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First pediatric case of spermatic cord fibrolipoma: case report and literature review

Agah Koray Mansiroglu[1*], Abdullah Duman[2] and Seher Deniz[3]

Abstract

Background Benign tumors of the spermatic cord constitute the majority of paratesticular tumors. Fibrolipomas are unusual in adults; however, there are no known cases involving the spermatic cord in children.

Case presentation A male patient, aged 13, arrived at the emergency department complaining of right inguinoscrotal pain and nausea for the past four days. The genital examination of the patient revealed a tender, freely movable mass located in the right scrotum above the testicle. Doppler scrotal ultrasound demonstrated a soft tissue structure measuring 48 × 19 mm with heterogeneity and absence of vascular activity located along the spermatic cord in proximity to the right testicle. Right scrotal tenderness and absence of blood supply on Doppler ultrasound indicated emergency surgical intervention, considering the possibility of torsion in an accessory testicle, more frequently encountered in pediatrics. Surgical exploration of the inguinal region and mass excision were conducted. The pathology report determined a tumor exhibiting collagenized tissues surrounding fatty lobules, indicative of a fibrolipoma.

Conclusions To our knowledge, this pediatric patient represents the first reported case of spermatic cord fibrolipoma. Although benign, fibrolipomas can present with acute scrotal symptoms and mimic more urgent conditions, such as torsion of an accessory testis. The possibility of fibrolipoma, while rare, should be considered in the differential diagnosis of a paratesticular mass to prevent misdiagnosis and potential testicular compromise. Optimal outcomes depend on early detection, accurate imaging, and prompt surgical intervention.

Keywords Fibrolipoma, Paratesticular mass excision, Rare tumors

Introduction

Paratesticular masses most commonly originate from the spermatic cord [1], with lipomas being the most prevalent subtype [2]. Other less common lipomatous tumors include fibrolipoma, angiomyolipoma, spindle cell lipoma, and angiofibrolipoma [3].

These cases are undiagnosable with preoperative radiologic imaging and require diagnostic immunohistochemistry. If radiological imaging is inconclusive, clinicians and radiologists face a diagnostic challenge.

Here, we present the first documented pediatric case of spermatic cord fibrolipoma, highlighting the diagnostic challenges posed by its acute presentation and the importance of histopathologic confirmation to guide appropriate management.

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Case presentation

A 13-year-old male presented to the emergency department with a four-day history of right inguinoscrotal pain and nausea. He had no prior medical history. Genital examination revealed a tender, freely movable mass in the right scrotum, positioned above the testicle, while both testes were fully descended and appeared symmetrical in size and structure (Fig. 1a).

Given the acute presentation, Doppler ultrasonography revealed a 48 × 19 mm heterogeneous soft tissue mass in the spermatic cord adjacent to the right testicle, with no vascular flow (Fig. 2). Tumor markers (β-HCG, AFP, LDH, and CEA) were all within normal limits, reducing suspicion of malignancy.

Due to persistent pain, imaging findings of an avascular mass, and the potential risk of testicular compromise, urgent surgical exploration was deemed necessary. The patient, initially apprehensive about surgery and the potential risk of testicular loss, provided informed consent following a detailed discussion of risks and benefits.

Inguinal exploration identified a 5 × 2 cm solid, white mass within the tunica vaginalis. The mass was excised relatively easily after severing its vascular connections to the pampiniform plexus (Fig. 1b). The testicle was intact, and no additional intervention was required. A right herniotomy and high ligation were performed concurrently.

Postoperatively, the patient was discharged with a structured follow-up plan, including monthly and six-monthly evaluations. Physical examination and ultrasonographic follow-up demonstrated no recurrence. The patient reported no ongoing symptoms during subsequent clinic visits.

Histopathological examination confirmed the diagnosis of fibrolipoma, characterized by collagen-rich stroma enveloping lobules of mature adipose tissue. Macroscopically, the lesion measured 5 × 4 × 2 cm, was partially encapsulated and exhibited a grayish-yellow cut surface. Microscopically, elongated spindle cells were observed within the collagenized stroma, interspersed with mature adipocytes and vascular channels, without evidence of atypia (Fig. 3).

