Accuracy of Goodsall's Rule in Perianal Fistulas – Correlation with Mr Fistulogram

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Abstract

Introduction: Perianal fistula is one of the common gastrointestinal pathology with significant morbidity. Goodsall's rule states that the posterior perianal fistulas have the fistulous tract that opens into the anal canal in the midline posteriorly, sometimes taking a curvilinear course and anterior perianal fistulas will have a radial fistulous tract.

Objectives: To assess the accuracy of Goodsall's rule in perianal fistulas on comparison with Magnetic Resonance (MR) fistulogram findings.

Materials and Methods: A total of 45 cases with perianal fistula underwent pre-operative MR Fistulogram assessment. Fistulas were divided into anterior and posterior fistulas based on MR Fistulogram findings. Accuracy of Goodsall's rule in all the perianal fistulas visualised on MRI was assessed.

Results: Out of 45 patients, 10(22.2%) patients had anterior fistulas and rest of 35(77.8%) patients had posterior fistulas. Goodsall's rule was valid in 28(62.2%) patients. Seventeen (37.8%) patients did not follow Goodsall's rule. Goodsall's rule was found to be more accurate in anterior fistulas than posterior fistulas.

Conclusion: MR Fistulogram has high accuracy of detecting perianal fistulas. Goodsall's rule may not be valid in all the cases of perianal fistulas. Goodsall's rule is more applicable in anterior fistulas. Posterior fistulas do not strictly adhere to Goodsall's rule with many of them showing linear tracts. This information is useful for pre-operative planning of fistula treatment.

Key words: *Anal fistula, Fistulogram, Goodsall's rule.*

Introduction

Perianal fistulisation is one of the important gastrointestinal tract pathology with substantial morbidity. Perianal fistula is an abnormal fistulous connection between the skin of the perineum and the anal canal. Prevalence is about 0.01% and predominantly affects young males, with a male-to-female ratio of 2:1[1]. Causes of perianal fistulas include perianal gland sepsis, Crohn's disease, tuberculosis, trauma during childbirth, pelvic infection/malignancy and radiation therapy, with perianal gland sepsis being the commonest cause[2]. Most common presenting symptom is discharge (65% of cases), but local pain due to inflammation is also common[1]. Perianal fistulas are classified into anterior fistula when external opening is anterior to transverse anal line and posterior fistula when external opening is posterior to transverse anal line[3].

In 1900, David Henry Goodsall described a rule after him, which predicts the position of the internal opening of the perianal fistula in relation to its external opening[3]. There are many classification systems used to describe perianal fistulas. Sir James Parks in

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1976 introduced a classification system for perianal fistulas which is still practised. St James's University classification is a commonly used perianal fistula classification which is Magnetic Resonance (MR) Imaging–based classification. It consists of five grades and it relates the Parks surgicalclassification to anatomy seen at MR imaging in both axial and coronal planes[4]. This classification deals with the demonstration of the primary fistulous track, secondary ramifications and associated abscesses. Goodsall's rule[3] states that if the perianal skin opening is posterior to the transverse anal line, the fistulous tract will open into the anal canal in the midline posteriorly, sometimes taking a curvilinear course. A perianal skin opening anterior to the transverse anal line is usually associated with a radial fistulous tract. An exception to the rule are anterior fistulas lying more than 2.5 cm from[1] the anus, which may have a curved track (similar to posterior fistulas) that opens into the posterior midline of the anal canal. Data regarding the positive predictive value have been inconsistent with different studies showing a wide variance in results[2].

Materials and Methods

Forty eight consecutive patients with clinical diagnosis of fistula-in-ano attending the surgery outpatient Department of Sree Balaji Medical College & Hospital, Chennai, India, were referred to the Radiology Department for MRI Fistulogram between January 2016 and September 2016. Three patients who were claustrophobic for MRI study were excluded from the study. Finally, 45 patients who underwent MRI were included in the study. Detailed clinical history taking and a thorough examination were done for all the patients. Study was done using HITACHI Aperto MRI scanner (Hitachi Corporation, US). This study group comprised of 42 males and 3 females. Age group of the patients ranged from 18 – 80 yrs with mean age of 42.5 years. Prior informed consent was obtained from all the patients. Ethical approval was obtained from Institutional ethical committee to conduct the study. MR Fistulogram protocol included T1W Axial, T2W and STIR Sequences in Axial, Coronal and Sagittal planes [Table 1]. Clinical findings of perianal fistulas were correlated with MRI findings to assess the accuracy of the Goodsall's rule in predicting the internal opening of the tract, using appropriate statistical tests such as Chi-Square test. Data was analyzed using SPSS Version 20 statistical software.

