

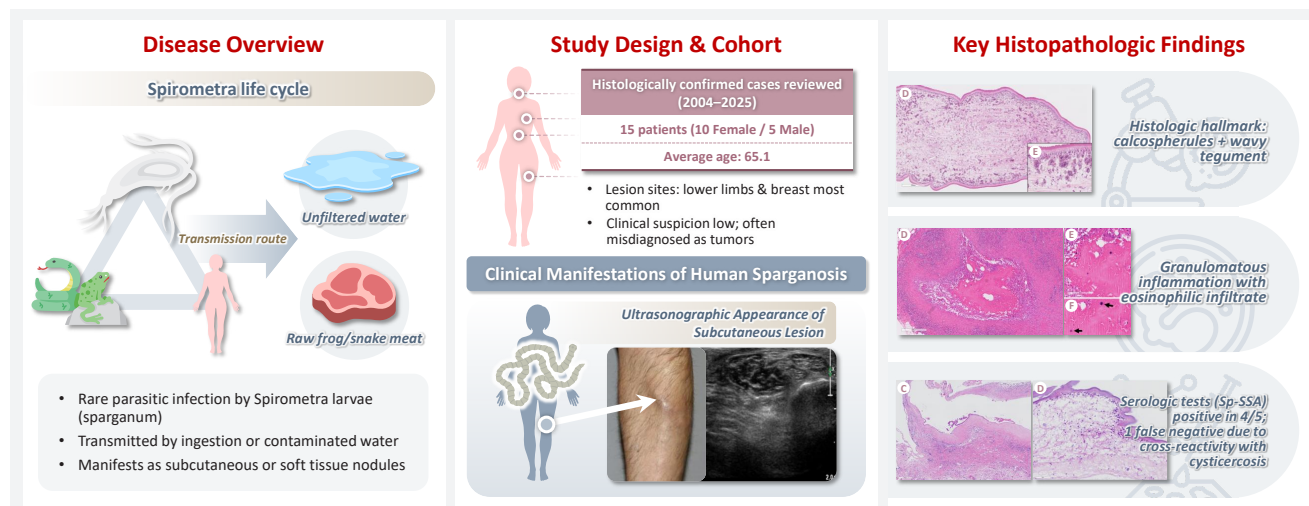
# Revisiting human sparganosis: a pathologic review from a single institution

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## Graphical abstract



### CONCLUSION

This study underscores the importance of recognizing the characteristic histopathological features of sparganosis, which can allow for accurate diagnosis even in the absence of clinical suspicion. Although rare, sparganosis remains a relevant diagnostic consideration in endemic regions, particularly in East Asia.

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**Background:** Sparganosis is a rare parasitic infection caused by *Spirometra* species. Although it was relatively common in the past, it is now often overlooked. In this study, we review cases diagnosed through histopathological examination at a single institution in recent years to raise awareness of this neglected parasitic disease. **Methods:** We retrospectively analyzed cases of human sparganosis identified in the pathology archives of a single institution in South Korea between 2004 and 2025. A comprehensive review was conducted, including demographic data, clinical features, lesion locations, imaging findings, exposure history (such as dietary habits), and histopathologic findings. **Results:** A total of 15 patients were identified, including 10 females and 5 males, with a mean age of 65.1 years. Lesions were most commonly located in the lower extremities and breast. Imaging findings were largely nonspecific, with ultrasonography being the most frequently used modality. In most cases, clinical suspicion of sparganosis was absent, and excision was performed under the impression of a benign or malignant tumor. Histologically, variably degenerated parasitic structures were identified within granulomatous inflammation. However, preserved features such as calcospherules and tegumental structures facilitated definitive diagnosis. **Conclusions:** This study underscores the importance of recognizing the characteristic histopathological features of sparganosis, which can allow for accurate diagnosis even in the absence of clinical suspicion. Although rare, sparganosis remains a relevant diagnostic consideration in endemic regions, particularly in East Asia.

**Keywords:** Sparganosis; Infection; Parasite diseases

## INTRODUCTION

Sparganosis is a rare parasitic infection in humans caused by the plerocercoid larvae (spargana) of *Spirometra* species, a genus of pseudophyllidean tapeworms [1]. Human infection typically occurs accidentally through the consumption of raw or undercooked amphibians or reptiles, or via drinking water contaminated with procercoid-infected copepods [1]. The life cycle of *Spirometra* involves multiple hosts, with humans serving as secondary or paratenic hosts.

Clinically, sparganosis most commonly presents as a slowly migrating subcutaneous nodule, which may be asymptomatic

or mildly tender [2]. Depending on the site of invasion, spargana can involve the orbit, central nervous system, genitourinary tract, or visceral organs, sometimes resulting in significant symptoms. Radiologic studies may provide clues such as calcifications, tubular structures, or peritubular changes; however, these findings are usually nonspecific and rarely diagnostic [3-6]. Consequently, diagnosis is often made histopathologically following surgical excision, frequently in the absence of prior clinical suspicion. This makes diagnosis especially challenging for pathologists unfamiliar with its characteristic features.

Although rare globally, sparganosis is reported more frequently in East and Southeast Asia, particularly in Korea, Chi-

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na, Japan, and Thailand. In Korea, over 400 cases have been reported in the literature [7-13], although incidence has declined in recent years, likely due to improvements in public health and hygiene. Nevertheless, sporadic cases continue to be encountered.

Most literature consists of case reports or studies of uncommon anatomical involvement, while comprehensive analyses within defined populations remain limited. In this study, we present a case series of 15 histologically confirmed cases of human sparganosis diagnosed at a single institution in Korea over a 21-year period. This study aims to provide practical diagnostic insights for pathologists and to raise awareness of this neglected parasitic infection.

