

Incidence of Anorectal Diseases Diagnosed by Anorectal Ultrasound: A Retrospective Mexican Study

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Received: February 04, 2025; Published: June 11, 2025

Abstract

Introduction: Anal diseases, such as anorectal abscess, anorectal fistula, fecal incontinence, anorectal tumors, rectocele, cystocele and hysterocele, can be accurately diagnosed by endoanal and endorectal ultrasound. This non-invasive technique uses high-frequency sound waves to create detailed images of the anorectal region, allowing for accurate assessment of the anatomy, extent and severity of diseases. Endoanal ultrasound offers several advantages over other diagnostic techniques, such as digital rectal examination or anoscopy. It is painless, fast and provides real-time images that make it easy to differentiate between different types of diseases. In addition, it allows the detection of complications, such as the presence of abscesses or fluid collections. In expert hands, endoanal ultrasound becomes an invaluable tool for the diagnosis and monitoring of anal diseases, guiding therapeutic decisions and improving treatment results.

Material and Methods: A retrospective, cross-sectional, observational and descriptive study was carried out with patients from the outpatient clinic of the coloproctology service of Regional General Hospital No. 58 undergoing endoanal and endorectal ultrasound as a diagnostic method for anorectal diseases in the period from January 2019 to May 2024.

Results and Discussion: A total of 182 patients underwent endoanal ultrasound, with a total of 193 ultrasound diagnoses for anorectal diseases were identified.

Conclusion: Endoanal ultrasound is a very useful tool in the initial evaluation of anorectal pathology and is projected as an important screening tool.

Keywords: Endoanal US; Anorectal Diseases; Screening; Anorectal Tumor; Anal Fistula

Introduction

Endoanal or endoanorectal ultrasound emerges as a very useful diagnostic and therapeutic method in the field of anorectal diseases [1]. A method that was first described almost 30 years ago, its non-invasive nature, low risk and simple preparation make it an attractive alternative for both doctors and patients. But in order to understand how different diseases are reflected through ultrasound, we must understand the principles that govern it, as well as the ultrasound anatomy of the rectum wall [1,2].

The main indications for endoanal ultrasound are the morphological study of the sphincter apparatus in fecal incontinence, the study of the location of anal abscesses and perianal fistulas, the staging of anal cancer, and pelvic floor dysfunction or pelvic organ prolapse [3] transvaginal exploration has recently been added allowing a complete evaluation of pelvic floor prolapse [4].

Ultrasound is defined as a series of mechanical waves, generally longitudinal, originated by the vibration of an elastic body (piezoelectric crystal) and propagated by a material medium (body tissues), whose frequency is greater than 20,000 cycles/second or 20 kilohertz (20 KHz), so it exceeds the frequency of sound audible to humans [2]. Diagnostic ultrasounds are generated in a device called a transducer, which contains one or more ceramic crystals (usually titanium zirconate) with piezoelectric properties. That is, with the capacity to transform electrical energy in sound and vice versa. In this way, the transducer or ultrasound probe acts an ultrasonic emitter and receiver. The elastic waves that originate cause the vibration of the particles of the medium, in the air there is no propagation of the wave elastic. Molecules move back and forth around their position intermediate producing bands of compression and rarefaction [2]. The transducer vibrates when electrical energy is applied and collects the return of the echoes at different times, measuring the energy of each reflected echo an transforming each numerical value into an echogenicity or intensity on a scale o gray, proportional to the reflected object. Image formation depends entirely of the echoes that return [2].

Currently, there are high-frequency probes (16 MHz) with excellent spatial resolution and automatic image acquisition, which, added to the development of recent software, are capable of generating high-quality two-dimensional or three-dimensional images [3]. The result obtained can be stored and analyzed later without the patient being present; Likewise, 3-D echo allows volumetric calculations to be carried out. One of the main advantages is that 3D images can be freely rotated, transformed, tilted and sliced, allowing the explorer to infinitely vary the different section parameters and view the lesion at different angles to have the greatest possible information [2].