Results

Out of the 45 patients, 10 patients (22.2%) had anterior fistulas and rest of 35 patients (77.8%) had posterior fistulas [Figure 1]. Fistulas with curved tracts were more common than those with linear tracts. Goodsall's rule was valid in 28 patients (62.2%). Seventeen patients (37.8%) did not follow Goodsall's rule [figure 2 and 4]. Eight of the ten anterior fistulas followed Goodsall's rule, with linear tracts (80.0% accuracy). Twenty of 35 posterior fistulas followed Goodsall's rule (57.2% accuracy) [Figure 3]. Goodsall's rule was found to be more accurate in anterior fistulas than posterior fistulas.

Table 1: Protocol used for MRI fistulogram

Parameters	T1W FSE	T2 FSE	T2 FSE	T2 FSE	STIR	STIR	STIR
Imaging plane	Axial	Axial	Coronal	Saggital	Axial	Coronal	Saggital
TR/TE(msec)	995/17	880/105	6800/105	6400/105	8200/15	7600/15	7200/15
FOV(cm)	26 x 26	26 x 26	26 x 26	26 x 26	26 x 26	26 x 26	26 x 26
Section thickness(mm)	3.5	3.5	3.5	3.0	3.5	3.5	3.5
Intersection gap(mm)	4.5	4.5	4.5	4.0	4.5	4.5	4.5
Matrix	256 x 256	256 x 256	256 x 256	256 x 256	256 x 256	256 x 256	256 x 256
NSA	2	2	1	2	2	2	2

MRI- Magnetic resonance imaging; T1W FSE- T1 weighted Fast Spin Echo; T2 FSE- T2 Fast Spin Echo; STIR- Short Tau Inverse Recovery; TR- Time of Recovery; TE- Time of Echo; FOV- Field of View; NSA- Number of Signal Averages

Table 2: Goodsall's rule accuracy in following studies:

Authors	Accuracy of Goodsall's rule in anterior fistulas	Accuracy of Goodsall's rule in posterior fistulas	Overall accuracy	Gold standard used
Mallick and Kamil	54%	46%	----	Intraoperative findings
Alexander et al	66%	29%	----	Intraoperative findings
Cirocco-Reilly et al	90%	49%	----	Intraoperative findings
Barwood et al	91%	69%	----	Intraoperative findings
Gunavardhana and Deen	----	----	59%	Intraoperative findings
Hiranyakas et al	----	----	58%	Endoanal ultrasound
Our Study	80.0%	57.2%	62.2%	MR Fistulogram

