MAK HILL Publications Research Journal of Medical Sciences

Research Article
doi: 10.59218/makrjms.2023.12.516.520

OPEN ACCESS

Key Words
Perianal fistula, cryptoglandular infection, transcutaneous perianal ultrasonography (TPUS), magnetic resonance imaging (MRI)

Corresponding Author
Astha Mehra,
Department of Radiology People's College of Medical Sciences and Research Centre, Bhopal, Madhya Pradesh, India
draasthapruthi@gmail.com

Author Designation
[1]PG Student
[2]Professor
[3]Associate Professor
[4]Assistant Professor
[5]Senior Resident

Received: 27 October 2023
Accepted: 9 December 2023
Published: 20 December 2023

Citation: Rashi Garg, Rajesh Gupta, Ritema Mangal, Astha Mehra and Harsh J. Bhomaj 2023. Comparative Analysis of Transcutaneous Perianal Ultrasonography and Magnetic Resonance Imaging in Evaluating Perianal Fistulas: A Cross-Sectional Study. Res. J. Med. Sci., 17: 516-520, doi: 10.59218/makrjms.2023.12.516.520

Comparative Analysis of Transcutaneous Perianal Ultrasonography and Magnetic Resonance Imaging in Evaluating Perianal Fistulas: A Cross-Sectional Study

[1]Rashi Garg, [2]Rajesh Gupta, [3]Ritema Mangal, [4]Astha Mehra and [5]Harsh J. Bhomaj

[1-5]Department of Radiology People's College of Medical Sciences and Research Centre, Bhopal, Madhya Pradesh, India

ABSTRACT
Perianal fistula is an abnormal communication between anal canal/rectum and skin with high morbidity and recurrence. These are common affliction in lower socio-economic society. Therefore calls for need of less expensive, easily available and repeatable method that can adequately evaluate perianal fistulas and abscesses. To compare the diagnostic accuracy of the high resolution transcutaneous perianal ultrasonography(TPUS) compared with the findings of MRI in the evaluation of perianal fistula. A hospital based cross-sectional study on 50 patients who underwent TPUS and magnetic resonance imaging(MRI). The findings of both modalities were then classified as per Park's classification and St. James classification and compared. Study was conducted on 50 patients of which 43 were males and 7 were females with most patients belonging to age group of 30-60 years and average age being 43.3 years. Internal opening of fistula was detected in 33 patients on TPUS however, 42 internal openings were diagnosed on MRI. The sensitivity of TPUS to detect primary tracts in our study was 97.9 % and was 79% sensitive in identification of internal openings. As TPUS is real time imaging the movememt of air foci and echoes within the tracts on on valsava manoeuvre, increased echogenicity of surrounding fat on B-mode and surrounding hypervascularity on colour Doppler helps in distinguishing the active and fibrosed. Transcutaneous perianal ultrasonography can potentially be used as first line investigation for perianal fistula and its rerecurrence. Further investigations are required in cases where a doubt exists for internal opening or a high fistula.

INTRODUCTION

Fistula is an abnormal connection between two epithelial surfaces. Perianal fistula or Fistula in ano is an inflammatory disease affecting the region around the anal canal forming an abnormal communication between skin surfaces of perineum and anal canal. It is seen in two distinct populations-Ones who develop perianal fistula as a complication of Crohn's disease (14-16%), others are the majority group who develop perianal abscess or fistula spontaneously as a sequelae of infection of the cryptoglandular anal glands. The most common clinical presentation of the patients with perianal fistula is pain and discharge from the external opening of the fistula[1].

The true prevalence of fistula is unknown. But the incidence of fistula in ano developing from an anal abscess ranges from 26-38%. According to a study Domkundwar *et al*.[3] Abraham *et al*.[2] the prevalence of nonspecific anal fistulae is to be 8.6 to 10 in 100,000 and predominantly affect young adults between 20-50 years of age, with a male to female ratio of approximately 1.8 1. It is common and relevant complication in patients of Crohns Disease with incidence of approximately 21-23% during their life.Main concern arises as it causes significant morbidity and often requires repeated surgical treatments due to its high tendency to recur.

