

Factors Associated with the Occurrence and Healing of Umbilical Pilonidal Sinus: A Rare Clinical Entity

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ABSTRACT

Objective: Pilonidal sinus disease (PSD) is a chronic inflammatory condition of skin that is thought to be related to implanted loose hair. Although PSD is most frequently seen in the sacrococcygeal region, it can also occur at the axilla, perineum, suprapubic regions, hands, and umbilicus. The aim of this project was to find factors influencing the development and treatment of umbilical PSD.

Methods: In this retrospective study, the authors evaluated 82 patients (19 women, 63 men) with a history of umbilical PSD between 2012 and 2020 to determine predisposing factors and treatment modalities.

Results: There was a 20% concordance with intergluteal PSD. Smoking was the only modifying factor for recurrence. The three different treatment methods studied (conservative treatment, surgical treatment, silver nitrate) did not differ in recurrence rate ($P = .57$).

Conclusions: Because of its rare nature, umbilical PSD can be misdiagnosed or underdiagnosed. Key aspects of treatment include smoking cessation and a conservative approach.

Keywords: conservative, pilonidal sinus, silver, smoking, surgical, treatment, umbilical

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INTRODUCTION

Pilonidal sinus disease (PSD) is a chronic, but intermittently symptomatic, disorder that is characterized by granulomatous inflammation due to implanted loose hair. Because of its intermittent nature, PSD has a significant social impact on patients. The pathophysiology of PSD is not fully understood, but current theories focus on the gluteal cleft facilitating an accumulation of loose hair, possibly driven by negative pressure on the cleft sides. Negative pressure occurs during body movements and leads to hair penetration into the skin. After penetration of hair through the epidermis, a foreign body reaction occurs in the form of granulation tissue. Although PSD primarily affects the sacrococcygeal region, it can also occur at the axilla, perineum, penile shaft, or umbilicus. Umbilical pilonidal sinus (UPS) constitutes approximately 0.6% of cases, making it the most common site of extrasacrococcygeal PSD.³ In this cross-sectional study, the authors examined factors influencing the development of UPS, its treatment options, and results.

METHODS

In this retrospective study, participants were patients admitted to Erzincan Binali Yildirim University Medical Faculty to the General Surgery Outpatient Clinic between March 2012 and December 2020 with umbilical symptoms such as discharge and pain. Inclusion criteria were patients with UPS diagnosed by physical examination (Figure 1) and confirmed with ultrasonography (Figure 2A, 2B). Patients with diseases other than UPS were excluded from the study. Examined patients' characteristics included age, sex, intergluteal sinus disease history, family history, belly shaving history, daily shower, treatment modality, and healing status. Three treatment modalities were examined: a conservative approach (daily shower, shaving, and antibiotics if infected); topical silver nitrate treatment; and surgery, which included extracting the hairs from the sinus and excising it (Figure 3). To determine if the sinus "closed," the authors followed up with the patients, ensuring they experienced no symptoms for a minimum of 2 years.⁴ The institutional review board of Erzincan Binali Yildirim

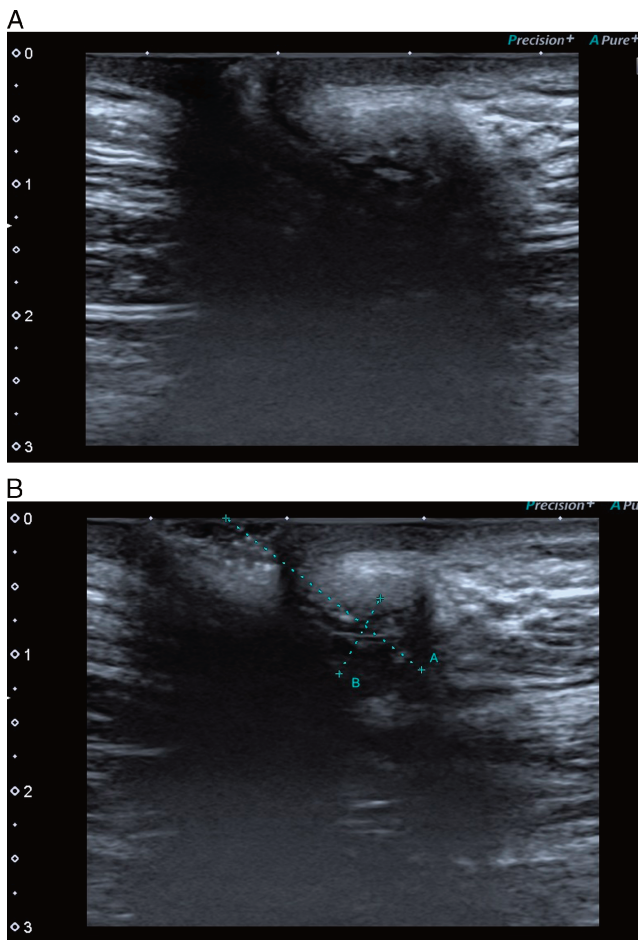
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Figure 1. PHOTO OF UMBILICAL PILONIDAL SINUS



