The value of superficial parts and endoanal ultrasonography in evaluating pilonidal disease and exclusion of perianal sepsis

Ashraf Talaat Youssef

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Abstract

Introduction Pilonidal disease is a benign anorectal inflammatory disease that involves the subcutaneous adipose tissue overlying the sacrococcygeal region.

The aim of the work The current study aimed to assess the value of preoperative evaluation of pilonidal disease and the exclusion of perianal sepsis using superficial parts ultrasonography and endoanal ultrasound.

Methodology Referred 30 patients were clinically diagnosed as pilonidal disease, all were examined with superficial parts ultrasonography and if the disease was extending to the perianal region further endoanal US was performed to exclude perianal sepsis.

Results 7 patients showed subcutaneous abscesses and 23 patients showed pilonidal sinus tracts. Among patients with pilonidal sinus tracts, six tracts (26 %) seen as superficially situated, short narrow tracts with straight course, no side branches and with a blind end situated away from the anal canal wall. 2 (9 %) tracts showed vertical orientation and three tracts (13 %) were wide and deeply situated reaching the presacral fascia. 7 cases (30 %) showed branching pilonidal sinus tracts, two cases of them showed more than one external opening. 5 patients (22 %) showed abnormally long tracts seen reaching the perianal region.

Conclusion Ultrasonography is an available, inexpensive, safe imaging modality that yields a high degree of accuracy in evaluating pilonidal disease and in exclusion of perianal sepsis.

Keywords Pilonidal sinus · Superficial parts · Endoanal · Ultrasonography · Perianal sepsis

Riassunto

Introduzione La malattia pilonidale (PND) è una patologia infiammatoria ano-rettale benigna che coinvolge il tessuto adiposo sottocutaneo sovrastante la regione sacro-coccigea. **Scopo** scopo dello studio è stato evidenziare il ruolo dell'ecografia delle parti molli ed endorettale nella valutazione preoperatoria della malattia pilonidale e nell'escludere la sepsi perianale.

Materiali e Metodi sono stati presi in esame 30 pazienti ai quali era stata diagnosticata clinicamente la malattia pilonidale, tutti sono stati sottoposti ad esame ecografico delle parti molli, se la malattia si era diffusa anche alla regione perianale, sono stati ulteriormente sottoposti ad esame ecografico endorettale per escludere sepsi perianale.

Risultati 7 pazienti mostravano ascessi sottocutanei e 23 cisti pilonidali. Tra questi ultimi, 6 (26 %) presentavano cisti con localizzazione superficiale, a decorso stretto e lineare, senza ramificazioni laterali e con un fondo cieco situato lontano dalla parete del canale anale. 2 pazienti (9 %) mostravano cisti ad orientamento verticale e 3 (13 %) sito ampio e profondo fino a raggiungere la fascia presacrale. 7 casi (30 %) mostravano ramificazione delle fistole pilonidali, di cui 2 con più di un'apertura esterna. 5 casi (22 %) cisti estremamente lunghe fino a raggiungere la regione perianale. **Conclusione** L'ecografia è una modalità d'indagine economica e sicura con un alto grado di precisione nella valutazione della malattia pilonidale e nell'esclusione la sepsi perianale.

Introduction

Pilonidal disease (PND) is a benign anorectal inflammatory disease that involves the subcutaneous adipose tissue

A. T. Youssef (✉)
Department of Radiology, Faculty of Medicine,
Fayoum University, El Fayoum, Egypt
e-mail: ashraftalaat1@yahoo.com

overlying the sacrococcygeal region. The presentation of the disease occurs in one of three forms: acute abscess, sinus tract, which is chronic tract lined with stratified squamous epithelium, and complex disease showing recurrent abscesses and complex branching sinus tract [1, 2].

The disease is more common in males than females between the ages of 20–25 years [3]. Risk factors for development of the disease are obesity, positive family history, and smoking, while risk factors for recurrence of the disease including family tendency, sinus number, cavity diameter, and local anesthesia [4]. Pilonidal disease is caused by ingrowing hair, excessive sitting and fragile skin with hair follicle obstruction, enlargement, inflammation, and secondary infection to form the pilonidal abscess (acquired theory) [5] or congenital pilonidal dimple [6]. Management of pilonidal abscess is by incision and drainage while management of sinus tract requires complete excision of the sinus tracts and all ramifications to completely eradicate the disease and prevent the recurrence, surgical treatment includes excision and healing with secondary intention which carries the principal advantage of a low recurrence rate but showing long healing time between 8 and 10 weeks [7], excision with primary closure with short healing time and high recurrence rate, [8] and excision with reconstructive procedure [9–11]. Recently sinotomy and fibrin glue injection into the sinus tract reported with minimal disability, early return to daily activities and low postoperative complications [12]. Preoperative evaluation of pilonidal sinuses includes palpation, injection of methylene blue, probing of the sinus tract, and imaging techniques. Imaging techniques include ultrasonography and magnetic resonance imaging (MRI).

