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Inguinal Canal Tumors of Adulthood

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Abstract. *Aim: To review benign and malignant paratesticular lesions. Materials and Methods: A non-systematic review of the English literature in the National Library of Medicine Database (MEDLINE) was performed using the key words "spermatic cord", "inguinal canal", "neoplasms" (focusing on soft tissue sarcomas). The 74 most significant contributions were selected. Results: Although generally benign (lipoma is the most frequent), paratesticular tumors have a high incidence of malignancy (30%). Ultrasonography, computed tomography and magnetic resonance imaging represent the main tools in the evaluation of a solid paratesticular mass. Most malignant tumors are sarcomas and commonly spread via local invasion to adjacent structures. The definitive diagnosis is made postoperatively. Surgical excision in the form of radical orchiectomy and wide local resection of tumor margins is mandatory and represents the mainstay of treatment options. Conclusion: Surgical treatment of paratesticular tumors is fundamental in order to determine the histology so as to define the correct follow-up for each patient.*

In males, the inguinal canal (IC), a short passage in the lower anterior abdominal wall, contains the spermatic cord (SC), consisting of vas deferens, the testicular artery, pampiniform plexus of veins, lymphatic vessels of the testis and nerves; it connects the pelvic cavity by the scrotum, which is also formed by epididymis and associated fascial remnants. These structures can be involved in a large variety of pathological processes including congenital, inflammatory and neoplastic disease; normally the finding of an inguinal/scrotal mass requires a thorough investigation to ascertain the nature of the lesion.

Although less frequently involved than the testis, the paratesticular region may be the site of the onset of benign and malignant lesions or, more rarely, the site of metastatic dissemination. A scrotal mass, with different growth profile, or scrotal swelling are the typical clinical presentations of these lesions and differential diagnosis from other benign and malignant conditions that may affect the inguinal region may be difficult. Paratesticular tumors (PT), although rare, have a high incidence of malignancy. It has been estimated that 70% of paratesticular tumors are benign and 30% are malignant; the spermatic cord is the most common site of onset.

Nowadays, ultrasonography (US) represents the imaging modality of choice but US findings are often variable and non-specific; therefore, information provided by computed tomography (CT) and magnetic resonance (MR) imaging, not only for morphologic characteristics but also for therapeutic planning, can aid in the evaluation and the differential diagnosis of extratesticular masses.

In this article, we review benign and malignant conditions of the paratesticular region that occur in adulthood, emphasizing on soft tissue tumors, and providing some clinical and radiographic features for easier diagnosis and treatment.

Materials and Methods

A non-systematic review of the literature based on a free-text search in the National Library of Medicine Database (MEDLINE) was performed using the key words spermatic cord, inguinal canal, neoplasms (focusing on soft tissue sarcomas), filtered for human and adult pathological conditions. For this review, we selected only articles written in English and the related citations of papers of major interest and chapters of books of relevance to the topic were also taken into account. We scrutinized and critically analyzed a total of 104 articles, focusing on the sonographic, radiological and histopathological features of soft tissue sarcomas. Based on the relevance of their content, we finally selected for our review the 74 most significant contributions. We carried out the literature search, and all the Authors participated in the review of selected articles; any contrast or unclear interpretation of data was solved by open discussion.

Results

Unlike intratesticular masses (generally considered malignant), extratesticular neoplasms represent a rare and heterogeneous group of lesions that affect patients of all

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ages, with the prevalence of benignity being approximately 70% (1). It may be difficult to establish the exact site of origin. SC represents the primary site of onset of extratesticular tumors (75-90% of the cases) (2); however they can also arise from the epididymis or the mesenchymal sheaths that surround the testicle, albeit less frequently.

The clinical manifestation of an inguinal mass is typically represented by the appearance of a painless inguinal or scrotal swelling. It is difficult to differentiate between benign and malignant lesions. Features suggestive of malignancy include rapid growth, large size and symptomatic presentation. While common inguinoscrotal swellings (hernias and hydroceles) can be diagnosed on clinical examination, all atypical swellings should be further investigated before surgical exploration.

US is the modality of choice to detect and evaluate PT: it has a high sensitivity for the characterization of intratesticular versus extratesticular lesions, in addition to being easy to perform and inexpensive (3-5). Some sonographic features have been identified for lipomas (characteristic high reflectivity), highly vascular scrotal hemangiomas and epididymal papillary cystadenomas (6); conversely, undefined, solid masses with invasion of adjacent structures and unclear planes of cleavage, are features associated with malignant growth.

The precise definition of a paratesticular mass is always difficult by sonographic appearance alone. CT and MR imaging are helpful in distinguishing a primary SC tumor from a retroperitoneal process extending into the scrotum. CT allows the morphology and staging of a lesion to be determined, while the multiplanar imaging capability of MR can give a more precise definition and localization, including its anatomic relationship to the surrounding structures (7). Both T1-weighted and T2-weighted sequences at MR should be performed and fat-suppressed sequence should also be used in cases in which a lipoma or liposarcoma is a consideration (8). The diagnostic role of CT and MR imaging remains undisputed also for the definition of the best surgical approach in the case of malignant lesions.