University approved this study (B.30.2 ATA.0.01.00/22). Patients provided consent to participate in the study and for their photographs to be published.

Figure 2. ULTRASONOGRAPHY OF UMBILICAL PILONIDAL SINUS



Statistical Analysis

The researchers used χ^2 tests to compare the distribution of categorical variables. Age was analyzed as a continuous variable with a *t* test. Univariable and multivariable logistic regression models were used to calculate odds ratios (ORs) and 95% confidence intervals. *P* < .05 was considered statistically significant. Statistical analyses were conducted with R version 3.6.1 (R Foundation for Statistical Computing, Vienna, Austria; <https://www.r-project.org>) software packages.

RESULTS

A total of 82 patients were treated for umbilical PSD (63 men, 19 women). They ranged between 16 and 43 years of age (median, 23.6 years). All patients complained of umbilical pain as the presenting symptom. As detailed in Table 1, common factors included extensive body hair growth (60%), infrequent daily bathing (65.9%), family history in first-degree relatives (32.2%), smoking (48.9%), and abdominal shaving (62.5%).

The authors also compared the treatments patients received and assessed their outcomes. Of the participants, 52 took medication (63.4%), 25 had surgical interventions (30.5%), and 5 received silver nitrate treatment (6.1%). The authors noted that 20.7% of patients with UPS had an intergluteal pilonidal sinus. With the exception of smoking,

Figure 3. UMBILICAL PILONIDAL SINUS SURGERY



Table 1. PILONIDAL SINUS (PS) DISEASE RISK FACTORS

Risk Factor	Present, n (%)	Absent, n (%)	
Daily shower	28 (34.14)	54 (65.85)	
Intergluteal PS	17 (20.7)	65 (79.2)	
Family history	19 (32.2)	40 (32.2)	
Smoking	32 (48.49)	34 (51.51)	
Belly shaving	24 (37.5)	40 (62.5)	
Umbilical PS closed	54 (85.7)	9 (14.3)	
Body hair status	Limited	Normal	Extensive
	17 (26.15%)	9 (13.85%)	39 (60%)

**Table 2. COMPARISON OF FACTORS FOR HEALING**

Variable	Healed		P
	No (n = 9), n (%)	Yes (n = 54), n (%)	
Age, mean ± SD, y	24.6 ± 8.4	23.4 ± 5.8	.70
Sex			1.00
Male	7 (14)	42 (86)	
Female	2 (14)	12 (86)	
Treatment modality			.57
Operation	4 (20)	16 (80)	
Medical	5 (12)	35 (88)	
Silver nitrate	0 (0)	3 (100)	
Operation			.37
Yes	4 (20)	16 (80)	
No	5 (12)	38 (88)	
Smoking			.007
Yes	8 (27)	22 (73)	
No	1 (3)	32 (97)	
Shaving			.24
Yes	5 (21)	19 (79)	
No	4 (10)	35 (90)	
Hair			.21
Limited	2 (12)	14 (88)	
Normal	3 (33)	6 (67)	
Extensive	4 (11)	34 (89)	
Intergluteal PS			.78
Yes	1 (9)	10 (91)	
No	8 (16)	44 (84)	
Shower			.12
Yes	5 (24)	16 (76)	
No	4 (10)	38 (90)	
Family history			.79
Yes	2 (12)	14 (88)	
No	7 (15)	39 (85)	

