ORIGINAL RESEARCH PAPER
Volume - 13 | Issue - 12 | December - 2024 | PRINT ISSN No. 2277 - 8179 | DOI : 10.36106/ijsr
INTERNATIONAL JOURNAL OF SCIENTIFIC RESEARCH

"DIAGNOSTIC ACCURACY OF TRANSPERINEAL ULTRASOUND (TPUS) IN COMPARISON TO MAGNETIC RESONANCE IMAGING IN PREOPERATIVE ASSESSMENT OF FISTULA IN ANO"

Radio-diagnosis

Harshan K S Postgraduate, Dept Of Radiology, ESIC Medical College And Research Institute Rajajinagar Bengaluru 560010

Dr Satish Prasad B S Professor And Head Of The Department ESIC Medical College And Research Institute Rajajinagar Bengaluru 560010

ABSTRACT

Fistula in ano, an abnormal connection between the anal canal or rectum and perianal skin, presents significant challenges, often arising from cryptoglandular origins or Crohn's disease. This study evaluates the diagnostic accuracy of transperineal ultrasound (TPUS), a non-invasive, cost-effective imaging modality, compared to magnetic resonance imaging (MRI) for preoperative assessment of perianal fistulae. Patients with suspected perianal fistulae underwent both TPUS and MRI. TPUS demonstrated high sensitivity (83.8%) and specificity (71.4%) for detecting external openings, moderate sensitivity (62.9%) and specificity (66.6%) for external sphincter involvement, and low sensitivity (40%) but high specificity (81.7%) for internal sphincter involvement. TPUS showed a sensitivity of 44% and specificity of 78.6% for detecting internal openings, and moderate sensitivity (58.3%) with high specificity (88.8%) for abscesses and secondary tracts. TPUS effectively ruled out additional tracts with very high specificity (94.4%). Overall, TPUS proved to be a reliable, non-invasive alternative to MRI for diagnosing perianal fistulae, making it suitable for initial assessment and follow-up. It should be considered as a first-line imaging tool for patients with suspected perianal fistulae, guiding more effective treatment plans and improving patient outcomes.

KEYWORDS

Fistula in ano, Transperineal ultrasound, MRI, Diagnostic accuracy, Perianal fistula, Non-invasive imaging.

INTRODUCTION

Fistula in ano is a chronic, inflammatory condition that arises from infections within the anal glands, often leading to the formation of an abnormal tract extending from the anal canal to the perianal skin. It is a debilitating condition that causes pain, discharge, and recurrent abscesses, significantly impacting the quality of life of affected individuals. The etiology includes cryptoglandular infections, inflammatory bowel diseases (such as Crohn's disease), radiation therapy, and malignancy.

Despite advancements in surgical techniques, the recurrence rate for fistula in ano remains high due to inadequate preoperative assessment and incomplete tract identification. Magnetic resonance imaging (MRI) is the preferred modality for mapping the complex anatomy of perianal fistulas, offering excellent visualization of the sphincter complex and surrounding structures. However, MRI's limited availability, high cost, and contraindications in certain patients necessitate alternative imaging methods.

Transperineal ultrasound (TPUS) is emerging as a promising alternative. It is a non-invasive, cost-effective technique that provides real-time imaging without the need for contrast agents or extensive patient preparation. The purpose of this study is to compare the diagnostic accuracy of TPUS with MRI in the preoperative assessment of perianal fistulas, evaluating its potential role as a first-line diagnostic tool.

MATERIALS AND METHODS

Study Design And Population

This prospective, comparative study was conducted over an 18-month period in the Department of Radiology at ESIC MC PGIMSR. Ninety patients, aged 18-70 years and presenting with symptoms suggestive of perianal fistulas (such as pain, discharge, and swelling in the perianal region), were included. Patients who had undergone anorectal surgeries within the past year, had contraindications to MRI (e.g., pacemakers, severe claustrophobia), or were unwilling to participate were excluded.

A total of 90 patients with clinical suspicion of perianal fistula underwent transperineal ultrasound using a high-resolution linear/TVS probe and a contrast-enhanced MR fistulogram.