Sonographically, the rectal wall is composed of five layers of different ultrasound density (3 hyperechoic and 2 hypoechoic) that correspond to the anatomical layers of the rectal wall [2]. To correctly perform the endoanal ultrasound examination, it is performed with the patient in the left lateral decubitus position. Most patients tolerate the examination well and sedation is not necessary [5]. A previous rectal enema is recommended 2 hours before the scheduled time for the exam, although some authors report not needing special preparation. The probe is introduced between 6 to 15 cm depending on whether an anal or rectal scan must be performed [2,4]. It is recommended to use a 360° axial endoprobe between 7 and 10 MHz, as well as an axial convex anal probe when a full 360° probe is not available. The simple gray scale image is sufficient for optimal diagnostic accuracy. Among the anorectal diseases that can be diagnosed by endoanal ultrasound are anal fistulas, abscess, tumors, fecal incontinence, rectal prolapse, rectocele, hysterocele, cystocele. [5].

Anal fistula is defined as an abnormal external anatomical connection between the anorectal canal and the perianal skin and which can be classified as intersphincteric, transsphincteric, suprasphincteric, extrasphincteric [6]. Symptoms of anal fistulas include perianal cellulitis, anorectal pain, anal itching, drainage of pus, and in some cases, fecal incontinence. Its origin is usually cryptoglandular, although other etiologies include Crohn's disease, malignant neoplasms, radiation, trauma, or the presence of a foreign body [7]. Endoanal ultrasound is a useful tool for the evaluation of endoanal lesions, especially in the context of perianal fistulas. Although conventional anal ultrasound has limited value in visualizing fistulous tracts, instillation of hydrogen peroxide (H_2O_2) as a contrast medium improves visualization of secondary tracts and the internal opening [8]. Competent interpretation of anal endosonography during investigation of perianal fistula requires prior experience. On average, interpretation of at least 50 proctored exams is recommended to achieve reasonable competency for performance and independent reporting [9]. Acquisition of 3D images is not recommended as it is not necessary to achieve maximum diagnostic accuracy. However, it can be useful when it is necessary to review the exam later [10]. According to the medical literature, endoanal ultrasound has a sensitivity of 92.2% and a specificity of 100% for the diagnosis of perianal fistulas when compared with surgical results, indicating high accuracy in the detection of these lesions [7]. However, it is important to note that sensitivity and specificity may

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vary depending on the type of lesion and the experience of the operator [11]. The prevalence of anal fistula is approximately 1 - 2 per 10,000 patients in studies of the European population, [6] while in Mexico it is reported in a study carried out at the General Hospital of Mexico in a period of 5 years and with a total of 871 patients with a first-time diagnosis of anal fistula, an annual prevalence of the condition is 5.9% [7].

The cryptoglandular theory proposes that anorectal abscesses result from the blockage of intramuscular anal glands. These glands, located circumferentially in the anal canal at the dentate line level, typically drain into the Morgagni crypts. When they become enlarged, an abscess forms if the gland cannot decompress into the anal canal [12]. According to the widely used Parks classification system, anorectal fistulas can also be classified into four main types:

- Intersphincteric (70%): located between the internal and external sphincters.
- Transsphincteric (23%): extends through the external sphincter to the ischiorectal fossa.
- Extrasphincteric (5%): passes from the rectum to the skin through the levator ani.
- Suprasphincteric (2%): extends from the intersphincteric plane through the puborectalis and exits the skin after traversing the levator ani [13].

Endoanal ultrasound is a tool that allows for precise and rapid confirmation of anal abscesses when diagnostic doubt exists, as treatment remains drainage, aiming for good opening while preserving skin [14].

Defining the true incidence of anorectal abscesses is challenging, as many abscesses drain spontaneously before patients seek attention or are treated. Extrapolating from population-based studies on anal fistulas, an estimated 68,000 to 96,000 people are affected annually in the United States. Most patients are in their fourth decade of life, with a male-to-female ratio of 2-3:1 [12].

Fecal incontinence is the involuntary or inability to control fecal discharge through the anus, significantly impacting quality of life. It can be caused by damage to the internal or external anal sphincter or both. The internal anal sphincter (IAS) is responsible for most of the resting anal pressure, while the external anal sphincter (EAS) contributes to pressure during voluntary contraction. Dysfunction or damage to either sphincter can lead to fecal incontinence, often multifactorial [15].

In Mexico, the SIGAME study found a 4.7% prevalence in the general population, with a mean age of 49.5+13 years, predominantly female (67%) [16].

The global prevalence of fecal incontinence varies between 7-15% in Western countries, affecting 2% of the population under 65, 10% over 65, and up to 50% of nursing home residents. Anal incontinence prevalence is higher in women, especially those with obstetric injuries. According to medical literature, anal incontinence prevalence in women can be up to 25.8%, while men's prevalence is generally lower [17].