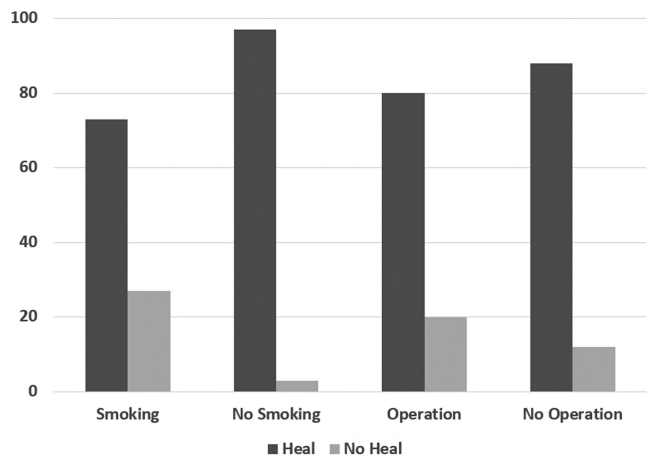
Abbreviation: PS, pilonidal sinus.

no other examined factors were significantly associated with healing (Table 2).

The authors created a multivariable logistic regression model based on factors reported to influence the healing process and variables that were suggestive in their categorical analysis ($P < .40$). The significant negative effect of smoking on healing was still evident: smoking reduced the odds of healing 96% (OR, 0.04; Table 3). The model also suggested

Table 3. MULTIVARIABLE LOGISTIC REGRESSION MODEL EXAMINING THE FACTORS THAT INFLUENCE HEALING

Variable	Odds Ratio	95% Confidence Interval	P
Smoking	0.04	0.002–0.36	.01
Operation	0.15	0.02–0.99	.05
Limited hair growth	1.43	0.25–14.95	.73
Shower	0.31	0.05–1.78	.19
Abdominal shaving	0.43	0.07–2.44	.33

Figure 4. HEALING FREQUENCIES BASED ON SMOKING AND OPERATION STATUS

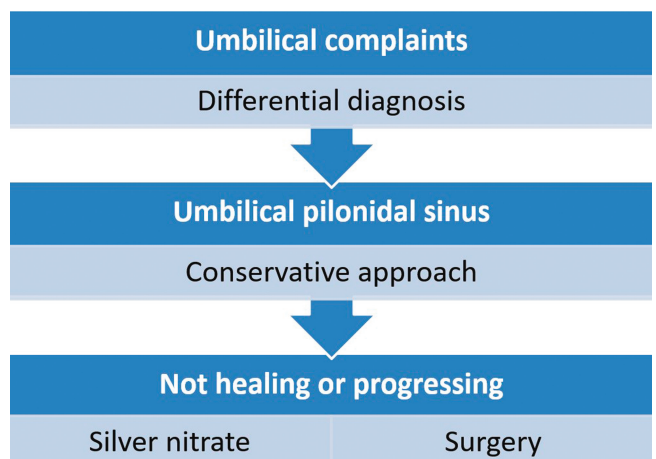
that having surgery reduced the odds of healing 85% after accounting for all other factors (OR, 0.15; Table 3, Figure 4).

DISCUSSION

Approximately 80% of patients with UPS in this study were 15 to 40 years old, and 20% had coexisting sacrococcygeal PSD. The ratio of men to women was 3:1, but this sex difference was not correlated with healing or relapse rates. Nearly one-third of the patients had a family history of UPS. Pilonidal sinus disease most often presents as a sacrococcygeal, chronic, and recurrent inflammatory disorder due to hair shafts penetrating the epidermis.⁵ It is believed to be acquired rather than congenital, based in part on observation of occupational exposure increasing incidence (eg, barbers' hands).⁶ Of pilonidal sinuses, UPS constitutes a small portion (0.6%).⁷ Umbilical sinus can be discovered by various signs and symptoms, such as pain, discharge, and inflammation.

Figure 5. ALGORITHM OF TREATMENT

For the differential diagnosis (eczema, dermatitis, erythema, etc), physical examination and, in difficult cases, ultrasonography are needed. A conservative approach may include shaving, smoking cessation, better hygiene, etc.