Immunohistochemical analysis demonstrated positive staining with CD34 in some stromal areas and negative staining in others. Positive staining with CD117 was rare in mast cells, while positive staining with CD68 was rarely noted in histiocytes. Positive staining with SMA was observed exclusively in vascular walls, while positive staining with S-100 protein was observed in fatty tissues. Negative staining was observed with β-catenin, PanCK, MelanA, HMB-45, and Desmin (Fig. 4).

Discussion

Overview

Primary paratesticular tumors are detected in 7–10% of patients with intrascrotal neoplasms [2]. Spermatic cord tumors are exceedingly rare [4]. Paratesticular fibrolipoma is exceedingly rare, with very few documented cases in the literature. A comparative synopsis of the paratesticular fibrolipoma cases reported in the literature and the presented case is provided in Table 1.

Differential diagnosis

Although benign, the fibrolipoma can mimic acute conditions requiring immediate intervention, such as torsion of an accessory testis or other scrotal structures, as seen in our case. This resemblance underscores the importance of careful differential diagnosis, timely imaging, and surgical exploration when needed.

Identifying paratesticular fibrolipoma through USG presents challenges. In evaluating an extratesticular, paratesticular mass, several key conditions warrant consideration. It is crucial to exclude incarcerated hernia,

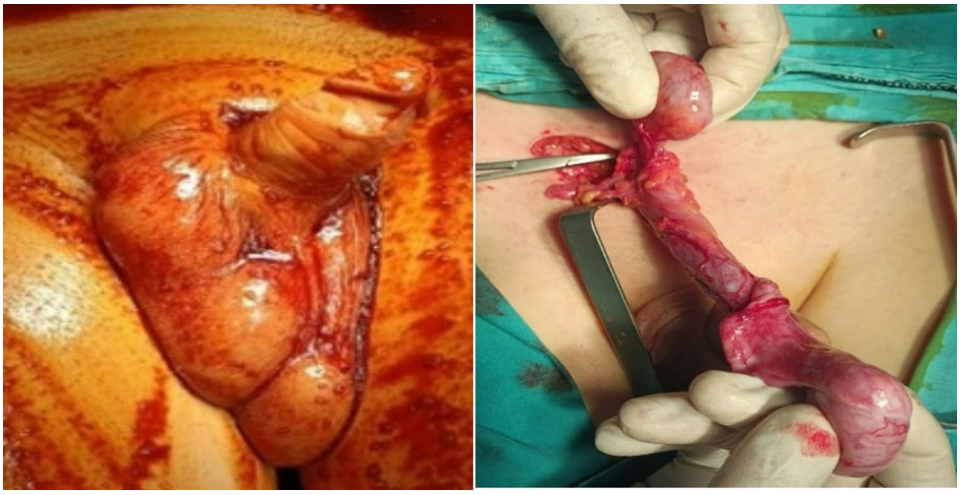

Fig. 1 Photographic images of the case: (**a**) Preoperatively; (**b**) Intraoperatively

