



Diagnostic Approach to Perianal Fistulas with Magnetic Resonance

Aproximación diagnóstica de las fístulas perianales por resonancia magnética



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Key words (MeSH)

Fistula
 Anal canal
 Magnetic resonance
 imaging



Palabras clave (DeCS)

Fístula
 Canal anal
 Imagen por resonancia
 magnética



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Summary

Fistulous perianal disease is an inflammatory entity that affects the anal canal and perianal spaces. Anal fistulas represent important morbidity and recurrence for patients. For the planning of surgical treatment, preventing recurrences and complications like fecal incontinence, a proper characterization and classification of fistulas with magnetic resonance must be done. Currently, magnetic resonance is the imaging modality with greatest diagnostic sensitivity due to its high anatomical resolution in defining structures like the anal canal and fistulous tracts with its complications (abscesses, secondary paths).

Resumen

La enfermedad fistulosa perianal es una entidad inflamatoria crónica que afecta el canal anal y los espacios perianales. Las fístulas anales presentan gran morbilidad y recurrencia. Para definir el tipo de tratamiento quirúrgico o médico, evitar recurrencias y complicaciones como la incontinencia fecal, es importante una adecuada caracterización y clasificación de las fístulas mediante la resonancia magnética (RM). Actualmente la RM es el estudio imaginológico con mayor sensibilidad diagnóstica debido a su alta resolución anatómica para definir las estructuras del canal anal y demostrar el trayecto fistuloso con sus complicaciones (abscesos y trayectos secundarios).

Anatomy of the anal canal

The anal canal is a cylindrical structure with a length of approximately 3 cm. It is surrounded by a sphincter system made up of the internal (IS) and external (ES) sphincters. IS is composed of smooth muscle and is responsible for 85% of anal tone; ES is composed of striated fibers of voluntary contraction that contribute 15% of the anal tone. Its upper part is the continuation of the anal elevating muscle (AE) (1,2).

The two sphincters are separated by the intersphincterian space, which is composed of fat and connective tissue. This space forms a natural plane of low resistance where the fistulas and the purulent content can be easily disseminated (1,3).

Magnetic resonance in the evaluation of perianal fistulas

Magnetic resonance imaging (MRI) has a high diagnostic efficacy to identify fistulas, complications and their relation to anatomical structures of the anal canal (figure 1).

The importance of evaluating anal fistulas with MRI lies in the ability to demonstrate hidden areas of sepsis, secondary extent of infection and identify patients who, according to the type of fistula, have greater risk of postoperative fecal incontinence (4-6).

MRI study protocol

The study of perianal fistulas (PF) by MRI performed at our institution does not require previous

bowel preparation. Body coils are used. The sequence of the protocol is:

- » *Fast spine echo (FSE) Axial oblique T1 (acquisitions orthogonal to the major axis of the anal canal):* It allows assessing the anatomy of the anal canal and the adjacent ischioanal regions). Fistulas appear with low signal, with difficulty to differentiate them from adjacent structures.
- » *FSE T2 sagittal:* In this sequence the fistulas are observed as high signal paths, as well as in sequences that have T2-weighted fat saturation, and abscesses appear as high signal collections. Fistulas of chronic evolution with fibrous component are seen with low signal in the sequences enhanced in T1 and T2.
- » *FFSE T2 axial oblique with fat saturation.*
- » *FSE T2 coronal oblique with fat saturation.*
- » *T1 gradient echo (GE) with fat saturation with gadolinium in the axial, sagittal and coronal planes:* Allows identifying active fistulous trajectories and abscesses as high signal images that enhance the administration of gadolinium.
- » *Sequences of diffusion (b: 50,400 and 800):* Fistulas and abscesses are identified with diffusion restriction (high signal in diffusion and low in ADC maps).
- » It is essential that the image acquisition planes are properly aligned with the anal canal in order to acquire oblique axial and coronal images oriented in an orthogonal plane and parallel to said structure (figures 2 and 3) (1,7-10).

Definition and classification

Perianal fistulas (PF) are defined as an abnormal communication that connects two surfaces lined by epithelium, usually the anal canal mucosa and the perianal skin. It is a rare disease, affecting 0.01% of the population, predominantly young adults (11,12).