## MATERIALS AND METHODS

A total of 15 cases of human sparganosis diagnosed at Seoul Metropolitan Government-Seoul National University Boramae Medical Center between 2004 and 2025 were included in this study. Two cases previously published as a case report [10] were also included to provide a comprehensive institutional review. Clinical data, imaging findings, exposure history (drinking of unfiltered water or ingestion of raw frog/snakes), and histopathological features were retrospectively reviewed.

## RESULTS

### Clinical and demographic features

Table 1 summarizes the clinical and histopathologic characteristics of the 15 patients. The cohort comprised 10 women and 5 men, with a mean age of 65.1 years (range, 46 to 83 years). All patients were Korean nationals except for one Chinese individual. Only two patients (13.3%) reported a history of consuming raw snake or frog meat. The remaining patients denied known exposures and were unable to recall any relevant risk factors. Serological testing for sparganum-specific antibody was performed in five patients, of whom four showed positive results (Table 1). In one spinal cord case, however, the sparganum enzyme-linked immunosorbent assay (ELISA) was negative while the cysticercosis antibody was slightly elevated, although histopathology confirmed sparganosis.

### Anatomic distribution and imaging characteristics

Lesions were located predominantly in the subcutaneous tissue, most frequently in the lower extremities (n = 6) and breast (n = 4), followed by the trunk (n = 2), neck (n = 1), and pubic region (n = 1). One case involved the spinal canal, and none involved visceral organs. In most cases, sparganosis was not clinically suspected; lesions were often interpreted as benign tu-

**Table 1.** Summary of clinical profile of patients with sparganosis

No.	Sex	Age (yr)	Nation	Location	Imaging	Recurrences	Sp-SSA	Hx	CC	Clinical diagnosis
1	M	64	Korean	Lower leg	US	Yes	Pos	Yes	Migrating mass	Infection
2	F	58	Korean	Lower leg	US	No	N/A	Yes	Fluctuant mass	Infection
3	F	74	Korean	Trunk	N/A	No	N/A	No	Mass with heating sense	Unknown
4	F	53	Chinese	Neck, SC	US, CT	No	Pos	No	Mass	M. lymphoma
5	F	76	Korean	Lower leg	US, MRI	No	Pos	No	Tender mass	Phlebitis
6	M	79	Korean	Spinal cord	MRI	No	Neg <sup>a</sup>	No	Leg numbness	Neurogenic tumor
7 <sup>b</sup>	F	46	Korean	Breast	US, MMG	No	N/A	No	N/A	Fat necrosis
8 <sup>b</sup>	F	69	Korean	Breast	US, MMG	No	N/A	No	N/A	Infection
9	M	52	Korean	Trunk	US	No	N/A	No	N/A	Unknown
10	F	57	Korean	Lower leg	N/A	No	N/A	No	Palpable mass	Inflammatory nodule
11	F	60	Korean	Breast	US, MMG	No	N/A	No	Mass	Inflammatory nodule
12	F	70	Korean	Breast	US, MMG	No	N/A	No	Mass	Benign tumor
13	M	62	Korean	Pubic, SC	CT	No	N/A	No	Mass	Benign tumor
14	M	73	Korean	Lower leg	US, MRI	No	N/A	No	Mass	M. lymphoma
15	F	83	Korean	Lower leg	US	Yes	Pos	No	Multiple mass	Infection

Nation, Nationality; Sp-SSA, sparganosis serum specific antibody; Hx, history of drinking unfiltered water or ingestion of raw frog/snakes; CC, chief complaint; US, ultrasonography; Pos, positive; N/A, not assessed; CT, computed tomography; M. lymphoma, malignant lymphoma; MRI, magnetic resonance imaging; Neg, negative; MMG, mammography; SC, subcutis.

