

Analysis of Diagnostic Value of Ultrasonography in Perianal Abscess and Anal Fistula

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ABSTRACT Objective: To discuss the diagnostic value of ultrasonography in perianal abscess and anal fistula. **Method:** through retrospectively analyzing clinical data of 80 cases of perianal abscess and anal fistula patients in our hospital from January 2013 to December 2014, compare the sensitivity (Se), specificity (Sp) and positive predictive value of transrectal ultrasonography and body surface ultrasonography. **Results:** Operation pathology of 80 cases of patients confirms that there are 35 cases of single perianal abscess (43.8%), transrectal ultrasonography and body surface ultrasonography diagnosis also confirm 35 cases; 2 cases of single anal fistula (2.5%), transrectal ultrasonography and body surface ultrasonography diagnosis also confirm 2 cases; 43 cases of abscess combined anal fistula (53.8%), body surface ultrasonography diagnosis confirms 39 cases of abscess and 36 cases of anal fistula transrectal ultrasonography diagnosis confirms 40 cases of abscess and 38 cases of anal fistula. There is no significant difference in Se, Sp and positive predictive value between two groups ($p > 0.05$). **Conclusion:** There is no significant difference in Se, Sp and positive predictive value of body surface ultrasonography diagnosis, but it can obviously relieve patients' pain.

KEYWORDS

Ultrasonography
Perianal abscess
Anal fistula

1. Introduction

Anal fistula and perianal abscess is often originating from anal sinusitis, and clinical diagnosis is often based on the patient's chief complaint, symptoms, signs and digital rectal examination. As for deep-abscess in deep position or high anal fistula, especially for patients with inconspicuous

anal fistula outer edge, iodine oil radiography cannot be used to confirm the direction and the infection parts, which directly affects the effect and causes recurrent pain to patients. The abscess around the anus rectum (perianal abscess) is emergency of anus bowel division and usually occurs in men, especially men aged of 20–40 years old. It is often caused by anal sinus infection spreading to anal gland and clearance around the anus, and anal fistula is formed after abscess collapsing. Clinical treatment is given priority to surgery. The key is to confirm the scope of abscess, direction, branches and internal opening of anal fistula. Therefore, it is very important to get preoperative detailed image information. We chose transrectal ultrasonography examination in the past, but it is invasive, patients may not be able to endure due to severe pain, which affects diagnosis of disease condition and effect. Our hospital choose body surface ultrasonography examination, which

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is fast, convenient, non-invasive and repeatable. It can be used as direct, comprehensive diagnosis of perianal abscess and anal fistula. Now report the experience as follow [1].

2. Materials and Methods

2.1. General Materials

80 cases of perianal abscess and anal fistula patients, who have been confirmed by surgery pathology in our hospital from January 2013 to December 2014, were selected, among them, there were 64 men and 16 women; aged from 19 to 75 years old, the average age was 36.9 ± 4.2 years old; course of disease is from 2d to 8a, the average is (2.9 ± 3.1) a. Clinical manifestation: all had crissum smelling, fever and pain; some had touchable fluctuate, lack of power, fever, chilly and systematic arthralgia. Laboratory inspection: some patients had different extent of white blood cell count rising.

2.2. Method

2.2.1. Ultrasonic testing

Use MyLab70XVG and Siemens X150 color Doppler ultrasound equipment, high-frequency probe with frequency range of 5 MHz to 14 MHz and intracavitary probe with frequency range of 5 MHz to 9 MHz. All patients received transrectal and body surface ultrasonic inspection respectively. Method: transrectal inspection, choose the patients' left lateral position, and use high frequency probe to do 360° rotating scan around the anus, then apply a suitable amount of coupling agent on the lumen probe; cover condom, apply a few coupling agent in the outer, conduct transrectal expedition. as for inspection through body surface, choose the patients' chest-knee position, do sector scan around the anus with high frequency probe; detect and record the lesion location by clockwise positioning method, observe the size, shape and internal echo of lesion after finding the location of lesions anatomy, then judge the distance to anal edge and direction and whether there is anal fistula; if any, record the trace direction, number and relationship of fistula to confirm the location of internal opening. Use color Doppler to capture blood flow signals around lesion to indirectly judge the physical properties of unusual echo

area, so as to help evaluate the vomica, scope of fistula and the spreading way of inflammation and others, grab image and store it.

