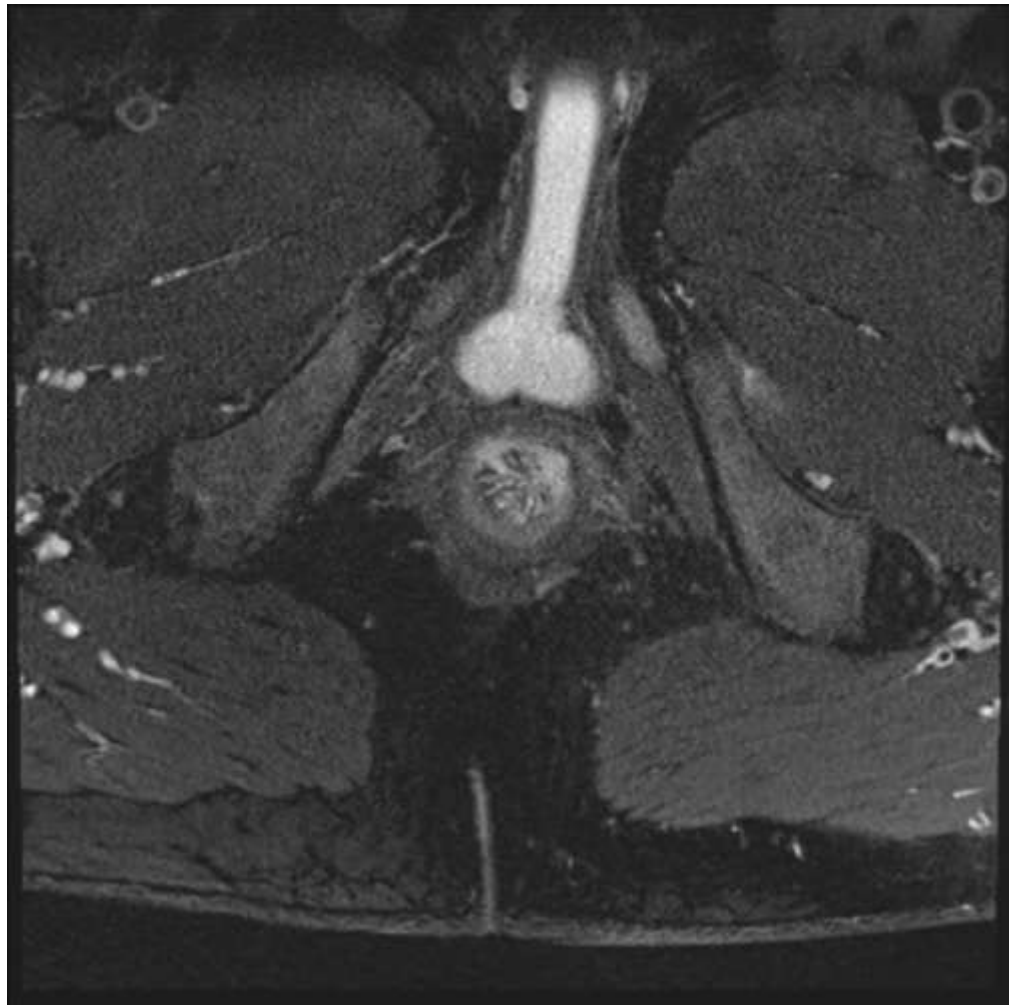


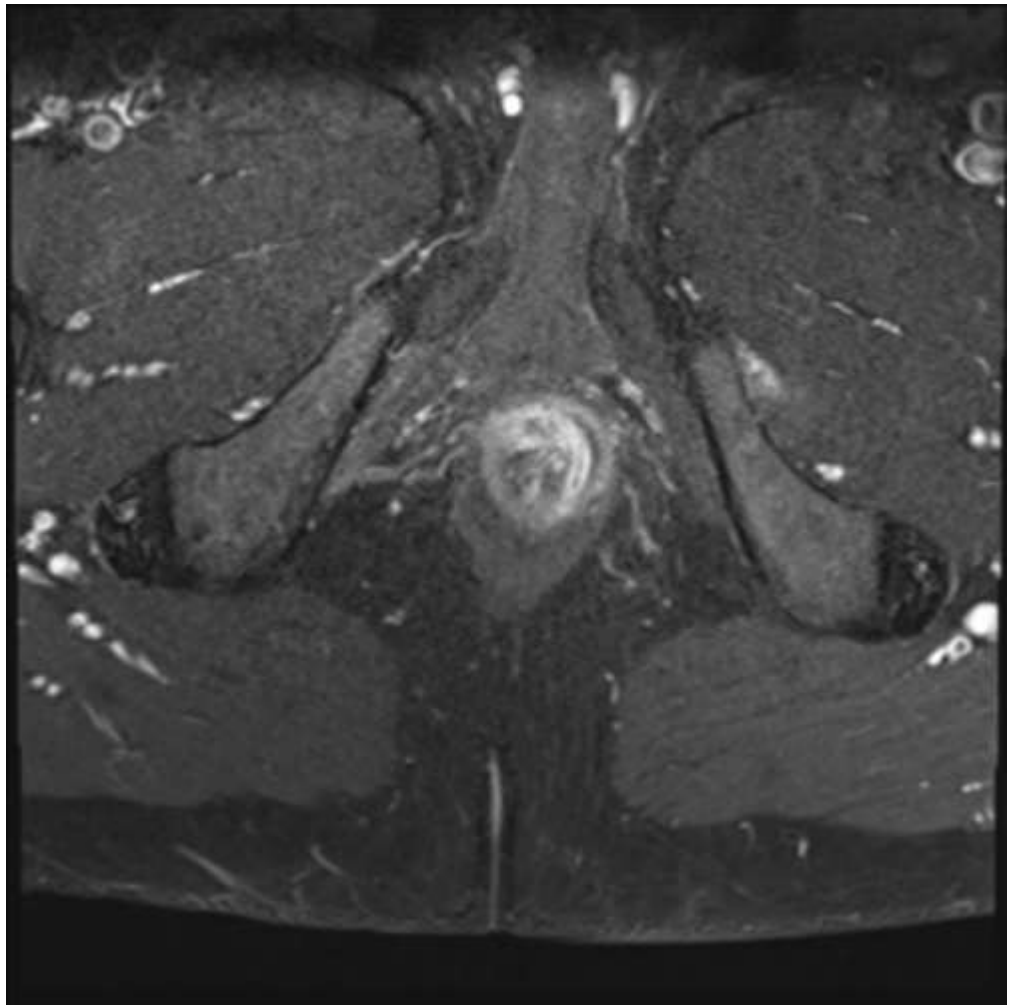
Questions - evaluation

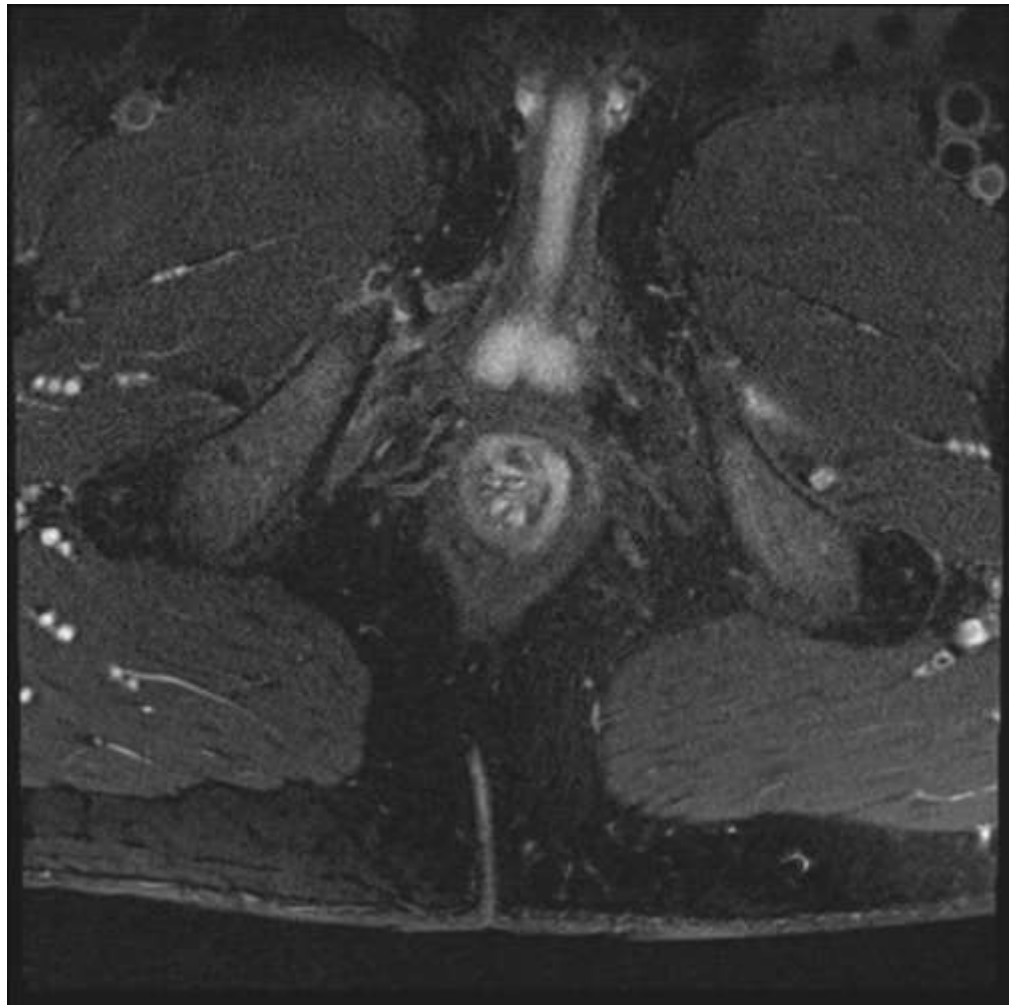
Case 1

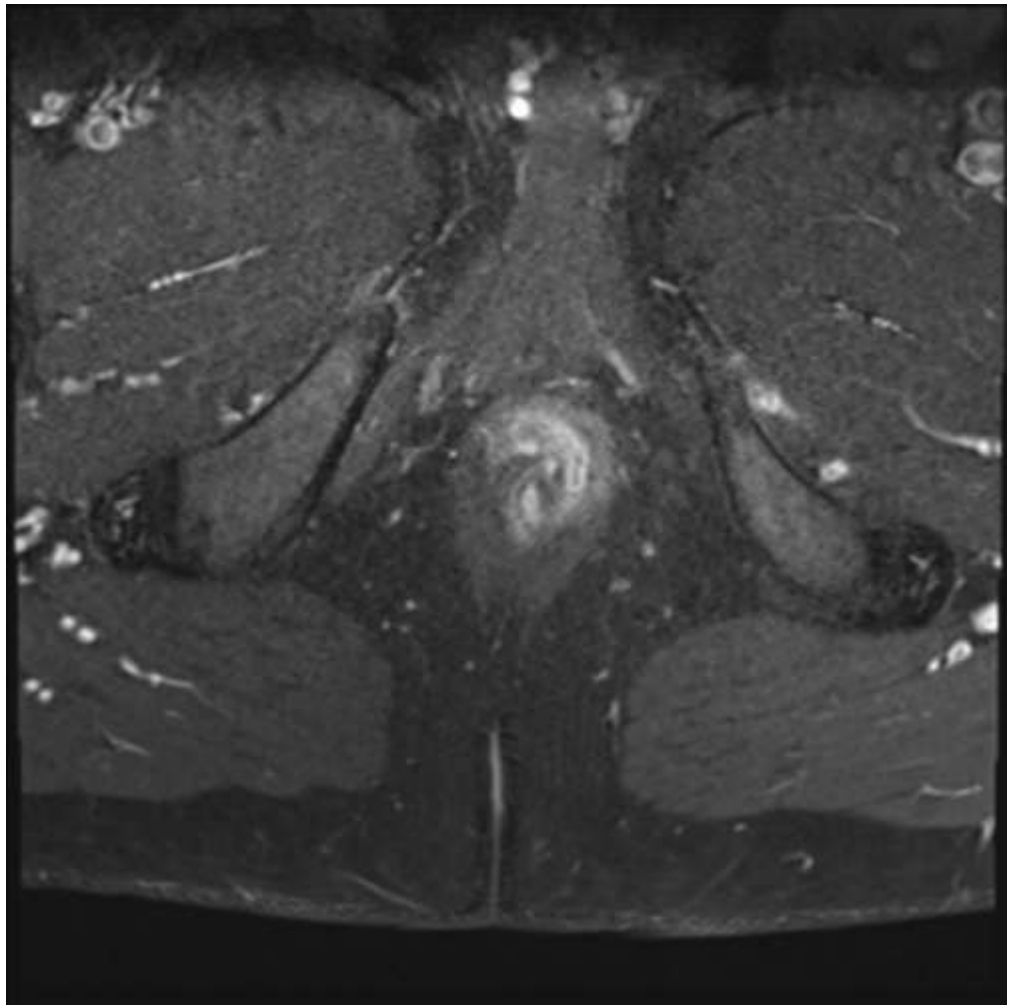