PFs that result from a baseline disease are called specific. Most are non-specific and result from inflammation of the anal glands and crypts (cryptoglandular).

The anal glands are a little more numerous in men than in women, are located at the level of the dentate line of the anal canal and sometimes protrude through the internal anal sphincter and intersphincteric space to the ischioanal region. Infection of these glands by predisposing factors such as an acute episode of diarrhea or trauma is common in the development of cryptoglandular fistulae, with a prevalence of 10 per 100,000 in the general population. Specific perianal fistulas and abscesses result from other pathologies such as Crohn's disease, tuberculosis, labor trauma, pelvic infection, pelvic malignancy and radiotherapy (4,5,13).

PFs are classified according to the anatomical structures involved in the anal canal, as well as associated findings (abscesses or secondary fistulous pathways). It is important to describe: a) the point of origin of the fistula in the anal canal, using as a schematic tool "the anal clock".

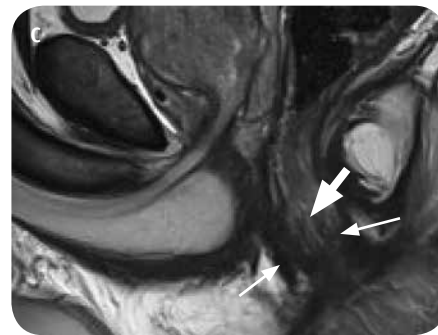
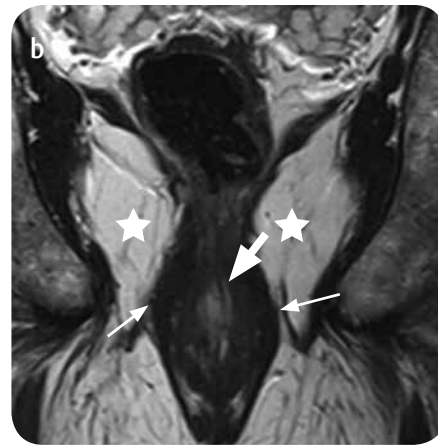


Figure 1. Radiological anatomy of the anal canal by MRI. a) Axial cut, b) coronal and c) sagittal with T2 TSE information. Internal sphincter (thick arrows), external sphincter: puborectal (thin arrows) and ischioanal fossae (stars).

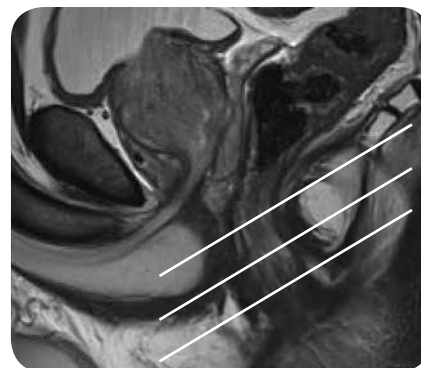


Figure 2. MRI acquisition of axial images oblique to the axis of the anal canal.



Figure 3. MRI acquisition of the images in the coronal plane to the axis of the anal canal.



Figure 4. Simple intersphincterian fistula (grade 1). a) TSE axial cut with fat saturation and b) Coronal TSE with T2 information with saturation fat. Fistula of high linear signal with internal fistulous orifice (IFO) at 12 h (arrow in a) with downward path (arrow in b) through the left intersphincterian space with external fistulous orifice (EFO) at the level of the left gluteal fold. There is no presence of secondary fistulous pathways or abscesses.



Figure 5. Intersphincterian fistula with small abscess adjacent to the left intergluteal fold (grade 2). a) Axial TSE with information T2 at the level of the anal canal and b) coronal TSE with T2 information. High signal fistula with internal orifice at 13 h (thick arrow) in the anterior slope, with descending fistulous trajectory (thin arrow) by the intersphincterian space and medial slope of the left ischioanal fossa. Small high signal abscess (arrowhead) in the subcutaneous cellular tissue adjacent to the left gluteal fold.



