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Research Article

Utility of Ultrasound in the Evaluation of Chronic Anal Fissure

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ABSTRACT

Introduction: Anal fissure is a linear tear in the anal mucosa seen distal to the dentate line. The diagnosis of chronic anal fissure depends on clinical history, physical exam, anoscopy and other imaging modalities are uncommonly recommended unless an associated condition was suspected. Management is either by chemical sphincterotomy or surgery through lateral internal sphincterotomy when chronic anal fissure was resistant to treatment.

Purpose of the Study: The current study aimed to evaluate the sonographic findings that can be observed in cases with chronic anal fissure and their significance.

Methodology: 15 asymptomatic patients and 30 patients with chronic anal fissure were examined with 3 dimensional transperineal ultrasound and if females an additional transvaginal ultrasound was performed.

Results: 26 patients (86.5%) showed diffusely thickened internal anal sphincter of mean thickness >3.5mm, ranging from 3.7 mm to 6.4mm and the mean value was 5mm. 3 patients (10%) with posterior fissure showed a lucent narrow defect in the internal anal sphincter at the midline of the distal aspect of the anal canal wall. One of them showed associated localized intersphincteric plane sepsis.

Conclusion: Use of ultrasound in cases with chronic anal fissure may show gapping of the internal anal sphincter and an associated intersphincteric plane sepsis corresponding to the high morphological grade of anal fissure which predict poor healing response to chemical sphincterotomy and further studies that correlate between the thickness and texture of IAS and the healing response to chemical sphincterotomy recommended.

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Introduction

Anal fissure is a linear tear in the anal mucosa seen distal to the dentate line of an estimated incidence about 10% in surgical practice. Acute anal fissure is considered when the duration of symptoms lasts less than 8 weeks and fissure chronicity if it lasts more. In approximately 90% of cases, anal fissure involves the midline posteriorly, in approximately 9% of cases involves the midline anteriorly and in 1% of cases with secondary anal fissure, it involves the lateral aspect of the anal canal wall. Anal fissure is much more common posteriorly due to the lower blood perfusion compared to the other parts of the anal canal wall [1-3].

The patient complaints are pain which could be severe with bowel movement that may last for hours after the bowel movements, there may be a bright blood in stool and intense spasm of the anal ring. The anal fissure could be primarily caused by trauma, chronic constipation, and chronic diarrhea or uncommonly secondary caused by malignancy, sexually transmitted disease, inflammatory bowel disease and tuberculosis.

The diagnosis of chronic anal fissure depends on clinical history, physical exam, anoscopy and other imaging modalities are uncommonly recommended unless an associated condition was suspected [4]. Management is either by chemical sphincterotomy through the application of topical agents like nitroglycerin ointment or calcium channel blockers or Botulinum toxin injection and surgery through

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lateral internal sphincterotomy if chronic anal fissure was resistant to treatment [2].

Purpose of the Study

The current study aimed to evaluate the sonographic findings which could be observed in cases with chronic anal fissure and their significance.

Methodology

Retrospective descriptive study included 45 patients, among them 15 asymptomatic patients were representing the control group (group A) and 30 symptomatic patients with chronic anal fissure (group B). Symptomatic patients were admitted to the ultrasound department of my institute for exclusion of an associated perianal sepsis from march 2019 to December 2019, their diagnosis was based on the medical history, physical exam and anoscopy, fissure chronicity was identified by the duration of complaint > 8 weeks, the morphology of anal fissure during physical exam and anoscopy which may show thickened fissure edges, the presence of sentinel skin tags distal to the site of fissure, the presence of hypertrophied anal papillae proximal to the site of fissure and an exposed underlying internal anal sphincter [4]. Their age ranged from 22 to 55 years and the mean age was 41 years. Among them 12 females and 18 males, the duration of complaint was ranging from 6 months to 25 months with mean duration of 13 months. Group A patients (control group), their age ranged from 25 to 48 years and the mean age was 38 years, among them 6 females and 9 males.