Benign Lesions

Epithelium-derived lesions. Cystoadenomas of the epididymis, papillary tumors and dermoid cysts of the SC originate from the epithelium. These are papillary, papillary-like lesions or Müllerian-type epithelial neoplasms reminiscent of ovarian tumors that have been described in the paratesticular area (9, 10). Most of these lesions are benign but there have been isolated reports of both borderline and malignant (9); consequently, most patients undergo surgery in order for the mass to be excised and to exclude malignancy. Cystoadenomas of the epididymis arise from the efferent epididymal ductules (11); if bilateral, this is a virtually pathognomonic feature for von Hippel–Lindau syndrome (12) and unilateral and bilateral cystoadenomas are frequently associated with infertility (13).

Adenomatoid tumor of the epididymis. Lesions involving the paratesticular region are generally of mesenchymal origin (14). A common benign neoplasm is the adenomatoid tumor of the epididymis, which represents approximately 30% of all PTs (11, 15), second only to lipoma (12). It is probably of mesothelial origin as microscopic and immunohistochemical studies revealed similar features to normal mesothelium and mesothelioma (16, 17).

The diagnosis is generally made in adult patients, presenting an incidental, unilateral, painless, slow-growing mass; only few cases have a history of trauma or are found with acute onset of inflammation and pain. A slightly higher incidence in the epididymal tail has been reported, on rare occasions, arising from the spermatic cord or *tunica vaginalis*. US examination reveals the solid nature of the lesion (hyperechogenic homogeneous mass, though it may adopt any morphology) and its precise location (8). MR imaging may be of value for differentiating these lesions from other pathological conditions.

At gross examination, the lesion is a round, yellow-white solid and elastic tumor, with a brown surface (2, 7). Microscopically, the tumor is characterized by a series of more or less irregular tubular spaces coated by a layer of cuboidal epithelioid or endothelioid cells. Microscopic analysis reveals irregular spaces with irregular tubules and a stroma of loose or dense collagen.

An adenomatoid tumor is usually solid, rather than cystic, and stains for calretinin and not for progesterone receptors; this feature differentiates it from cystoadenoma and other papillary-like epithelial lesions of the epididymis (10). In addition, cilia are not generally found in adenomatoid tumors. It has benign behavior and common treatment is surgical removal. When the tumor is well-outlined, an enucleation or partial epididymectomy can be carried out.

Spermatic cord lipoma. Generally, an inguinal hernia is clinically apparent and the diagnosis is not difficult but, in some cases, it may manifest as a hard, irreducible mass, and must be differentiated from other primary inguinal masses.

Lipoma is the most common benign neoplasm of the paratesticular tissues and SC, comprising 45% of PT. The definition of a "true lipoma" is possibile only if it is confined to the IC and has no connection with the retroperitoneal fat (18). Normally, lipomas tend to be more well-defined masses, usually asymptomatic; however, they can cause pain and discomfort (19, 20). During inguinal hernia repairs, incidental lipomas are commonly found. In the series of Carilli *et al.*, 128 consecutive patients with 139 indirect inguinal hernias underwent open repair between 1997 and 2001 were found to

have 100 lipomas of the SC or round ligament (21). The incidence of cord lipoma associated with indirect inguinal hernia was 72.5%: no reported neoplastic changes were noted at histopathological examination of the specimens; as a matter of fact, a cord lipoma is merely normal fat, as confirmed in this study and in that of Heller and colleagues (22). Gross examination reveals fatty masses. Generally, lipomas appear hyperechoic at US but the presence of fibrous or vascular tissue can change the sonographic features.

If a mass cannot be shown to be a lipoma, the risk of malignancy increases significantly (8). CT and MR imaging are helpful to differentiate lipomas from hernias or suspected malignant lesions: the tumor maintains low attenuation at CT and bright signal intensity at T1-weighted MR imaging; however, resection is the treatment of choice if the patient is clinically asymptomatic (21).

Leiomyoma of the epididymis. Well-known as the most common neoplasms arising from the uterus, leiomyomas are unusual, if not rare (6% of cases), benign neoplasms of the epididymis, generally found in men in the fifth decade of life. In a recent, albeit small, series of Roman Birmingham *et al*. (23), leiomyoma was found in 23.5% of cases and the most frequent location was the epidiymis (50%).

Physical examination reveals a painless mass of the scrotum; US scan is the investigation of choice in the preoperative assessment in order to define the mass, but these tumors often adhere to the testis and this makes us unreliable in excluding a malignancy. At gross examination, leiomyomas are usually well-circumscribed and surrounded by fibrous capsule, while smooth muscle spindle cells mixed with fibrous, hyalinised connective tissue (7).

Their behaviour is benign although it is not clear if they can recur locally. Radical orchiectomy is generally performed and follow-up of these patients is advised.

