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Magnetic Resonance Imaging for Perianal Fistula

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Perianal fistulas and other inflammatory diseases of the anus and perianal soft tissues are a cause of substantial morbidity, and are a major part of the practice of any colorectal surgeon. Magnetic resonance imaging (MRI) has a key role in the assessment of patients for the extent of fistulizing Crohn disease, complications related to fistulas, and to assist in confirming the diagnosis or proposing an alternative. Technique is critical and in particular, the selection of sequences for diagnosis and characterization of abnormalities with the main choices being between standard anatomical sequences (T1 or T2), assessing for edema (FS T2 or STIR), assessing abnormal contrast enhancement (FS T1), and assessing for abnormal diffusion or a combination of these. Guidance on MRI sequence selection, classification of fistulas, the current guidance on the role of MRI in assessing patients, and advice on how to provide useful structured reports, as well as how to detect complications of perianal sepsis are included.
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Introduction

Perianal fistulas and other inflammatory diseases of the anus and perianal soft tissues are a cause of substantial morbidity, in particular related to incontinence and consequently poor quality of life as a result of either the disease itself or the surgical interventions. These diseases form a substantial part of the practice of any colorectal surgeon with an increasing range of surgical procedures being performed for treatment. As with many other areas of surgical practice, radiology has developed a key role in the assessment of patients for the extent of fistulizing Crohn disease, complications related to fistulas, and to assist in confirming the diagnosis or proposing an alternative. This article assesses the role of magnetic resonance imaging (MRI), provides guidance on MRI sequence selection, and advices how to provide useful reports for clinical colleagues.

How Do Perianal Fistulas Arise?

There are 2 main reasons for a perianal fistula to form. The first is related to the anal glands. These lie in the mid-to-lower anal canal at the dentate line, where the columnar epithelium of lower gastrointestinal tract meets the squamous epithelium of the lower anus. When anal glands become occluded, an infection of the contents may develop leading to the formation of a small abscess. As this abscess grows, it typically passes toward the anal verge where it may discharge either spontaneously or following surgical incision and drainage if the patient presents to hospital with an acute perianal fistula. In either situation, an abnormal fistulous communication may form in between 15% and 40% of cases between the anal canal (the internal opening) and the perineum (external opening).

Alternatively, rather than being formed from occlusion or infection of glands, a fistula may form as a result of deep ulcerating diseases of the anorectum. The commonest cause in most Western Countries relates to Crohn disease, whereas in developing countries, such as in the Indian subcontinent, tuberculosis (TB) is much more common. Other less frequent causes include fistulation from adenocarcinoma or squamous cell carcinoma of the anorectum or less commonly as a complication of high-dose pelvic radiotherapy, whereas other infections are recognized to cause perianal fistulation including actinomycosis and human immunodeficiency virus (HIV) infection.

Classifying Fistula-In-Ano

The most frequently used classification system used in surgical practice is the Parks Classification.[1] This describes the anatomical location of the fistula. However, to understand the

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classification of fistulas using this and all other systems we must first evaluate the relevant anatomy of the perianal region and pelvic floor.

Anatomy for Fistula Classification

The pelvic floor is a conical structure formed from the levator ani muscles (Fig. 1). As these pass medially and inferiorly from their attachment on the pelvic sidewall, they merge with the V-shaped or U-shaped puborectalis muscle sling. The puborectalis passes posterior to the anorectal junction and acts to pull the anorectal junction anteriorly toward the pubis to assist with continence. Inferiorly, the puborectalis blends with the continuous circular external anal sphincter forms, which passes inferiorly to the anal verge. Although anatomical studies have described 3 separate components of the external sphincter (deep, superficial, and subcutaneous), these are usually inseparable on imaging evaluation and act as a single functional unit. All of these pelvic floor muscles are striated, providing baseline tone in addition to voluntary squeeze or relaxation for the regulation of continence and defecation respectively.

The internal sphincter lies medial to the external sphincter and is formed from smooth muscle, which is continuous with the muscularis propria of the rectum. This runs from the anorectal junction inferiorly to where it terminates as it interdigitates with the lowermost fibers of the external sphincter muscle.