All patients (group A and B) were examined with 3 dimensional (3D) transperineal ultrasound exam using multifrequency linear probe aided with 3D capability and for female patients an additional transvaginal 2 dimensional (2D) ultrasound was performed with a multifrequency transvaginal probe, using Sonoace x8 ultrasound machine, Medison, Korea. Transperineal ultrasound was performed with the patient in left

lateral decubitus position with flexed knee and hip-joints, the anal canal was imaged in the sagittal plane at midline, left paramedian and right paramedian planes followed by an axial planes at low, mid and upper anal canal levels, subsequent 3D reconstruction of anal canal with multiplanar image analysis and volume rendering was performed. Female patients were further subjected to transvaginal ultrasound with serial axial images of the anal canal from low to upper anal canal levels.

The anal canal walls were composed of three layers by ultrasound exam, the inner echogenic mucosal layer, the middle hypoechoic layer representing the internal anal sphincter (IAS) and the outer moderately echogenic layer which represents the external anal sphincter. The thickness of the internal anal sphincter was measured at mid anal canal level at 3 and 9 o'clock. The mean internal sphincter thickness was estimated and was considered thickened if it exceeds 3.5 mm irrespective of the patients age and sex [5, 6]. The sonographic morphology of the mucosa layer, the internal, the external anal sphincters and the intersphincteric plane were assessed and the results were recorded.

Results

Among 15 asymptomatic patients (control group) examined with ultrasound, the mean internal sphincter thickness was 2.8mm, ranging from 2 to 3.5mm in 13 patients. 2 patients showed increased IAS mean thickness measuring 4mm and 3.8mm. No asymptomatic patient showed internal sphincter defects. Among 30 symptomatic patients admitted to the ultrasound exam with chronic anal fissure, 27 patients (90%) showed a posterior midline chronic anal fissure, and 3 female patients (10%) were detected with anterior midline fissure, no patients with lateral fissures observed. Sentinel skin tags were observed in 6 patients (20%). 26 patients (86.5%) showed diffusely thickened internal anal sphincter of mean thickness >3.5mm, ranging from 3.7 mm to 6.4mm and the mean value was 5mm.