2.2.2. Retrospective analysis

Record results of transrectal and body surface ultrasonography, including ultrasonographic characteristics, condition judgment and others, compare with surgical results. Comparative analysis on the sensitivity (Se), specificity (Sp) and positive predictive value of ultrasound diagnosis is made.

2.3. Statistical treatment

Carry out statistics, and use SPSS 13.0 software to deal with data. Enumeration data is expressed as case or percentage, and analyzed by χ^2 test. There is statistical significance, $p < 0.05$.

3. Results

Surgery pathology of 80 cases of patients confirms 35 cases of single perianal abscess (43.8%), 2 cases of single anal fistula(2.5%), 43 cases of abscess combined anal fistula (53.8%). The Se, Sp and positive predictive value of transrectal ultrasonography and body surface ultrasonography are shown in Table 1. There is no significant difference between groups ($p > 0.05$).

4. Discussions

The understanding of the anal fistula structure directly affects the treatment plan, the operation method and prognosis. The clinical commonly used DRE, probe, methylene blue inspection and X-ray imaging and other method all have their limitation. DRE, probe and methylene blue inspection cannot understand the relationship of fistula and surrounding tissues, while X-ray angiography of fistula hinder the contrast agent pass because fistula and pus cavity have necrotic tissue and pus. Due to the impact of injecting time of contrast agent, pressure and position angle, the imaging result is not obvious, and the accuracy of internal opening is only 28%, so there is little help in clinical. With the development of medical imaging technology, some new imaging technology is used. Zhang Dajun, et al. applied spiral CT three-dimensional

Table 1. Comparison of Se, Sp and positive predictive value of perianal abscess and anal fistula between two groups.

Group	Perianal abscess			Anal fistula		
	Se	Sp	Positive predictive value	Se	Sp	Positive predictive value
Body surface	(74/78) 94.9%	(2/2) 100%	(74/74) 100%	(38/45) 84.4%	(33/35) 94.3%	(39/41) 95.1%
Transrectal	(75/78) 96.2%	(2/2) 100%	(74/74) 100%	(40/45) 88.9%	(34/35) 97.1%	(40/41) 97.6%
χ^2	0	0	0	0.3846	0	0
p value	$p > 0.05$	$p > 0.05$	$p > 0.05$	$p > 0.05$	$p > 0.05$	$p > 0.05$

reconstruction techniques to do anal fistula preoperative diagnosis. MRI can accurately describe the anatomical structure of inside and outside sphincter of anus, levator ani and pubic rectum muscle, and display the relationship of anal fistula and the muscles around the anus, which can have a correct evaluation of postoperative curative effect. But its disadvantage is that the relative operation time is long and cost is higher; it cannot be performed regularly in basic-level hospitals. The examination time is long, and patients who have done metal transplantation or cardiac pacemaker surgery are contraindicated, limiting its widely application in clinical. Now ultrasound has been widely applied in the diagnosis of anal fistula. High-frequency linear array ultrasound can clearly show the superficial crissum lesions through the crissum. Xu Changnian in domestic reported [2], comparison between examination results and results of surgery of 26 cases shows that through the crissum, Color Doppler ultrasonography high-frequency linear array probe can clearly show levator ani, anal sphincter, all layers of rectum wall including dentate line structure and other fine structure; shows the position, size and direction of fistula and abscess, especially the internal opening of abscess and anal fistula. The result has high coincidence rate. Ma Chenxia, et al. reported that for the majority of anal fistula, high-frequency linear array ultrasound probe can clearly show the part and direction of fistula, especially the internal opening of fistula. The result has high coincidence rate with surgical results. Bian Hexing thinks that ultrasound can not only provide the location, shape, size, scope of perianal abscess and the relation with sphincter, and clearly judge the formation of abscess, size of pus cavity, viscosity of pus, thickness of pus cavity wall and communication among single abscess, multiple abscesses and abscess, and accurately judge whether pus is mature or not, but also provide the image data of rectum and adjacent tissue, providing the basis for the differential diagnosis.

