

Original Research Article

Goodsall's rule– its predictive accuracy in tracing the tract of fistula in ano

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ABSTRACT

Background: Despite being one of the oldest reported medical conditions, the management and treatment of fistula in ano are still in the evolving phase. The management of fistula-in-ano requires confirmation of the diagnosis, identifying the fistulous tract and inner opening. In majority of patients a single primary fistula tract exists and the anatomy can be determined by examination under anaesthesia adhering to the principles described by Goodsall. A thorough clinical examination of the patient is essential in the assessment of fistula-in-ano, sometimes helped by imaging such as magnetic resonance imaging and endoanal ultrasonography. Although Goodsall's rule was accepted in the past, as a method to determine the course of the fistula, recent studies showed poor conflicting results. Thus, this study attempts to scrutinize the predictive accuracy of Goodsall's rule.

Methods: After approval from ethical committee and obtaining informed consent from each patient, prospective analysis of 188 patients who has fistula-in-ano were included in the study. They were grouped according to Goodsall's rule and its predictive accuracy was checked with intraoperative findings. Data was entered in excel sheet and analysed by SPSS version 20.0. For all statistical interpretations, $p < 0.05$ was considered the threshold for statistical significance.

Results: Predictive accuracy of Goodsall's rule found to be 84.6% in case of fistula with an anterior external opening. While in case of fistula with posterior external opening this found to be 69.1%. Overall predictive accuracy of Goodsall's rule is 77%.

Conclusions: Goodsall's rule can be used as guide in predicting the tract.

Keywords: Goodsall's rule, Fistula in ano, External opening, Internal opening

INTRODUCTION

A fistula-in-ano is an abnormal hollow tract that is lined with granulation tissue and that connects a primary opening inside the anal canal to a secondary opening in the perianal skin.¹ Repair of the fistula itself is considered an elective procedure which many patients opt for due to the discomfort and inconvenience associated with an actively draining fistula. Surgical treatment includes laying open/fistulotomy, setons, fistulectomy. Majority of cases here underwent fistulectomy.

Goodsall's rule says when the external opening of fistula in ano lies behind the transverse anal line or anterior and beyond 3 cm the internal opening is in the midline posteriorly between the sphincters and the track will be curved. When the external opening is in front of the transverse line but within 3 cm from the anus, the internal opening will be in the same radial line of the external opening and tract will be straight. In situations where there are multiple anal fistulae, the course would be like that of posterior opening fistulae because of branching and communication between these openings.

Treatment of fistula in ano will be difficult without recognising the internal opening and identifying the fistula tract. Previously Goodsall's rule was well accepted to determine the course of the fistula. But recent data have shown conflicting results.^{2,3}

Objectives

Objectives were to study the predictive accuracy of Goodsall's rule in fistula in ano.

METHODS

The study was conducted in the department of surgery, Sree Gokulam Medical College and Research foundation after obtaining clearance from institutional ethical committee and obtaining informed consent from each patient. Prospective analysis of 188 patients who attended the surgery OP and diagnosed to have fistula-in-ano were included in the study. The study duration was two years from 2017. All patients with fistula in ano irrespective of age and sex were included. Detailed history and clinical examination were done for these patients. Findings of the digital rectal examinations of all patients were recorded. Preanesthetic work up and investigations related to the patient's comorbidities were done. All examinations and definitive surgical care for each patient were carried out by the same senior surgeon. Preoperatively patients were examined under anaesthesia in lithotomy. Hydrogen peroxide along with methylene blue was injected through the external opening and the appearance of air bubbles and dye staining in the anal canal helped to identify internal opening. The morphological parameters including the site, number of internal and external opening, level of the internal opening and the course of the tract recorded.

Categorical and quantitative variables were expressed as frequency (percentage) and mean±SD respectively. Data

entered in Excel sheet and analysed by SPSS version 20.0. Frequency, proportion calculated. Sensitivity and specificity, positive predictive value and negative predictive values calculated. For all statistical interpretations, p<0.05 was considered the threshold for statistical significance.

RESULTS

The study group consisted of total 188 patients of which 99 (52.7%) were males and 89 (47.3%) were females. The male to female ratio being 1.11:1. In the study population 122 (64.9%) patients had external opening posterior to the transverse anal line, whereas anterior external opening found in 66 (35.1%) patients. The external opening lies within 3cm for 179 (95.2%) patients, in rest of the 9 (4.8%) patients the opening lies beyond 3 cm (Table 1). During intraoperative assessment 37 (56.6%) of the patients with anterior external opening had direct course where in 29 (43.9%) patient's course being curved.

Table 1: Percentage distribution of the sample according to external opening.

External opening	Count	Percentage
Anterior	66	35.1
Posterior	122	64.9

Table 2: Percentage distribution of the sample according to intraoperative finding.

Intra operative	Count	Percentage
Anterior straight	37	19.7
Anterior curved	29	15.4
Posterior straight	58	30.9
Posterior curved	64	34.0

Table 3: Predictive accuracy of Goodsall's rule in comparison with Intra operative finding.

Goodsall's rule	Intra operative				Total
	Anterior straight	Anterior curved	Posterior straight	Posterior curved	
Anterior straight	33	25	0	0	58
Anterior curved	4	4	0	0	8
Posterior straight	0	0	0	0	0
Posterior curved	0	0	58	64	122
Total	37	29	58	64	188

Fistula with opening posterior to transverse anal line had curved tract in case of 64 (52.5%) patient, compared to direct tract in 58 (47.5%) (Table 2).

