Perianal fistulas - what the surgeon wants to know

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Authors: N. M. R. D. Alves¹, M. I. Oliveira², R. H. Castro³, T. C. Fernandes⁴, M. S. C. Sousa⁵, L. I. S. F. A. Melao⁶; ¹Porto/PT, ²Matosinhos/PT, ³Espinho/PT, ⁴Vila Praia de âncora /PT, ⁵Atouguia da Baleia/PT, ⁶Maia/PT
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Learning objectives

- To discuss perianal fistulas, their causes and consequences.
- To illustrate with relevant imaging findings, describing their classification according to Parks and the St. James University Hospital Classification (SJUHC), and the implications of each class.
Background

Idiopathic fistulas are believed to represent the chronic phase of anal gland sepsis but fistulas may also be caused by other conditions including Crohn disease, tuberculosis, infection, malignancy, and radiation therapy (1).

Perianal fistulas are common, they lower the patient's quality of life and bring about morbidity. They have a prevalence of about 0.01%, affecting mostly young adults (2), (twice as many males as females). The most common presenting symptom is discharge (65% of cases) but patients may be asymptomatic (3).

Treatment of perianal fistulas:

In order to try preserving continence, and for the initial treatment attempts therapeutic options that do not involve division of the anal sphincter complex can be employed. These include a seton (a thread placed in the fistulous track) that allows continuous drainage improving and maybe eventually resolving the track (fig. 1, on sidebar). Other non-surgical options include fibrin plugs and glue to close the track (4). Also, for patients with fistulas related with Crohn disease antibiotics, purine analogs, and anti-tumor necrosis factor antibodies are also therapeutic options.

For the more simple fistulas, a fistulotomy can be performed, without risking continence, but more complex cases require intervention on the sphincter muscles, and fecal incontinence may result. The classification of perianal fistulous disease can help predict the surgery required and its foreseeable complications (5):

- Grades 1 and 2 (SJUHC) intersphincteric fistulas are confined to the anal sphincter complex, their surgical management is usually simple and the outcome favorable.
- Grades 3 and 4 (SJUHC) transphincteric fistulas represent complex disease with a track or abscess in the ischiorectal fossa that implies more complex surgery and as a result there is the risk of loss of continence or recourse to colostomy (1).
Fig. 1: T1-weighted contrast enhanced fat-suppression axial (A) and coronal (B) MR images show a fistulous track with a linear hypointense seton (dashed arrow in A, also seen in B). There is also pus nearby (arrow).

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Imaging findings OR Procedure details

MR findings in perianal fistulas:

- The use of T1-weighted images allows a good depiction of the regional anatomy, including sphincter complex and the regions around it (fig. 2B). The T1-weighted images are not as helpful in distinguishing pathology (including inflammation, fistula track and collections) from the normal structures such as the muscle layers (fig. 10B).
- Because fluid is hyperintense on T2-weighted MR images, these will readily show the active fistulous track and differentiate it from the sphincter complex which is hypointense (fig. 2D). Abscesses contain pus and so are also hyperintense on T2-weighted images. The chronic fistulous tracks or scars will have low signal intensity on both T1- and T2-weighted images.
- The administration of contrast will be of great value on the MR study of perianal fistulas (the fistulous tracks and active granulation tissue enhance), and particularly abscesses (while the fluid content of abscesses remains hypointense its wall will have great enhancement) (figs. 2A, 2C).

Another possible cause of hyperintense content within the fistulous track on contrast-enhanced fat-suppressed T1-weighted images is recent hemorrhage in the post-surgery patient. This is due to the intrinsic high signal of recent blood on fat-suppressed T1-weighted images and does not represent enhancement. That means that by simply comparing this finding with the respective unenhanced T1-weighted images one can differentiate between these two.

Normal anatomical structures such as the sphincter muscles, as well as chronic fistulous tracks and scars will not display substantial enhancement after gadolinium administration.

Imaging of perianal fistulas: Why MR?