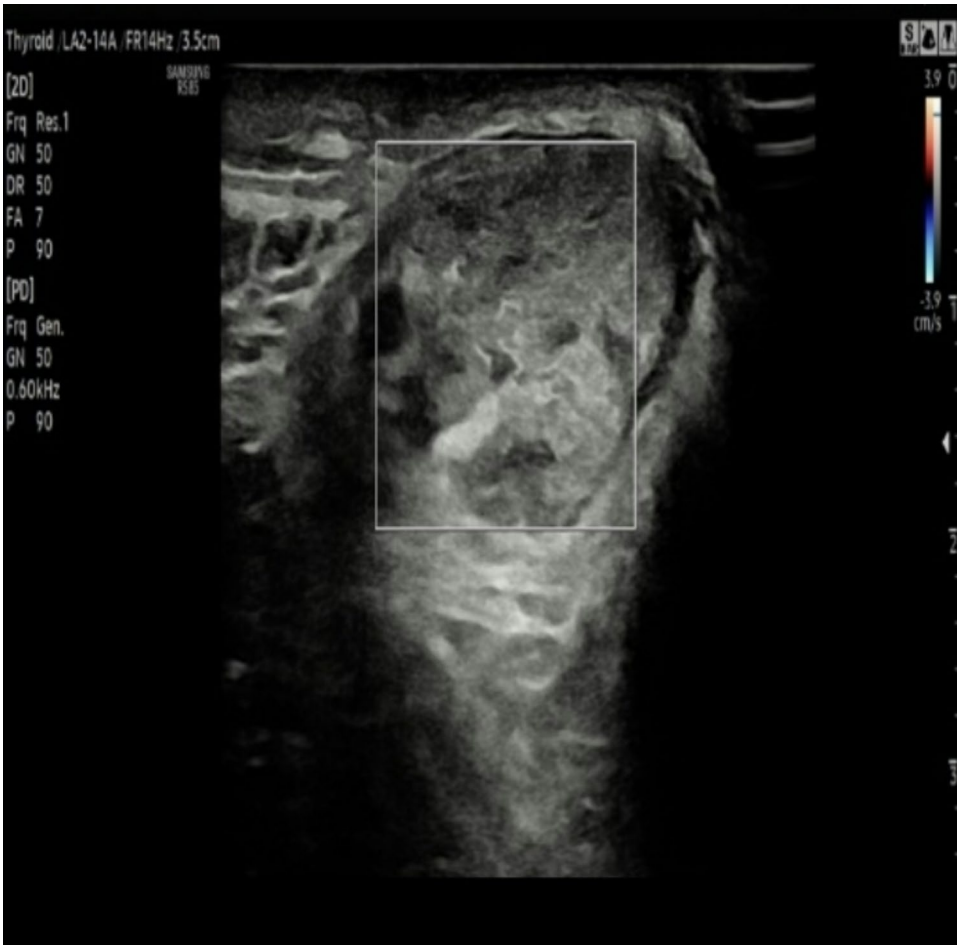

Fig. 2 Color Doppler ultrasonographic image of the case: Heterogeneous soft tissue structure (48×19 mm) at the right spermatic cord level with no vascular activity

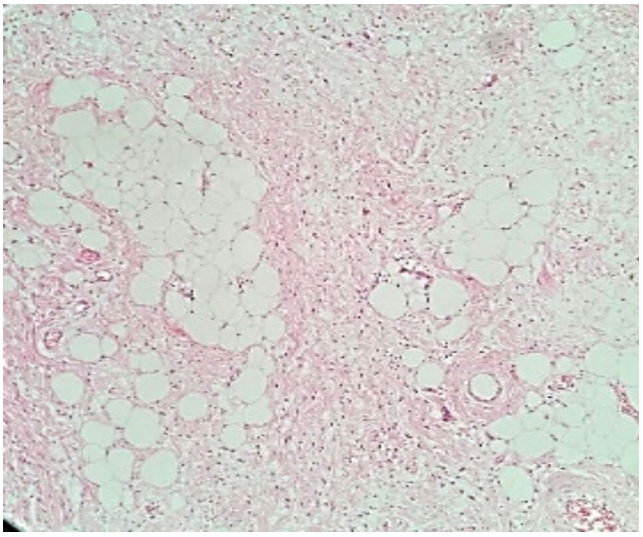

Fig. 3 Microscopic image of the pathology specimen: Hematoxylin - eosin staining showing adipose tissue surrounded by collagenous tissue