The relevance of the dentate line has already been described but this is not visible on radiological assessment. Instead, its position may be approximated to lie 2 cm superior to the anal verge, or alternatively caudal to the inferior border of the puborectalis muscle that is usually a position one-third to one-half the distance of the anal canal from the anal verge. The anal glands arising at this location may penetrate into and beyond the internal anal sphincter muscle into a potential space called the intersphincteric plane. This is a critical potential space for perianal infection as such infections may track either inferiorly or superiorly along it. Alternatively, infection may pass from the intersphincteric plane through the external sphincter muscle into the fat of the ischioanal fossa, which lies below the levator ani muscles and lateral to the anal sphincters.

Parks Classification

Sir Alan Parks from St Marks Hospital first produced a classification of perianal fistulas, based on the relationship of the fistula to the anal sphincter complex (Fig. 2).[1] *Superficial or submucous fistulas* are rarely encountered in radiological practice but are the simplest to treat surgically. *Intersphincteric fistulas* arise in the anal canal before descending in the intersphincteric plane to reach the anal verge. A *transsphincteric fistula* may track for a variable distance in the intersphincteric plane before crossing the external sphincter muscle into the ischioanal fossa fat to reach the perineum or adjacent urogenital structures. *Supralevator fistulas* also originate in the intersphincteric plane but instead pass superiorly before they cross the levator ani muscles and descend through the ischioanal fossa to the perineum. The final group of fistulas are the *extrasphincteric fistula*; these usually arise from the rectum and entirely bypass the anal sphincter complex by crossing the levator ani muscle via the mesorectum before reaching the perineum through the ischioanal fossa.

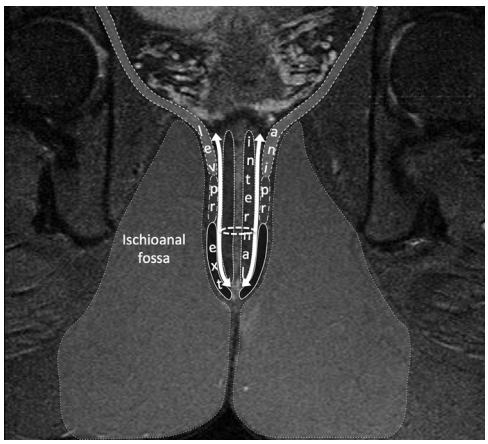

Figure 1 Normal anatomy of the pelvic floor and anal sphincters. The levator ani (lev ani) muscles blend with the puborectalis (pr), which in turn merges with the circular external sphincter (ext). The internal sphincter is continuous with the muscularis propria of the rectum, running the length of the anal canal. The intersphincteric space (white arrow) occupies the plane between the internal sphincter and the striated sphincter muscles. The dentate line, though not visible radiologically, lies just below puborectalis, approximately 2 cm from the anal verge (broken circular line).

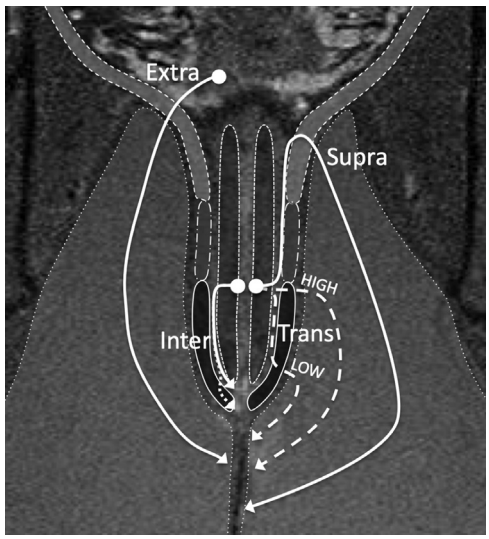

Figure 2 Inter—intersphincteric fistula: confined to the intersphincteric plane. These may cross the lowermost fibers of the external sphincter (dotted arrow). Trans—transsphincteric fistula: may traverse the external sphincter high or low to pass some distance distally in the intersphincteric plane before crossing the external sphincter. Supra—supralevator fistula: sepsis tracks proximally in the intersphincteric plane before piercing the levator ani to descend through the ischioanal fossa. Extra—extrasphincteric fistula: pelvic pathology generates sepsis that tracks across the levator ani to the perineum.