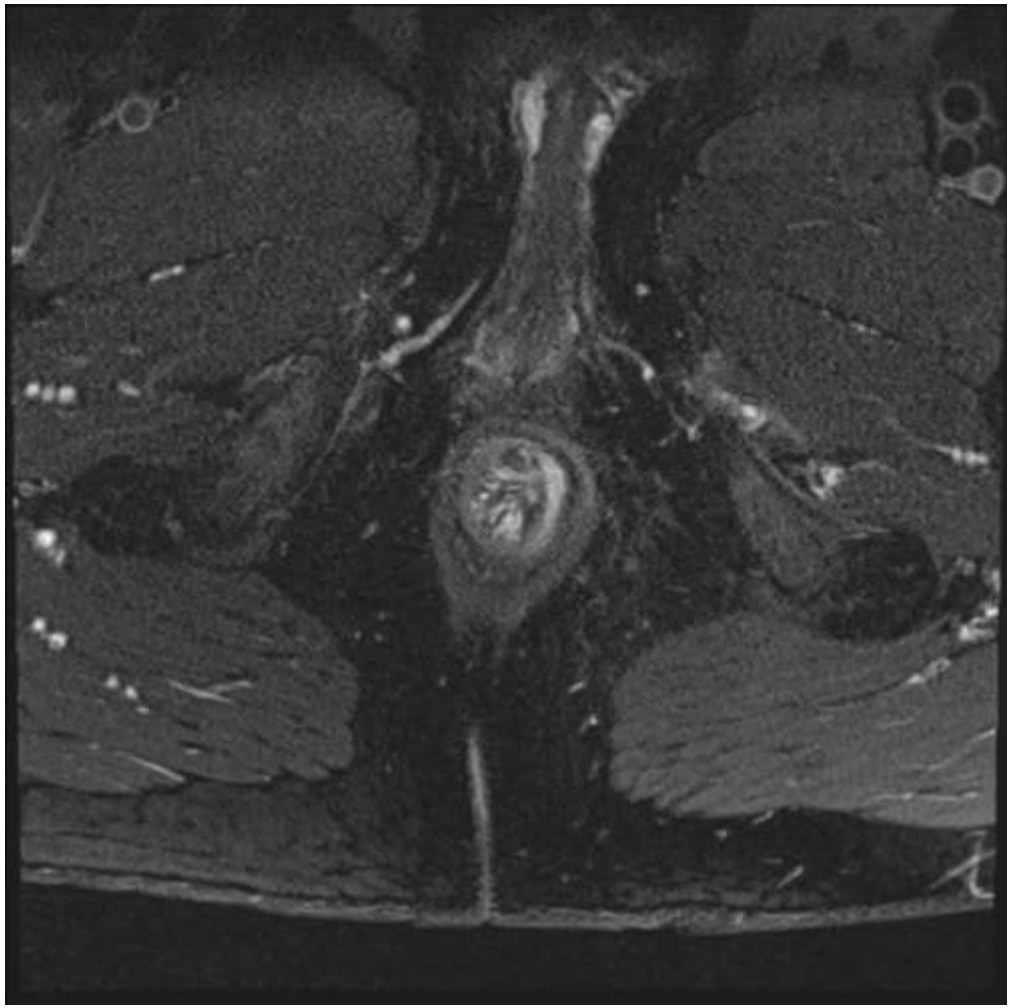


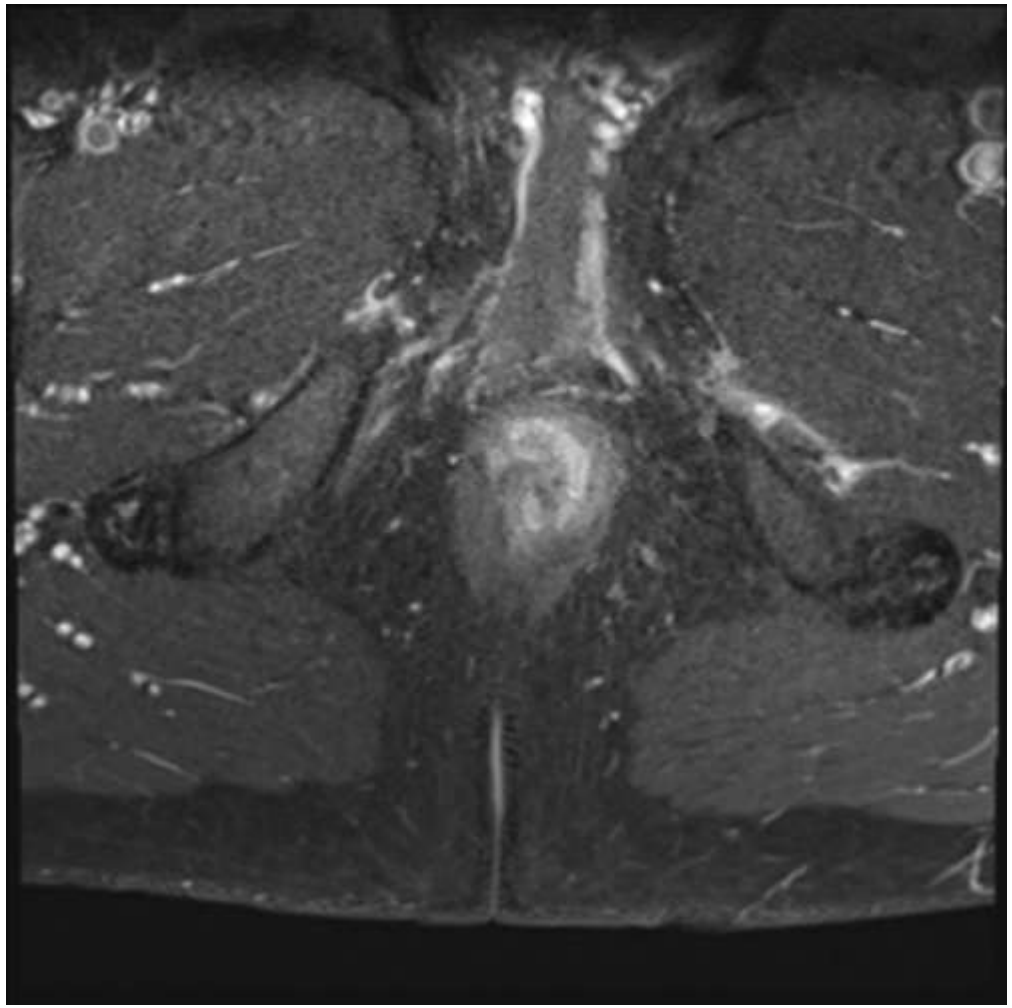


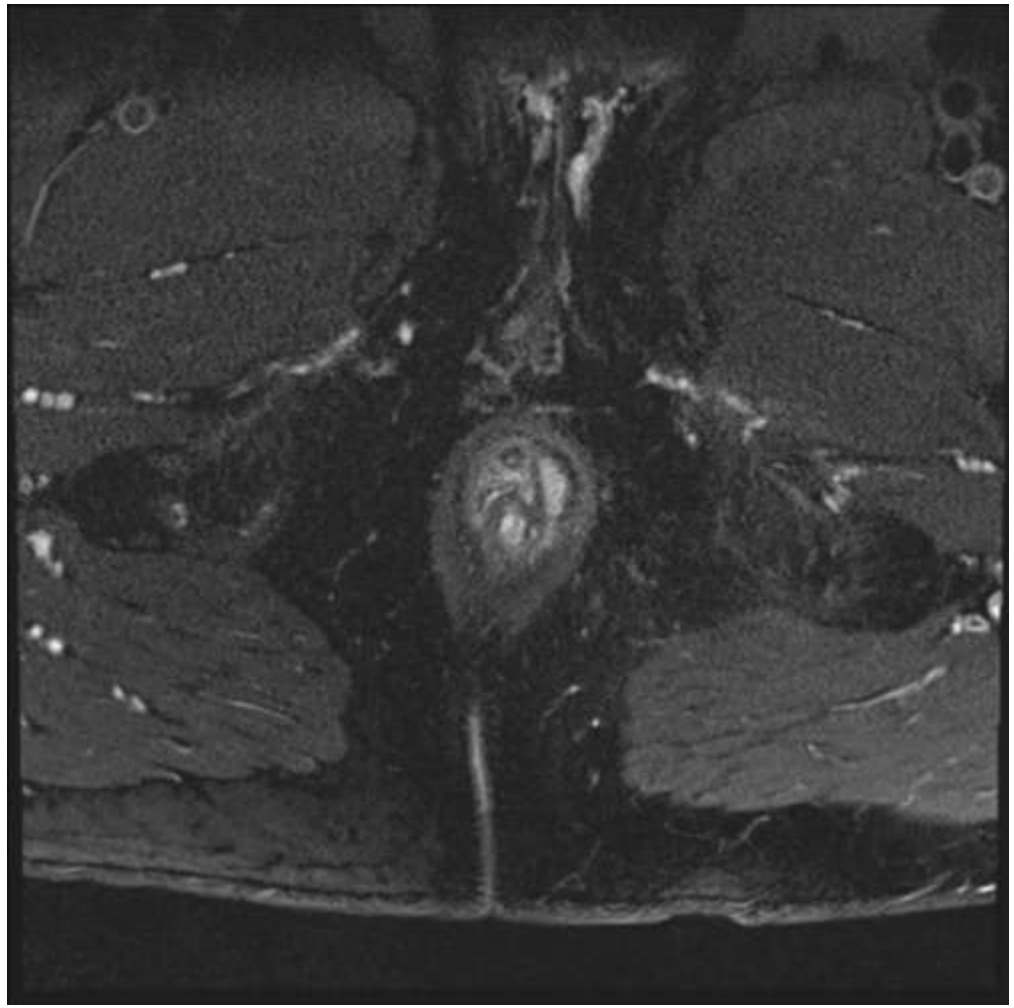


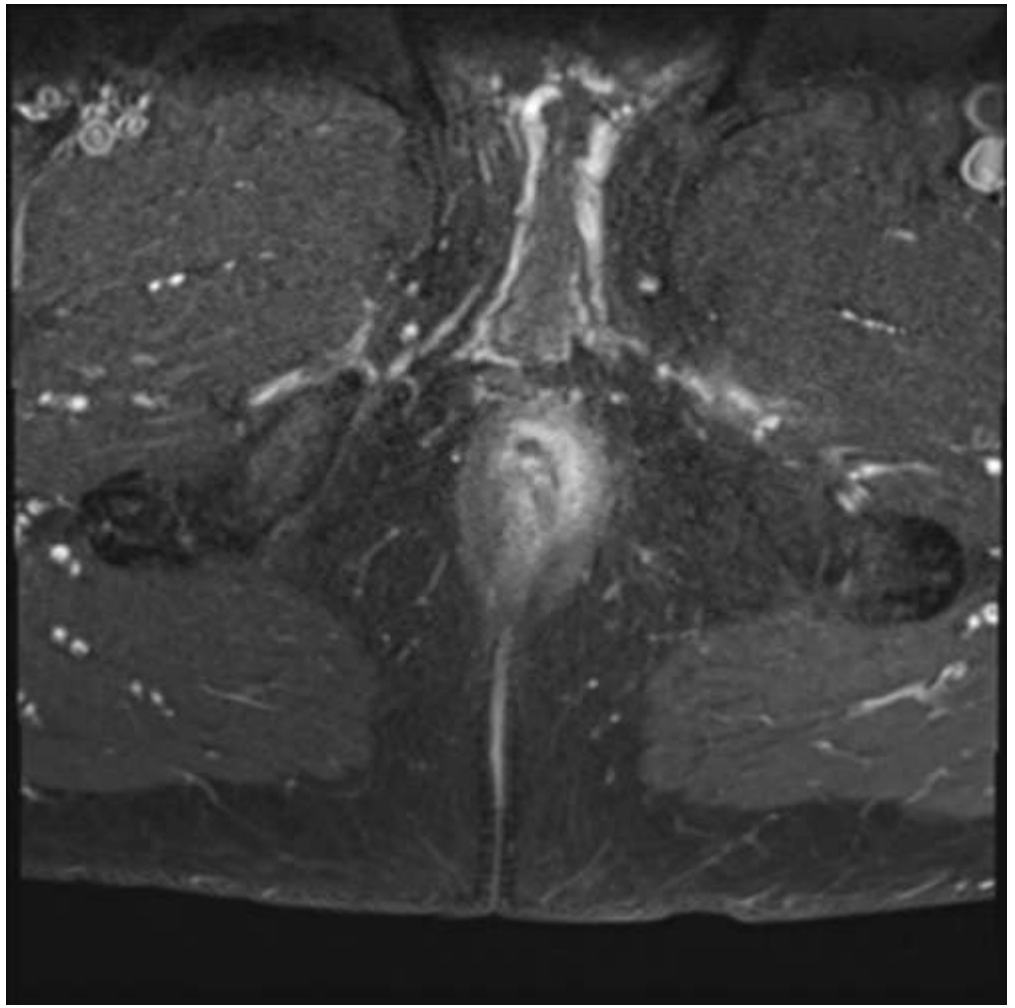


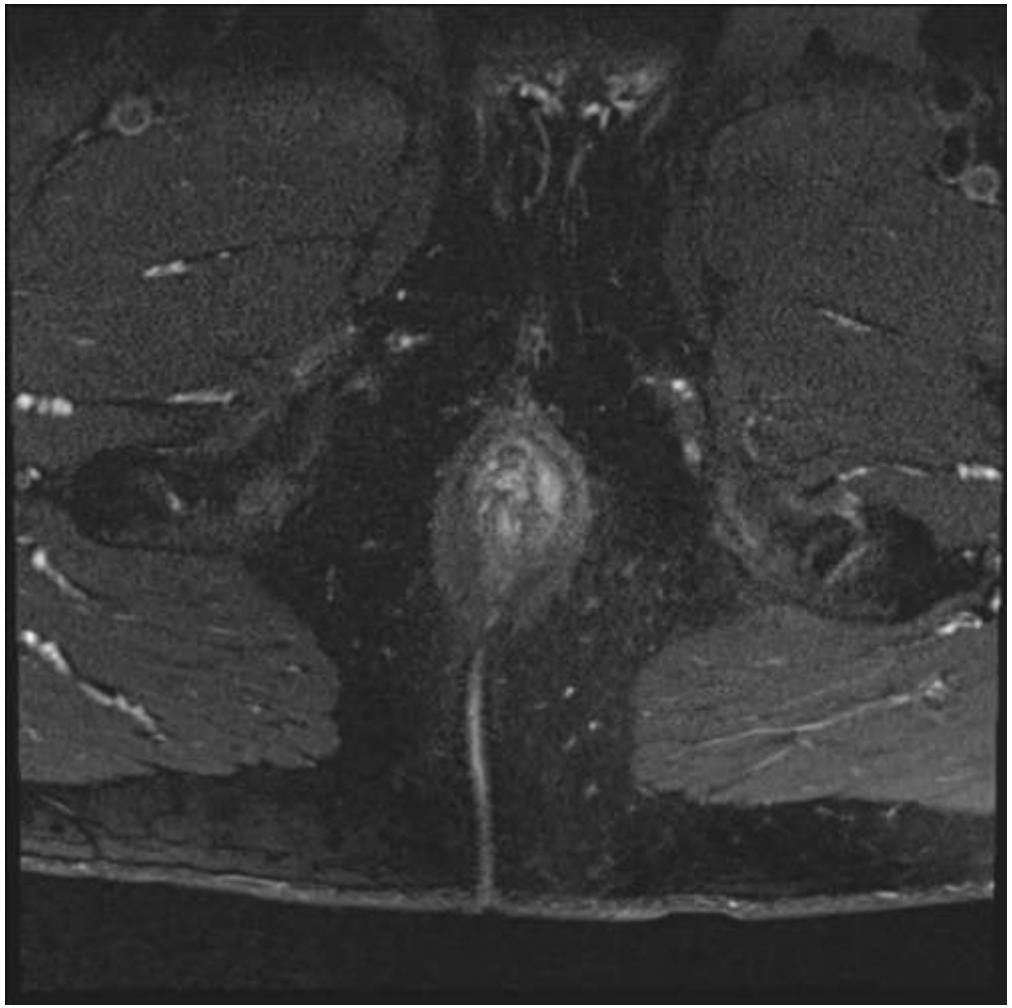