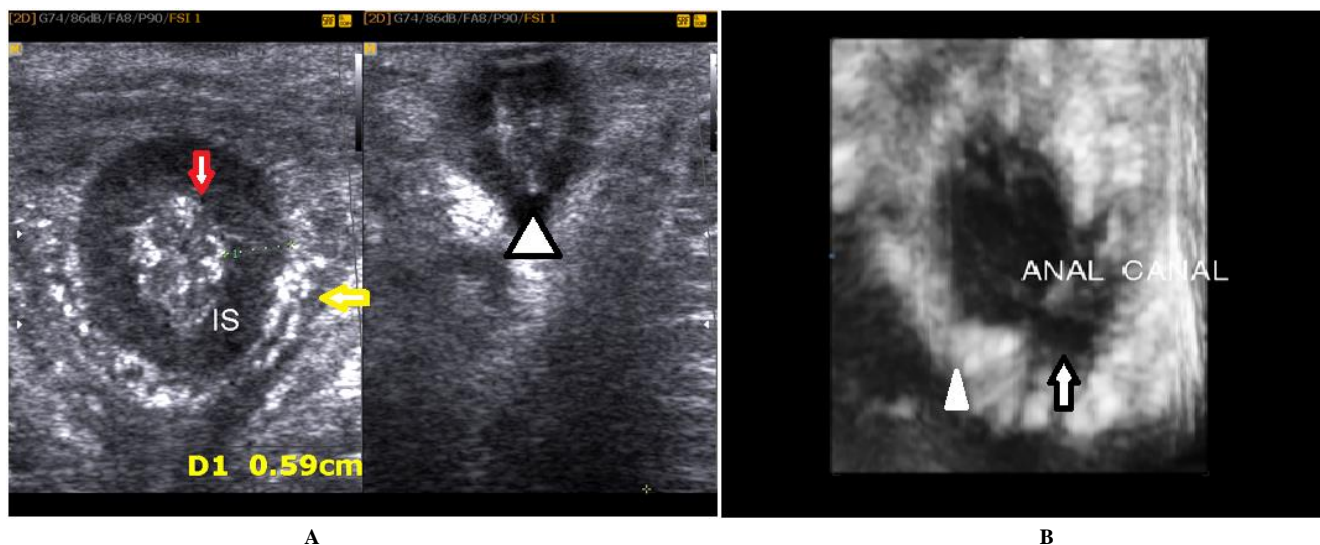


Figure 1: A) 2 dimensional transperineal ultrasound axial images of the anal canal showing thick internal sphincter (IS) with associated lucent defect posteriorly (arrowhead), the yellow arrow points to the external anal sphincter and the red arrow points to the anal mucosa. B) 3 dimensional surface rendering of the internal anal sphincter showing posterior lucent defect (arrow) and arrowhead indicates the internal anal sphincter.

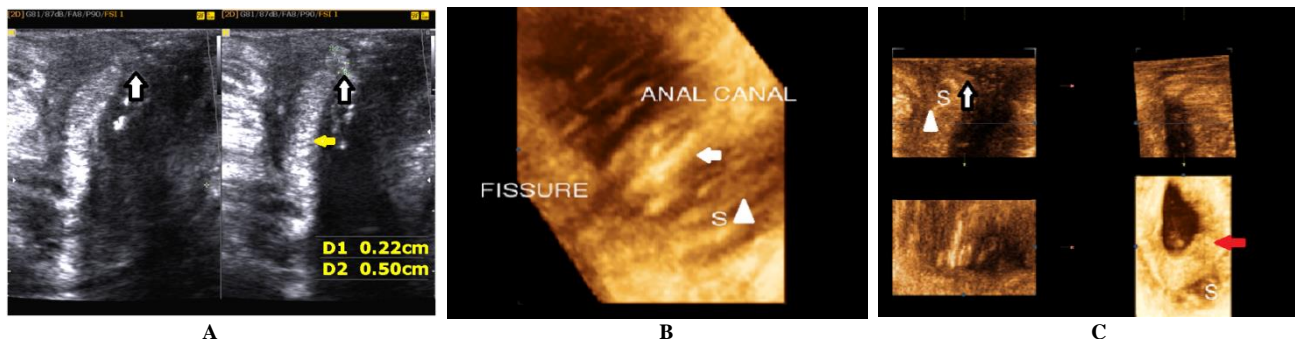


Figure 2: **A)** 2 dimensional transperineal ultrasound showing gap in the internal anal sphincter at the lower posterior aspect of the anal canal wall (white arrow) and the yellow arrow indicates the internal anal sphincter. **B)** 3 dimensional surface rendering of the internal anal sphincter narrow defect, an arrow indicates IAS, and the arrowhead indicates an intersphincteric plane sepsis. **C)** 3 dimensional multiplanar image analysis of the IAS defect (arrow) and the associated intersphincteric plane sepsis (S), the red arrow indicates the internal anal sphincter.

The estimated sensitivity of thick IAS in diagnosing chronic anal fissure was 86.67%, the specificity was 86.67%, positive predictive value 92.86%, negative predictive value was 76.47% and the total accuracy was 86.67%. 3 patients (10%) with posterior fissure showed a lucent narrow defect in the internal anal sphincter at the midline of the distal aspect of anal canal wall (Figures 1A & 1B), with the width of the defect 1.4mm, 1.6mm and 2.2mm and its length 4mm, 6.3mm, 5mm respectively, the defect was lucent in 1 case and showed mobile echogenic fluid debris and gas bubbles in the other 2 cases, involving the whole thickness of the internal anal sphincter and extends to the underlying intersphincteric plane, it slightly widens during squeeze and an anoscopic correlation revealed undermined fissures. One of the three cases showed associated localized intersphincteric plane sepsis with widened intersphincteric plane showing fluid debris at the lower 1/3 of anal canal wall posteriorly (Figures 2A, 2B & 2C). In spite of Lucent IAS defect was observed in only 10 % of symptomatic patients in our study group, it yields sensitivity, specificity, and total accuracy 100% in diagnosing high grade chronic anal fissure, in the absence of traumatic history.