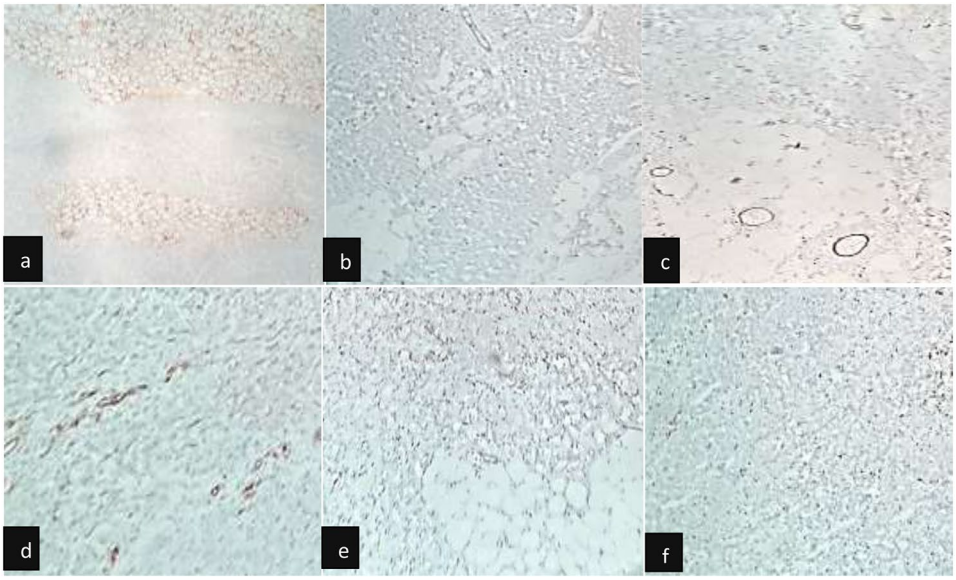

Fig. 4 Microscopic images demonstrating the immunohistochemical staining of fibrolipoma. (**a**) S-100 staining: Image demonstrating positivity in adipose tissue and negativity in collagenous tissue; (**b**) HMB-45 staining: Image demonstrating negative staining; (**c**) SMA staining: Image demonstrating negative staining except for vessel walls (**d**) CD34 staining: Image demonstrating positivity in some stromal areas but negativity in most regions; (**e**) CD68 staining: Image demonstrating negative staining; (**f**) CD117 staining: Image demonstrating negative staining

spermatic cord cysts, cystic structures such as angiofibrolipoma [3], or solid structures like lipoma. An incarcerated inguinal hernia may present with scrotal swelling and pain, potentially mimicking testicular or paratesticular pathology. Ultrasound can typically distinguish herniated bowel loops or omentum, but additional imaging may be required in complex or chronic cases. Cystic lesions such as epididymal cysts or spermatoceles usually transilluminate and exhibit fluid-filled characteristics on ultrasound, helping to differentiate them from solid masses such as fibrolipoma. Huben et al. employed scrotal ultrasound to exclude hydrocele/hernia during the primary assessment of a scrotal fibrolipoma [5].

Lipoma is more common than fibrolipoma, yet it may present similarly on physical examination [6, 7]. Rhabdomyosarcoma and liposarcoma should be ruled out since 56% of spermatic cord masses are malignant when lipoma is excluded [6]. Normal tumor markers, patient age, and imaging characteristics help exclude such clinical suspicion.

In our case, the painful, tender, and mobile lesion necessitated an ultrasound. Spermatic cord cysts can also be mobile and hard; however, pain is not expected. On Doppler USG, we encountered a heterogeneous, solid mass with no circulation, suggesting incompatibility with fibrolipoma, which is well perfused on USG, as Hegele et al. noticed, but rather a finding that can be seen in lipoma [4]. However, pain and USG still did not describe lipoma [7].

Combined with MRI, its use is critical for narrowing the diagnostic differential [8, 9]. Advances in MRI, particularly sequences with fat suppression, could potentially improve diagnostic precision by more clearly delineating the fatty component of these tumors. However, given the rarity of fibrolipoma and the urgency associated with acute scrotal presentations, MRI is often bypassed if clinical suspicion for torsion or incarceration is high to expedite surgical exploration.

Tumor marker analysis displayed normal values, aligning with previous fibrolipoma cases as documented by Hegele, Mykoniatis, and Kacan [4, 8, 9]; tumor marker assessments were not conducted in other fibrolipoma case work-ups [1, 5, 10].