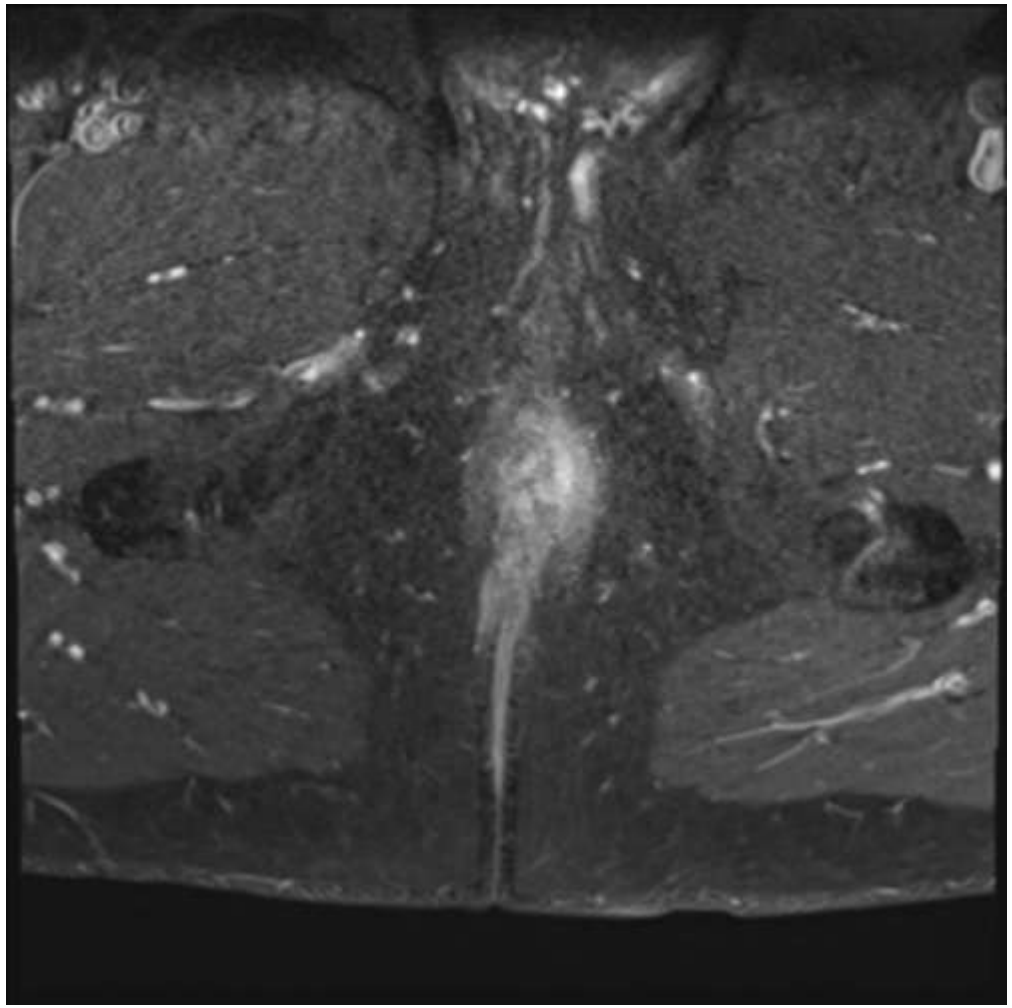


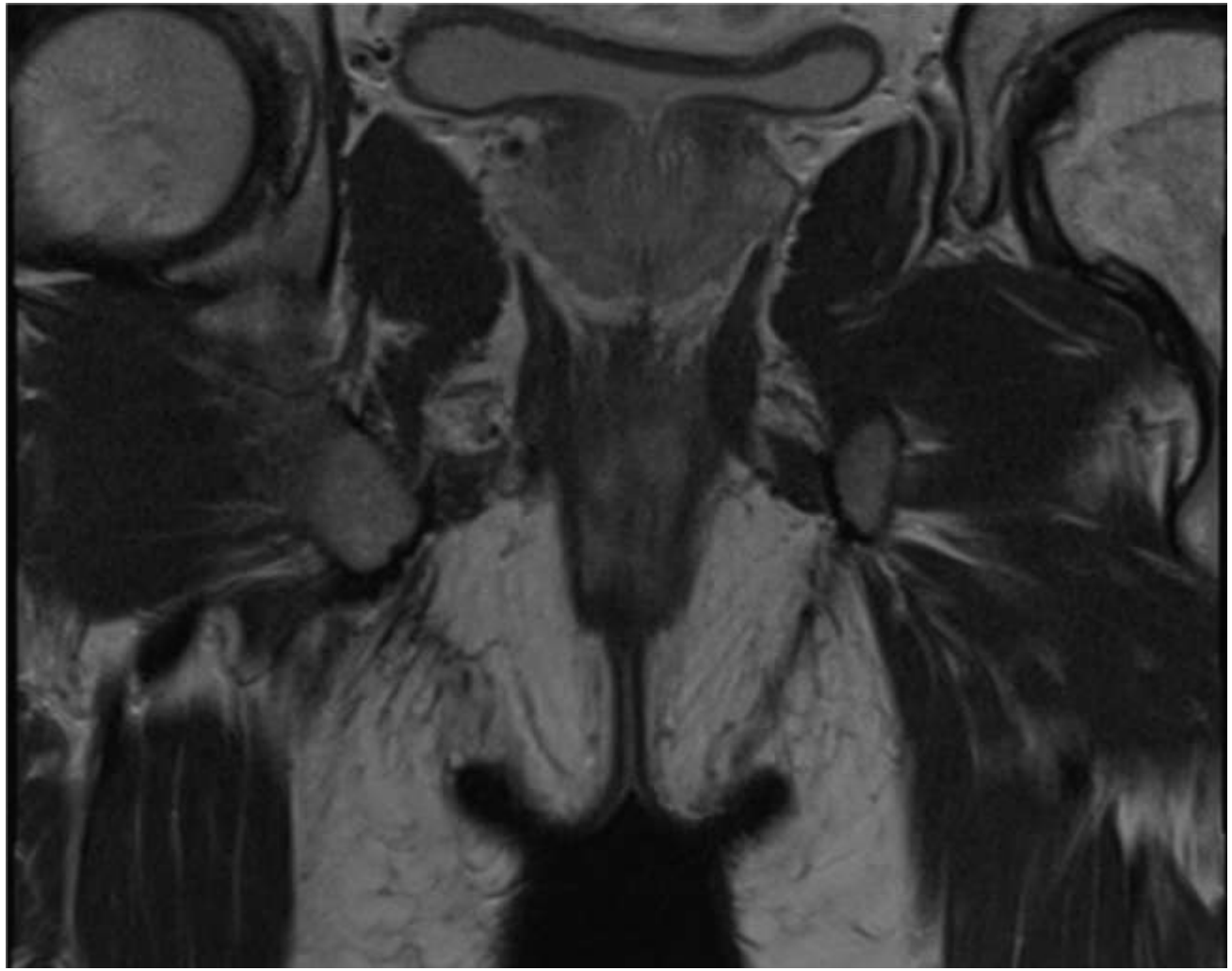


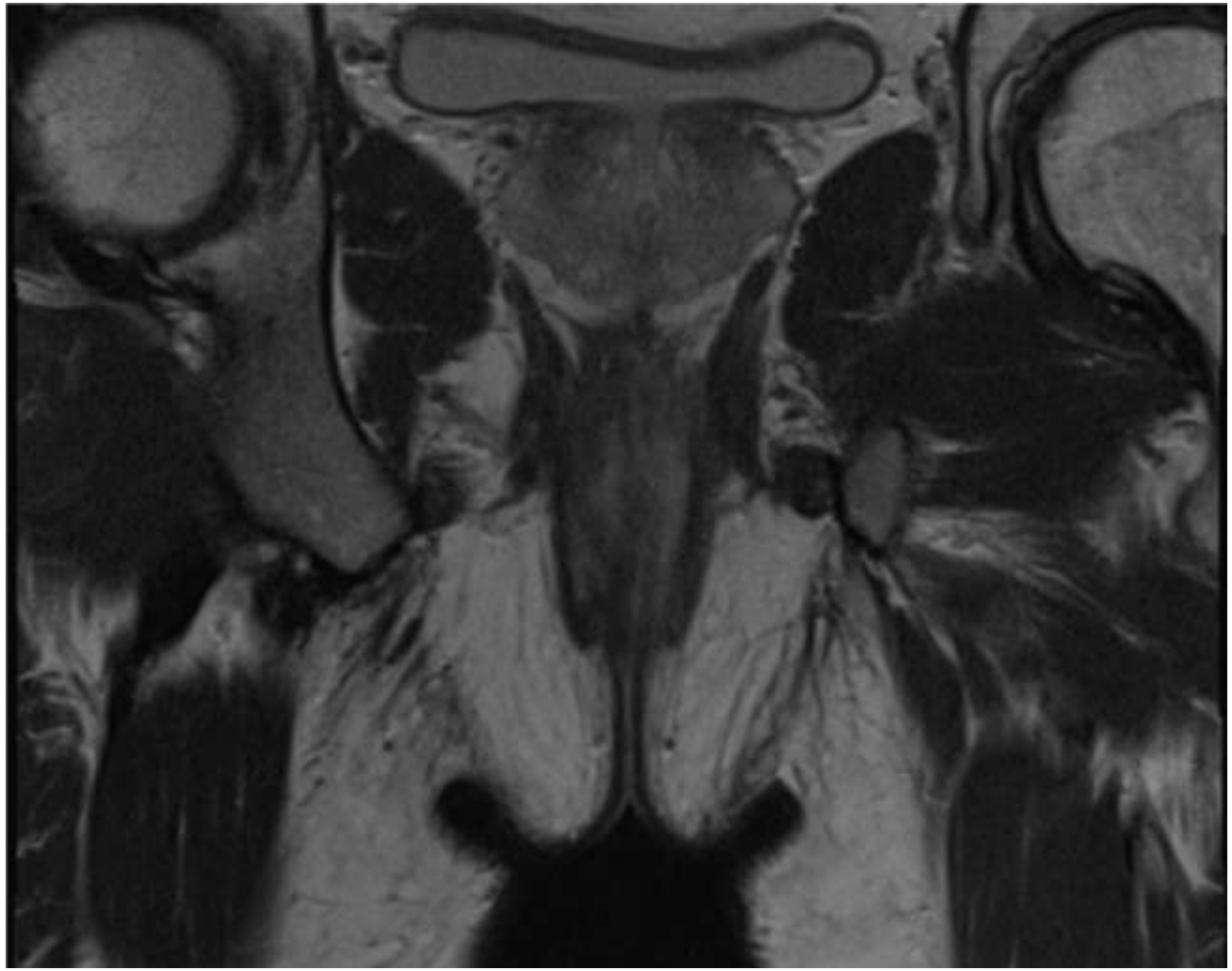


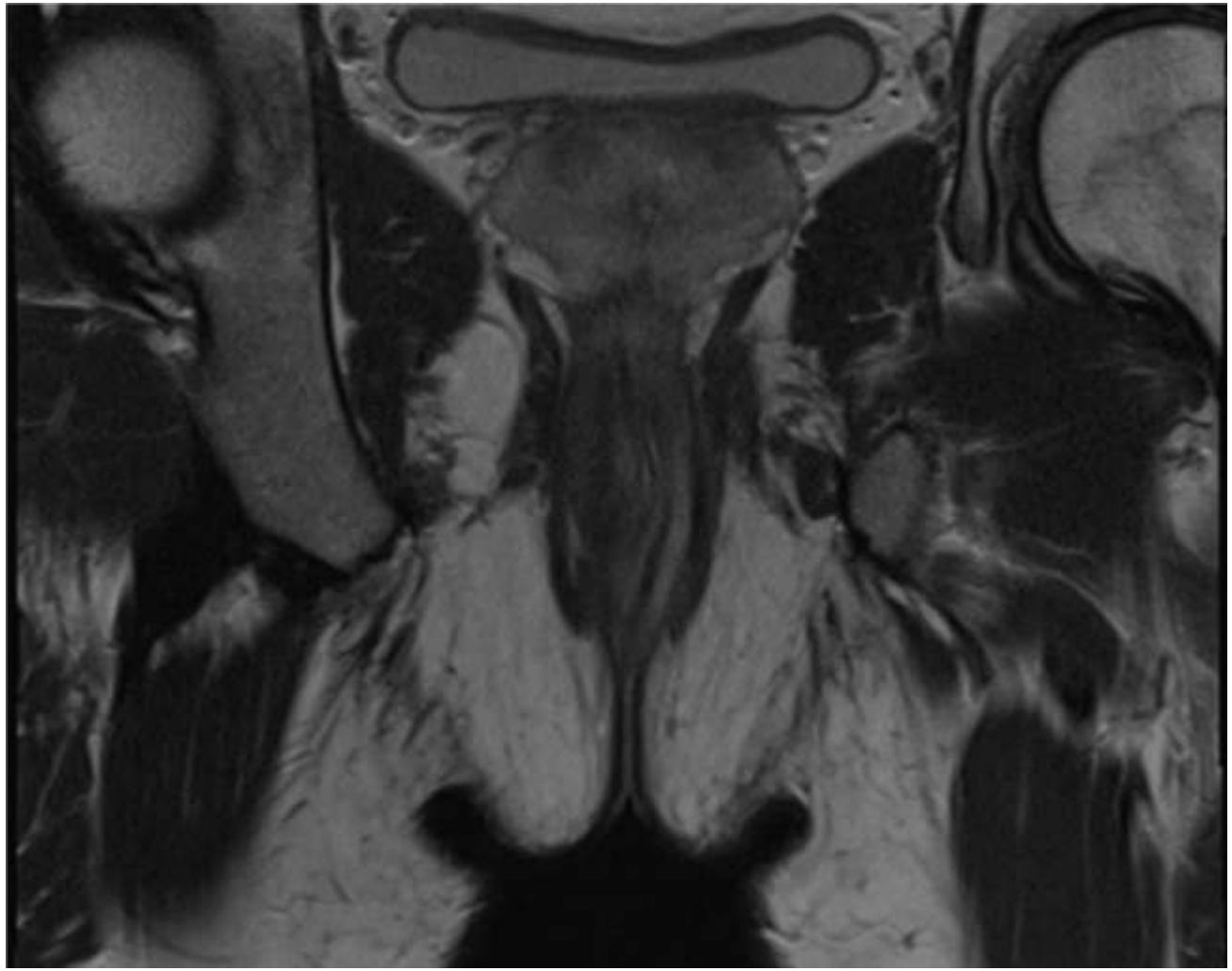