Figure and figure legends

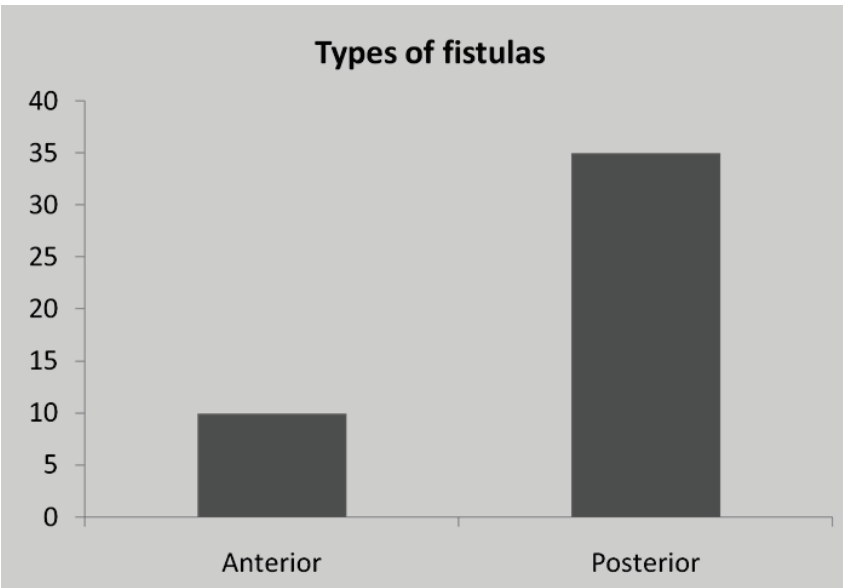

Figure 1: Bar diagram showing the number of anterior and posterior fistulas in our study.

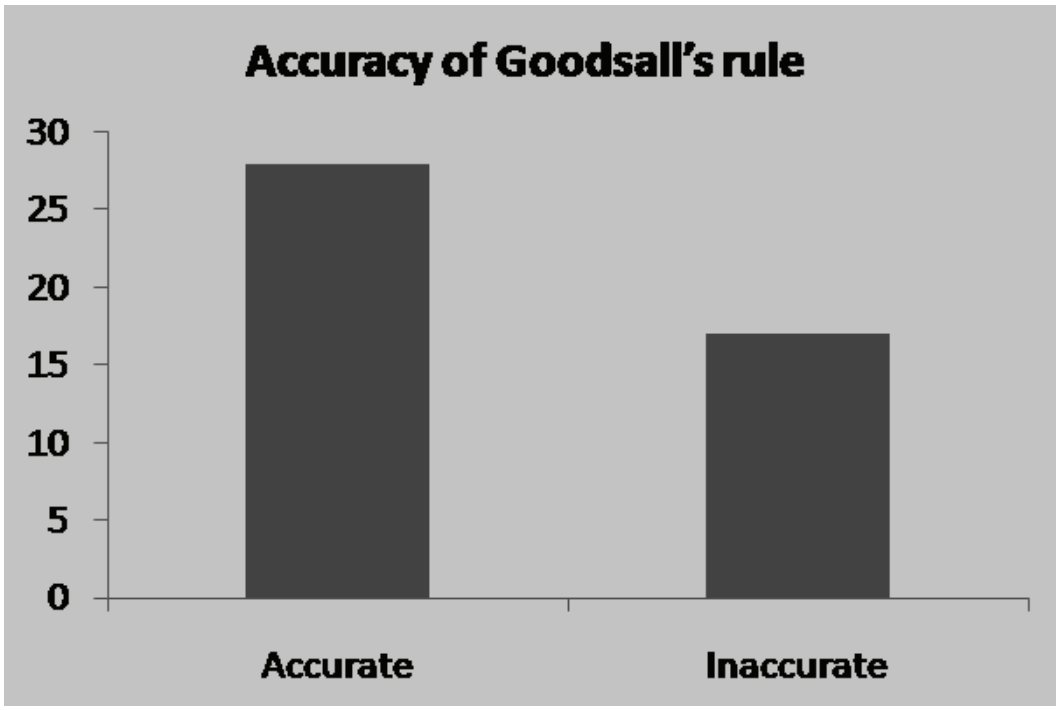

Figure 2: Bar diagram showing the accuracy of Goodsall's rule in our study.