In light of the patient's clinical presentation, we opted for surgery. We chose excision because of the mass's mobility and smooth surface. Torsion was not observed, and perfusion was provided by numerous thin vessels, contrary to USG findings. The possibility of spontaneous detorsion under anesthesia was also considered. However, performing an intraoperative frozen-section pathological examination was impossible, as in Hegele's case, due to the unavailability of a pathologist. The fact that the mass was not as large as that evaluated by Terada might have influenced us not to add orchiectomy. Following the pathology report, we considered a second operation if deemed necessary.

Upon macroscopic examination, no significant variations were observed, aside from its size, compared to other fibrolipoma cases. The lack of a conclusive radiological diagnosis of fibrolipoma in our case and other fibrolipoma cases emphasizes the significance of microscopic examination and immunohistochemistry staining

Table 1 Comparative synopsis of the paratesticular fibrolipoma cases reported in the literature, together with the presented case

Paratesticular fibrolipoma	Age	Symptoms	Physical examination findings	Radiological and laboratory findings	Treatment	Macroscopic examination findings	Microscopic and immunohistochemical examination findings
1. Huben, 1983 [5]	68	2 years of increasing right scrotal swelling	20 × 25 × 30 cm non-tender mass; bilateral reducible inguinal hernias; normal lymph nodes	A mass with diffuse irregular internal echoes in USG	Mass excision	An encapsulated fibro-fatty tumor adherent to the scrotal wall but easily detachable	A benign fibrolipoma without cellular atypia containing typical fat cells and fibrous tissue
2. Hegele, 2003 [4]	55	Palpable mass in the right inguinal region for the last 15 years; enlargement and pain extending to the scrotum for the last 6 months	Firm, slightly painful mass; testes normal on palpation; no enlarged lymph nodes	Well-perfused mass with low echogenicity on color Doppler USG; homogeneous soft tissue tumor measuring 4 × 3 × 2 cm on CT scan; tumor marker values within normal limits	Intraoperative frozen section examination + mass excision	A thinly encapsulated tumor composed of white tissue	Mature fibrous connective tissue bundles crossing adipocytes; no atypia; Immunohistochemistry: fat cells positive for S100 protein - negative reaction to S-100 protein, actin, desmin and CD34
3. Terada, 2010 [10]	68	Right inguinal swelling for 2 years			Mass excision + right orchiectomy	13 × 10 × 9 cm, round, hard tumor with a thin capsule; yellowish-white solid and lobulated tissue fragment with gelatinous consistency on the surface of the section	Tumor consisting of mature adipose tissue (40% area) and mature collagenous fibrous tissue (60% area), which overlapped; lipoblasts not recognized; myxoid degeneration of mature adipose tissue in focal areas; smooth muscle not recognized with Azan stain; no vascular proliferation; tumor spindle cell clusters not recognized. Immunohistochemistry: Tumor cells negative for cytokeratins, epithelial membrane antigen, CD34, desmin, SMA, melanosome, p53 protein, MDM2, and CDK4; adipose tissue weakly positive for S-100 protein; %1 Ki-67 labeling
4. Mykoniatis, 2015 [8]	55	Slowly increasing painless swelling of left hemiscrotum for 6 years	A painless, large, firm mass palpated in the left hemiscrotum, extending into the perineal region and not clearly distinguishable from the surrounding scrotal components; non-palpable inguinal lymph nodes	On USG, a hyperechoic scrotal mass, 5 × 6 cm in size, separate from the left testicle; on MRI, a mass showing a high T1 signal intensity characteristic of fat-containing tumors (no benign/malignant differentiation could be made); tumor markers (β-HCG, AFP, LDH) within normal limits	Mass excision	A yellowish-white solid tumor measuring 19.5 × 7 × 5 cm, surrounded by a thin fibrous capsule	Evident presence of mature fat cells between fibrous substrate; no cellular atypia, mitotic activity, lipoblasts, or necrosis; no smooth muscle recognized using Azan stain. Immunohistochemistry: Tumor cells negative for desmin, SMA, p53 protein, CD34, MDM2 and CDK4 Pathology report: fibrolipoma with diffuse mucoid degeneration
5. Kacan, 2016 [9]	56	Right scrotal swelling	Painless, mobile mass posterolateral to the right testicle, distinct from the testicle; non-palpable inguinal lymph nodes	On USG, a large, hyperechoic scrotal mass separate from the right testicle; laboratory tests normal; serum markers for testicular cancer (β-HCG, AFP, LDH) within normal limits	Mass excision	Yellowish, solid tumor with a thin capsule, with dimensions of 9.5 × 9.5 × 2 cm	Microscopically, a tumor composed of mature adipose tissue and collagenous fibrous tissue; no lipoblasts recognized Tumor diagnosis: giant fibrolipoma of the right spermatic cord