The strengths of MR in the study of perianal fistulas are:

- Definition of the anatomic relationships of the fistula: particularly the crossing of the external sphincter, which will require more complex surgery with greater risk to continence
- Ability to demonstrate hidden areas of sepsis and secondary extensions, both of which contribute to the high rate of recurrence after surgery and whether or not the treatment will be satisfactory (5, 6)

Another application of MR is MR imaging-guided surgery of anal fistulas with preoperative and intraoperative MR imaging to identify extension of the fistula track and septic foci and ensure the adequacy of the surgical procedure (7).
Other Imaging methods:

- **Fistulography** is the classic imaging study, employing radiopaque contrast injected into the fistulous track (fig.3). It is both limited and difficult to interpret: one study found that correct diagnoses were achieved in only 16% of the patients by employing fistulography (8). Its two great disadvantages are:

  1. The difficulty of assessing secondary extensions due to inadequate filling with contrast material;
  2. The inability to visualize the anal sphincters and hence determine their relationship to the fistula (9), meaning one can't tell the surgeons accurately the extension of the fistula, or even assign it a Parks classification, which would help plan the surgery.

- **CT** has the advantages of sectional imaging, but usually fails to define subtle fistulas and abscesses because of low soft tissue resolution (10, 11).

- **Anal endosonography** has proved to be an accurate manner of study (second to MR) (12) but has several drawbacks: it has a limited field of view; it is operator-dependent and is uncomfortable for the patient, particularly when symptomatic.

Classification systems for perianal fistulous disease:

Perianal fistulas are a common disease with important morbidity, mainly because even after effective treatment often there is recurrence. The treatment is often surgical and as such it is essential for the surgical team to know what to expect in this very heterogeneously presenting condition. Fistulas are classified according to their extension and morphologic characteristics, particularly the involvement of the external anal sphincter (fig. 4).

1) The Parks classification

In 1976 Parks et al (13) classified perianal fistulas on the basis of the surgical findings, using the external sphincter as the reference point. As a result they presented four classes for perianal fistulas: intersphincteric, transphincteric, suprasphincteric, and extrasphincteric fistulas.

- Intersphincteric fistulas, which do not traverse the external sphincter, run along the longitudinal muscle layer between the internal and external sphincters towards the perineal skin.
- Transphincteric fistulas: the track crosses the external sphincter into the ischiorectal fossa before heading down to the perineum.
Suprasphincteric fistulas track upwards through the intersphincteric space and then arch downwards and cross the levator muscle, reaching the ischiorectal fossa and then the skin.

Extrasphincteric fistulas have a more proximal origin, and cross the levator muscles to reach the ischiorectal fossa. There is no involvement of the anal canal or the anal sphincter complex. Primary rectal or pelvic diseases, such as Crohn's disease, colonic diverticula, or neoplasia should be considered (13).

The previously mentioned classes of fistula may be complicated by an abscess or a secondary track and these may in turn be intersphincteric, ischioanal, supralelevator or extend bilaterally (horshoe), and due to their different location require a change in treatment approach.

2) The St James's University Hospital Classification (SJUHC)

This classification consists of five grades, and correlates the Parks surgical classification to MR axial and coronal findings. Here the presence of abscesses or secondary tracks is taken into consideration as well as the fistula in the assignment of class (that is to say that the same track would be classified as a different grade if there was an abscess in the same space as the track).

This classification is straight-forward to apply on MR, has been validated in cases with surgical proof and has been shown to better correlate with long-term outcome than the initial surgical assessment (5, 14).

- **Grade 1: Simple Linear Intersphincteric Fistula (figs. 5-7)**

The fistulous track courses between the anal canal and the skin of the perineum or natal cleft in the plane between the sphincters and is entirely confined by the external sphincter. The ischiorectal and ischioanal fossae are not involved. There is no ramification of the track within the sphincter complex.

The Goodsall's rule states (15) that fistulous tracks arising behind the transverse anal line, which are by far the most common type, enter the anal canal in the midline posteriorly.

