ORIGINAL ARTICLE

Diagnostic Accuracy of Magnetic Resonance Imaging in Perianal Fistula Taking Surgical Findings as Gold Standard

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ABSTRACT

Aim: To determine the diagnostic accuracy of magnetic resonance imaging (MRI) in perianal fistula taking surgical findings as gold standard
Study design: Cross Sectional Study.
Place of study: Radiology Department, Sheikh Zayed Hospital, Lahore.
Methods: The non-probability consecutive sampling technique was used in this study. After taking the informed consent the MR imaging was done using a 1.5 Tesla superconducting magnet with external coil. All the data was entered and analyzed on SPSS version 17.
Results: In our study the mean age of the patients was 44.36±15.55 years, the male to female ratio of the patients was 1.3:1. The sensitivity, specificity and diagnostic accuracy of MRI was 92.94%, 91.76% and 92.35% respectively taking surgical findings as gold standard
Conclusion: It has been proved in our study that the MR imaging is reliable and accurate procedure for detecting perianal fistula taking surgical findings as gold standard with high sensitivity and specificity.
Keywords: Perianal Fistula, magnetic resonance imaging, Surgery, Assessment

INTRODUCTION

A perianal fistula is an inflammatory condition that affects the region around the anal canal with a presence of a fistulous tract across the anal sphincters[1]. It affects approximately ten individuals in 100,000. It usually affects men, in their fourth decade[2].

The true prevalence of fistula in ano is unknown. The incidence of a fistula in ano developing from an anal abscess ranges from 26-38%[3]. Darwish reported 68% patients with perianal fistula among patients presenting with anal incontinence. 22% patients had only Perianal fistula with a high tendency to recur because of perianal sinuses[4].

Perianal fistula has high tendency to recur because of undetected infection at surgery, causing significant morbidity and often requiring repeated surgical treatments[5]. Once the fistulizing process becomes complex, the chance of healing is greatly reduced. The possible causes include persistent cryptoglandular sepsis, anal fissure, trauma, anal malignancy, inflammatory bowel disease (IBD), radiation injury[6].

The anal canal is surrounded by the internal (involuntary) and external (voluntary) sphincters[5]. The mucosal surface has dentate line which is considered to be the initial site of infection where fistula formation starts[7]. The anal glands being deeply located in the intersphincteric space are claimed for abscess formation secondary to any obstruction of their ducts outlet openings. The infection process, thereafter, spreads through the intersphincteric space downward or outward delineating the different types of fistula[8]. Fistulae may thus be classified according to the route taken by this "primary tract" that links the internal and external openings[5].

Magnetic resonance imaging is now generally available and high quality examination does not require special equipment. It suffers from none of the drawbacks associated with other imaging modalities. Conventional radiography, proctosigmoidoscopy and endoanal ultrasound are often insufficient to demonstrate extra-intestinal extent of disease. While MRI can accurately identify the fistula tract in relation to sphincter complex and its associated complications (secondary tract and abscesses)[9].

In one study conducted on 56 patients, the sensitivity and specificity of MRI in diagnosing perianal fistula is 100 % and 100% respectively[1]. Whereas another study conducted on 25 patients, showed that the sensitivity and specificity of MRI Is 100% and 88%. Authors concluded that MRI has comparable sensitivity for detecting peri anal fistulas but has poor specificity[9].

The objective of the study was to determine the diagnostic accuracy of magnetic resonance imaging (MRI) in perianal fistula taking surgical findings as gold standard.

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MATERIALS AND METHODS

This cross sectional study was carried out in the Radiology Department, Sheikh Zayed Hospital, Lahore. Sampling technique was non-probability consecutive sampling. One hundred and seventy patients fulfilling the inclusion criteria were selected from departments of Radiology, Sheikh Zayed hospital, Lahore. Informed consent was obtained from each patient and demographic details (name, age, sex and contact) were also noted on pre-designed proforma. MR imaging was done using a 1.5 Tesla superconducting magnet with external coil. The images were evaluated for the presence of the primary fistulous tract (the path having two openings, one external and one internal, considered as positive finding), internal opening and its relations to the sphincters. Secondary extensions, any abscesses and/or collections were also recognized. The fistula was identified as hyper intense tubular structures on T2WI and abscess appears as fluid filled cavities either high or low signals on T2WI by a single consultant radiologist (as per operational definition) patient was labeled as positive or negative. Then patient underwent surgery and the result of surgery was compared with MRI findings to assess true and false positive & negative cases.