With the continuous development of medical imaging technology, the application of ultrasound in the diagnosis of anorectal diseases is more and more widely, especially high frequency probe can clearly display perianal superficial lesions, showing anal sphincter, levator ani and the layers of rectum wall and other fine structure, the position, direction and scope of abscess and fistula, especially the endostoma of abscess and fistula, which obviously improves the coincidence rate of diagnosis [3]. Traditional ultrasonic diagnosis is done by transrectal examination, intracavity probe can clearly show deep abscess; coincidence rate of diagnosis is high, but because patients often cannot tolerate the pain of DRE and transrectal examination, it can affect the judgment of lesion and reduce the effect. MRI and spiral CT three-dimensional reconstruction are also used for preoperative diagnosis of anal fistula, but it is time-consuming and expensive, so our group choose the body surface examination, which is not invasive and can reduce the pain of patients; and study shows there was no

significant difference between its diagnostic sensitivity (Se), specificity (Sp), positive predictive value and transrectal ultrasonography ($p > 0.05$), which shows that the body surface examination can also ensure the diagnostic accordance rate of perianal abscess and anal fistula. It has a good application prospect.

The ultrasonogram of body surface ultrasonic examination of perianal abscess shows that during early abscess (that is immature stage), since the tissue has only inflammation and severe congestion, but no fester, there is inhomogeneous or honeycomb hypoechogenic area, edge blur; the internal opening is manifested as crack shape defect of internal sphincter. During middle abscess (that is mature stage), the tissue has been part of liquefaction, fluid dark space is visible at internal lesion, and the boundary is clear, there are echogenic dots with uneven thickness, posterior echo has enhanced, the internal opening is often at the place 2–3 cm above anal edge. during later abscess (after burst), strong gas echo can be seen in the hypoechogenic area. With the delay of lesions and repeated infection, proliferation of fibrous tissue will occur inside lesion; there are uneven, mixed weak and strong echo with point-like, line-like or spot-like calcification, and the internal opening is often at the tooth line.

Ultrasonogram of body surface ultrasound examination shows linear or streaky hypoechoic from the anal fistula mouth to anal wall; the fistula is straight or curved, the number may be one or several, horizontal cut surface is circular and cystic, longitudinal cut surface is streaky; patients with early pus often have liquid dark area, mixed heterogeneous echo will occur in the later period, there are blurred edges; some internal opening of anal fistula can be detected directly, there are also continuously interrupted defect on the inner sphincter.

Perianal abscess is purulent anal gland infection, developing toward gap around the anus through glands duct to form lesions. Anal fistula is gradually formed after abscess collapse, clinical patient complaints and some routine examination is difficult to accurately meet the requirements of clinical diagnosis, even leading to failure of surgery, bring unnecessary pain to patient, while ultrasound is showing its advantages. Ultrasound is to determine the location, direction of anal fistula, size of infection lacuna and depth of abscess by analyzing echoes through combining the physical acoustics of each tissue and organ on the base of pathological anatomy, particularly pathological anatomy. Combining with comprehensive analysis of chief complaint, symptoms, signs and relevant history, ultimately make the correct diagnosis, guide treatment, ensure the radical cure for anal fistula and perianal abscess, improve the diagnostic quality of anal fistula and perianal abscess and success rate of surgery, eliminate recurrent phenomenon of anal fistula and perianal abscess, reduce the suffering of patients, at the same time, reduce the financial burden of patients, there is

a breakthrough significance in the clinical diagnosis and treatment of anal fistula and perianal abscess.

In conclusion, body surface ultrasonography may assess the course of perianal abscess, show location of lesion, there is no obvious difference in Se, Sp, and positive predictive value between transrectal ultrasonography and body surface ultrasonography, but it can obviously relieve patients' pain, is worth studying.

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