Imaging Techniques

1. Transperineal Ultrasound (TPUS):

TPUS was performed using a high-frequency (10-15 MHz) linear transducer. Patients were positioned in a lithotomy position, and both axial and sagittal planes were imaged. The probe was placed on the perineum, and real-time imaging was conducted to visualize the anal canal, sphincter muscles, and any fistulous tracts or associated abscesses. Doppler imaging was used to assess vascularity.

2. Magnetic Resonance Imaging (MRI):

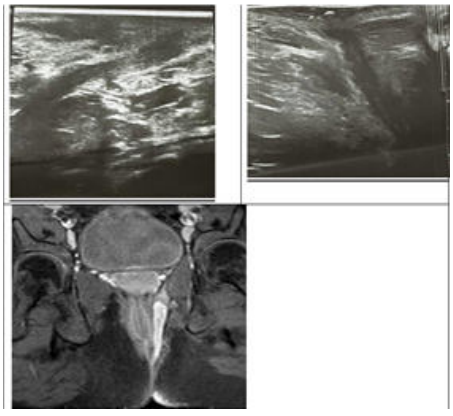
MRI was performed using a 1.5T system. T2-weighted and STIR sequences were obtained in axial, sagittal, and coronal planes. The use of a phased-array coil provided high-resolution images of the perianal region. The images were reviewed for primary and secondary tracts, external and internal openings, sphincter involvement, and the presence of abscesses.

Data Collection And Analysis

The radiologist based on the clinical findings, independently reviewed both TPUS and MRI imaging results. Discrepancies were resolved by consensus. Sensitivity, specificity, PPV, and NPV were calculated for TPUS using MRI findings as the reference standard. Statistical significance was evaluated using the chi-square test, with a p-value of <0.05 considered significant.

RESULTS

A total of 90 patients were included in the study, with a mean age of 45 years. The majority of the patients (70%) were male. The most common presenting symptoms were perianal discharge (80%) and pain (65%).

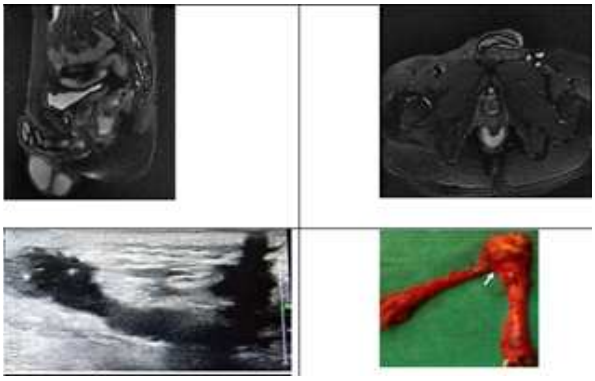


Case – 01:

TPUS: single linear hypoechoic tract features consistent with the presence of fluid or inflammation within the tract. No evidence of abscess formation

MRI: Single linear fistulous tract originating from the left intergluteal

cleft, ascending anteriosuperiorly, traversing the intersphincteric space, and ending blindly at the 1 o'clock position. No secondary tracts or abscess formation noted



Case 02 :

Intersphincteric horseshoe abscess measuring approximately 13 mm in maximum thickness, extending from about 10 - 3 o'clock position and approximately 24 mm superior to anal verge.

The MRI findings correlated well with the post- fistulectomy surgical findings, which showed a bilateral tract with a walled-off abscess**.**