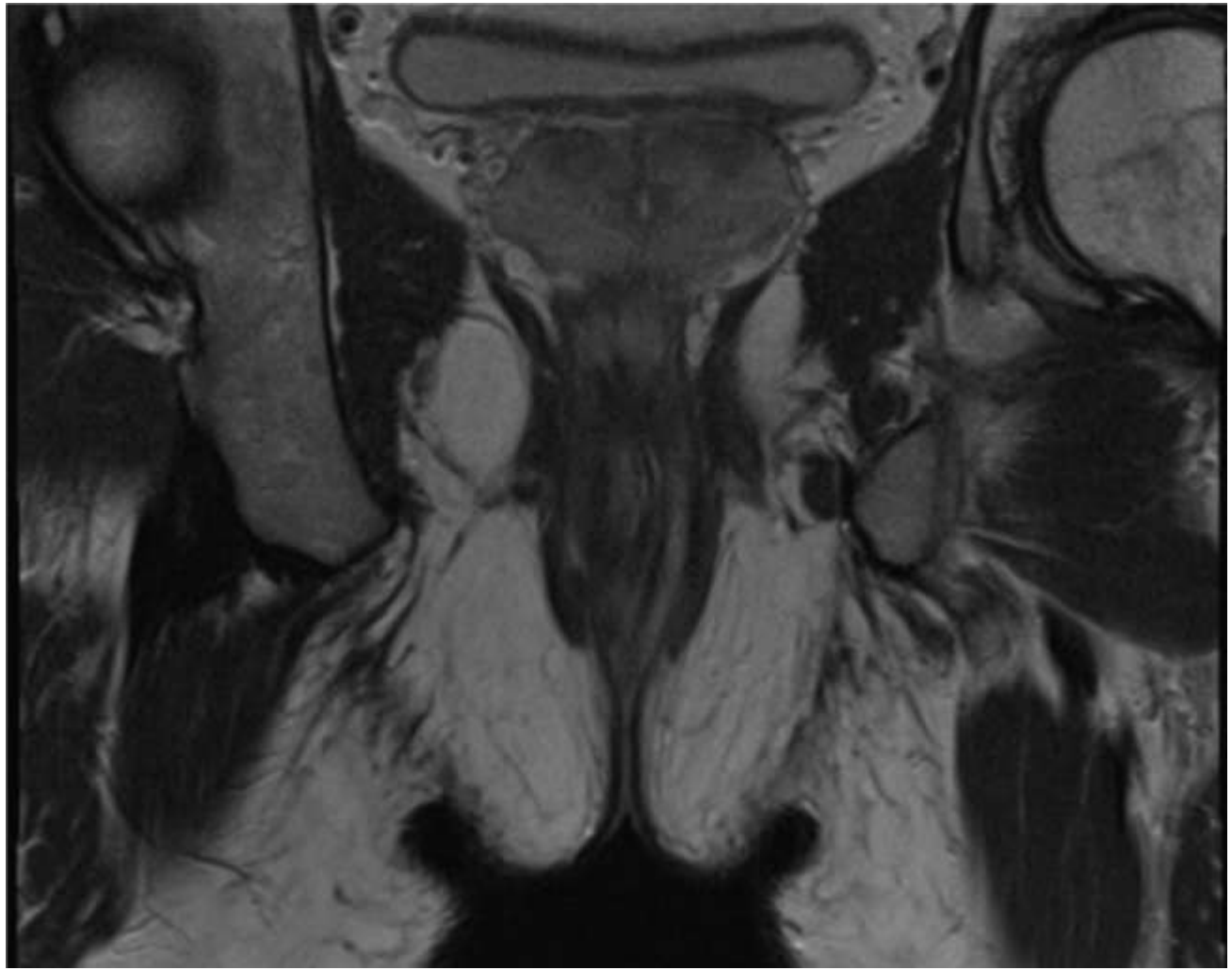


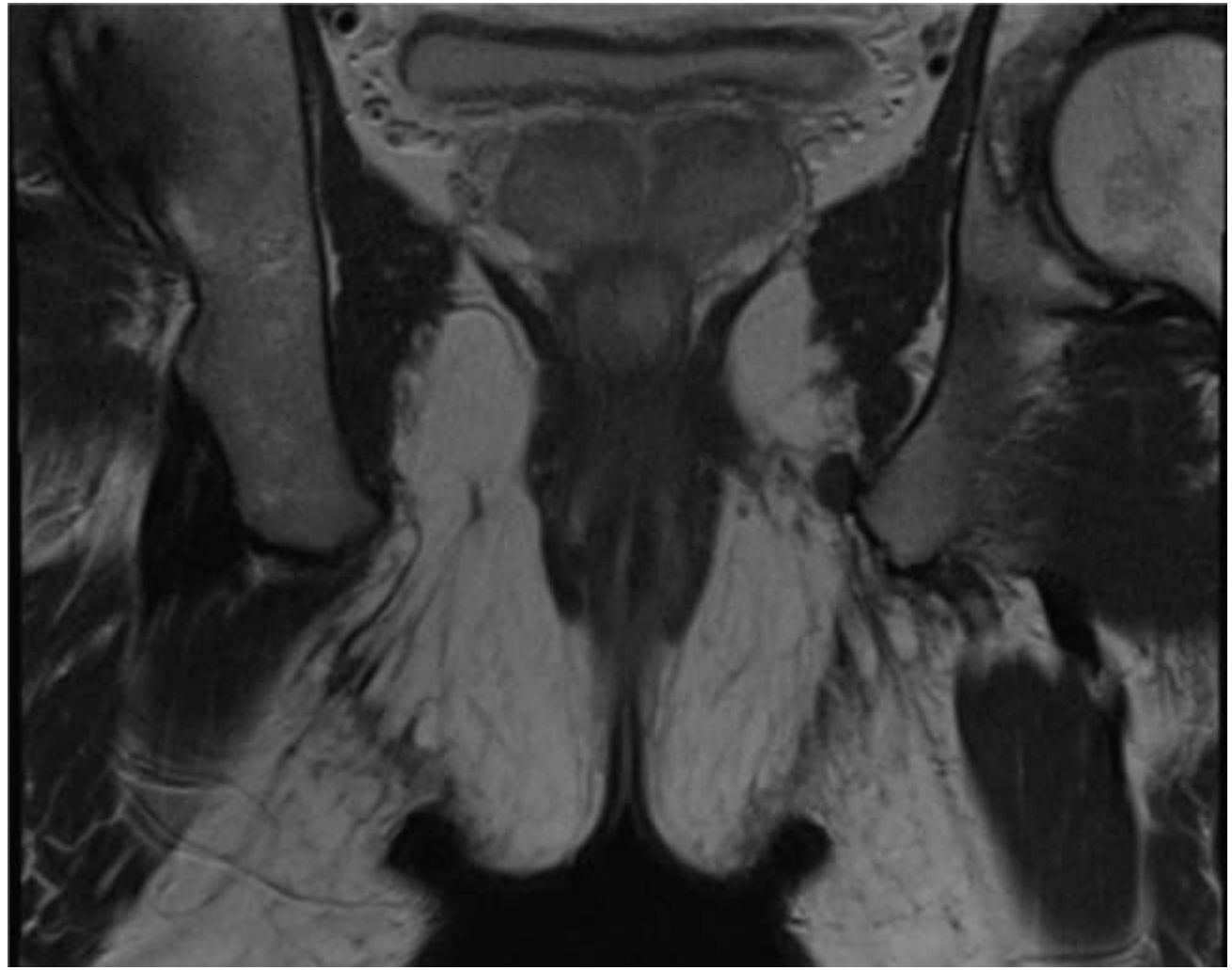












Question 1

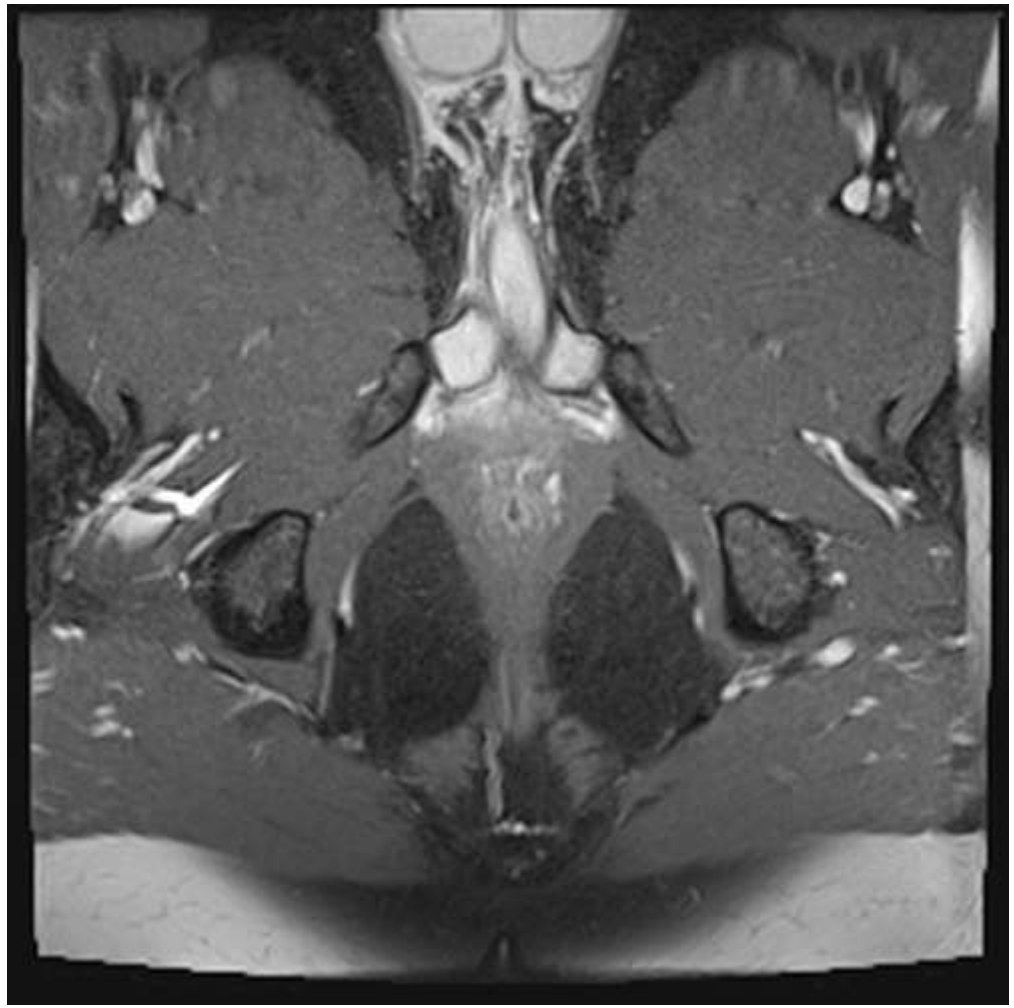
- Type of fistula?
- Inter – right side
- Trans – left side