All the data was analyzed by SPSS version 17. The quantitative variables like age were presented as means and standard deviations. The qualitative variables like gender and perianal fistula on MRI and surgical findings were presented as frequencies and percentages. 2x2 was generated to calculate sensitivity, specificity, PPV, NPV and diagnostic accuracy of MRI taking surgical finding as gold standard. Data was stratified for gender, age and BMI. Chi Square test was applied. Post stratification with p value ≤ 0.05 was considered as significant.

RESULTS

TableI: Frequency distribution of MRI

MRI	Frequency
Positive	86(50.6%)
Negative	84(49.4%)
Total	170(100%)

TableII: Comparison of MRI with surgical finding

MRI	Surgery		Total
	Positive	Negative	
Positive	79	7	86
Negative	6	78	84
Total	85	85	170

Sensitivity	92.94%
Specificity	91.76%
Positive Predictive Value	91.86%
Negative Predictive Value	92.86%
Diagnostic Accuracy	92.35%

Table-III: Comparison of MRI with surgical finding stratified by age

MRI	Age (years)	
	<50	≥50
Sensitivity	90.74%	96.77%
Specificity	92.31%	90.91%
PPV	92.45%	90.91%
NPV	90.57%	96.77%
Diagnostic accuracy	91.51%	93.75%

Table IV: Comparison of MRI with surgical finding stratified by sex

MRI	Gender	
	Male	Female
Sensitivity	94.87%	91.3%
Specificity	91.18%	92.16%
PPV	92.50%	91.3%
NPV	93.94%	92.16%
Diagnostic accuracy	93.15%	91.75%

TableV: Comparison of MRI with surgical finding stratified by BMI

MRI	BMI		
	Underweight	Normal	Obese
Sensitivity	94.12%	94.12%	96.3%
Specificity	93.1%	89.66%	92.59%
PPV	94.12%	87.5%	92.86%
NPV	93.1%	89.66%	96.15%
Diagnostic accuracy	93.65%	88.68%	94.44%

DISCUSSION

In this study, sensitivity of MRI in diagnosing peri anal fistula taking surgical finding as gold standard was 92.94%, the specificity was 91.76%, the PPV value was 91.86%, the NPV value was 92.86% and the diagnostic accuracy was 92.35%. These results were comparable with a study conducted on 25 patients which showed that sensitivity and specificity of MRI for peri anal fistula diagnosis were 100% and 88% respectively[9]. A similar study was conducted on 42 patients with suspected anal fistulas. In this study, results of digital rectal examination, dynamic contrast-enhanced MR imaging, and surgical exploration were compared. It was seen that MRI was superior to digital rectal examination with or without surgical exploration. It was concluded that sensitivity of MRI was 97% and specificity of 100% for detection of fistulas[10].

Another study was conducted to see the accuracy of MRI in primary fistulating tracts and abscesses and it was concluded that sensitivity of MRI for detection of tract was 100 % and specificity was 86% and for abscesses sensitivity and specificity were 96% and 97 % respectively[11]. Similar results were obtained by Imaadur Rehman et al whose study showed that MRI had a sensitivity of 90%, specificity of 100% and a

diagnostic accuracy of 90% in diagnosis of type and extent of peri-anal fistula[12].

In one study sensitivity and specificity of MRI in correctly detecting and grading the primary tract was found to be 95.56% and 80% respectively[5]. In another study, sensitivity and specificity of MRI for detecting abscess ware 87.50% and 95.24% respectively[13].

Results of our study were also comparable with a study done by Regina G. H. Beets-Tan et al. in their study, results revealed that the sensitivity and specificity of MRI for detecting fistula tracts were 100% and 86%, respectively; abscesses, 96% and 97%, respectively; horseshoe fistulas, 100% and 100%, respectively; and internal openings, 96% and 90%, respectively[14].

CONCLUSION

It has been proved in our study that the MR imaging is reliable and accurate procedure for detecting perianal fistula taking surgical findings as gold standard with high sensitivity and specificity.

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