Table 1 (continued)

Paratesticular fibrolipoma	Age	Symptoms	Physical examination findings	Radiological and laboratory findings	Treatment	Macroscopic examination findings	Microscopic and immunohistochemical examination findings
6. Rohit, 2021 [1]	30	Left inguinoscrotal non-tender swelling for 2 years	Left inguinoscrotal firm, elastic, non-tender swelling with a smooth surface and sized 8 × 6 cm	on USG, heteroechoic mass measuring 7 × 6 cm with possible characteristics of a lipoma or desmoid	Mass excision following fine needle aspiration biopsy	Solid tumor measuring 7 × 6 × 5 cm with a smooth surface, smooth margins, and a gray-white stalk	Mature adipose tissue with an encapsulated mass line of fibro-collagenous tissue, macrophages, calcifications, and areas of fat necrosis indicating fibrolipoma with secondary fat lysis; no atypia.
7. Mansiroglu, 2025 (presented case)	13	Four-day history of pain and swelling in the upper half of the right hemiscrotum	An ellipsoid, firm, mobile lesion with a smooth surface, approximately 5 cm in length, tender to palpation; no inguinal LAP; no additional pathology on examination of the testes	On Color Doppler USG, a 49 × 18 mm heterogeneous, solid, soft tissue structure with no vascular activity; tumor markers' (β -HCG, AFP, LDH) values within normal limits	Mass excision + inguinal hernia repair	Partially encapsulated, solid tumor measuring 5 × 4 × 2 cm; solid tissue fragment, sections gray-yellow and occasionally glossy gelatinous.	Fibrolipoma, characterized by collagenized and occasionally spindle cells surrounding fatty lobules; no atypia Immunohistochemistry: Positive staining with CD34 in some stromal parts (usually negative), positive staining with CD117 in rare mast cells, positive staining with S-100 in rare histiocyte cells, positive staining with S-100 in adipose tissue and negative staining in other areas, negative staining with B-catenin, PanCK, HMB-45, and Desmin

for a definitive diagnosis [11]. No evidence suggests any distinction in management and prognosis between spermatic cord fibrolipomas and other benign lipomatous tumors [8]. However, malignant lesions do not fall into this category. Pathological assessment validated the absence of rhabdomyosarcoma or liposarcoma, the predominant malignant lesions in the paratesticular region.

Angiomyolipomas, primarily renal and rarely in the spermatic cord, demonstrate intense staining with HMB-45 (80–100%) and almost complete staining with SMA, which allowed us to deduce that angiomyolipoma was unlikely [12]. Abundant mast cells in spindle cell lipomas, combined with intense positive CD34 staining, were observations that eliminated spindle cell lipoma [3, 10, 13]. Exclusive staining with S-100 in adipose tissue, as documented by Hegele and Terada [4, 10], and encasement of fatty lobules with collagenous stroma in all remaining scenarios, constituted additional results affirming fibrolipoma, differentiating it from other subtypes. Table 2 summarizes the clinical features, diagnostic criteria, and the pathology/immunohistochemistry characteristics of the spermatic cord's lipomatous masses. Figure 5 presents the diagnostic flowchart to help summarize the work-up of spermatic cord masses.