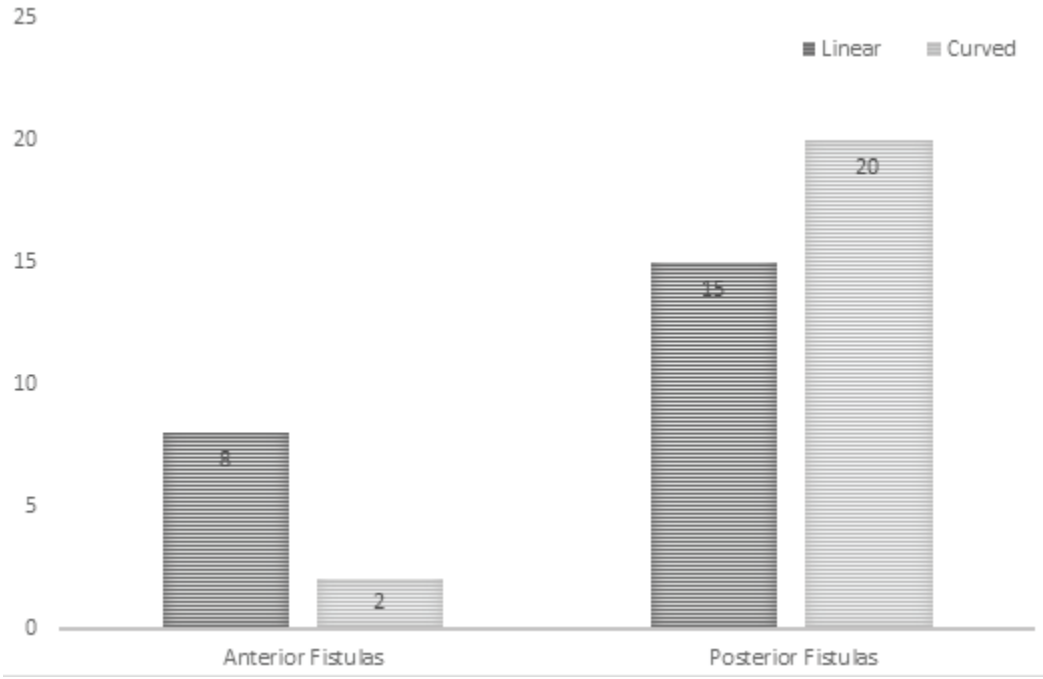

Figure 3: Bar diagram showing the number of linear and curved tracts amongst the anterior and posterior fistulas in our study.