In this study when comparing the Goodsall's rule with intraoperative finding, Goodsall's rule found to be accurate in predicting the direct course in 33 patients. In

4 patients the curved tract of anteriorly opening fistulas could be predicted with the rule. In case of posterior opening fistulas Goodsall's rule found to be consistent in 64 patients (Table 3).

The accuracy in predicting the tract was 84.6 in anterior tracts and 69.1 in posterior tracts (Table 4).

Table 4: Findings.

	Anterior straight	Anterior curved	Posterior straight	Posterior curved
Sensitivity	89.2	13.8	0.0	100.0
Specificity	83.4	97.5	100.0	53.2
False Negative	10.8	86.2	100.0	0.0
False positive	16.6	2.5	0.0	46.8
Positive Predictive value	56.9	50.0	-	52.5
Negative Predictive value	96.9	86.1	69.1	100.0
Positive Likelihood ratio	5.39	5.48	-	2.14
Negative Likelihood ratio	0.13	0.88	1.00	0.00
Accuracy	84.6	84.6	69.1	69.1

DISCUSSION

Even though Fistula in ano is one of the oldest reported condition, the treatment possibilities are still in evolving phase. The exact identification of the internal opening and course of tract is of basic importance for effective management. Goodsall's rule was accepted in the past, as a method to determine the course of the fistula, but later found to have discrepancy. Only few studies have been done in predicting the accuracy of fistulous tract using Goodsall's rule.

Fistula in ano may be found in association with a variety of specific conditions like crohn's disease, tuberculosis, hidradenitis suppurativa, lymphogranuloma venereum, rectal duplication, actinomycosis, trauma and foreign bodies.⁴⁻⁹

For the majority of patients with simple fistulas, the time spent off-work with the parent abscess and subsequent fistula management may be relatively short. However, it is not uncommon for a patient with a complex fistula to have multiple hospital admissions for attempted cure over several years, only to end up incontinent and permanently incapacitated.

Goodsall pointed out that if a transverse line is drawn across the mid-point of the anus, fistulae with their external openings anterior to this line usually run directly to the anal canal, whilst those with external openings behind the transverse line tend to take a curved course terminating in an opening in the midline of the posterior wall of anal canal.¹⁰ This generalization is known as Goodsall's rule. Explanation for this lies in the fact that in posterior midline longitudinal muscle of rectum which forms the internal sphincter of anus fails to fuse with external sphincter. Goodsall's rule holds true only if external opening is within 3 cm of anal verge.

Fistula in ano shows male preponderance. In our study also males (52.7%) are affected more than females (47.3%). Male to female ratio being 1.11:1. This is low when compared to study by Jayarajah et al which was about 3.7:1. Where 78.8% were males.² Mostly it affects the young and the middle age group thus affecting

productive work hours and quality of life. Majority of study population belonged to fifth decade, with mean age of 44.8 yrs compared to the median age of 39 years in the study

Mallick et al analysed about 70 patients with fistula-in-ano, 60 males and 11 females of which 53% of posterior external opening and 54% of anterior external opening complied with Goodsall's rule. Hence, Goodsall's rule only gives a clue about the direction of tract and internal opening.¹

According to Gunawardhana et al among 35 patients with fistula in ano, the overall predictive accuracy of Goodsall's rule was poor, chiefly because of poor predictive accuracy in posterior and recurrent fistulas. Hence Goodsall's rule alone is not recommended in decision-making before surgery.¹¹

In our study population 56.9% of patients had previous history of perianal abscess, for which incision and drainage was done. Rest 43.1% did not have history of perianal abscess, necessitating to rule out other causes. In this study 64.9% of patients have fistula opening posterior to transverse anal line, anterior opening constitute only 35.1%. That means posteriorly opening fistulas are more common. In 95.2% of patients the external opening lies within 3 cm, all these were anteriorly opening fistulas. In only 4.8% it lies beyond 3 cm.

Among 66 patients with anteriorly opening fistulas, in 37 cases Goodsall's rules was consistent with intraoperative finding. Among these 37 patients, 33 patients had direct tract and 4 had curved tract. Goodsall's rule was able to predict the curved course in the case of posteriorly opening fistulas. But 36 patients of 122 had midline posterior opening.

In our study predictive accuracy of Goodsall's rule was found to be 84.6% in case of fistula with an anterior external opening. While in case of fistula with posterior external opening this was found to be 69.1%. In study by Jayarajah et al the predictive accuracy for simple fistulae was 78.3%.² Fistulae with an anterior external opening

had a predictive accuracy of 76.3% while those with a posterior opening had a predictive accuracy of 79.4%. The difference was not statistically significant.

Limitations

This was a prospective clinical study where the anatomy of the fistulous tract was identified only by clinical examination and correlated peroperatively. Multiple tracts may not be identified even peroperatively which can lead to recurrence of fistula. If imaging techniques were also added, identification of fistula tract may be more accurate.

CONCLUSION

In our study, we found that predictive accuracy of Goodsall's rule is 77%. Only 23% were non-compliant. Hence, Goodsall's rule can be used as a guide to identify the tract and internal opening before surgery, but supportive investigations are also suggested.

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