Ultrasound is a valuable tool for evaluating anal incontinence in both sexes, although its ability to predict long-term incontinence severity may be limited. Three-dimensional endoanal ultrasound is widely accepted for evaluating sphincter damage in fecal incontinence, improving diagnostic accuracy and understanding of physiological and pathological changes in the sphincters [18].

Endoanal ultrasound is particularly useful for local staging of rectal and anal cancers. Serra-Aracil., *et al*.'s study highlights that endoanal ultrasound has an overall accuracy of 78% in identifying rectal tumors, with an 83.78% sensitivity and 20% specificity [19].

However, accuracy may vary depending on factors like lesion size and operator experience. It remains one of the most accurate methods for staging rectal and anal cancers, especially compared to MRI, which may be less accurate for local staging [20].

Three-dimensional endoanal ultrasound with MRI in the context of anal cancer is more accurate for T1 staging, although MRI is superior for detecting neoplastic lymph nodes [21].

Rectal prolapse is a relatively rare condition, with an estimated prevalence of approximately 2.5 cases per 100,000 people per year, more common in women over 50 [22]. Rectoceles, more common in older women, can be secondary to pelvic floor weakness and/or dysfunction with altered rectal evacuation. Rectoceles can be small (< 2 cm), medium (2 - 4 cm), or large (> 4 cm) [23].

Rectoceles indicate structural deficits (i.e., pelvic floor weakening, especially the perineal body) and pelvic floor dysfunction with excessive straining and altered rectal evacuation during defecation [22]. Observed infrequently in younger nulliparous women, age, parity, anal sphincter injury, and hysterectomy are the most frequently cited risk factors for rectocele [23].

Among its advantages, it has been highlighted for its accuracy in evaluating anal sphincter integrity and has proven to be a valuable tool for staging colorectal cancer, allowing for better tumor classification and, consequently, modifying treatment as necessary [24]. It presents several advantages in evaluating perianal fistulas, especially considering its high sensitivity of 92.2% and specificity of 100% [25].

One of the main advantages is its ability to provide detailed visualization of the anal canal and sphincter complex, crucial for preoperative planning and evaluating disease extension. Additionally, endoanal ultrasound is a non-invasive and relatively inexpensive technique [26].

Magnetic resonance imaging (MRI) plays a crucial role in diagnosing and preoperatively evaluating anal fistulas. MRI is considered the gold standard for evaluating these pathologies due to its superior ability to provide soft tissue contrast and multi-planar capability, facilitating detailed evaluation of fistulous tracts and associated abscesses [27] with 100% sensitivity and specificity [28].

Another study reported 100% sensitivity and 86% specificity for detecting fistulous tracts and 96% and 97% for abscesses, respectively [29]. It is a highly effective tool for diagnosing and staging anal and rectal tumors, with high diagnostic accuracy for T and N staging, with sensitivities and specificities ranging from 66% to 76% for detecting lymph nodes [30].

MRI defecography allows for detailed anatomical and functional evaluation of the pelvic floor, essential for diagnosing and planning treatment for complete and internal rectal prolapse, as well as other posterior pelvic floor compartment dysfunctions [30].

Material and Methods

Study design

It is a retrospective, cross-sectional, observational and descriptive study.

Type of study

Cross-sectional descriptive.

Universe of study

Patients with diseases diagnosed through endoanal ultrasound in the coloproctology service (anorectal tumors, anorectal abscesses, anorectal fistula, fecal incontinence, rectocele) at the Regional General Hospital #58 in the period from January 2019 to May 2024.

Temporary location

Patients from Regional General Hospital No. 58, in the period from January 2019 to May 2024.

Sample calculation

It was carried out for convenience, and the total number of patients who underwent endoanal and endorectal ultrasound were taken in the coloproctology service of the Regional General Hospital No. 58, in the period from January 2019 to May 2024 reported in the database. of the service, with a total of 182 patients.

Inclusion criteria

Age over 18 years, both sexes, eligible, patients undergoing endoanal ultrasound in the coloproctology service of HGR 58 in the period from January 2019 to May 2024, diagnosed with one, two or more anorectal pathologies.

Exclusion criteria

Those who do not have complete clinical or paraclinical information in the file.