Ultrasonography reported as an accurate method in preoperative evaluation of the sinus tracts gives an idea about the full extent of the tract and its ramifications [13].

No previous studies observed about the use of ultrasound to differentiate pilonidal sinus extends to the perianal region from perianal sepsis.

MRI is an excellent imaging modality that determines the extent of the disease and that differentiate perianal fistulas from pilonidal sinus tracts [14].

The aim of the work

The current study aimed to assess the value of preoperative evaluation of pilonidal disease and the exclusion of perianal sepsis using superficial parts ultrasonography and endoanal ultrasound.

Methodology

Referred 30 patients (Table 1) were clinically diagnosed as pilonidal disease between March 2012 and March 2014, there were 22 males, 8 females, their age ranged from 18 to 35 years old, mean age was 26 years, their BMI ranged from 18 to 34, and the mean was 27, all were examined clinically, all showed midline pits, sinus tracts were palpated and in each case the preliminary surgical decision was taken.

Patients lost to follow-up and patients with active inflammation of sinus tracts were not included in the study.

All were examined by superficial parts ultrasonography with multi-frequency linear probe 5–12 MHz assisted with three dimensional (3D) and color Doppler capabilities using sonoace ×8 ultrasound machine (Medison, Korea).

If the pilonidal disease was extending to the perianal region further endoanal ultrasound was performed by mechanically rotating high frequency endoanal probe using Siemens versa pro ultrasound machine (Siemens, Germany).

The patient natal cleft situated midway between the gluteal regions was examined in left lateral decubitus position with superficial parts ultrasonography for detection of subcutaneous anechoic cyst, pilonidal abscess or pilonidal sinus tracts. The pilonidal cysts detected as small anechoic cyst with or without hair inside, hair detected as highly echogenic linear echoes.

Subcutaneous abscess was detected as thick wall cavity with turbid contents, marginal hyperemia ± internal highly echogenic linear echoes of hair.

Subcutaneous sinus tract was detected as hypoechoic branching or non-branching tract with a blind end situated away from the anal canal wall.

Table 1 Demonstrates the patients included in the study

Number of patients	Age	Sex	BMI	Ultrasound diagnosis	Duration of symptoms	Patients with recurrent disease
30	18–35 years	22 Males and 8 females	18–34 and the mean was 27	7 Patients with pilonidal abscesses 23 Patients with sinus tracts	1–40 months (mean 16 months)	4 Patients

The sinus tract was evaluated for the direction, length, depth, width, the presence of side branches, and the number of external openings.

If the lesion was extending to the perianal region further endoanal ultrasound was performed to assess the relationship between the tract, the perianal spaces, and the anal sphincters.

Contact with the referring surgeons was done for any change in the surgical plan after getting the ultrasound report and after surgery to obtain the surgical results.

Results

30 patients detected with pilonidal disease among them 7 patients (23 %) showed subcutaneous abscesses (Figs. 1, 2, 3) and 23 patients (77 %) showed pilonidal sinus tracts.

Fig. 1 Two dimensional ultrasound of pilonidal abscess

Among patients with pilonidal sinus tracts (Figs. 4, 5, 6), six tracts (26 %) seen as superficially situated, short narrow tracts with straight course, no side branches, and with a blind end situated away from the anal canal wall, two tracts (9 %) showed vertical orientation (Figs. 7, 8) and three tracts (13 %) were wide and deeply situated reaching the presacral fascia (Fig. 9). 7 cases (30 %) showed branching pilonidal sinus tracts, two cases of them showed more than one external opening.

5 patients (22 %) showed abnormally long tracts seen reaching the perianal region, among them two tracts seen with external opening close to anal verge with one external opening leading to superficial perianal fistula tract that terminates at low anal canal level below the expected site of the dentate line (Fig. 10a, b) and the other one seen leading to transsphincteric perianal fistula that cross the external sphincter at mid anal canal level (Fig. 11a, b).