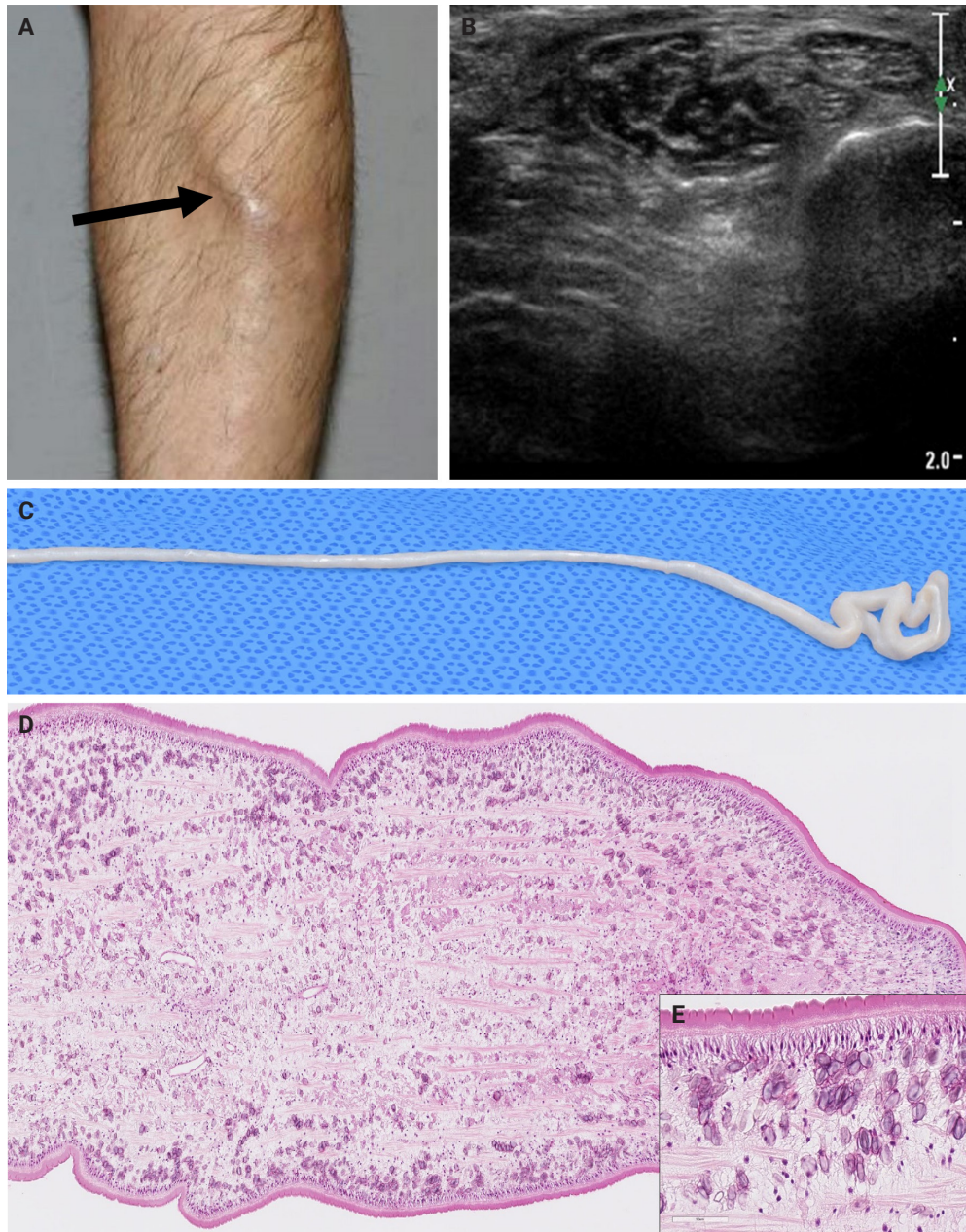
<sup>a</sup>Sparganum enzyme-linked immunosorbent assay was negative but cysticercosis antibody was slightly elevated, while histopathology confirmed sparganosis; <sup>b</sup>Cases previously reported [10].

mors, lymphadenopathy, or mesenchymal neoplasms. Ultrasonography was the most commonly used imaging modality, typically revealing nonspecific hypoechoic or tubular structures.

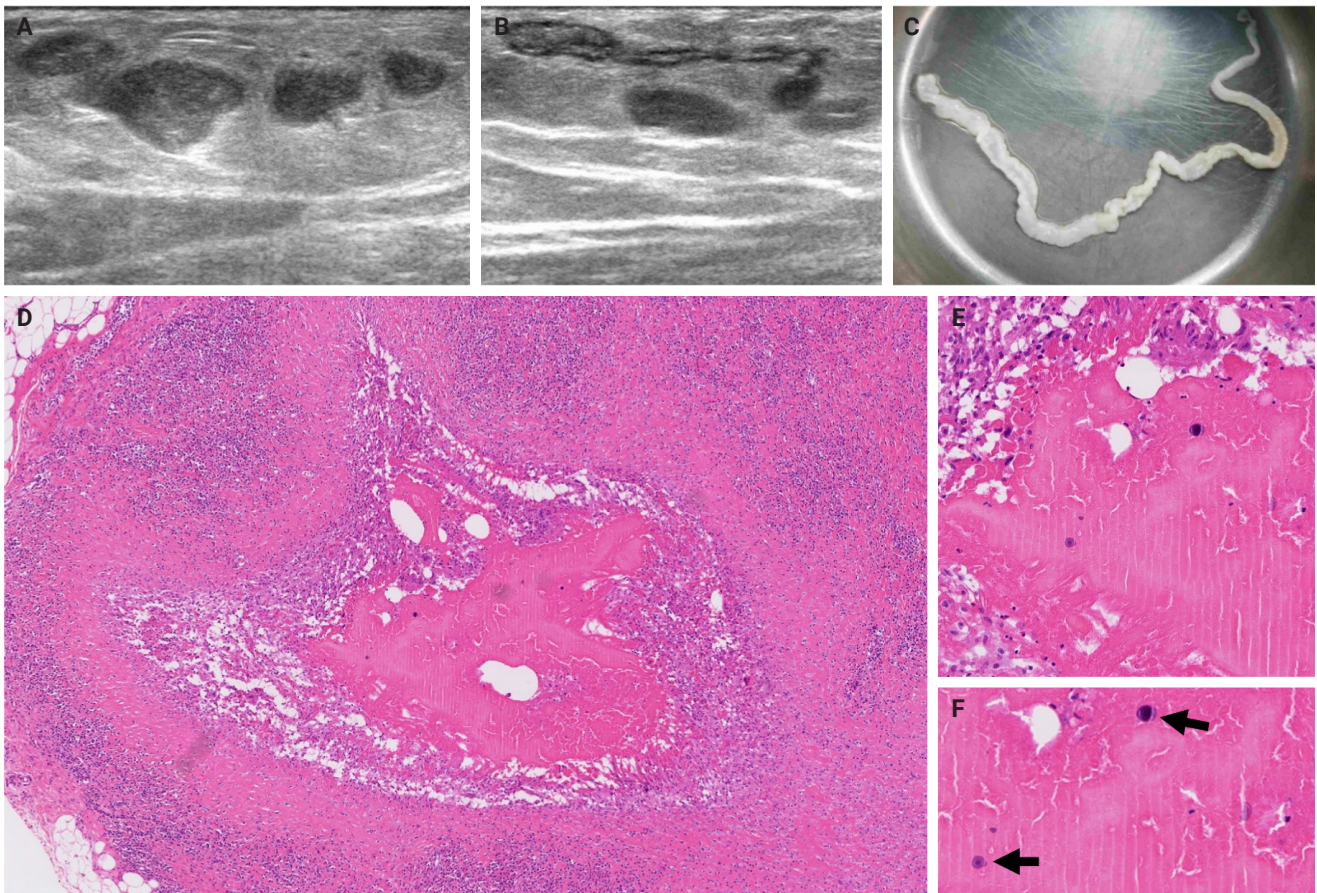
**Summary of clinicopathologic findings in representative cases**