- Supra – right side
- Inter – left side

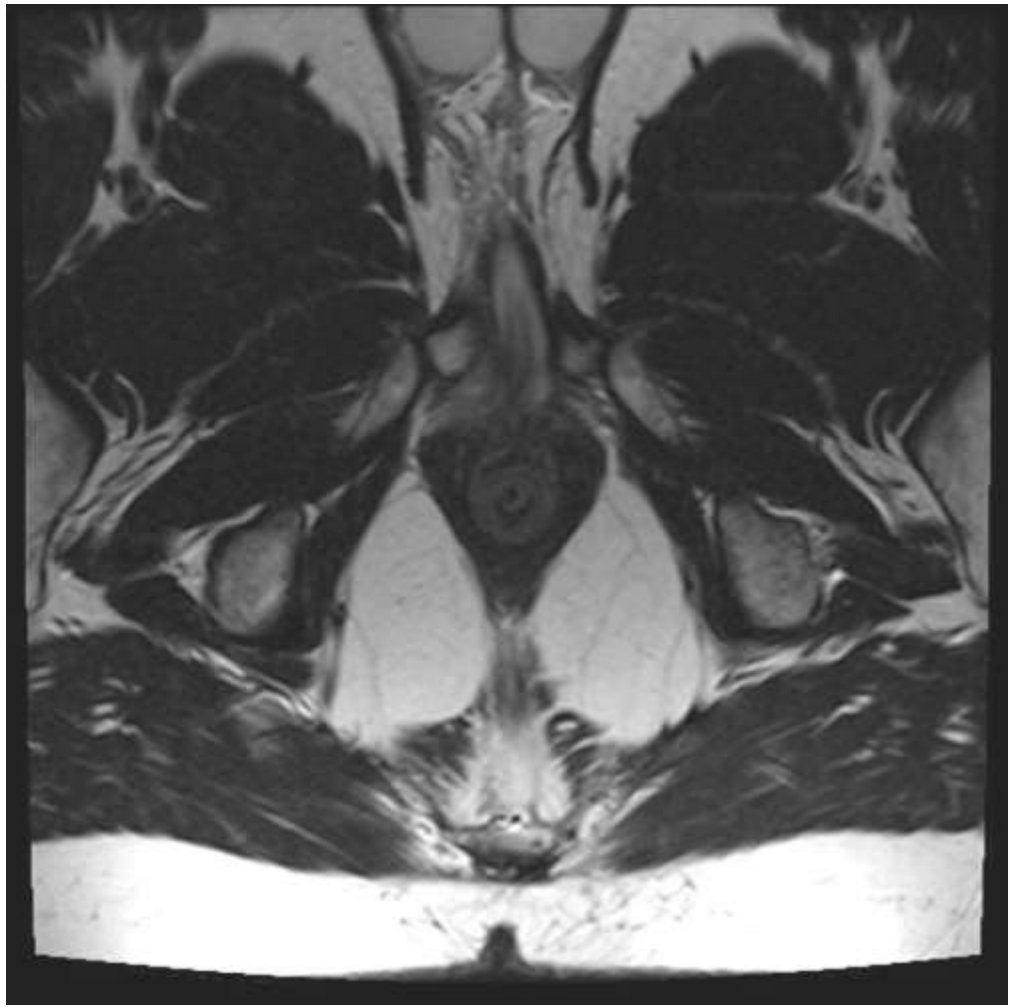
Question 2

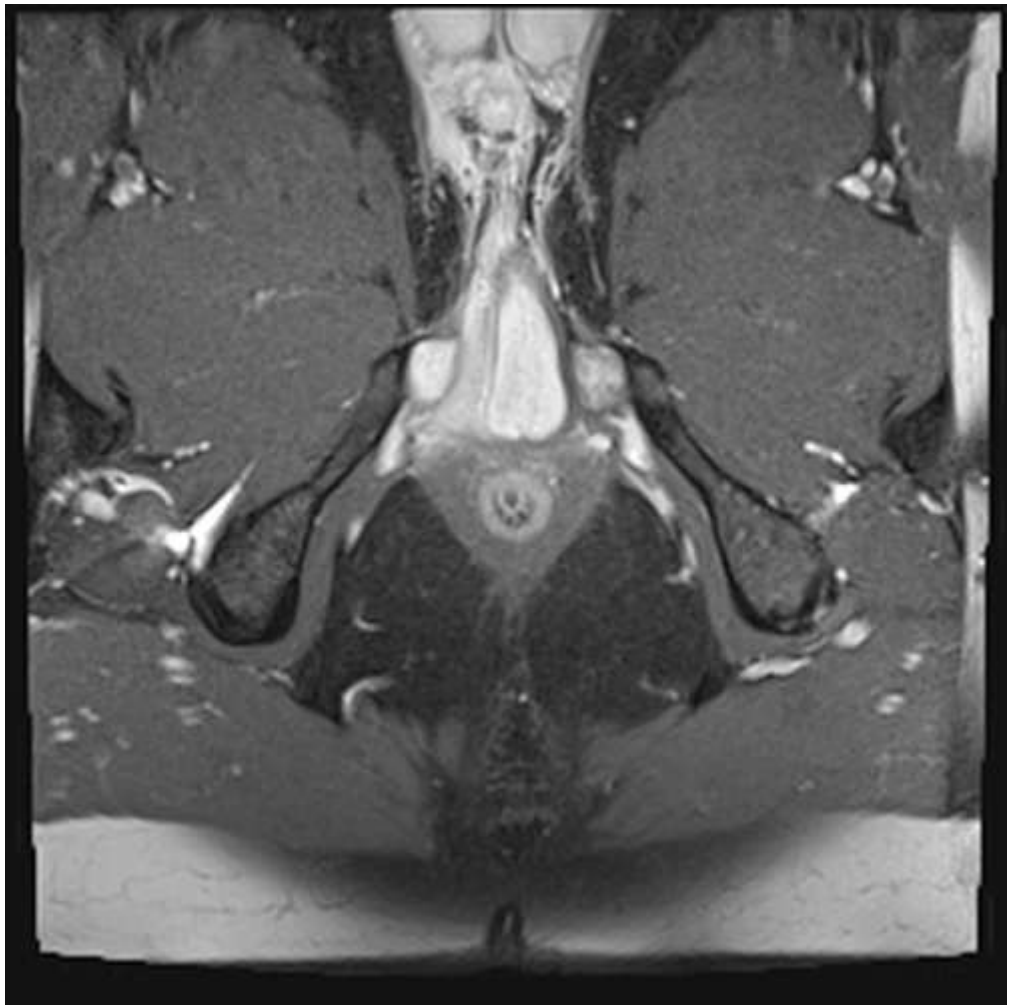
- Is there any collection?
- Yes
- No
- Inflammatory mass