Fig. 3 3D surface rendering of pilonidal abscess showing linear echoes of hair inside

Fig. 2 Multiplanar image analysis and 3D surface rendering of pilonidal abscess

Fig. 4 2D ultrasound showing long non-branching pilonidal sinus tract measuring 4.5 cm in length and 4.6 mm in thickness

Fig. 5 3D surface rendering of short, relatively wide pilonidal sinus with small, short, and thin side branches

Fig. 8 3D surface rendering of short, wide vertically oriented branching pilonidal sinus

Fig. 6 3D surface rendering of broad and deep non-branching pilonidal sinus

Fig. 7 3D surface rendering of short vertically oriented pilonidal sinus tract

Fig. 9 Superficial parts ultrasonography showed pilonidal sinus tract (S) seen extending to the presacral fascia

In comparison with the clinical findings, the extent of pilonidal sinus tracts was underestimated in 8 out of 23 cases (35 %), overestimated in 2 out of 23 (9 %), and misdiagnosed as perianal sepsis in 3 out 23 cases (13 %).

The change in surgical plan was made in all cases with abnormally long tract reaching the perianal region who represent 5 out of 23 cases (22 %), 3 tracts reaching the perianal region were managed surgically with excision and Karydakis flap (a change made to the type of flap surgery) and two tracts seen with external openings near the anal verge leading to superficial perianal fistula and in the other case to transsphincteric perianal fistula, the surgical decision was only fistulotomy to the perianal fistula and was modified to fistulotomy for the perianal fistulas followed by excision and a Karydakis flap for the pilonidal sinus tracts.

According to the surgical findings, ultrasonography accurately detected the stage and the extent of the disease in all cases.

Follow-up of the patients underwent surgical excision of pilonidal sinus tracts after ultrasound evaluation, revealed

Fig. 10 **a** 2D ultrasound showing pilonidal sinus tract seen reaching the perianal region and created perianal fistula. **b** Endoanal ultrasound showing superficial fistula seen beneath the subcutaneous part of external anal sphincter

one patient suffered a postoperative hematoma, one patient suffered postoperative wound infection, one case with postoperative seroma, and two patients showed recurrent pilonidal sinus during 1-year follow-up (Table 2).

Discussion

There is controversy about the best way of surgical treatment of pilonidal sinus tract, the best treatment option should be simple, of low recurrence rate, of little postoperative pain and morbidity, and with decreased time of hospital stay and patients' time off work. Surgical excision with primary closure was associated with high recurrence rate but with decreased patients' time off work, excision with open packing or with marsupialization was associated with low recurrence rate but with long patients' time off work, and increased postoperative morbidity and pain. Excision with flap surgery carries lower recurrence rate, shorter time of wound healing and lower postoperative pain and morbidity than excision with primary closure. Wide and deep sinus tracts, tracts with multiple openings and branching sinus tracts require wide surgical excision while small, thin, non-branching tracts with a single opening

Fig. 11 **a** 2D ultrasonography showing pilonidal sinus tract with an external opening close to the anal orifice. **b** Endoanal ultrasound showing transsphincteric perianal fistula (arrow) at mid anal canal level

require simple surgical excision [15, 16]. So an accurate preoperative assessment of the sinus tract and its extensions is highly required to choose the optimal surgical procedure, also, a careful preoperative planning of the size and type of graft required if an excision with flap surgery was the treatment option, as during the surgical procedure the surgeon may find difficulty in changing the preoperative down incision line.

Clinical palpation of the pilonidal sinus tract may underestimate the size of the lesion, the depth of extension, and the presence of side branches as it could be difficult in median lesions, deeply situated lesions, and in obese patients. In the current study clinical palpation underestimates the size of the lesion in 35 % of cases, overestimates in 9 %, and misdiagnosis observed in 13 % of cases. Injection of methylene blue may overestimate the size of lesions due to staining of adjacent healthy tissue [13]. Probing of pilonidal sinuses may lead to false passage, may underestimate the length of sinus tract if the sinus was blocked with granulation tissue and debris and can miss the presence of side branches.

MRI is an accurate but expensive tool for evaluating the pilonidal disease and not readily available in low-income nations.