The patients exhibited diverse clinical manifestations, often lead-

ing to diagnostic confusion. In cases 1 and 2, soft tissue masses yielded intact or live spargana during surgical excision (Figs. 1, 2). Case 1 involved a 64-year-old male with a crawling sensation in both legs and a history of consuming raw snake and frog meat. In case 2, a 58-year-old female had a long-standing thigh mass since childhood, with no known exposure history. Case 3 presented with multiple subcutaneous nodules mimicking benign cysts.



**Fig. 1.** Case 1. (A) Subcutaneous nodule (arrow). (B) Ultrasonography showing a well-defined serpentine hypoechoic lesion. (C) Gross specimen of an elongated whitish plerocercoid worm. (D, E) Histopathological sections showing a thick eosinophilic tegument, muscle fibers, and calcareous corpuscles.



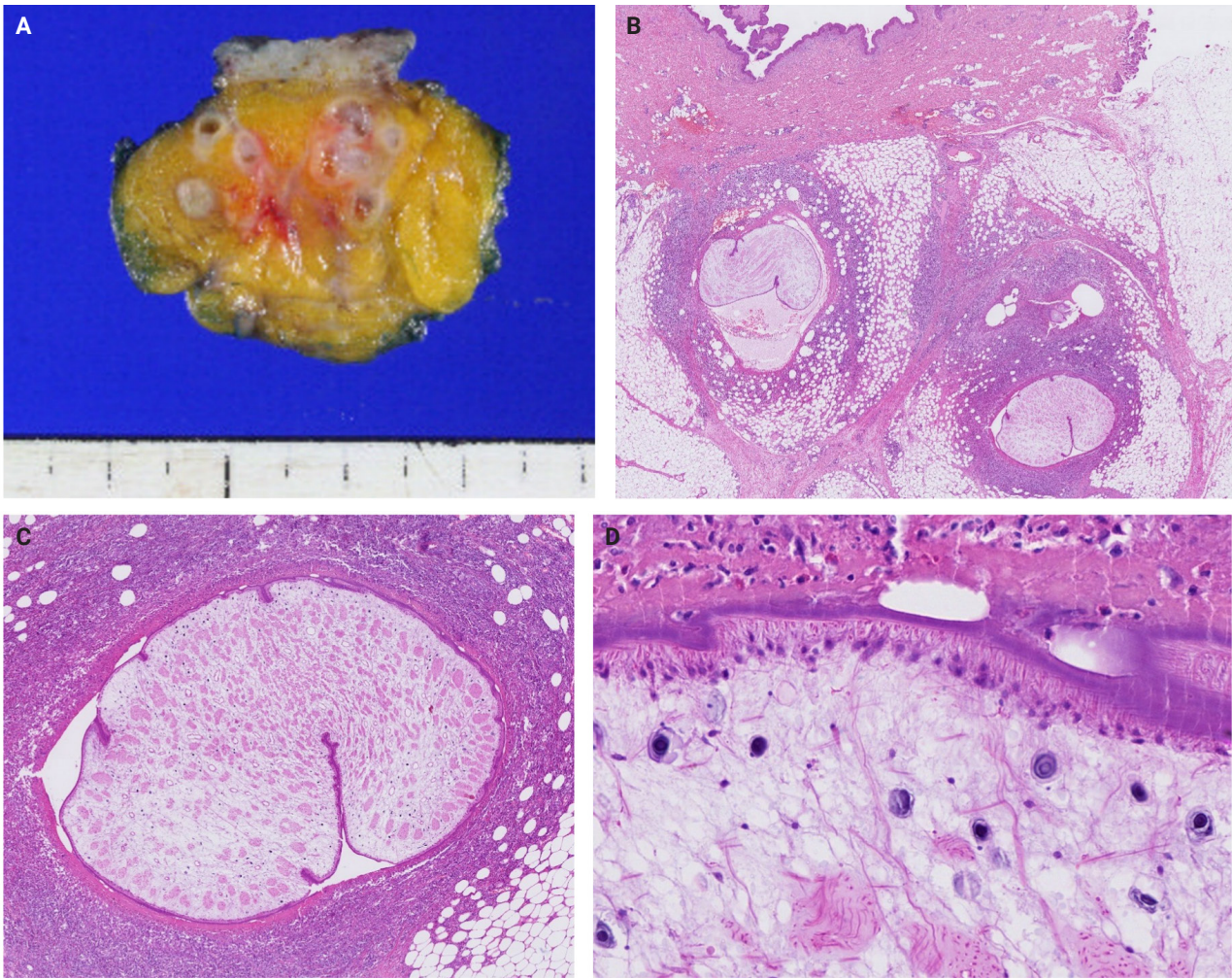
**Fig. 2.** Case 2. (A, B) Ultrasonography showing elongated structures with perilesional subcutaneous inflammation in the right inner thigh. (C) Gross specimen of an ivory-colored tapeworm, 20 cm in length. (D–F) Fibrotic tissue and granulomatous inflammation surrounding parasitic fragments, with recognizable calcareous corpuscles (arrows, far lower right).