Conclusion

In this first reported pediatric case of spermatic cord fibrolipoma, we underscore that a rare, benign paratesticular tumor can present with acute scrotal symptoms, closely mimicking emergent pathologies like testicular torsion. Prompt surgical intervention remains crucial when torsion or incarceration cannot be excluded, yet avoiding unnecessary orchiectomy is equally important. Histopathologic confirmation is vital to accurately distinguish fibrolipomas from other potentially malignant tumors and guide appropriate management. Looking ahead, improved imaging techniques (e.g., MRI with fat suppression) and a structured approach to immunohistochemical analysis may further reduce diagnostic uncertainties, refine treatment decisions, and safeguard testicular viability in pediatric and adult patients.

Patient perspective

The patient and their parents were notified. Their opinions on the diagnostic and treatment procedures were solicited. The subjects reported experiencing significant concern regarding the pain in the testicle during the application process and the decision to proceed with immediate surgical intervention. However, these concerns diminished upon learning that no intervention would be necessary for the testicle post-surgery. They hoped the mass would not be malignant, a sentiment confirmed upon receiving the pathology report. The

Table 2 Lipomatous tumors of the spermatic cord

Pathological entity	Physical examination	USG findings	MRI findings	Pathology & immunohistochemistry
Lipoma	Typically discovered incidentally as a soft, non-tender scrotal mass that can be palpated [6]	Homogenously hyperechoic lesion [7]- usually avascular [6]	In large lipomas, differentiating from liposarcoma might be required [7].	It is composed of mature adipocytes with delicate fibrous septa [7].
Fibrolipoma	A painless, mobile mass [9]	A heteroechoic solid mass [1]	The mass may show high T1 signal intensity characteristic of fat-containing tumors on MRI (may not distinguish benign vs. malignant) [8].	It appears as a yellowish-white, gelatinous, lobulated solid tissue on cross-sections. The tumor comprises ~40% mature adipose tissue and ~60% mature collagenous fibrous tissue. The adipose tissue is positive for S-100 protein [4, 10].
Angiofibrolipoma [14]	An elastic, non-tender mass	It appears as a cystic-solid echogenic lesion with minimal blood flow.	–	The cut surface is macroscopically a blood-filled multilocular cyst without necrotic or cystic changes. Pathological examination shows mature adipocytes, blood vessels, and dense collagen tissue, with no evidence of mitosis or cellular pleomorphism.
Angiomyolipoma [12]	Tenderness on the side where the mass is located	A hypoechoic mass	–	Thick-walled blood vessels (medium to large caliber) with ectatic lumens, surrounded by sclerotic, fibrous smooth muscle bundles within a fatty environment. Strong positivity with HMB-45 (80–100%) and almost complete staining with SMA.
Spindle Cell Lipoma [13]	An elastic, non-tender mass.	A hypoechoic mass.	It appears as a high signal area on T2-weighted images.	Cross-sections reveal smooth gray-white tissue interspersed with yellow areas. Numerous mast cells are observed. Spindle cells show strong positivity for vimentin and CD34 but are negative for S-100 and SMA.
Liposarcoma	A firm, non-tender, immobile mass fixed to surrounding tissues [15].	Variable appearance, depending on the proportion of adipose vs. soft tissue. Typically, heterogeneous echogenicity with hypoechoic mass-like areas [6].	It predominantly displays fatty attenuation or signal intensity, possibly enhancing soft tissue components [6]. If the lesion is not homogeneously hyperechoic, has blood flow, or is significant, an MRI can confirm a lipoma or rule out suspicious soft tissue components/septa suggestive of liposarcoma [6].	It comprises relatively mature adipocytes, focal single-vesicle adipocytes, fibrous tissue with mucous stromal changes, and a well-defined tumor capsule. It shows sclerotic liposarcomatous proliferation with large, hyperchromatic, atypical tumor cells. S-100, CD34, vimentin, SMA, CD68, and Ki67 < 1% positivity [15].