In this study, most patients described pain and discharge over the periumbilical area, as well as bleeding.

The higher incidence of UPS in young men might be due to body hair growth, which peaks after puberty. Because the umbilicus is a cleft, it is a natural site for hair insertion. Moreover, softness, maceration, erosions, and spacious pores make the skin of the umbilicus susceptible to hair piercing. The presence of moisture, decreased skin integrity, and edema further promote the piercing of new hair shafts and creating sinus tracts. From a pathophysiologic perspective, hairs shed from the chest and abdomen are pulled down into the deep navel. Hairs caught in the umbilicus possibly get hooked and perforate the umbilical recess, which then induces a foreign body inflammatory response. If local infection is added, it will produce an acute abscess.⁹ The infection is generally polymicrobial, and broad-spectrum antibiotics (ie, omidazole 500 mg and sultamicillin 750 mg twice per day orally) could be used for 10 to 15 days simultaneously with wound dressings until the infection abates.

Because of its greater incidence in men, UPS is considered to be a male-dominant disease.¹⁰ Being hirsute is presumably the most important predisposing factor for UPS—more than two-thirds of the patients in this study had extensive body hair.¹¹ Limited personal hygiene was also noticed in most patients. Importantly, 20% of the UPS patients also had an intergluteal pilonidal sinus. Overall, 14% of patients experienced a relapse of UPS following three different treatment methods: surgical operation, silver nitrate application, and conservative treatment. An initial examination did not show any difference in healing capacity between these treatment modalities. However, a multivariate model accounting for risk factors indicated that both smoking and undergoing surgery had negative effects on healing. Perhaps patients who had surgery for UPS had more complicated cases, leading to a longer healing period and less-successful treatment compared with the patients treated medically.

Kaplan et al⁴ studied 84 patients with UPS. They found that partial umbilectomy had more advantages over conservative treatment. However, the relapse rate for surgery was high, and reinterventions were needed for surgery in the short term. A conservative approach has a lower cost in comparison with surgery. Because UPS is believed to be associated with people in low-income and lower sociocultural communities, conservative treatment could be advantageous for those patients who cannot afford the cost of surgical treatment. Failed conservative management is an indication for surgery (Figure 5).

In addition, UPS may be more common than previously believed but misdiagnosed or undertreated. It is a known disease of hirsute young men with a deep umbilical recess and obesity combined with poor personal hygiene and immoderate sweating. Consequently, both general and systemic examination should be performed to identify the site of discharge; radiologic examinations, such as ultrasonography, may be required to exclude other diseases.⁴ As a matter of differential diagnosis, lesions secondary to trauma, urachal anomalies, granulomas,

folliculitis, tumors, endometriosis, and omphalomesenteric duct remnants should be kept in mind. Umbilical sinus can be diagnosed clinically, but if suspected, ultrasound should be used.¹² Because of the difficulties in making a precise diagnosis, some patients may be treated with extreme surgical operations, including total umbilectomy and diagnostic laparoscopy. Total umbilectomy is not recommended: solely the deeper third of umbilical recess, including the sinus tracts and infected tissues, should be excised with the aim of protecting the general appearance of the umbilicus. Externally, the umbilicus is a component of aesthetic appearance for most people and a standard entrance point for laparoscopic operations, so it is reasonable for surgeons to try a conservative approach first. Surgeons' fear of a poor aesthetic outcome after surgery due to large excisions can be eliminated with the umbilicus-protecting surgical technique described by Kaplan et al.¹³ The authors believe that the outcomes of this study will become more critical over time.¹³⁻¹⁵

Limitations

This was a single-center study with a limited number of patients and time to healing. If participants were followed up for a greater duration of time, a greater percentage of patients may have been cured.

CONCLUSIONS

Because of its rarity, UPS is easily misdiagnosed and mistreated. Intergluteal pilonidal sinus concordance is high with UPS, so umbilicus examination is needed for patients with intergluteal pilonidal disease. Diagnosis is easy to establish with physical examination and a detailed history, and UPS should be kept in mind when encountering patients with umbilical complaints. A larger, multicenter study with a longer follow-up duration would reveal more accurate information for this rare disease. ●

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