Histologic examination revealed several larval structures embedded in the subcutaneous tissue, surrounded by eosinophilic and giant cell-rich inflammation (Fig. 3). Case 4 involved a neck mass initially suspected to be malignant lymphoma or metastatic carcinoma. Surgical excision revealed necrotic larval fragments with granulomatous inflammation (Fig. 4). Case 5 showed an erythematous, tender, S-shaped linear lesion on the thigh, clinically resembling phlebitis; histology demonstrated a necrotic worm in the dermis with microcalcifications and chronic inflammation (Fig. 5). In case 6, a spinal lesion caused neurologic symptoms and was radiologically interpreted as a nerve sheath tumor. Surgical resection revealed calcified parasite remnants within a yellowish translucent cystic mass (Fig. 6).

## DISCUSSION

Despite improvements in hygiene and public health, sporadic

cases of sparganosis continue to occur. Pathologists should maintain a high index of suspicion for sparganosis in patients presenting with subcutaneous masses, even in the absence of a relevant exposure history. In our series, most patients were elderly women, and only two reported a history of consuming raw amphibians or reptiles; none had occupations associated with zoonotic exposure. These observations raise the possibility of an alternative, previously unrecognized route of infection, warranting further investigation. Potential routes could include consumption of undercooked fish or untreated drinking water and, although less probable, exposure to companion animals. While domestic dogs and cats are definitive hosts and do not typically transmit spargana to humans, prior studies from Iran, China, and Vietnam have reported *Spirometra* larvae in up to 40% of domestic animals [14–16]. Further population-based studies are needed to clarify the roles of sex, tissue characteristics, and environmental exposures in sparganosis epidemiology.



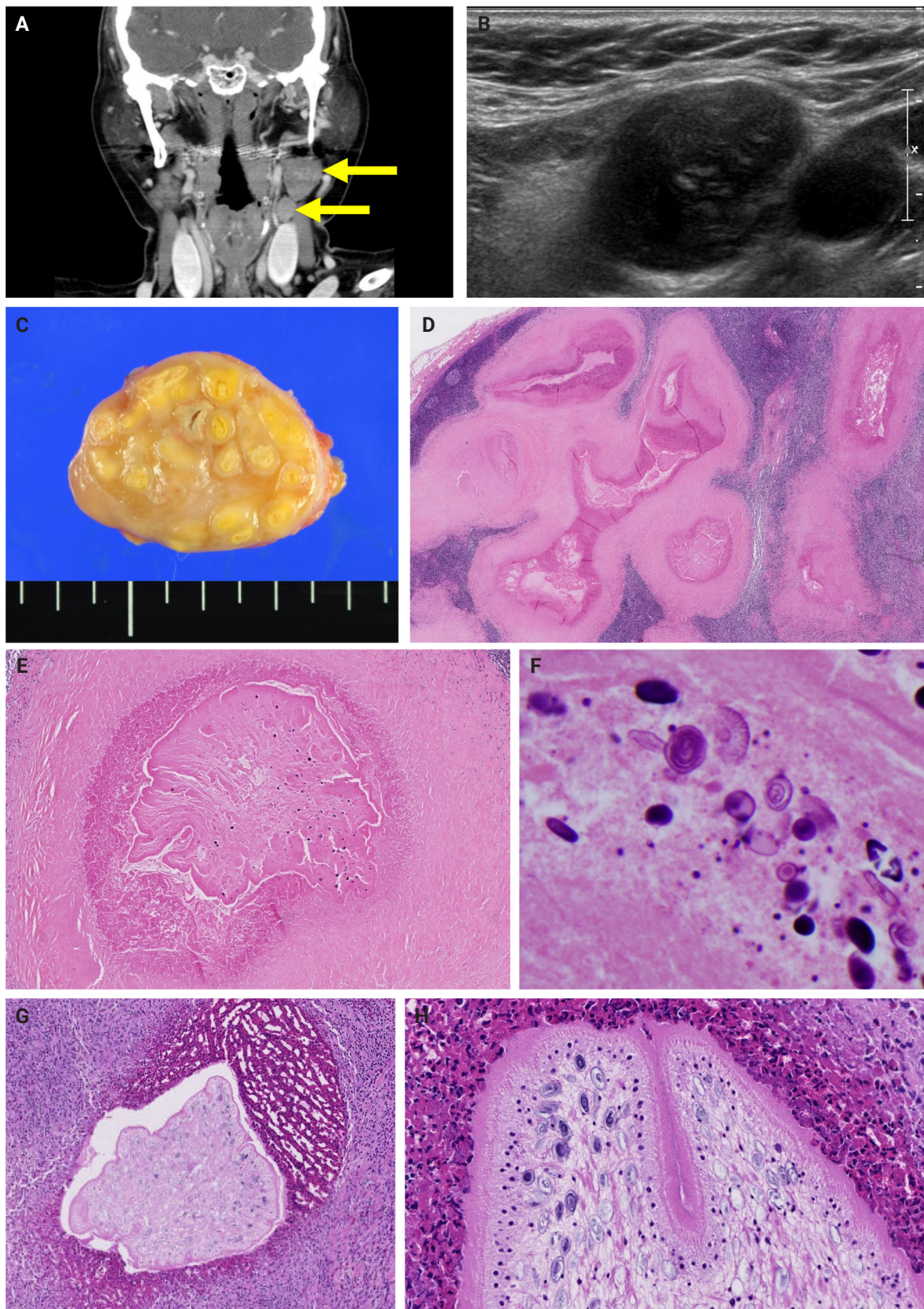
**Fig. 3.** Case 3. (A) Multiple small circular cavities in the subcutaneous tissue. (B) Larval structures surrounded by dense inflammatory cells. (C, D) Cross-sectioned spargana, readily discernible.