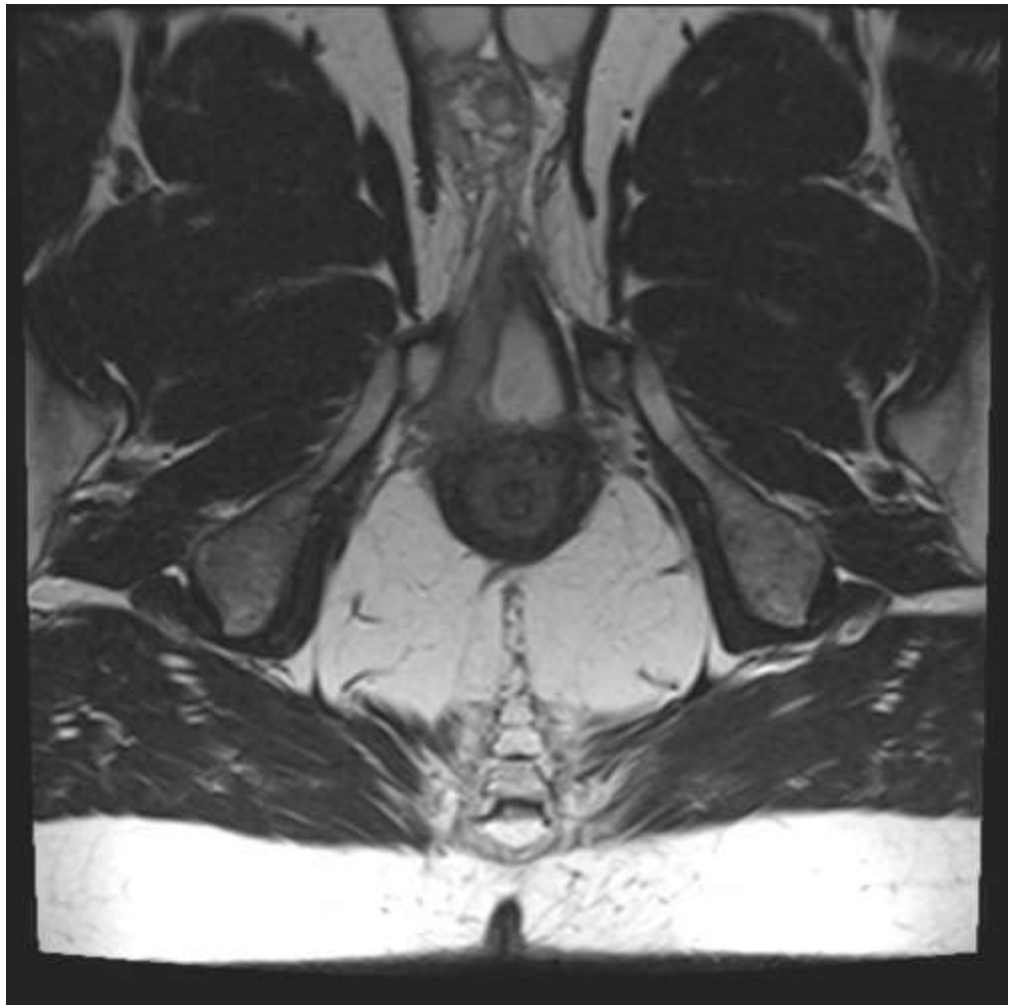
Questions - evaluation

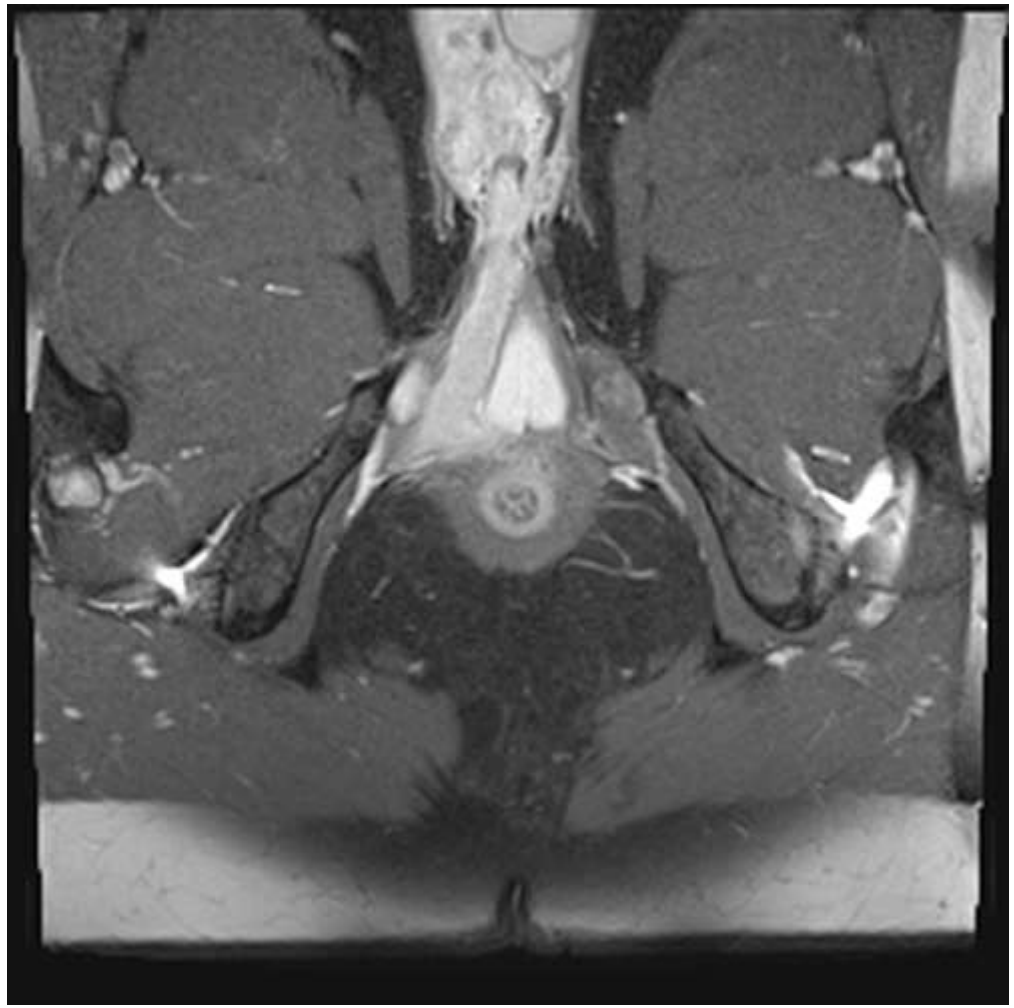
Case 2

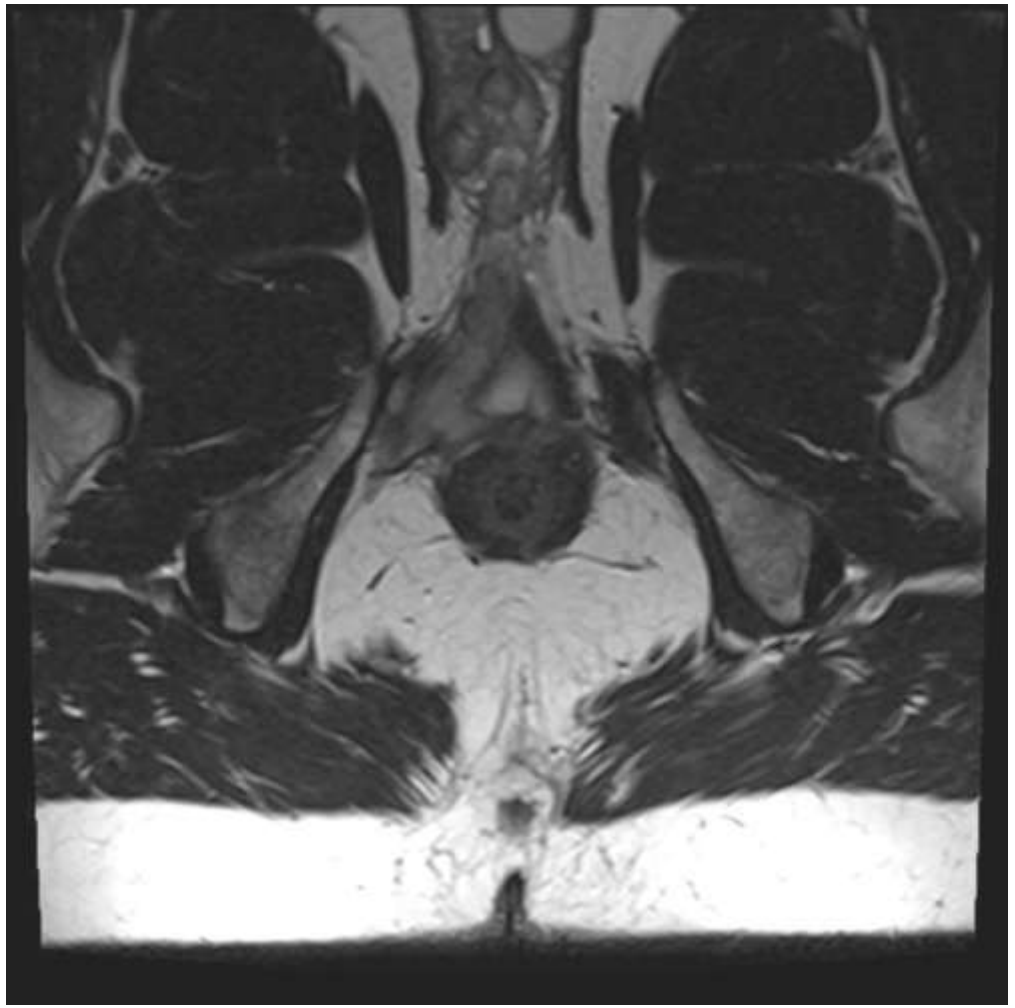


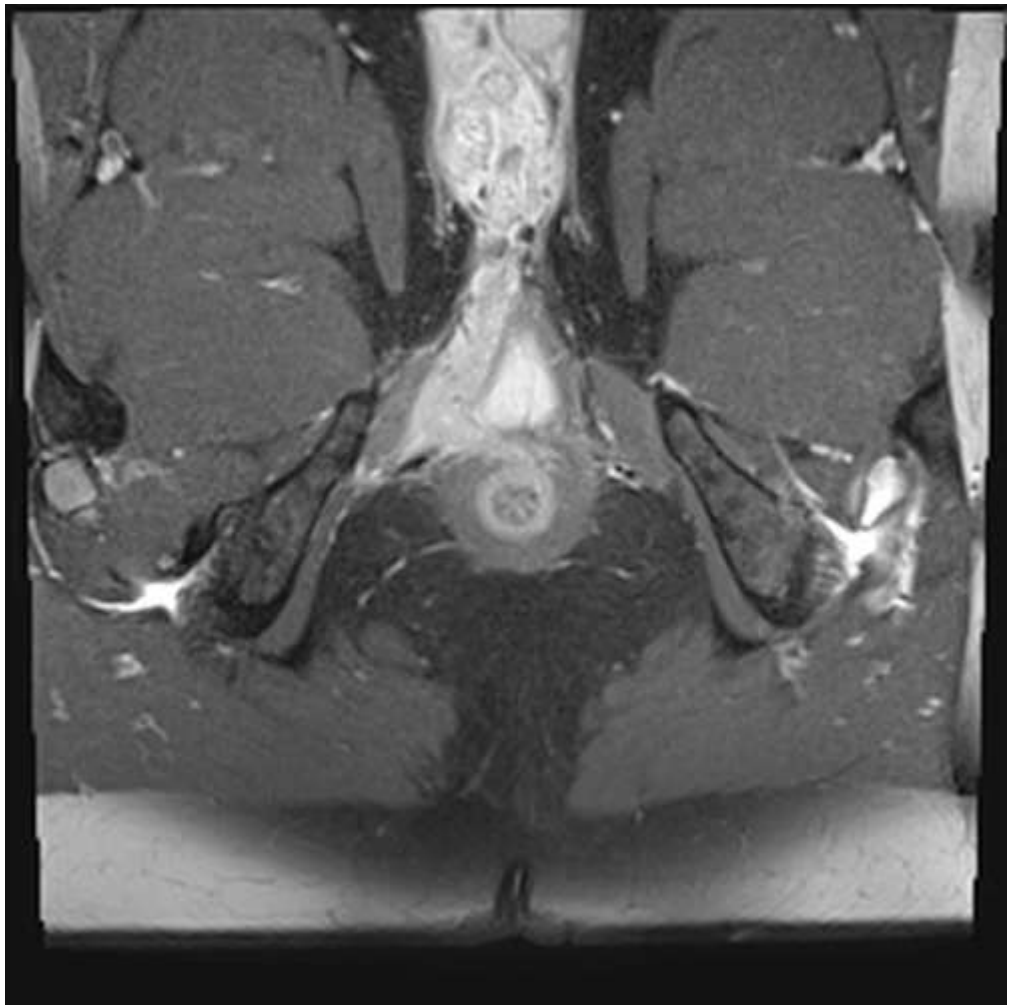


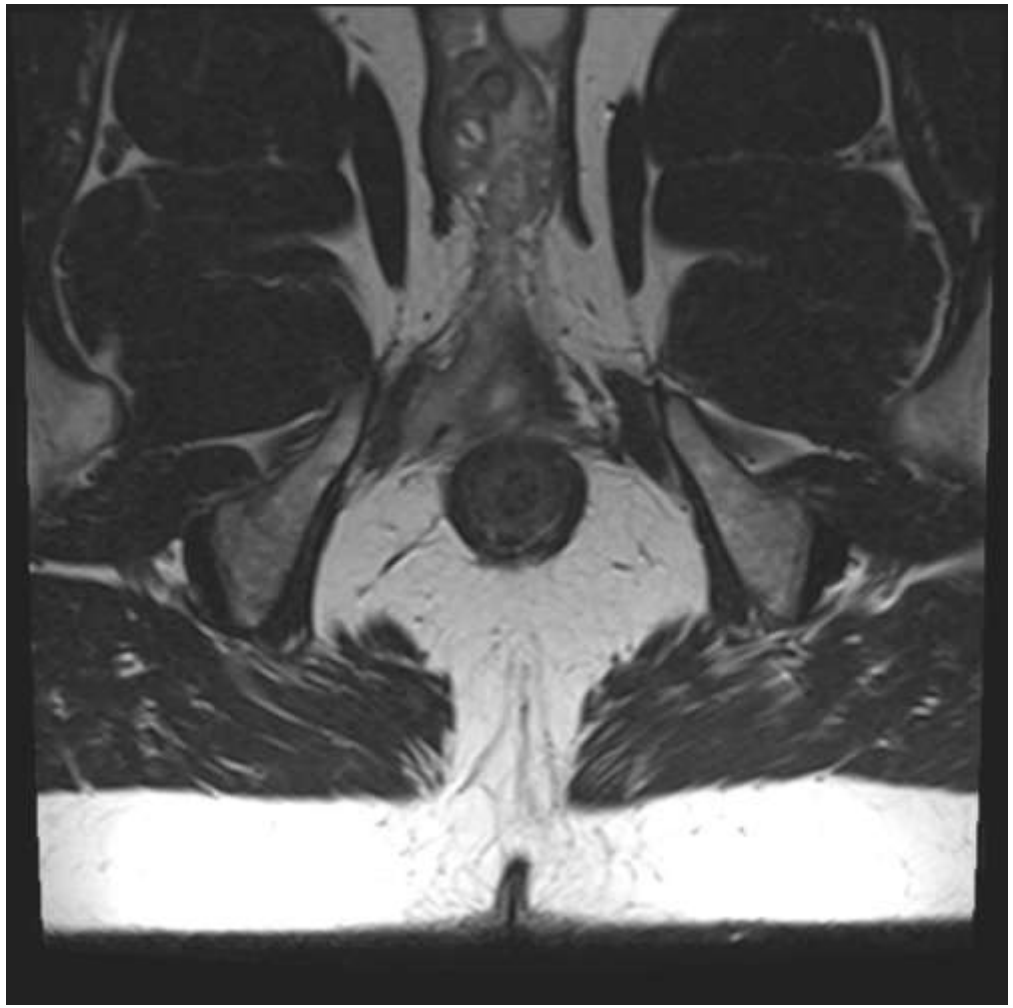


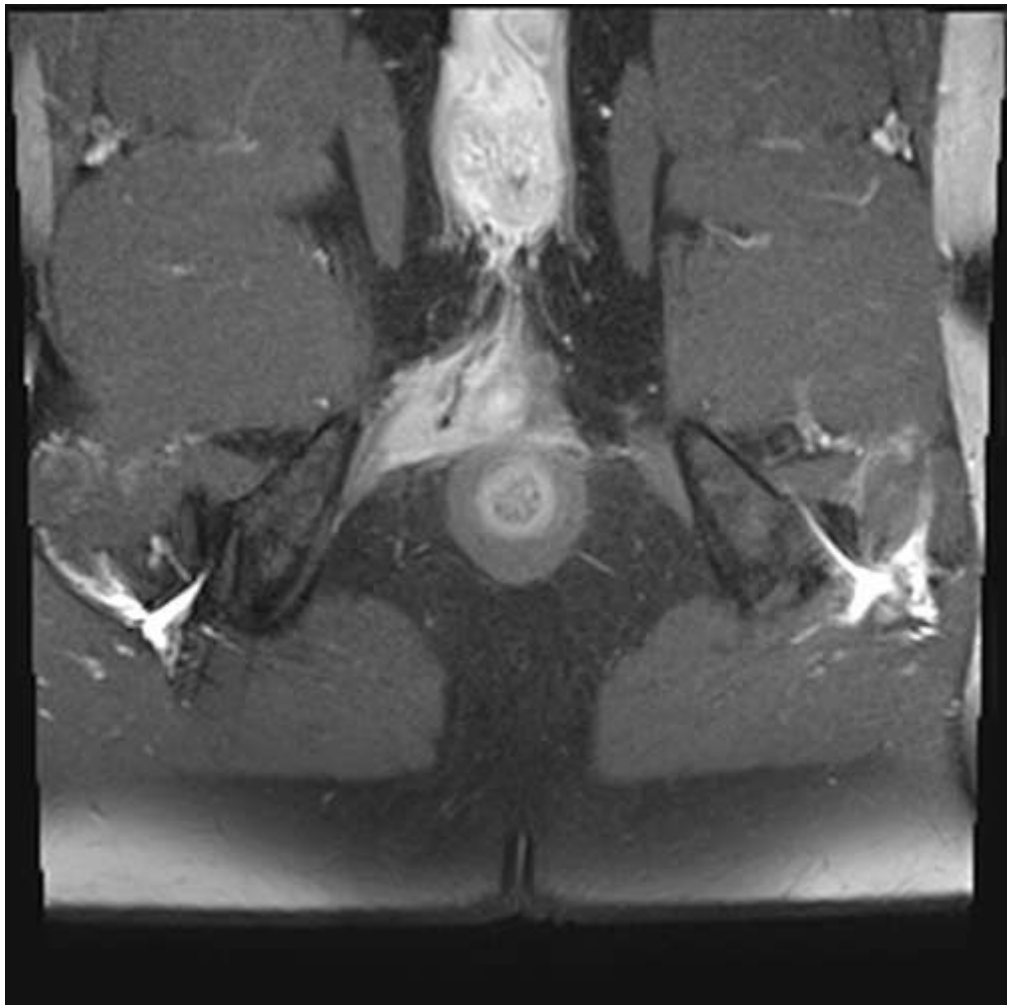