Treatment modalities include both conservative as well as surgical approach therefore comprehensive imaging is necessary to develop adequate treatment plan and to assess treatment outcomes. To adopt the best surgical strategy and avoid recurrences, it is necessary to obtain precise radiological information about the location of the fistula track and the affected pelvic structures. Magnetic resonance imaging (MRI) has shown accurate anatomy of the perianal region, the anal sphincter morphology, the relationship of fistulas to the pelvic diaphragm (Levator plate) and the ischiorectal fossae.Several studies have shown transcutaneous ultrasound is comparable alternative method with high sensitivity and specificity for evaluating the perianal anatomy when considering the noninvasiveness, availability and cost[3-4].

Need to study: Perianal fistula is a common affliction in people from low socioeconomic class and with poor personal hygiene. They have propensity for chronicity and need for frequent follow up. Therefore in view of high cost, paucity and insufficient availability of magnetic resonance imaging (MRI).There is a need for a simpler, less expensive, easily available and repeatable method that can adequately evaluate perianal fistulas and abscesses. Aim of the study was to compare the diagnostic accuracy of the high resolution transcutaneous ultrasound compared with the findings of magnetic resonance imaging (MRI) in the evaluation of perianal fistula.

MATERIALS and METHODS

A hospital based cross-sectional study over a period of 18 months from November 2020 to August 2022 was conducted on 50 patients with clinically suspected perianal fistula and referred for MRI to the department of Radiodiagnosis in People's College of Medical Science And Research Center, Bhopal.

Independent variables: Age, gender, discharge from fistulae.

Dependent variables: Fistula/sinus, branching/non-branching.

Inclusion criteria:

- Patients with clinical suspection ofperianal fistulas or its recurrence referred for MRI to the department of Radiodiagnosis

Exclusion criteria:

- Those patients who deny consent for transcutaneous perianal sonography
- Contraindications for undergoing MRI like- cardiac pace makers and other magnetic substances and claustrophobia

Data acquisition: MRI was undertaken with SEIMENS MAGNETOM Vision plus 1.5 Tesla, 8-channel. Study is done as per the existing protocol (includingAxial T1, TFSE, T Fat sat, and Axial STIR, coronal STIR, T and Saggital STIR sequences).USG was carried with GE VOLUSON S6 using the linear (7-12 MHz), curvilinear (2-5MHz) and endocavitary (4-9MHz) probes. Transcutaneous ultrasound was performedwith patient in left lateral and lithotomy positioning curvilinear and highresolution linear probe was used. Transrectal probe was be used percutaneously whenever required as it has an advantage of smaller footprint and high resolution with adequate penetration. The probes were covered with latex gloves or condoms filled with a coupling agent keeping in view the hygiene. MRI was performed as per above stated protocols for fistula and reported by an experienced radiologist. High resolution transcutaneous ultrasound was done for the same patient by another experienced radiologist who will be blinded of MRI findings. The final results of both ultrasound and MRI were then correlated.

Statistical analysis: Data analysis was done using SPSS version 21.0 Data transformation by recording, counting and cross tabulation was performed and obtained information was processed using Pearson chi-square and Spearman Correlation.

RESULTS

Out of 50 patients included in this study, 43 were males and 7 were females with most patients belonging to age group of 30 to 60 years and average age being 43.3 years (Fig. 1).

Out of these 50 participants, 48 primary tracts were diagnosed on TPUS which were confirmed on MRI and an additional tract that is total of 49 tracts were diagnosed on MRI.Internal opening was detected in 33 patients, which means these patients had fistulous tracts opening into the anal canal, on TPUS. However 42 internal openings were diagnosed on MRI. There were 12 patients with ramification/secondary tract accurately diagnosed on TPUS and there was no discrepancy in their course on MRI. Additionally 4 secondary tracts were identified on MRI (Fig 2). Fig 3a and 3b show comparison of TPUS and MRI fistulas based on Parks and St James classification.

Fig 3a comparisionofparksclassificationtpusvsmri

The sensitivity of transperianal ultrasonography to detect primary tracts in our study was 97.9 % and was 79% sensitive in identification of internal openings.

In general, TPUS is well tolerated by patients and requires no special preparation for the procedure. It is readily available, especially when immediate intervention is needed since sophisticated imaging modalities may delay diagnosis. TPUS has good sensitivity for assessment of primary and secondary tracts, their course and the extent.

Wedemeyer *et al*.[10] in their study published in World J gastroenterology 2004,10 (19) concluded that complex perianal fistula and abscesses could be detected with high sensitivity using Perianal USG and the results were comparable to Pelvic MRI. 4b- shows axial section of anal canal on TPUS . The fistula is seen opening into the anal canal at 10' o clock position (IAS- Internal anal sphincter, EAS-external anal sphinter.)-Intersphincteric fistula.