Viable parasites were associated with symptoms such as a crawling sensation or localized warmth. Most diagnoses relied on remnants of the parasite, including calcareous corpuscles or tegumental fragments, rather than intact worms. When residing in human tissues, particularly confined subcutaneous spaces, spargana can cause necrotizing lesions of irregular shape, granulomas, and fibrosis due to tissue damage from parasite movement. Irregular or radiating borders of granulomatous inflammation and abundant eosinophilic infiltration are commonly observed in sparganosis and other forms of cutaneous larva migrans (CLM). However, sparganum larvae display highly characteristic features—including internal calcospherules and an undulating wavy tegument—which are absent in CLM.

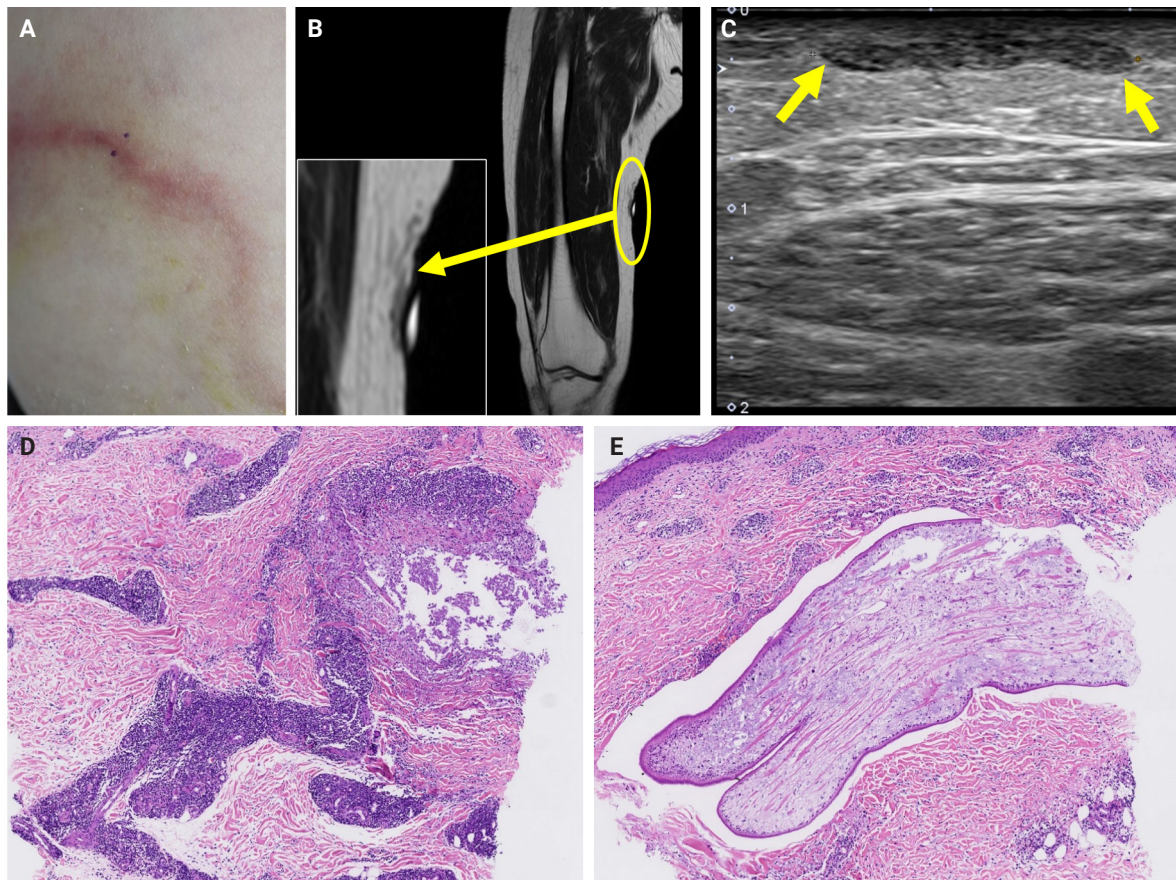
Spargana may survive for extended periods, especially in immune-privileged sites such as the brain and eyes [17-20],

possibly due to reduced immune surveillance. Experimental studies have demonstrated similar patterns, including variable preservation of parasite structures, granuloma formation, and chronic inflammation [21]. These findings correlate with our human cases, particularly those in which parasites had degenerated significantly.

In our series, serological testing was performed in a few patients. Interestingly, in one case of spinal cord sparganosis, sparganum-specific ELISA yielded a negative result, whereas the cysticercosis antibody level was slightly elevated. Despite this discrepancy, histopathological examination confirmed sparganosis. This case highlights the potential cross-reactivity of ELISA with cysticercosis and underscores the limited reliability of serological testing in isolation. Therefore, serological results should be interpreted with caution, particularly in endemic ar-



**Fig. 4.** Case 4. (A) Computed tomography and (B) ultrasonography showing multiple homogeneously enhancing cervical lymph nodes (arrows; enlarged cervical nodes), suspicious for malignant lymphoma or metastasis. (C) Gross specimen with multiple yellowish cystic cavities. (D–H) Necrotic nodules containing degenerated worms with scalloped cuticles and cladophores.



**Fig. 5.** Case 5. (A) Clinical photograph showing an S-shaped erythematous linear lesion on the inner thigh. (B) Magnetic resonance image showing a low-signal intensity lesion with peripheral enhancement (arrow indicates the lesion). (C) Ultrasonography showing a 2-cm tubular lesion in the subcutis (arrows indicate the lesion). (D) Granulomatous inflammation with a focal necrotic center. (E) Parasite embedded within the cyst.