Figure 6. Intersphincterian fistula with horseshoe morphology, with small abscess to the anterior slope of the intersphincterian space (3rd grade). a) Axial TSE with T2 information with fat saturation and b) coronal TSE with fat saturation T2 information. Contained fistula in the intersphincterian space with small collection prior to 12 h (thick arrow), with bilateral descent through the medial slope of both ischioanal pits adjacent to the gluteal folds (thin arrows).

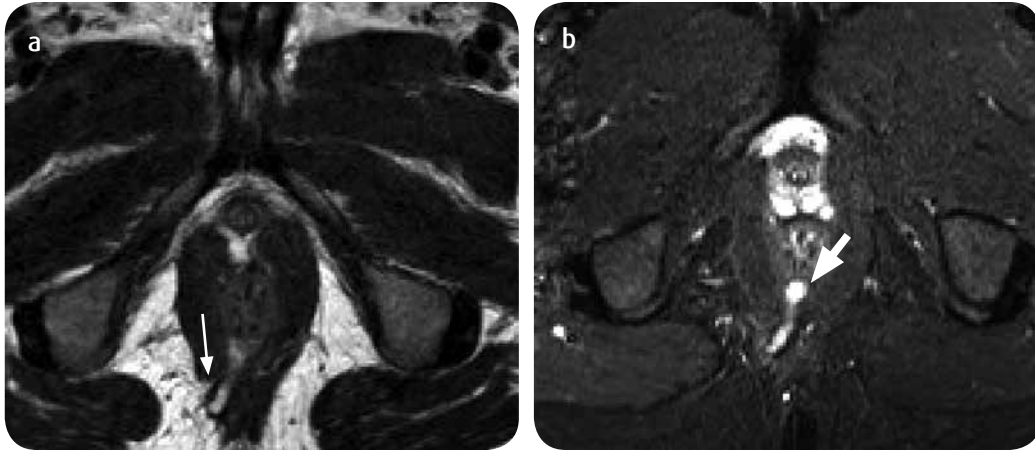


Figure 7. Transsphincteric simple fistula (grade 3). a) Axial TSE with information T2 and b) coronal TSE with T2 information with saturation fat. Transsphincteric fistula with IFO at 7 h, crosses the intersphincteric space on the posterior inferior \ right side and perforates the right puborectal: external sphincter (thin arrow). The fistula descends vertically through the internal slope of the ischioanal and right ischioanal fossa with EFO in the skin of the right intergluteus fold (thick arrow).

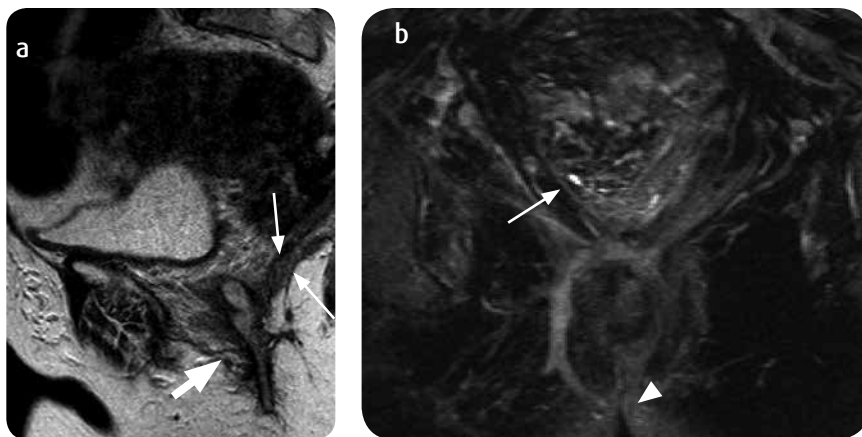


Figure 8. Transelevator (extra-sphincter) fistula (grade 5). a) Sagittal TSE with information T2 and b) coronal TSE with T2 information with fat saturation. Extrasphincteric fistula in female patient with ulcerative colitis of right parasagittal (thick arrow) localization to the anal canal, which perforates and surpasses the elevator muscle of the right anus (thin arrows). The external orifice (EO) is located on the skin of the right intergluteal fold (arrowhead).