Fig 5- Left image shows thick, hypoechic fistulous track on TPUS reaching upto the anal canal wall. Center image showsFistula track in same patient in axial plane shows an anterior secondary blind ending branch which reaches opposite side. Right most image shows oblique coronal section of anal canal on TPUS showing the entry of fistula track into anal canal and its distance from anal verge is approx. 1.2 cms. (F-anterior ramus of fistula, A-anal canal, IAS-internal anal sphincter, EAS-external anal sphincter)

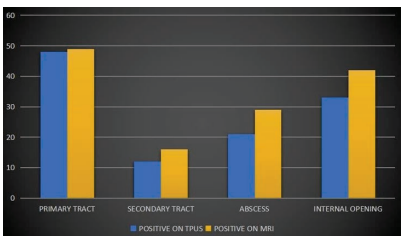

Fig. 1: distribution of patients

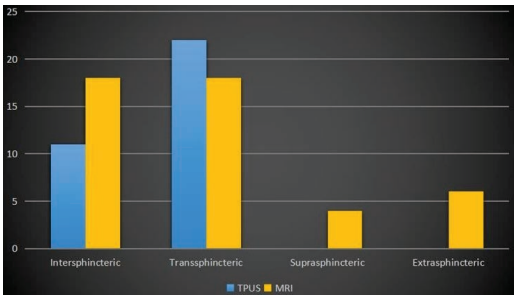

Fig. 2: comparision of tpusvs mrifindings

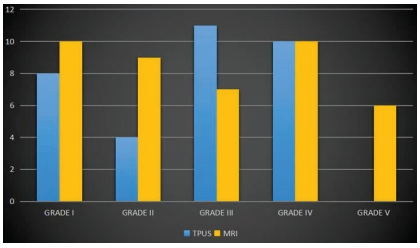

Fig. 3: bcomparisionofst. James's classification of perianal fistula tpusvsmri

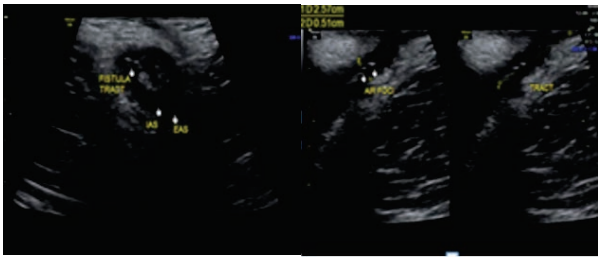

Fig. 4: A TPUS image showing the hypoechoic fistulous track (length~2.57 mm, thickness~ 5.1 mm) with air foci within

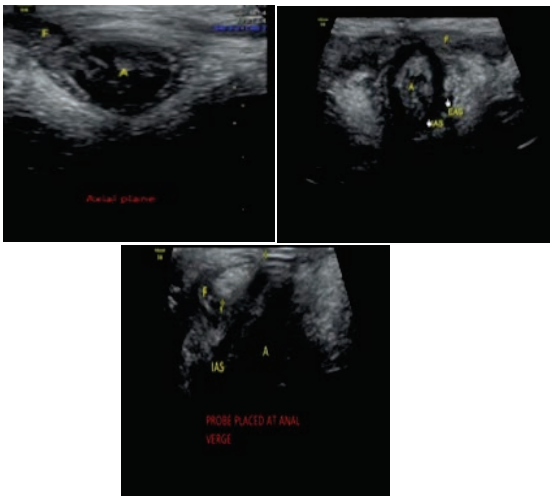

Fig. 6: shows axial section of anal canal on TPUS . The fistula is seen opening into the anal canal at 10' o clock position (IAS- Internal anal sphincter, EAS- external anal sphinter.)- Intersphincteric fistula

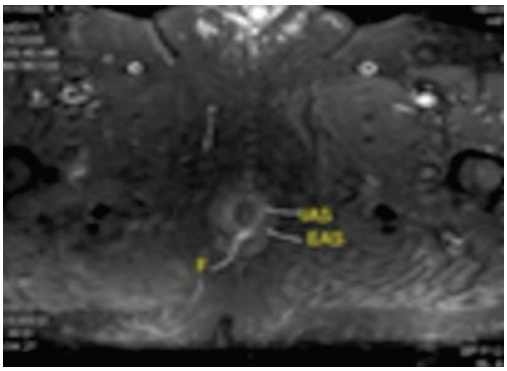

Fig. 6: show the intershincteric fistulous track (F) posteriorly at 6' O clock position (IAS- Internal anal sphincter, EAS- external anal sphincter)