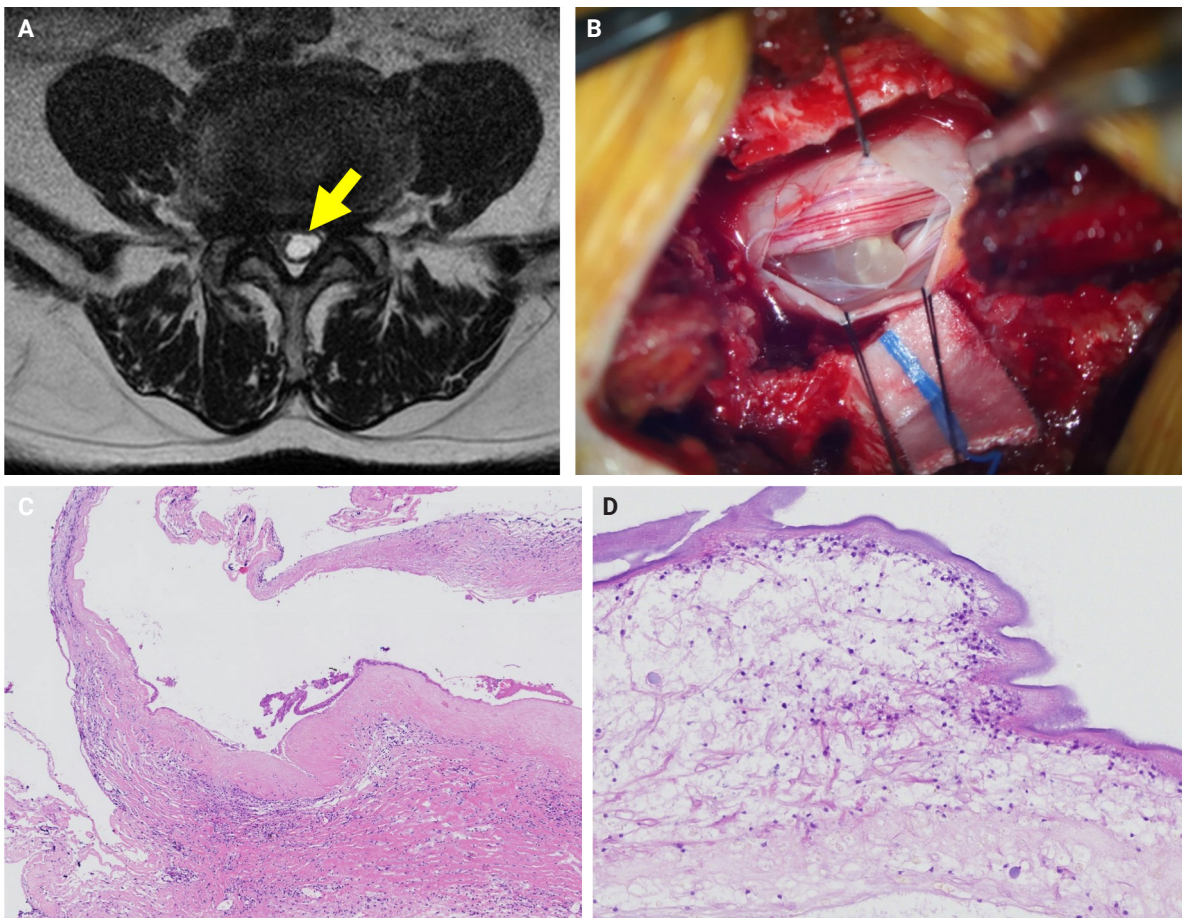
eas for both sparganosis and cysticercosis, and histopathology remains the gold standard for definitive diagnosis.

Imaging findings vary by site and stage of infection. Early lesions or live worms may appear as mobile tubular structures, whereas older lesions often show nonspecific low-density areas, calcifications, fibrosis, or cystic changes. Such lesions may be misdiagnosed as complicated epidermal cysts, organized abscesses, or post-traumatic pseudocysts. In our series, one patient with a lateral neck mass (case 3) was initially suspected to have metastatic lymph node involvement. The most significant histopathologic diagnostic pitfall is likely confusion with a tuberculous lesion due to an acellular necrotic center surrounded by granulomatous reaction. Histopathological distinction between sparganosis and cysticercosis may also pose challenges, especially when specimens are old, fragmented, or degenerated. In such circumstances, the absence of a bladder and fibril-

lary stroma and the presence of longitudinal smooth muscle bundles and calcareous corpuscles are helpful features favoring sparganosis. Careful recognition of these features is essential to avoid misdiagnosis, particularly in small biopsy samples.

Subcutaneous sparganosis should be distinguished from other conditions presenting with nodular lesions, including Kimura disease. Both entities may appear as slowly enlarging, painless subcutaneous nodules with marked tissue eosinophilia and reactive fibrosis. However, the absence of characteristic histopathologic features of Kimura disease—such as lymphoid follicular hyperplasia, eosinophilic microabscesses, and florid vascular proliferation—together with the presence of larval remnants embedded in granulomatous lesions, are key clues to sparganosis. Awareness of this differential diagnosis is essential for accurate evaluation of subcutaneous nodules in endemic areas.

Although previous reports have consistently documented a



**Fig. 6.** Case 6. (A) T2-weighted magnetic resonance image showing a 0.9-cm lesion causing central canal compromise (arrow indicates the lesion). (B) Intraoperative photograph of a whitish-yellow cystic mass. (C) Histopathological section showing a cystic lesion filled with necrotic debris, surrounded by dense fibrosis and chronic inflammation. (D) Degenerated parasitic fragments with calcified corpuscles, characteristic of sparganum.

male predominance in sparganosis, our series showed a striking predominance of female patients. This may reflect greater sensitivity in detecting lesions or a higher likelihood of seeking medical attention among women. Additionally, the relatively softer subcutaneous or soft tissue composition in females could provide a more favorable microenvironment for *Spirometra* larvae.