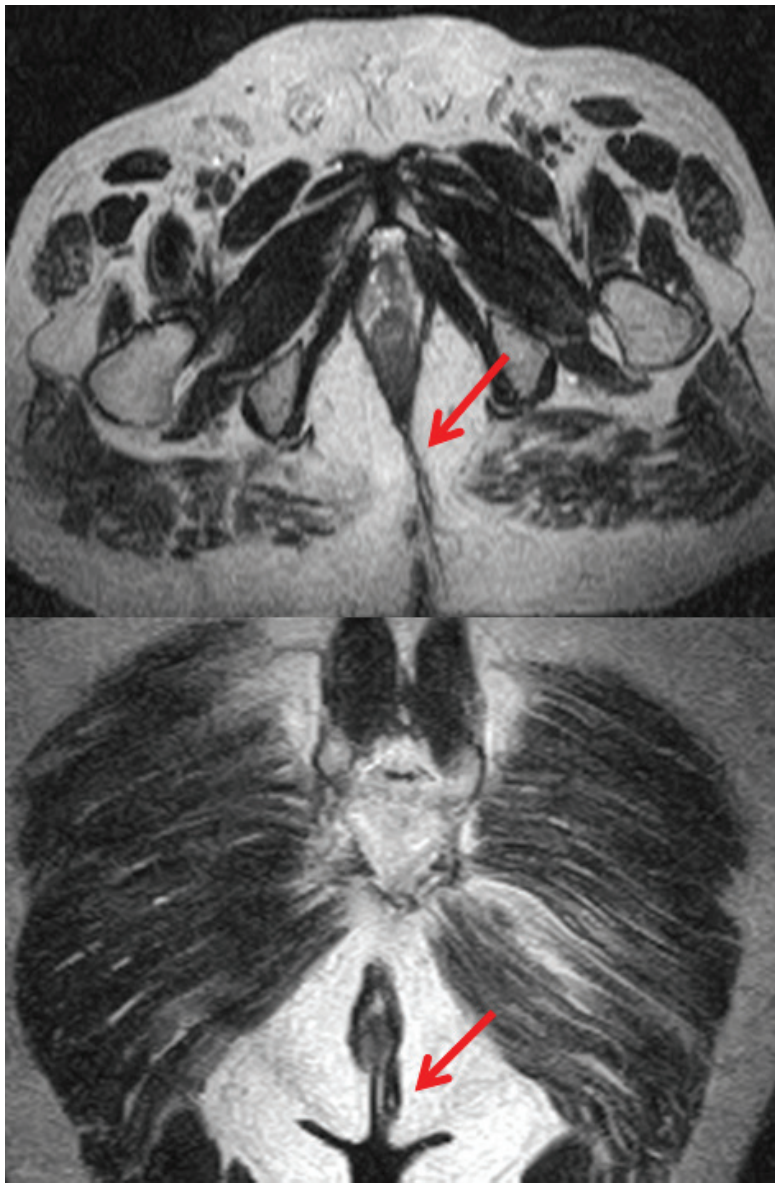

Figure 4. a,b: Axial (a) T2 weighted MRI showed linear posterior fistula (arrow) with external opening at 5'o clock and internal opening at 6'o clock position. Coronal (b) T2 weighted MRI showed linear posterior fistula (arrow) with external opening and internal opening at 5'o clock. Goodsall's rule does not hold good in these cases.

Discussion

Perianal fistulas while easy to diagnose, requires a thorough preoperative evaluation to map out the type and course of the tracts. Identification and localization of the entire crypto glandular fistula, including the external opening, the primary tract, secondary tracts, abcesses, and the internal opening are essential for classification and treatment. Inadequate assessment of the fistula may result in a simple fistula developing into a complex fistula, and failure to recognise secondary extensions can result in recurrent sepsis and a protracted clinical course[5].

Three main radiological imaging techniques used in assessment of perianal fistulas are contrast fistulography, endorectal ultrasonography and magnetic resonance imaging[6]. MRI imaging of perianal fistulae relies on the inherent high soft tissue contrast resolution and its multiplanar display of anatomy. In one of the early studies on MR fistulogram, Lunniss et al reported a concordance rate of 86- 88% between MRI and surgical findings[7].

Subsequent studies have suggested that MRI is more accurate than even surgical exploration of tract[8]. Hence MR imaging has emerged as the imaging technique of choice for preoperative evaluation of perianal fistulas, providing a highly accurate, rapid and non invasive means of performing pre-surgical assessment.

T2W images (TSE and fat suppressed) provide good contrast between the hyperintense fluid in the tract and the hypointense fibrous wall of the fistula, while providing good delineation of the layers of the anal sphincter[9,10]. The exact location of the primary tract (ischioanal or intersphincteric) is visualized on axial images, the presence of disruption of the external anal sphincter differentiates a trans-sphincteric fistula from an intersphincteric one. The internal opening of the fistula is also better seen in this plane. Coronal images depict the levator plane, thereby allowing differentiation of supralevator from infralevator infection. A combination of an axial and a longitudinal series (coronal and sagittal) will provide all the necessary details.

However, in places without access to MRI, preoperative planning is based on the long-standing Goodsall's rule. There have been quite a few studies assessing the diagnostic accuracy of the Goodsall's rule in comparison with surgical findings, endoanal ultrasound and MRI [Table 2]. Almost all the studies showed that Goodsall's rule is more accurate in anterior fistulas than with posterior fistulas[13-17]. In our study, we found that Goodsall's rule was accurate in 80% of cases with anterior opening and 57.2% of cases with the posterior opening with overall accuracy of 62.2%.

As the study revealed that the Goodsall's rule is not completely accurate in establishing the tract of the fistulae, the authors recommend that all cases of perianal fistula be thoroughly investigated preoperatively with MR fistulogram, which has a high accuracy of 80-90%[11,12]. These findings were consistent with the published papers regarding the same[13-17].

Conclusion

This study proves that Goodsall's rule may not be valid in all the cases of perianal fistulas. Goodsall's rule is more applicable in anterior fistulas. Posterior fistulas, which are more common than anterior fistulas, do not strictly adhere to Goodsall's rule. It has to be kept in mind when proceeding for surgery without preoperative MRI in unavoidable situations. MRI is the investigation of choice for perianal fistulas and should be done whenever available.

Ethical Clearence: This study was duly cleared by the ethics committee of Sree Balaji Medical college & Hospital

Conflict of Interest: Nil

Financial Disclosure: Nil

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