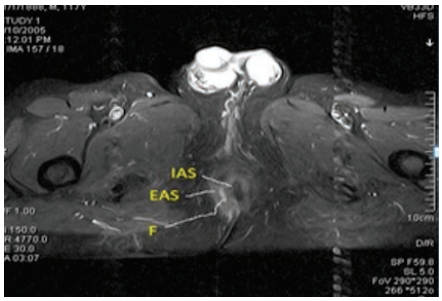

Fig. 7: Non contrast STIR Axial section of pelvis fistulous track(F) in intersphincteric space. (IAS- Internal anal sphincter, EAS- external anal sphincter)

Table 1: Distribution of patients

Gender	Males	Females
Number	43	07
Total patients	50	

DISCUSSIONS

In the published literature the sensitivity and specificity has been reported to be 84.9-100% and 80 100% respectively Maconi *et al*.[5] study showed a sensitivity of 99.4% in identification of fistula on transphincteric fistula.

During the procedure, movement of air foci and echoes are noted on B mode within the tracts on asking the patient to strain or on valsava manoeuvre. Such a movement is suggestive of active/acute stage of fistula. Thus TPUS provides a real time visualisation (which MRI lacks) and has multiplanar capability[6]. Increased echogenicity of surrounding fat and hypervascularity on colour Doppler also suggests active status of fistula. Thus colour Doppler increases the sensitivity of TPUS when used in combination[7,8].

It can also be helpful in assessing the fibrosed tracts which cannot be evaluated by fistulography. Therefore TPUS helps in differentiating active from fibrosed stage of fistula in ano[9]. TPUS can be helpful for regular assessment during treatment to identify the unexpected collections and during follow up of healed fistula as it can show the persistent tract despite closure of external opening after short term treatment[10].

Considering its real time application TPUS can be useful as practical complimentary methodology to MRI as it can be done intraoperatively to avoid incomplete drainage of abscess or fistulectomy and thus prevent early recurrence[11]. Study conducted by Maconi Et al published in IBDjournal concluded that TPUS can be useful to confirm the presence or absence of suspected superficial fistula in patients with clinically suspected fistula but negative MRI. In our study, similarly, we could accurately identify one superficial fistula tract with anterior internal opening which was confirmed by the surgeon on clinical examination and intraoperatively. However this superficial tract could not be identified on MRI. TPUS can also be used to discriminate between Perianal folliculitis and fistula in ano[16].

Limitations of transcutaneous perianal ultrasonography: Although TPUS has good diagnostic ability, it has some shortcomings in identification and localization of deeper lesion such as:

- Abscess located in supralevatoric region
- Too small hypoechoic abscesses surrounded with mixed echogenic fibroadipose tissue
- Delineation of Extra and suprasphincteric fistula

Ramifications that run in intersphincteric space or the intersphincteric course of fistula was difficult to assess on TPUS and required confirmation on MRI. However, ramifications in extrasphincteric space and transphincteric fistula were well evaluated on TPUS and corelated on MRI. Lastly, transcutaneus perianal ultrasonography is operator dependent and requires an experienced radiologist with a specific interest in perianal ultrasonography.

Consideration of MRI in addition to TPUS: Domkundwar. in their study on 'Role of TPUS in evaluation of fistula in Ano' (J.Ultrasound Med, 2007) states that-TPUS can be used as a first line of investigation to look for tracts, their extent and internal openings. No further investigations are required unless a doubt exists for internal opening or a high fistula. In cases of doubt it should be complimented with MRI.

Scope of further study: Few studies like Lavazza et al and Wedemeyer have mentioned the recent advances in diagnostic armamentarium for fistula in ano like:

- Contrast enhanced ultrasonography (CEUS)
- Sonoelastography
- 3D Ultrasound

CEUS using hydrogen peroxide or other contrast agents is helpful in accurately identifying the course of fistula, abscess and small collections within perianal

inflammatory conditions. Sonoelastography can easily differentiate sclerosing fistula which appear stiff (harder) in comparison to softer and compressible acute or active fistulas[12-16].

