Role of Magnetic Resonance Imaging Fistulography in Preoperative Evaluation of Perianal Fistulas

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INTRODUCTION

As per definition, a perianal fistula is any abnormal passage connecting two epithelial surfaces of anal canal and the skin of the perineum. They are thought to be a result of anal gland obstruction, with secondary abscess formation and external rupture of the abscess.

Anal fistulae have been known ever since the times of Hypocrates and have been described through centuries. In 1835, Frederick Salmon performed a successful operation in London on the writer Charles Dickens. Goodsall describes the fistulous passage in details, and Parks’ Classification shows the most practical significance until nowadays.

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Treatment of this condition includes surgical exploration and removal of the fistulous track. However, in 25-30% of cases, the condition has a tendency to recur. This is most often because surgical exploration can easily miss secondary tracks and abscesses, resulting in recurrent infection requiring re-exploration. Surgeons have traditionally used...
digital rectal examination and examination under anesthesia to detect the fistulous track and their internal opening. However, this method fails to identify complex fistulas and their branches, leading to wrong classification and incomplete treatment.\(^6\)\(^7\)

Conventional fistulograms has two main disadvantages: First, the primary track and its extensions do not fill with contrast if they are plugged with pus or debris and, second, the sphincter muscle anatomy is not imaged; hence, the relation between the track, the internal/external sphincter, and the levator ani muscle is not revealed.\(^6\) Transrectal ultrasound better depicts fistulae and their relation to the anal sphincter muscles. The operator dependence, limited field of view and absence of a coronal plane of imaging; however, are its disadvantages.\(^6\) Computed tomography (CT) fistulography is limited by the fact that attenuation values of the fistula track, the areas of fibrosis, and sphincter muscles are similar to each other.\(^6\) Researches have shown that techniques used for imaging perianal fistulas including fistulography, anal endosonography, and CT, have proved no better than clinical examination and are uncomfortable to the patient on one hand and or lack the ability to demonstrate secondary tracks and relationship of the fistulous tracks with the sphincter complex.\(^6\)\(^8\)

**MATERIALS AND METHODS**

Totally, 44 patients with clinical suspicion of perianal fistulae were referred to the Radiology Department of tertiary care rural hospital from January 2016 and July 2017. Out of these 26 patients underwent surgery in our hospital and were evaluated retrospectively. Magnetic resonance imaging (MRI) imaging was done with a 1.5T Magnetom Avanto MRI unit (Siemens Medical Systems) with parameters and protocol described in Table 1, using a phased array body coil. There was no special patient preparation. MRI fistulogram was performed with instillation of contrast (gadolinium) or saline through the external opening. The following items were assessed for each of the used MRI sequences: The type of the fistula, location of the internal opening, the presence or absence of sinus tracks, abscesses and a horseshoe component as well as coexisting inflammation. The type of the fistula was evaluated according to the St. James’s University Hospital MRI classification system (Table 2)\(^9\) which correlates Parks surgical classification\(^10\) to anatomical MRI findings in the axial and coronal planes (Table 3 and Figure 1). The location of the internal opening was identified on axial images using the “anal clock” with the 12 o’clock position located anterior and the 6 o’clock position located posterior (Figure 2).\(^11\) A fistula with a track medial to the levator plate or puborectalis muscle is supralevator, while a fistula lateral to these muscles is infralevator. Complicated primary tracks with secondary tracks, extensions or abscesses were defined by their anatomical location: Ischio-anal, intersphincteric, or supralevator and they were considered horseshoe if crossing the midline to the contralateral side.\(^12\) Fistulous tracks were differentiated from abscesses using the criteria of Laniado et al.\(^13\) in which fistulas were defined as being

![Figure 1: Parks classification. Drawing of the anal canal in the coronal plane shows the Parks classification of perianal fistulas. A = Intersphincteric, B = Transsphincteric, C = Suprasphincteric, D = Extrasphincteric. The external sphincter is the keystone of the Parks classification](image-url)
fluid–fluid tubular structures with a diameter smaller than 10 mm and abscesses were larger than 10 mm. Air pockets within the fluid collection also suggested the presence of an abscess. MRI findings were then correlated with the operative findings. Surgical findings were accepted as the gold standard and were recorded independently by the surgeon.