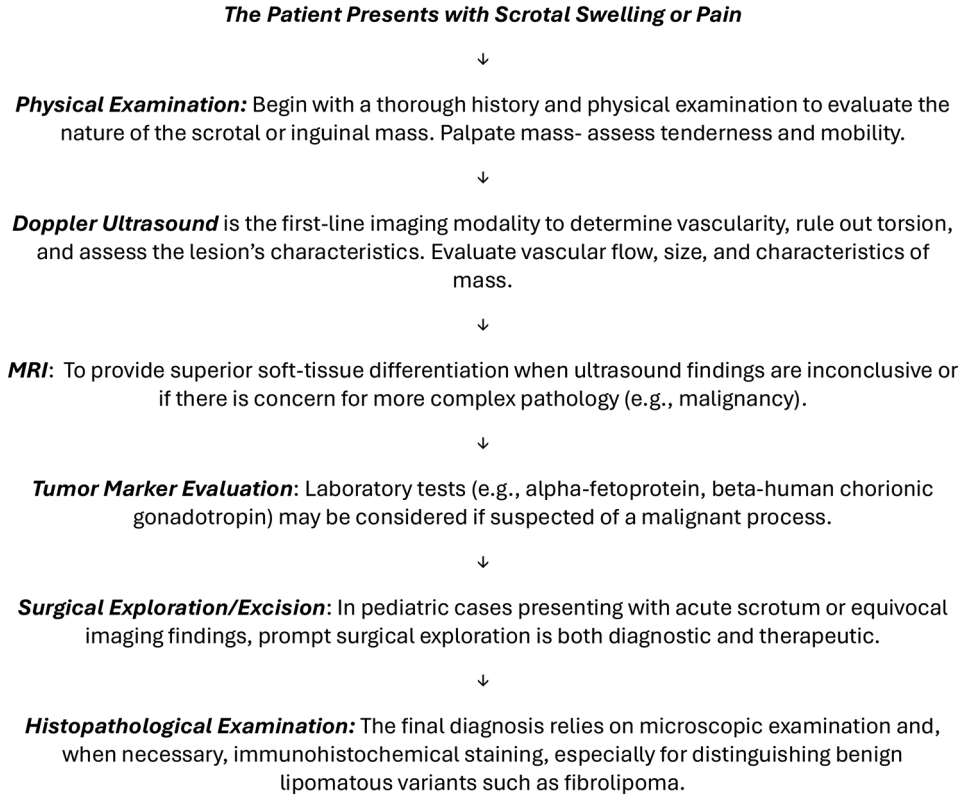

Fig. 5 Flowchart illustrating the diagnostic pathway for scrotal swelling or pain suspicious for paratesticular or spermatic cord masses

subjects subsequently experienced complete relief and reported no issues during subsequent follow-ups.

Abbreviations

USG	Ultrasonography
β-HCG	Beta-Human Chorionic Gonadotropin
AFP	Alpha Fetoprotein
LDH	Lactate Dehydrogenase
CEA	Carcinoembryonic Antigen
SMA	Smooth Muscle Actin
S-100	Soluble in 100% saturated solution of ammonium sulphate
HMB-45	Human Melanoma Black-45
MRI	Magnetic Resonance Imaging

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Author contributions
AKM contributed to Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Project administration, Resources, Supervision, Visualization, Writing– original draft–, Writing– review & editing.AD contributed to Conceptualization, Data curation, Formal analysis, Investigation, Methodology, Resources, Supervision, Visualization, Writing– review & editing. SD contributed to Investigation, Methodology, and Writing– review & editing. All authors reviewed the manuscript.

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Data availability
Data and materials supporting the findings of this study are available from the authors, but most data were obtained from the hospital information processing system, which is not publicly available. However, data and materials are available from the authors upon reasonable request and with permission from our hospital administrators.

Declarations

Ethics approval and consent to participate
Ethical approval for this study was granted by the Sivas Cumhuriyet University Ethics Committee (protocol # 2025-01/12). The study adhered to the ethical principles outlined in the Declaration of Helsinki. Parental informed consent was secured for all participating patients.

Consent for publication
Written informed consent was obtained from the parents of the case report for publication of the medical case details and accompanying images.

Competing interests
The authors declare no competing interests.

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