Table 2 Demonstrate the results of the study

Sonographic criteria of the sinus tracts	Comparing clinical with ultrasound findings	Modified surgical decision after sonography	Postoperative recurrence during 1-year follow-up	Postoperative wound complication
Superficial short non-branching tracts 26 %	Misdiagnosis 13 %	5 Cases (22 %)	2 Cases	3 Cases (1 case postoperative hematoma-1 case postoperative wound infection and 1 case with postoperative seroma)
Vertical tracts 9 %	Underestimation 35 %			
Branching tracts 30 %	Overestimation 9 %			
Deep wide tracts 13 %				
Long tracts reaching the perianal space 22 %				

Ultrasonography is an available, inexpensive, easily performed imaging technique that carries no risk of exposure to radiations.

The current study showed that ultrasound was an excellent imaging modality in the detection, staging of the disease, it was helpful in assessment of the extent of sinus tracts as regard to the length, the width, the depth, and the presence of side branches, findings which were previously reported with Montes et al. [13]. Surgical decision was modified based on ultrasound findings in 22 % of cases.

The main differential diagnosis of pilonidal disease is perianal sepsis, the perianal region is situated within 2 cm from the anal orifice, the differentiation between both is essential since each of them is managed differently.

Pilonidal sinus commonly treated with a closed surgical procedure while perianal fistula is treated with open surgical procedures, perianal fistula may extend to the region of the natal cleft while pilonidal sinus may reach the perianal region. MRI was previously reported to be valuable in differentiating perianal sepsis from pilonidal disease by the presence of intersphincteric plane sepsis noted in cases with perianal sepsis [14].

5 cases of our current study showed that pilonidal sinus can extend to involve the perianal spaces, endoanal and transperineal ultrasound were able to detect and localize the perianal extension of PND, to assess the relationship between the sinus tract and anal sphincters, and to exclude intersphincteric plane sepsis in cases with PND, in one case of the current study pilonidal sinus extended to the perianal space and created superficial perianal fistula, so the presence of intersphincteric plane sepsis differentiate only the cryptoglandular perianal fistulas from pilonidal disease but cannot differentiate fistulas of other etiological factors from PND. Superficial perianal fistula is uncommon type of perianal fistula that passes beneath the subcutaneous part of external anal sphincter showing no sphincteric involvement

and can be caused by previous anorectal surgery or Crohns' disease [17].

In another case with pilonidal sinus tract presented with only one external opening at the perianal region seen communicating with the anal canal wall through trans-sphincteric perianal fistula that crossed the superficial external sphincter at mid anal canal level (the expected level of dentate line), so sometimes it is difficult and may be impossible to detect the origin of the disease wither pilonidal sinus or perianal fistula and should be supposed as two concomitant pathological lesions each of them will be managed differently, however in this case the presence of midline pit in the natal cleft region, the presence of echogenic linear echoes suggesting of hair within the main tract and both the main tract, and perianal fistula have the same external opening in the perianal region, all are suggestive that the case was suffering from pilonidal disease complicated with perianal fistula, which had the same characteristics of cryptoglandular transsphincteric perianal fistula.

In the remaining three cases, ultrasonography was helpful in evaluating the deep extension of pilonidal sinus in the perianal region and exclude sphincter involvement, proving pilonidal disease and excluding perianal fistulas.

The prevalence of pilonidal sinus tract extending deeply to perianal region was comparatively high in the current study (22 %) of cases, perhaps owing to the fact that we were specially touched with those patients that can be clinically mistaken as perianal sepsis or vice versa, which augments the value of preoperative evaluation of PND with ultrasound.

In spite the flap techniques proved successful in the management of pilonidal sinuses with high cure rate and low incidence of recurrence, those tracts reaching the perianal region or were associated with perianal fistulas represent a surgical challenge and require special surgical

attention. Kulacoglu et al. [18] reported fistulectomy plus Karydakias flap for management of the pilonidal sinus tract extending to the perianal region. Akinci et al. [19] suggested limited separate elliptical excision with primary closure in complicated pilonidal sinus tracts reaching the perianal spaces.

Conclusion

Ultrasonography is an available, inexpensive, safe imaging modality that yields a high degree of accuracy in evaluating pilonidal disease and in exclusion of perianal sepsis.

Conflict of interest The author declares that he has no conflict of interest.

Informed consent 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 1975, as revised in 2000 (5). All patients provided written informed consent to enrolment in the study and to the inclusion in this article of information that could potentially lead to their identification.

Human and animal studies The study was conducted in accordance with all institutional and national guidelines for the care and use of laboratory animals.

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