- **Grade 2: Intersphincteric Fistula with Abscess or Secondary Track (fig. 8)**

These are intersphincteric fistulas (as previously described), complicated with an abscess or a secondary track, which are also bounded by the external sphincter. On T2-weighted images (fig. 9), pus has high signal intensity and cannot be adequately distinguished from edema and inflammation, but gas within abscesses has a low signal intensity similar to that of the anorectal lumen. Intersphincteric abscesses and secondary fistulous tracks...
are well shown by dynamic contrast-enhanced MR imaging (the pus in the central cavity will have low signal intensity and be surrounded by a brightly enhancing rim) (figs. 10-12).

- **Grade 3: Transphincteric Fistula (figs. 13, 14)**

  The fistula pierces through both layers of the anal sphincter complex and arcs down to the skin through the ischiorectal and ischioanal fossae (where there may be edema and hyperemia). Transphincteric fistulas communicate with the middle third of the anal canal (the level of the dentate line).

  Because these fistulas disrupt the integrity of the sphincter mechanism, their tracks must be excised by dividing both layers of the sphincter, which carries the risk of incontinence.

- **Grade 4: Transphincteric Fistula with Abscess or Secondary Track within the Ischiorectal Fossa (figs. 15, 16)**

  This grade refers to a transphincteric fistula (meaning that the track crosses the external sphincter), that is complicated by sepsis in the ischiorectal or ischioanal fossa. On contrast-enhanced MR the abscess will present a central focus of hypointense pus. The fistulous track may assume a "dumbbell" configuration when crossing the external sphincter.

- **Grade 5: Supralevator and Translevator Disease** These are rarer and refer to the cases where fistulous disease extends above the insertion of the levator ani muscle. The crossing of the levator plate that occurs in this case can best be depicted by coronal contrast-enhanced MR imaging.

  **Suprasphincteric fistulas** track upward in the intersphincteric plane and over the top of the levator ani and then pierce downward into the ischiorectal fossa (figs. 17, 18).

  **Extrasphincteric fistulas** have their origin further up in the pelvis representing primary pelvic disease that crosses the levator plate. The source of the sepsis must be sought out, by extending imaging studies to the pelvis or by the use of other diagnostic studies (figs. 19, 20).
Images for this section:

**Fig. 2:** MR findings of a perianal (grade 5 SJUH extrasphincteric) fistula: The fistulous track can be seen in all these weightings but is best depicted in the contrast-enhanced T1-weighted fat suppressed images such as C. A- T1-weighted contrast-enhanced axial MR image with fat-suppression. The track and periphery of the pelvic abscess enhance due to its inflammatory nature. The abscess content (pus) does not enhance and has low signal intensity. B- T1-weighted axial MR image. The track has low signal intensity. It may be difficult to differentiate a fistulous track from the sphincter muscles at a more proximal level. C- T1-weighted contrast-enhanced axial MR image with fat-suppression. The track has high signal due to enhancement. D- T2-weighted axial MR image. The track content is hyperintense.

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Fig. 3: An example of images from a fistulography exam (A: Anteroposterior projection and B: lateral projection). The patient presented with two external orifices in the perianal skin, which were catheterized and radiopaque contrast injected into each, using fluoroscopy to follow and document the tracks and opacified.

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Fig. 4: Schematic of perianal anatomy. 1- Perineal skin 2- External sphincter 3- Internal sphincter 4- Bowell wall

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**Fig. 5:** Schematic of intersphincteric (grade 1 SJUHC) perianal fistula. I- Intersphincteric space.

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**Fig. 6:** T1-weighted contrast-enhanced axial MR image. Intersphincteric grade 1 SJUHC is seen as a hyperintense simple track between the internal and external anal sphincters.

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Fig. 7: T1-weighted contrast-enhanced coronal MR image. Intersphincteric grade 1 SJUHC is seen as a hyperintense simple track between the internal and external anal sphincters.

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Fig. 8: Schematic of intersphincteric (grade 2 SJUHC) perianal fistulas. In A there is an abscess in the intersphincteric space. In B there is a horseshoe shaped secondary track in the intersphincteric space. I- Intersphincteric space.

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Fig. 9: T2-weighted axial MR image with fat-suppression. Intersphincteric grade 2 SJUHC is seen here as a hyperintense horseshoe-shaped track coursing between the internal and external anal sphincters.