**RESULTS**

Out of the 26 patients included in the study group with age ranging from 20 to 67 years. MRI revealed fistulae in 21 (80.7%; 17 males and 4 females) patients while 5 (19.2%; 3 males and 2 females) patients had only perianal sinuses. Out of total 21 fistulae seen, 10 (47.6%) were intersphincteric, 9 (42.8%) were transsphincteric, and 2 (9.5%) were suprasphincteric. No extrasphincteric fistula noted (Graph 1). Out of these fistulae, 14 (66.6%) were simple, whereas 7 (33.3%) showed associated abscess formation, inflammation, and branching course. Grade 1 was the most frequent (47.6%) type of anorectal fistula. The most common location of the internal opening of the fistula was at 6 o’clock position.

The MRI findings were in accordance with surgical findings in 25 out of 26 patients regarding type and extent of fistula-in-ano. One intersphincteric fistula misdiagnosed on MRI proved to be a sinus (Table 4).

Statistical parameters showed that MRI has a sensitivity of 100% and specificity of 83.3% in determining type and extent of perianal fistula (Table 5).
DISCUSSION

This is a retrospective comparative study between surgery and preoperative MRI, aiming to precisely evaluate the value of preoperative MRI examination. Until recently, imaging had very little role to play in the preoperative evaluation of perianal fistulas. The advent of MRI with its excellent soft tissue contrast and multiplanar capabilities makes it an ideal choice in the preoperative assessment of perianal fistulas. A detailed assessment of the anatomic relationship between the fistula and the anal sphincter complex allows surgeons to choose the best surgical treatment thus significantly reducing recurrence of the disease or possible secondary effects of surgery, such as fecal incontinence.9,14,15

The results of our study indicate that MRI is highly accurate for determining the type and extent of perianal fistulae. Sensitivity of 90% and specificity of 100% seen in our study is comparable to international literature Tables 6.

**MRI Appearance**

T1-weighted (T1W) images give an excellent anatomic overview of the sphincter complex, levator plate, and ischiorectal fossa. Fistulous tracks, inflammation, and abscesses appear as areas of low to intermediate signal intensity on T1W imaging. T2-weighted (T2W) images provide good contrast between the high signal intensity fluid in the track and the low signal fibrous wall of the fistula and allow adequate differentiation of the boundaries of the internal and external anal sphincters. Active fistulous tracks and extensions have high signal intensity on T2W images, while the sphincters have low
signal intensity. Chronic fistulous tracks or scars appear hypointense on both T1W and T2W images. Abscesses appear hyperintense on T2W images due to the presence of pus and fluid in the center. Gadolinium-enhanced T1W images are useful to differentiate a fluid-filled track from an area of inflammation. The track wall enhances, whereas the central portion is hypointense. Abscesses are also very well depicted on post-gadolinium images.

The exact location of the primary track (ischioanal or intersphincteric) is most easily visualized on axial images; the presence of disruption of the external anal sphincter differentiates a transsphincteric fistula from an intersphincteric one. The internal opening of the fistula is also best seen in this plane. As mentioned earlier, coronal images depict the levator plane, thereby allowing differentiation of supraleaverator from infrallevator infection. In our experience, axial T2W fat-suppressed images were the most useful for locating the fistulous track (Figure 3-7).

CONCLUSION

Our study supports that, MR fistulography precisely demonstrate the anatomy of the perianal region, show the anal sphincter complex and clearly identify the relationship of fistulas to the pelvic diaphragm and ischiorectal fossa which has important implications for surgical management and outcome. Pre-operative MRI can help recognize the unidentified infection, accurate in the detection of the secondary extension and abscess formation and markedly decreasing the incidence of recurrence and allowing side effects such as fecal incontinence to be avoided.

REFERENCES