Elimination criteria

Patient with intervention other than HGR 58.

Results and Discussion

A total of 182 patients treated in the coloproctology service of HGR 58 were analyzed, of which 61% were male patients and 39% were female. Overall, these patients were 49.48 ± 12.78 years old (Table 1).

Total	n = 182
Sex, n (%)	
Male	111 (61)
Female	71 (39)
Middle age ± ED	49.98 ± 12.78

Table 1: Demographic characteristics.

A total of 193 ultrasound diagnoses for anorectal diseases were identified in these patients. Of the total number of patients treated, 31 of them were diagnosed with normal findings. However, the most prevalent diseases were anal fistulas, present in 53.4% of patients, among them, the most frequent were transsphincteric (46.1%), intersphincteric (5.7%) and suprasphincteric (1.6%). Subsequently, anal abscesses and fecal incontinence were identified as the next most frequent pathologies with 20 cases each (10.4%).

In the case of abscesses, the most prevalent were intersphincteric (5.2) and perianal (2.6); while the majority of cases of fecal incontinence were caused by alterations in the internal anal sphincter (4.7%), and in both anal sphincters (3.6%). On the other hand, anorectal tumors were identified in 7.3% of the patients treated, where stages UT1 (2.6%) and UT4 (1.6%) were the most common. Finally, rectal prolapse, rectocele, hysterocele and cystocele were the pathologies that were identified to a lesser extent in these patients, with one case identified in the case of the last two (Table 2).

Endoanal ultrasound, in addition to being a safe and relatively inexpensive technique, can also be used in patients who cannot undergo an MRI due to the presence of implanted metal devices, claustrophobia, obesity, the presence of a pacemaker or a metal implant [31].

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Ultrasound diagnosis, n (%)	n = 193
Anal fistula	103 (53.4)
Interesfinteric	11 (5.7)
Transesfinteric	89 (46.1)
Supraesfinteric	3 (1.6)
Extraesfinteric	0
Absceso anal	20 (10.4)
Perianal	5 (2.6)
Interesfinteric	10 (5.2)
Isquiorrectal	3 (1.6)
Postanal superficial	1 (0.5)
Supraelevator	1 (0.5)
Anal incontinence	20 (10.4)
Intern anal sphincter	9 (4.7)
Extern anal sphincter	3 (1.6)
Both sphincter	7 (3.6)
Puborrectal muscle	1 (0.5)
Anorectal tumors	14 (7.3)
Rectal	13 (6.8)
Anal	1 (0.5)
Stage of rectal tumors	
UTO	1 (0.5)
UT1	5 (2.6)
UT2	2 (1)
UT3	2 (1)
UT4	3 (1.6)
No estratification	1 (0.5)
Rectal prolapse	2 (1)
Grade l	2 (1)
Grade ll	0
Grade Ill	0
Rectocele	1 (0.5)
Grade l	0
Grade ll	1 (0.5)
Grade lll	0
Grade IV	0
Hysterocele	1 (0.5)
Grade l	0
Grade ll	1 (0.5)
Grade Ill	0
Grade IV	0
Cystocele	1 (0.5)
Grade l	1 (0.5)
Grade ll	0
Grade Ill	0
Grade IV	0
No pathology	31 (16.1)

Table 2: Incidence of anorectal diseases.

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Likewise, it offers several advantages over other imaging techniques, particularly in the evaluation of perianal fistulas. Compared to MRI, it has high sensitivity and specificity, although MRI is more effective in identifying complex fistulous tracts and their possible secondary extensions. In addition to its ability to provide detailed visualization of the anal canal and sphincter complex, which is essential for evaluating anorectal anatomy and planning surgical interventions. Furthermore, the possibility of obtaining three-dimensional images and reconstructions in the coronal plane facilitates the identification of various pathologies [32].

Conclusion

Of the 182 patients referred for anorectal pathology and randomly studied with endoanal ultrasound, an incidence of 82.967% was found for anorectal pathology in the Mexican population studied, so it is concluded that endoanal ultrasound is a useful, rapid and minimally invasive tool. which is essential in the approach of the patient referred with anorectal pathology.

The population is found to be limiting in terms of volume because it is a single center; it is necessary to expand studies in the Mexican population to standardize the use of endoanal ultrasound as a screening method in the initial proctological evaluation.

Acknowledgements

Cabrera Oñate Group.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

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