In this scheme, the 12 hours correspond to the previous region of the perineum, 6 hours to the posterior slope of the anal canal (intergluteal fold). 3 hours to the left and 9 to the right; b) the fistulous pathway, the structures that involve the anal sphincter and complications.

There are two types of classifications for PFs: the classification of Parks and the University Hospital of St. James's.

We used the classification of St. James's University Hospital which selects the fistulas in five degrees according to the MRI findings in both the axial and coronal planes; It emphasizes the primary fistulous pathway and takes into account the anatomical structures of the anal canal as well as secondary pathways and abscesses, if any (1,14,15).

Simple linear intersphincterian fistula (grade 1)

The fistula extends from the anal canal to the skin of the perineum or the intergluteal fold through the intersphincteric space without traversing the external anal sphincter (figure 4).

Intersphincteric fistula with abscess or secondary fistulous path (grade 2)

Secondary fistulous pathways as well as abscesses are always limited by the external anal sphincter. There may be abscesses in the saddle or horseshoe in the intersphincteric space (figure 5).

Transsphincteric fistula (grade 3)

The fistula crosses the external anal sphincter, passes through the ischioanal and ischioanal fossae (figure 6) and flows into the skin of the perineum or the intergluteal fold. The involvement of the external anal sphincter causes patients with these fistulas to have an increased risk of incontinence after surgical treatment.

Transsphincteric fistula with secondary fistulous pathway or abscess in the ischioanal or ischioanal fossa (grade 4)

Commit the external anal sphincter associating secondary fistulous pathways and abscess formation. They can adopt horseshoe morphology if they extend to both sides of the anal canal. There is also an important risk of incontinence in their surgical treatment (figure 7).

Supralevator or transelevator fistulas (grade 5)

It is a type of unusual fistula, clinically difficult to evaluate, that shows an extension above the insertion of the elevator of the anus (figure 8). Supralevator fistulas extend through the intersphincteric space above the plane of the elevators and in the transelevators the fistulous path extends from the pelvic origin to the perineal skin through ischioanal or ischioanal pits.

Some fistulas have a tendency to reappear despite seemingly curative surgical management and recurrence rates can reach up to 25%. Successful surgical management of anal fistulas requires adequate preoperative evaluation of the primary tract of the fistula and affected pelvic structures (16). Perineal abscesses are an acute manifestation and fistulas a chronic condition of the same disease.

Radiological report

The most useful information that the radiologist can provide the surgeon with regard to perianal fistulous disease consists of a specific report, with key information to guide surgical management of the patient. The location and extent of the fistula should be complete, since the clinical examination of the fistula may be imprecise and more difficult under general anesthesia (table 1) (17).

Table 1. Important points to be taken into account in the radiological report of a perianal fistula

Clinical question	Radiological report
Fistula?	Define if the finding is actually a perianal fistula or if there is an alternative diagnosis, such as pilonidal cyst or hidradenitis..
Single or multiple fistula?	If there are multiple fistulous tracts, each should be described in detail and in a coherent order (eg, clockwise).
Type of fistula	Carry out a classification of the fistula according to Parks or St. James
Fistulous path	<ul style="list-style-type: none"> • Internal orifice according to the “anal clock”. • Path of the fistula: it must be described from the internal orifice, if it is intersphincterian or transphincterian. • External orifice according to the “anal clock” and distance to the anal border.
Findings that indicate complexity	<ul style="list-style-type: none"> • Internal orifice according to the “anal clock”. • Path of the fistula: it must be described from the internal orifice, if it is intersphincterian or transphincterian. • External orifice according to the “anal clock” and distance to the anal border.

Conclusion

RM es el método diagnóstico de mayor eficacia en la aproximación MRI is the most effective diagnostic method in the diagnostic approach and classification of perianal fistulas. The radiologist should

be familiar with the radiological anatomy of the anal canal and its pathology to provide the necessary information, which will determine the type of treatment as well as the reduction of the complications of this disease. It is important to make a comprehensive and concise report that contributes to surgical planning in the management of perianal fistulas.

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Received for evaluation: February 29, 2016
 Accepted for publication: November 29, 2016