Discussion

The presence of thick internal anal sphincter was present in 86% of our patients with chronic anal fissures which matches with the results of Erden A *et al.* who found that IAS was significantly thicker in patients with chronic fissure than in the control group and Pascual M *et al.* who reported thick IAS in 92% of patients with chronic anal fissure [7, 8]. 3 cases of our study group (10%) showed gapping of the internal sphincter beneath the site of chronic fissure and one of them showed an associated intersphincteric plane sepsis and were correlated with anoscopy under anaesthesia, which revealed a high grade anal fissure.

The only ultrasound feature associated with low grade fissure was thickened IAS, observed in 86% of our patients. Thick IAS is not specific for patients with chronic anal fissures but can be found in other patients with chronic anal pain, obstructed defecation, hereditary internal anal sphincter myopathy and solitary rectal ulcer syndrome [6]. Thickening of the IAS was attributed to prolonged muscle spasm with subsequent hypertrophy and fibrosis of the internal anal sphincter [9].

An anal fissure which exposes the internal sphincter will lead to its irritation with subsequent increased tonicity and elevated anal resting

pressure, which mainly depends on the tonicity of the internal sphincter. Anal hypertonia interferes with fissure healing as it leads to further impairment of blood flow to the site of anal fissure by compressing the feeding vessels [4].

Management of chronic anal fissure can be either through chemical sphincterotomy which includes topical application of nitroglycerine, calcium channel blockers or through the injection of Botulinum toxin or by surgical lateral internal sphincterotomy. Lateral internal sphincterotomy could lead to fecal incontinence, so chemical sphincterotomy is preferred on surgical sphincterotomy [2].

Determinant factors of the healing of chronic fissure to chemical sphincterotomy are:- pretreatment resting anal pressure and fissure grade. High pretreatment anal resting pressure and high fissure grade was associated with impaired fissure healing in response to chemical sphincterotomy. The morphological grades of anal fissure are: - Grade 0 healed fissure, Grade 1 Exposed IAS, Grade 2 deeply exposed IAS, Grade 3 Undermined fissure and Grade 4 undermined fissure complicated with abscess or fistula tract [10]. In the current study, 3 cases showed high grade chronic anal fissure that predicts poor response to chemical sphincterotomy.

It is of interest to understand, if the thickness of IAS can reflect increased pretreatment resting anal pressure and subsequently can be used to predict the healing response to chemical sphincterotomy or not. Some studies showed linear correlation between the thickness of internal anal sphincter and the resting anal pressure, and other studies showed that no correlation was found [6, 11-13]. So, the thickness of the IAS can't be used to reflect the maximum resting anal pressure for all patients and subsequently can't be used to predict fissure healing for all patients. IAS tone depends on its smooth muscle contents, in hypertrophy with increase bulk of muscle fibers, hypertonia with increased resting anal pressure will be expected. Another cause of increased IAS thickness is due to diffuse fibrosis as in cases with longstanding anal fissures with subsequent lower degrees of resting anal pressure, the same can be observed in patients with old age, in whom collagen increases the thickness, but the tone will be weak [14]. So further studies recommended to correlate between the pretreatment thickness, the sonographic texture of IAS and the healing response of chronic fissure to chemical sphincterotomy. The sonographic texture in addition to the thickness, may suggest the cause of IAS thickening, either due to muscle

hypertrophy or diffuse fibrosis, so can predict the pretreatment resting pressure of the anal canal.

Conclusion

Use of ultrasound in cases with chronic anal fissure may show gapping of the internal anal sphincter and associated intersphincteric plane sepsis corresponding to the high morphological grade of anal fissure which is based on previous studies will predict poor healing response to chemical sphincterotomy and further studies that correlate between the thickness and texture of IAS and the healing response to chemical sphincterotomy recommended.

Conflicts of Interest

None.

Ethics Statement

All procedures followed were in accordance with the ethical standards of the responsible committee on human experimentation (institutional and national) and with the Helsinki declaration of 1964 and later versions.

Consent

Informed consent was obtained from all patients for being included in the study.

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None.

Author Contributions

Ashraf Talaat Youssef contributed to conception and design of study, acquisition of data, analysis and/or interpretation of data, drafting the manuscript, revising the manuscript critically for important intellectual content, approval of the version of the manuscript to be published.

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