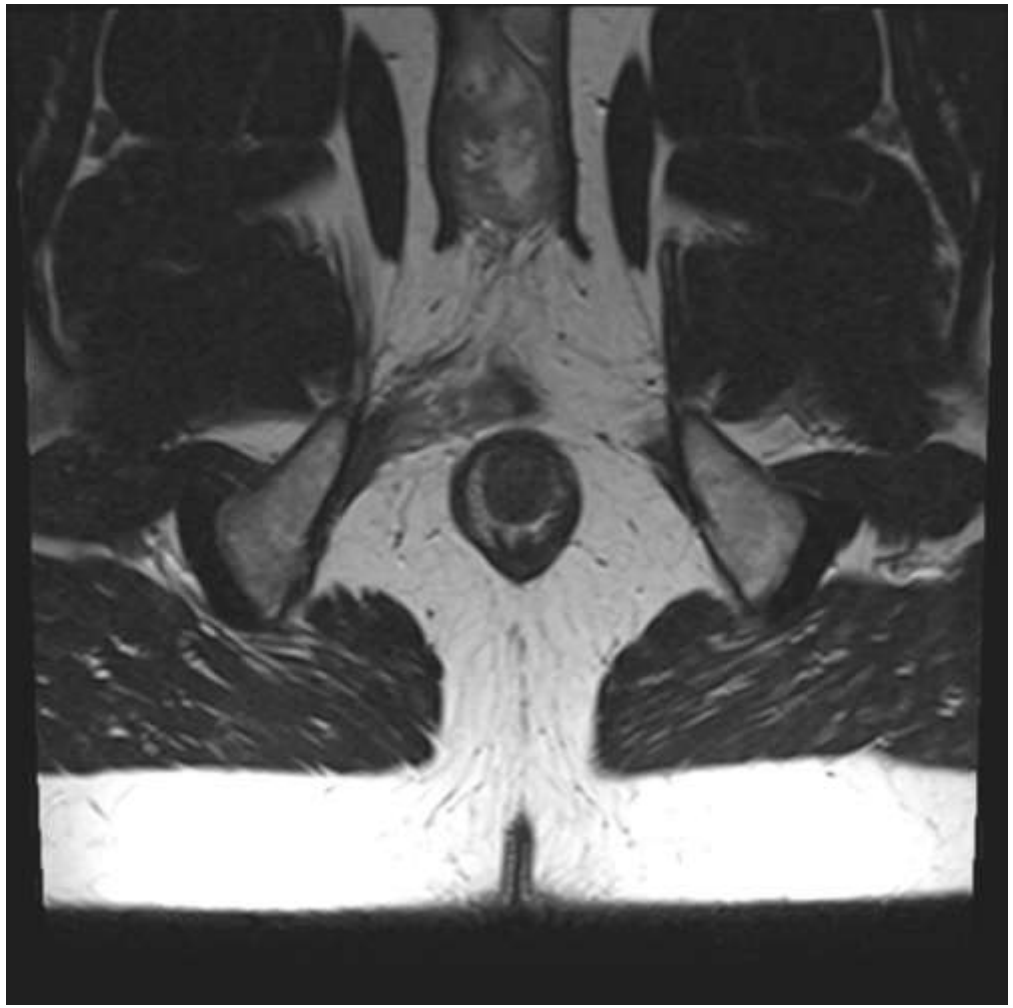


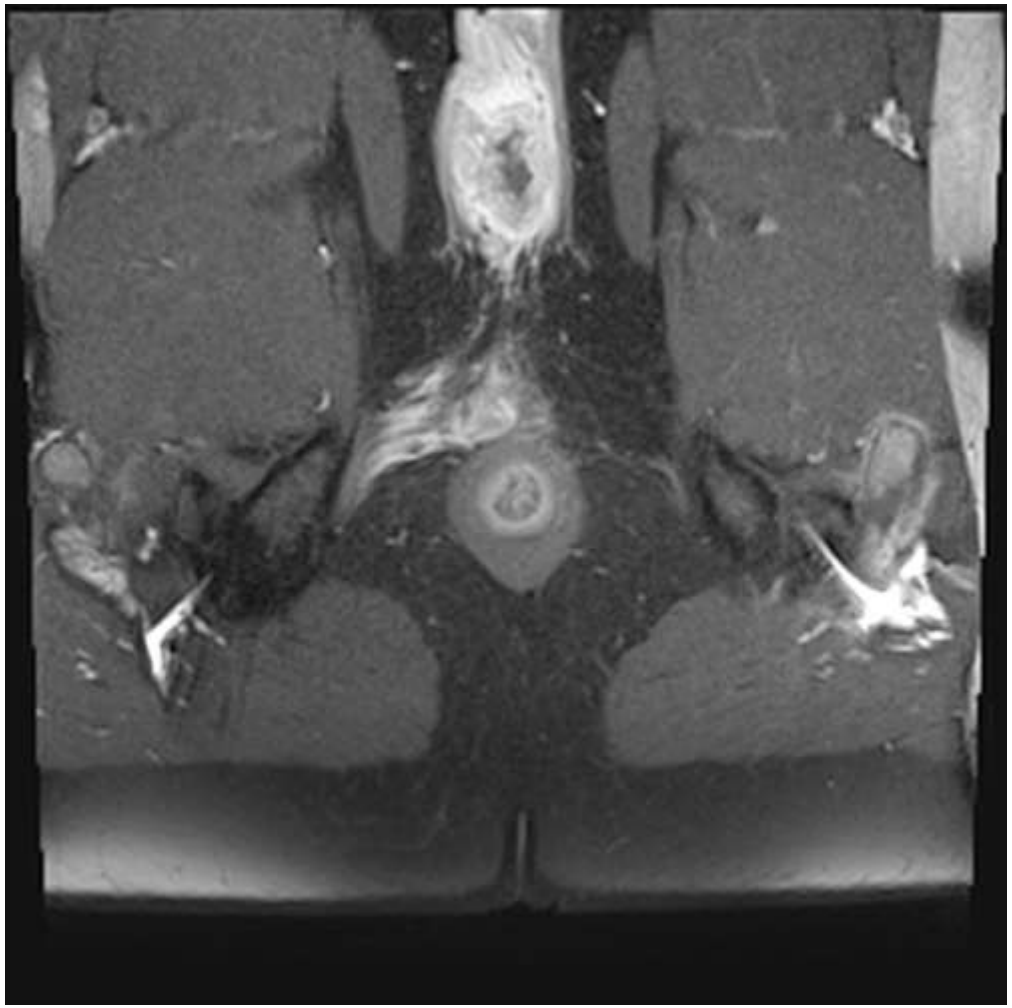


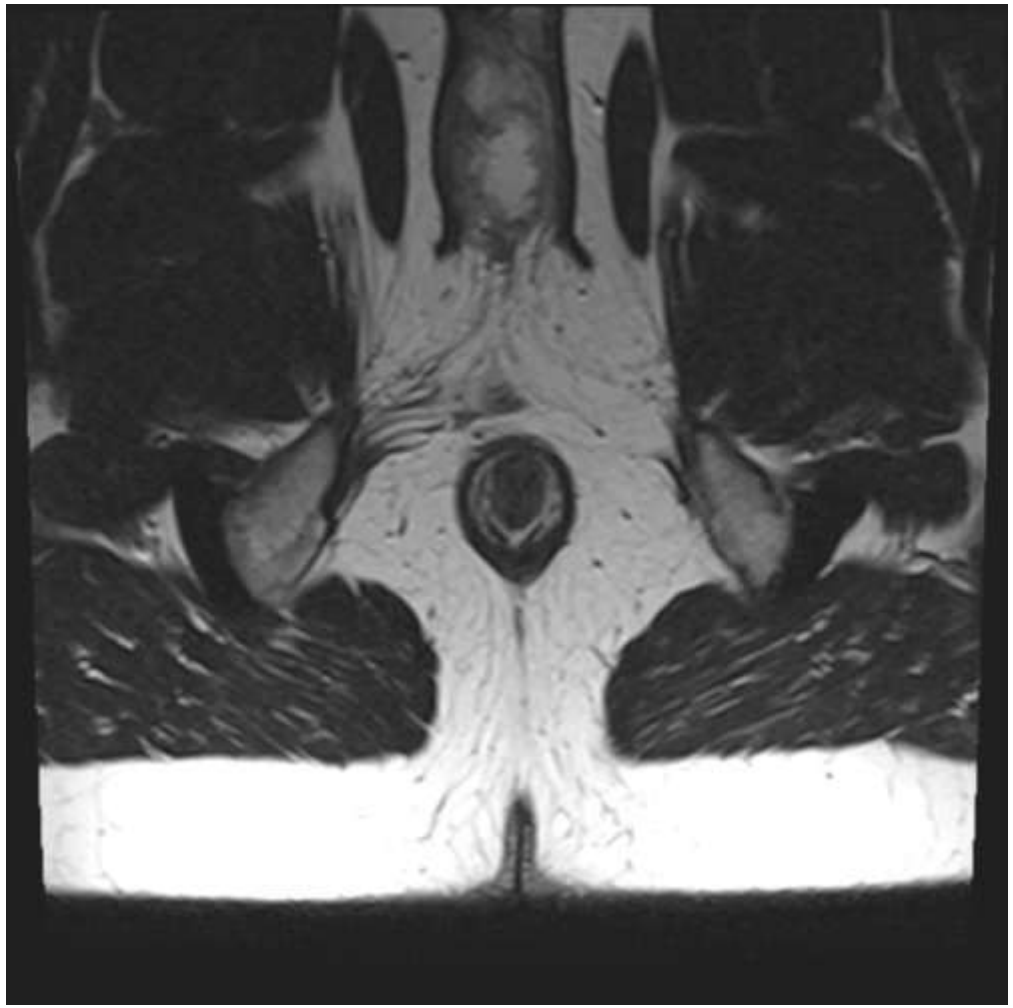


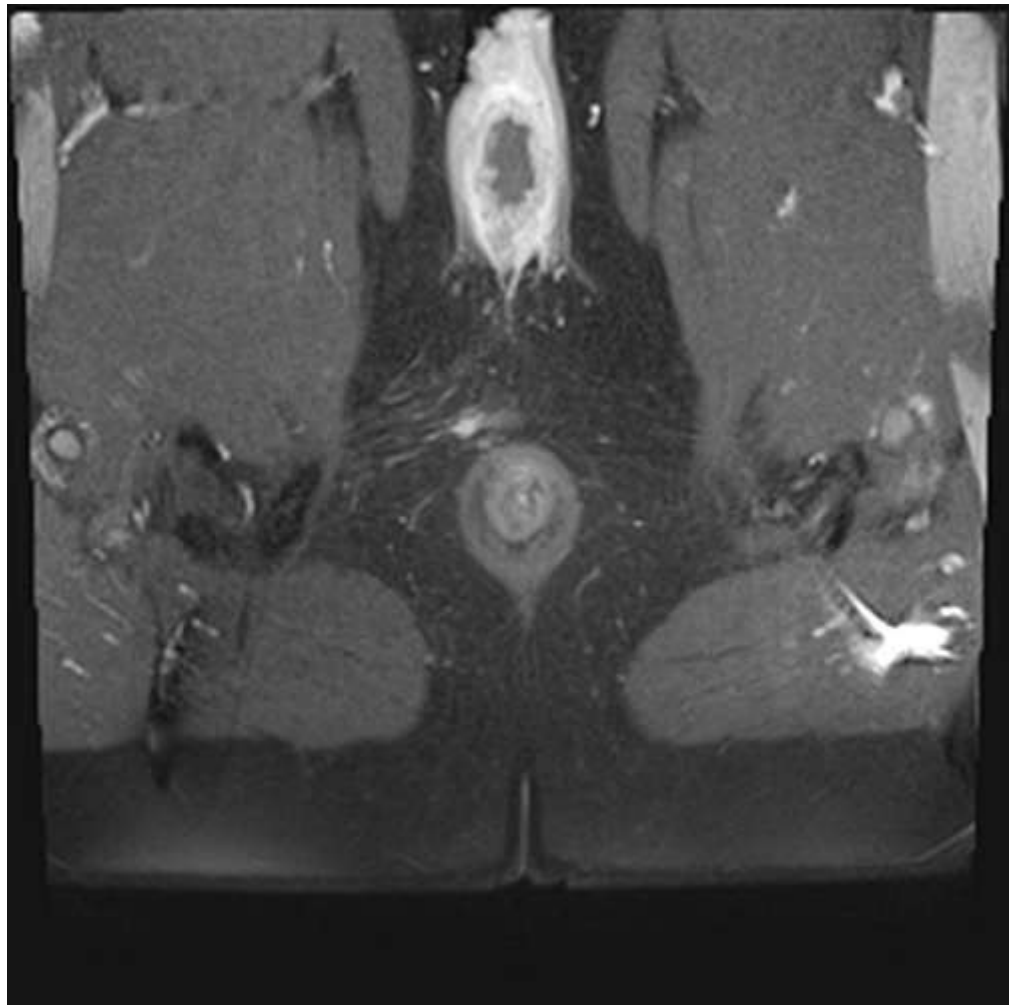


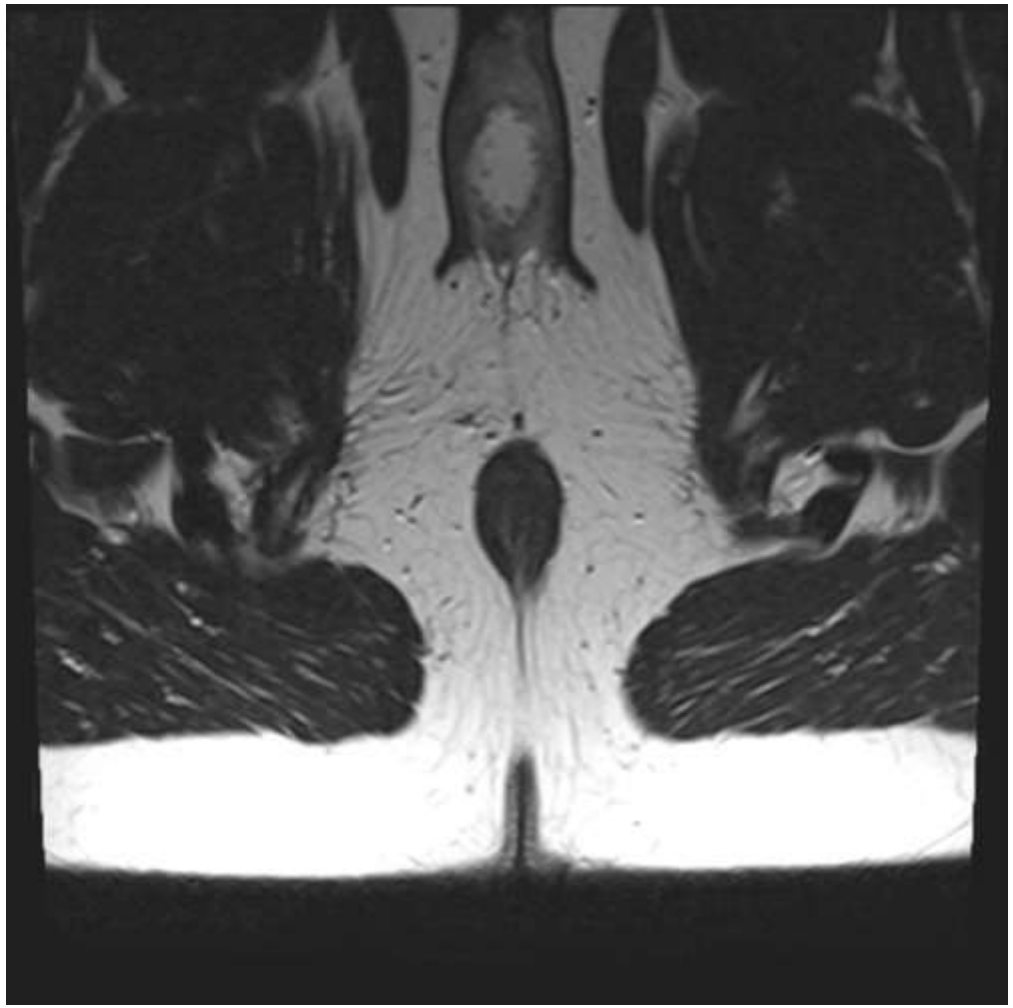












Question 3

- Is there any fistula?

- Yes • No

Question 4

- Is
  the
  re

any
coll
ect