Although sparganosis has become increasingly rare, it remains an important differential diagnosis for subcutaneous masses, particularly in endemic areas. Most cases are diagnosed histopathologically, often without prior clinical suspicion. Recognizing the characteristic histologic features—even in the absence of intact worms—is essential for accurate diagnosis and appropriate patient management.

#### Ethics Statement

This study was approved by the Institutional Review Board (IRB) of BRMH (No.10-2025-41) and the requirement for informed consent was waived.

#### Availability of Data and Material

All data generated or analyzed during the study are included in this published article.

#### Code Availability

Not applicable.

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**Author Contributions**

Conceptualization: JEK. Data curation: JEK, JY, YAK, JHP, HEP, HBS. Investigation: JEK, JY. Project Administration: JEK, JY. Resources: JEK, JY, YAK, JHP, HEP. Writing—original draft preparation: JEK, JY. Writing—review & editing: all authors. Approval of the final manuscript: all authors.

**Conflicts of Interest**

J.H.P., a contributing editor of the *Journal of Pathology and Translational Medicine*, was not involved in the editorial evaluation or decision to publish this article. All remaining authors have declared no conflicts of interest.

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**REFERENCES**

1. Liu Q, Li MW, Wang ZD, Zhao GH, Zhu XQ. Human sparganosis, a neglected food borne zoonosis. *Lancet Infect Dis* 2015; 15: 1226-35.
2. Kim JG, Ahn CS, Sohn WM, Nawa Y, Kong Y. Human sparganosis in Korea. *J Korean Med Sci* 2018; 33: e273.
3. Cho JH, Lee KB, Yong TS, et al. Subcutaneous and musculoskeletal sparganosis: imaging characteristics and pathologic correlation. *Skeletal Radiol* 2000; 29: 402-8.
4. Kim HS, Cha ES, Kim HH, Yoo JY. Spectrum of sonographic findings in superficial breast masses. *J Ultrasound Med* 2005; 24: 663-80.
5. Kim HY, Kang CH, Kim JH, Lee SH, Park SY, Cho SW. Intramuscular and subcutaneous sparganosis: sonographic findings. *J Clin Ultrasound* 2008; 36: 570-2.
6. Choi SJ, Park SH, Kim MJ, Jung M, Ko BH. Sparganosis of the breast and lower extremities: sonographic appearance. *J Clin Ultrasound* 2014; 42: 436-8.
7. Wiwanitkit V. A review of human sparganosis in Thailand. *Int J*

- Infect Dis* 2005; 9: 312-6.
8. Koo M, Kim JH, Kim JS, Lee JE, Nam SJ, Yang JH. Cases and literature review of breast sparganosis. *World J Surg* 2011; 35: 573-9.
9. Anantaphruti MT, Nawa Y, Vanvanitchai Y. Human sparganosis in Thailand: an overview. *Acta Trop* 2011; 118: 171-6.
10. Oh MY, Kim KE, Kim MJ, et al. Breast sparganosis presenting with a painless breast lump: report of two cases. *Korean J Parasitol* 2019; 57: 179-84.
11. Hwang M, Baek HJ, Lee SM. Apparent sparganosis presenting as a palpable neck mass: a case report and review of literature. *Tae-han Yongsang Uihakhoe Chi* 2020; 81: 1210-5.
12. Okino T, Yamasaki H, Yamamoto Y, et al. A case of human breast sparganosis diagnosed as spirometra type I by molecular analysis in Japan. *Parasitol Int* 2021; 84: 102383.
13. Liu W, Gong T, Chen S, et al. Epidemiology, diagnosis, and prevention of sparganosis in Asia. *Animals (Basel)* 2022; 12: 1578.
14. Hong Q, Feng J, Liu H, et al. Prevalence of *Spirometra mansoni* in dogs, cats, and frogs and its medical relevance in Guangzhou, China. *Int J Infect Dis* 2016; 53: 41-5.
15. Beiromvand M, Rafiei A, Razmjou E, Maraghi S. Multiple zoonotic helminth infections in domestic dogs in a rural area of Khuzestan Province in Iran. *BMC Vet Res* 2018; 14: 224.
16. Nguyen YT, Nguyen LA, Van Dong H, Duong HD, Yoshida A. Molecular identification of sparganum of *Spirometra mansoni* isolated from the abdominal cavity of a domestic cat in Vietnam. *J Vet Med Sci* 2024; 86: 96-100.
17. Nobayashi M, Hirabayashi H, Sakaki T, et al. Surgical removal of a live worm by stereotactic targeting in cerebral sparganosis: case report. *Neurol Med Chir (Tokyo)* 2006; 46: 164-7.
18. Yang JW, Lee JH, Kang MS. A case of oular sparganosis in Korea. *Korean J Ophthalmol* 2007; 21: 48-50.
19. Nkwerem S, Goto T, Ogiwara T, Yamamoto Y, Hongo K, Ohaegbulam S. Ultrasound-assisted neuronavigation-guided removal of a live worm in cerebral sparganosis. *World Neurosurg* 2017; 102: 696.
20. Hu J, Liao K, Feng X, et al. Surgical treatment of a patient with live intracranial sparganosis for 17 years. *BMC Infect Dis* 2022; 22: 353.
21. Chang KH, Lee GJ, Han MH, et al. An experimental study on imaging diagnosis of cerebral sparganosis. *J Korean Radiol Soc* 1995; 33: 171-82.