Limitations: One of the limitations of this study was the smaller sample size which could not give definite higher sensitivity and specificity for either of above in the diagnosis of fistula in ano. Due to smaller sample size the in depth results of both the modalities have been equivocal ie; both the modalities have their own benefits and show limitations as discussed above. Hence, we recommend conducting the similar study on a larger sample size.

CONCLUSIONS

TPUS is an effective imaging modality for evaluation of perianal fistula with good sensitivity of transsphincteric, intersphincteric fistula identification of abscess is comparable to MRI.Considering the limited availability and high cost of MRI, TPUS is a fast, simple, cost effective and repeatable method and does not require prior patient preparation.The high price and limited availability of MRI restrict its use for the followup of recurrence cases. The real time imaging advantage of ultrasound helps to avoid incomplete drainage of abscesses and fistulectomy when used intraoperatively and thus prevent early recurrence. We found that MRI and TPUS are complimentary modalities to each other for the diagnosis of perianal fistula and TPUS can be used as a primary investigation before invasive and expensive procedures are performed. To conclude, as perianal fistulae are more common in people with low socioeconomic status the use of transcutaneous ultrasound can be used as first line investigation and help in selection of smaller group who require MRI, thus limiting the use of MRI.

REFERENCES

1. Carol M., 2018. Diagnostic Ultrasound. 5th Ed., Edn., Carol M. Rumack, Deborah Levine, Pages: 307.
2. Bor, R., K. Farkas, A. Bálint, M. Szucs and S. Ábrahám et al., 2016. Prospective comparison of magnetic resonance imaging, transrectal and transperineal sonography, and surgical findings in complicated perianal crohn disease. J. Ultrasound Med., 35: 2367-2372.
3. Albuquerque, A. and E. Pereira, 2016. Current applications of transperineal ultrasound in gastroenterology. World. J. Radiol., 8: 370-377.
4. Domkundwar, S.V. and A.B. Shinagare, 2007. Role of transcutaneous perianal ultrasonography in evaluation of fistulas in ano. J. Ultrasound Med., 26: 29-36.
5. Abraham, S., Jebakumar, 2016. A comprehensive studyof fistula in ano. Inter. archeives. Integrated. Med., 3: 66-72.
6. Maconi, G., M. Greco and A. Asthana, 2017. Transperineal ultrasound for perianal fistulas and abscesses-a systematic review and meta-analysis. Ultraschall der Medizin Eur. J. Ultrasound, 38: 265-272.
7. Lee, E.H., H.R. Yang and J.Y. Kim, 2018. Comparison of transperianal ultrasound with colonoscopy and magnetic resonance imaging in perianal crohn disease. J. Pediatr. Gastroenterol. Nutr., 66: 614-619.
8. Plaikner, M., A. Loizides, S. Peer, F. Aigner and D. Pecival, 2013. Transperineal ultrasonography as a complementary diagnostic tool in identifying acute perianal sepsis. Tech. Coloproctology, 18: 165-171.
9. Nevler, A., M. Beer-Gabel, A. Lebedyev, A. Soffer, M. Gutman, D. Carter and A.P. Zbar, 2013. Transperineal ultrasonography in perianal crohn's disease and recurrent cryptogenic fistula-in-ano. Colorectal Dis., 15: 1011-1018.
10. Wedemeyer, J., T. Kirchhoff, Gernot, O. Sellge and J. BAchmann, 2004. Sensitive method for detection of petianal inflammatory lesions in Crohn Disease. World. J. Gastroenterology., 10: 2859-2863.
11. Erden, A., 2017. Mri of anal canal: Normal anatomy, imaging protocol, and perianal fistulas: Part 1. Abdominal Radiol., 43: 1334-1352.
12. Hwang, J.Y., H.K. Yoon, W.K. Kim, Y.A. Cho and J.S. Lee, 2014. Transperineal ultrasonography for evaluation of the perianal fistula and abscess in pediatric crohn disease: Preliminary study. Ultrasonography, 33: 184-190.
13. Singh, A., G. Kaur, J.I. Singh and G. Singh, 2022. Role of transcutaneous perianal ultrasonography in evaluation of perianal fistulae with mri correlation. Indian J. Radiol. Imaging, 32: 51-61.
14. Roche, B. 2001. Comparision oftransanal and external perianal ultra sonography. Eurradiol., 11: 1165-1170.
15. Lavazza, A. and G. Maconi, 2019. Transperineal ultrasound for assessment of fistulas and abscesses: A pictorial essay. J. Ultrasound, 22: 241-249.