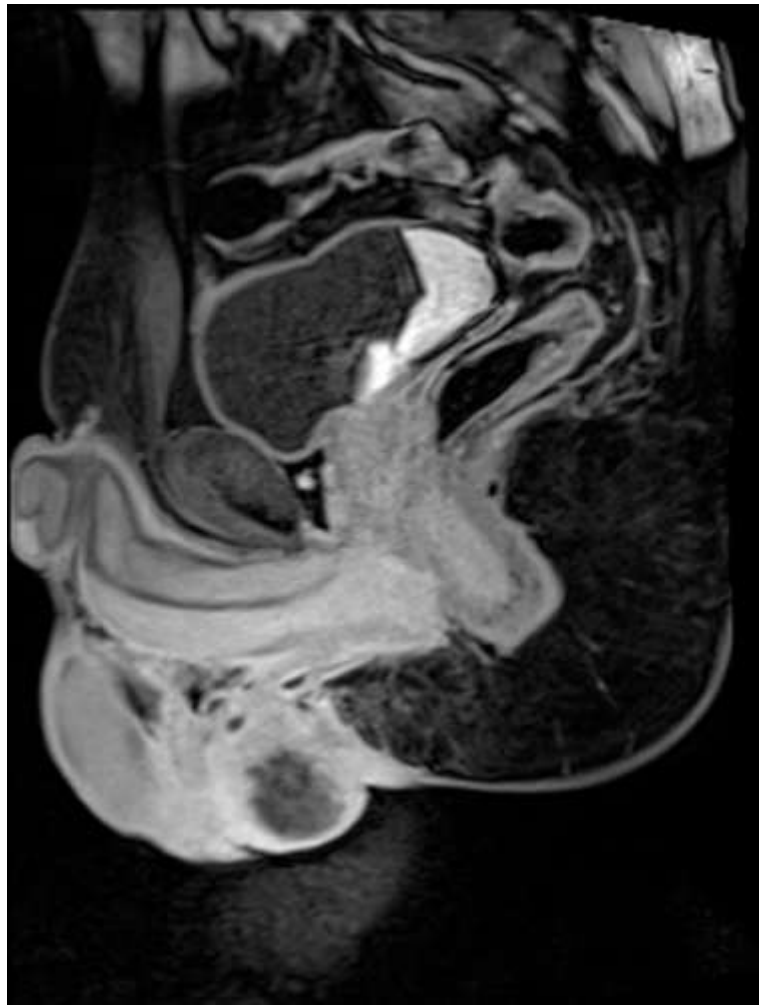
ion
?

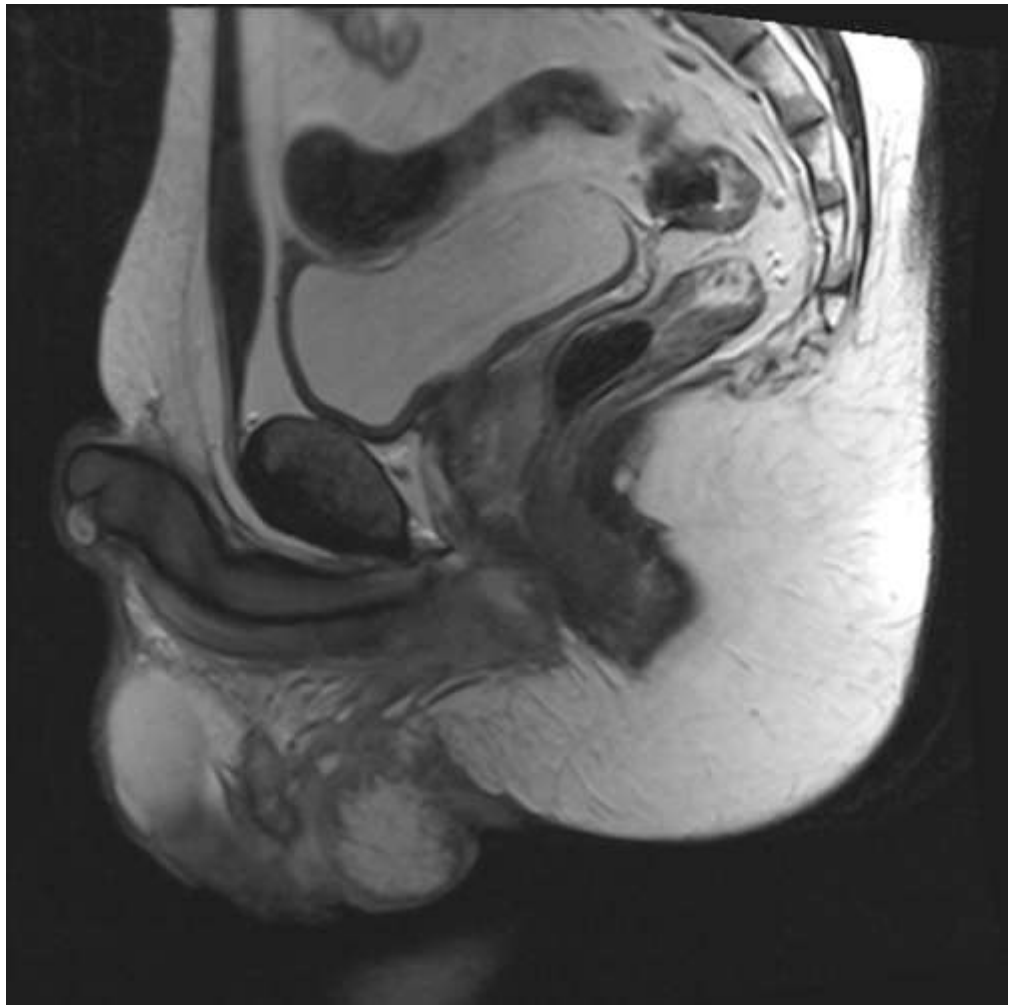
- Yes

- No

Piece of information

- Perineal pain and scrotum tumefaction





Remarks

- Basic sequences and planes
- Anatomy
- Sphincters, elevator
- Spaces
- Internal opening
- Fistula 1ari tract
- Extensions
- Collections