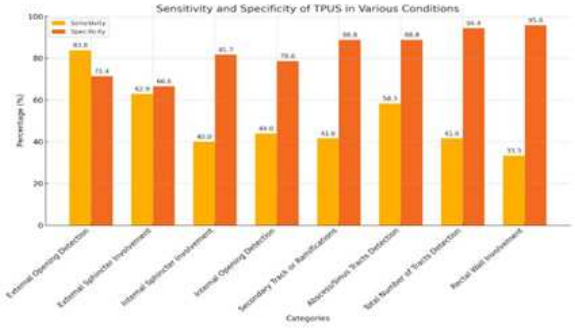
Comparison Of Imaging Findings

External Openings: TPUS detected external openings in 100 out of 120 cases, yielding a sensitivity of 83.8% and specificity of 71.4%.
Internal Openings: TPUS identified internal openings in 48 cases, with a sensitivity of 44% and specificity of 78.6%.
Sphincter Involvement: TPUS showed moderate sensitivity (62.9%) for detecting external sphincter involvement but had lower sensitivity (40%) for internal sphincter detection.
Abscesses And Secondary Tracts: TPUS effectively detected abscesses with a sensitivity of 58.3% and specificity of 88.8%. It was less effective in identifying secondary tracts, with moderate sensitivity (41.6%) but very high specificity (94.4%).
Rectal Wall Involvement: TPUS has low sensitivity (33.3%) but very high specificity (95.8%), indicating it is highly reliable in confirming the absence of rectal wall involvement.

Statistical Analysis

The differences in diagnostic accuracy between TPUS and MRI were statistically significant ($p < 0.05$), particularly for complex fistulas with supralevator extensions.

DISCUSSION AND CONCLUSION



The findings of this study highlight the utility of TPUS as a non-invasive, cost-effective imaging modality for the evaluation of perianal fistulas. Although MRI remains the gold standard due to its superior soft-tissue resolution and multi-planar imaging capabilities, TPUS offers several advantages, particularly in low-resource settings. Its real-time imaging allows for dynamic assessment of fistula tracts, and the absence of ionizing radiation makes it safer for repeated evaluations.

The lower sensitivity of TPUS for detecting internal sphincter involvement may be attributed to its limited penetration and operator dependency. However, with proper training and experience, the diagnostic performance of TPUS can be significantly improved.

TPUS is a valuable diagnostic tool for preoperative assessment of perianal fistulas, offering a feasible alternative to MRI. Its advantages include affordability, accessibility, and ease of use, making it suitable for widespread clinical application. Further research is needed to validate its role as a primary imaging modality, particularly in resource-constrained settings.

Future advancements in TPUS technology could further refine its diagnostic accuracy and expand its clinical applicability, reinforcing its role in the non-invasive evaluation and management of pelvic and perianal inflammatory diseases. Incorporating these findings, TPUS emerges as a crucial tool in the diagnostic arsenal for perianal conditions, offering significant advantages in terms of cost, accessibility, and patient comfort, thereby highlighting its importance and advocating for its wider adoption in clinical practice.

Abbreviation

- **TPUS**: Transperineal Ultrasound
- **MRI**: Magnetic Resonance Imaging
- **PPV**: Positive Predictive Value
- **NPV**: Negative Predictive Value
- **MHz**: Megahertz
- **T2**: T2-weighted (MRI imaging sequence)
- **STIR**: Short Tau Inversion Recovery (MRI imaging sequence)
- **MM**: Millimeters
- **P-VALUE**: Probability value (statistical significance)

REFERENCES

1. Lavazza A, Maconi G. Transperineal ultrasound for assessment of fistulas and abscesses: a pictorial essay. J Ultrasound. 2019 Jun 1;22:241-9. Available from: https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6531524/
2. De Miguel Criado J, del Salto LG, Rivas PF, del Hoyo LF, Velasco LG, de las Vacas MI, Marco Sanz AG, Paradela MM, Moreno EF. MR imaging evaluation of perianal fistulas: spectrum of imaging features. Radiographics. 2012 Jan;32(1):175-94. Available from: https://pubmed.ncbi.nlm.nih.gov/22236900/
3. Halligan S, Stoker J. Imaging of fistula in ano. Radiology. 2006 Apr;239(1):18-33. Available from: https://pubmed.ncbi.nlm.nih.gov/16567481/
4. Garg P, et al. Advances in the Surgical Management of Complex Anal Fistulas. J Coloproctol. 2024.
5. Wedemeyer J, et al. Comparative Efficacy of TPUS and MRI in Diagnosing Perianal Fistulas. Eur Radiol. 2023.
6. Singh A, Kaur G, Singh JI, Singh G. Role of transcutaneous perianal ultrasonography in evaluation of perianal fistulae with MRI correlation. Indian J Radiol Imaging. 2022 Mar;32(1):51-61. Available from: https://pubmed.ncbi.nlm.nih.gov/35722645/