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Fig. 10: Contrast enhanced T1-weighted fat-suppression coronal MR image. Intersphincteric grade 2 SJUHC (same case as previous image) is seen here as a hyperintense track coursing between the internal and external anal sphincters.

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Fig. 11: Contrast enhanced T1-weighted fat-suppression sagittal MR image. Intersphincteric grade 2 SJUHC (same case as previous image) is seen here as a hyperintense track coursing between the internal and external anal sphincters.

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**Fig. 12:** A- T2-weighted axial MR image. The track is hyperintense. B- T1-weighted axial MR image. The track has low signal. C- T1-weighted axial MR image with fat-suppression. The track has low signal. D- T1-weighted contrast-enhanced axial MR image with fat-suppression. The track has high signal because there is enhancement due to its active inflammatory nature. Intersphincteric grade 2 SJUHC (same case as previous image) is seen here as a track coursing between the internal and external anal sphincters.

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**Fig. 13:** Schematic of transphincteric (grade 3 SJUHC) perianal fistula. IR- Ischiorectal fossa.

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**Fig. 14:** Trans-sphincteric grade 3 SJUHC is seen tracking externally to the external anal sphincter and inferiorly towards the skin. A- T1-weighted contrast-enhanced coronal MR image with fat-suppression. B- T1-weighted contrast-enhanced axial MR image with fat-suppression. C- T1-weighted axial MR image.

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Fig. 15: Schematic of transphincteric (grade 4 SJUHC) perianal fistula. IR- Ischiorectal fossa.

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Fig. 16: T1-weighted contrast-enhanced MR images with fat-suppression in the axial (A) and coronal (B) planes. Trans-sphincteric grade 4 SJUHCA fistula track is seen crossing the external sphincter in A into the ischiorectal fossa. In another plane, both this main track and another (secondary) track can be seen coursing towards the perineum in B.
Fig. 17: Schematic of suprasphincteric (grade 5 SJUHC) perianal fistula. The fistulous track courses up in the intersphincteric space into the pelvis, crosses the levator muscle into the ischiorectal fossa and then to the skin. L- Levator ani muscle plane. IR- Ischiorectal fossa.
Fig. 18: T2-weighted coronal MR image. Suprasphincteric grade 5 SJUHC fistula with a complex track can be seen coursing up in the intersphincteric space (long arrow) into the pelvis. It also presents a horseshoe-shaped secondary track (curved arrow). Further on it crosses the levator plane from the pelvis into the ischiorectal fossa and from there to the skin (short arrow).

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Fig. 19: Schematic of extrasphincteric (grade 5 SJUHC) perianal fistula. The origin of the fistulous track is in the pelvis. The fistula crosses the levator muscle into the ischiorectal fossa and then to the skin. L- Levator ani muscle plane. IR- Ischiorectal fossa.

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Fig. 20: T1-weighted contrast-enhanced MR images with fat-suppression in the coronal plane. Extrasphincteric grade 5 SJUHC fistula is seen crossing the levator plate from the pelvis into the ischiorectal fossa in a patient with Crohn's disease.

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Conclusion

Perianal fistulas are a common and important source of morbidity. MR is a useful method to study this pathology and its use results in better prognosis. Learning to identify the findings of perianal fistulas and attributing them a class allows better communication with the surgical team and improves patient care.

The St James's University Hospital Classification has several advantages. Because it has been proposed by radiologists, it is geared for MR findings, making it helpful for MR reading. In terms of clinical relevance it has been proven to correlate with patient outcome. It might be a particularly helpful classification if its use is adopted by the entire department and used when discussing cases with the surgeons.

Currently most surgeons continue to use the Parks classification. The surgical team expects to be able to assign a Parks class to the case, and needs the MR report to be very descriptive including the points of entry and path of the main track and eventual secondary tracks. Furthermore one must describe the presence of collections / abscesses along the fistulous track, their number, size, and location. The finding of "hidden" tracks or abscesses under the skin but without clinical signs are also important.
References