Other less common benign lesions. In the literature, some benign lesions have been described involving the perineum or genitalia of young, middle-aged women, such as angiomyxoma and angiomyofibroblastoma, localized in the scrotum or in SC of men (24, 25).

To our knowledge, very few cases of nerve-derived benign tumors, such as paragaglioma (26,27), schwannoma (28) or neurofibroma (29) involving the IC previously have been reported; furthermore, the SC is an extremely unusual site for hemangiomas (30,31), where they are thought to arise from the pampiniform plexus.

Malignant lesions

Sarcomas. As mentioned above, because SC is almost completely derived from mesoderm, most malignant tumors are sarcomas (32).

Sarcomas account for 1% of all cancers in adults and fewer than 5% of them involve the genitourinary tract (33). Under the term soft tissue sarcomas are grouped more than 50 different histological types, based on the characteristics of the mature mesenchymal tissues that they resemble, with distinct biological characteristics and behaviors.

Rabdomyosarcomas and embryonal sarcomas typically occur in children and have good long-term survival rates. Cancer-specific survival approaching 95% has been reported after orchiectomy and chemotherapy for children less than 10 years of age (34), even if they have a higher propensity for lymphatic and hematogenous spread than other sarcomas (35). Twenty percent of the cases involve adulthood as large intrascrotal masses but only 7% are associated with pain (1).

Well-differentiated liposarcomas and leiomyosarcormas are the most frequent types in adults while malignant fibrous hystiocytoma and fibrosarcomas are rare (about 10% and 5% respectively) (36). These forms have a generally protracted course with locally invasive growth but with low probability of regional lymph node and hematogenous dissemination (37); generally, they begin below the external inguinal ring, growing as scrotal masses that involve the SC more than the testicular tunica.

Liposarcoma is the most common sarcoma subtype to arise in the retroperitoneum (38); they are more often located in the lower extremities (41%), the retroperitoneum (19%), and the inguinal region (12%) (39). Despite a retroperitoneal origin, only 0.1% of liposarcomas present as inguinal hernias (40). The occurrence of these malignancies typically concerns adulthood (between 50 and 60 years old), with an age range of 16 to 87 years (41, 42). To our knowledge, only one observation has been described in a patient aged six (43) and, over the years, the reported cases have been usually described as case reports (35, 42, 44-47). A large series of paratesticular liposarcomas was reported by Montgomery & Fisher (48) in which the authors analyzed 30 cases from a pathological and clinical point of view, besides focusing on disease treatment and prognosis. Liposarcoma generally occurs as a heterogenous solid, bulky lipomatous tumor. The differential diagnosis from benign lipomas is extremely difficult at the time of first clinical evaluation: most simple “lipomas of the cord” are smaller, whereas liposarcomas of the cord tend to be larger and firmer lesions. Malignant characteristics may be suspected in the case of large size, rapid growth and symptomatic presentation. Tumors range from 3 to 30 cm in diameter and are gray-white to yellow-tan in color, typically lobulated or nodular with the possible presence of necrosis and hemorrhage (42). In the past, a potential malignant degeneration from lipomas (49, 50) of the SC has been hypotized but it is widely accepted that these malignancies arise from mesenchymal cells rather than from malignant transformation of lipomatous cells.

The World Health Organization (WHO) Committee for the Classification of Soft Tissue Tumors in 2002 categorized soft-tissue liposarcomas into five types: well-differentiated, de-differentiated, myxoid, pleomorphic, and mixed (51, 52). A well-differentiated liposarcoma has no metastatic potential unless de-differentiation occurs, but lesions may recur locally. The prognosis and treatment of well-differentiated liposarcomas are therefore closely related to the anatomical location of the lesion.

From a histopathological stand, high-grade de-differentiated liposarcomas can exhibit a wide spectrum of appearance: high-grade pleomorphic spindle cell sarcoma, myxoid liposarcoma features lipoblasts at varying stages of development (42), a myxofibrosarcoma-like pattern with paucicellular areas with a relatively bland appearance, and areas containing sheets of spindled-to-stellate cells in a prominent myxoid stroma that contained thin-walled blood vessels (53).

Immunohistocheminstry helps in differential diagnosis between liposarcomas and lipomas: the former are immunoreactive for Proto-Oncogene Proteins c-MDM2 and Cyclin-Dependent Kinase CDK4 markers (42) and staining for the S100 protein is positive in up to 90% of cases (54). The specific histology and grade must be considered in the prognosis and treatment of SC sarcomas.

US is the modality of choice to detect and evaluate these PT but there are no specific sonographic features due to the extremely variable composition of lesions; historically, hyperechoic, solid paratesticular masses have been considered benign (55), as occurs generally for the majority of extratesticular lesions. However, it remains extremely challenging to characterize the type of the tumor by US examination alone. The sensitivity of CT for low-grade lesions is nearly 100% (56) and MR imaging can be an important tool in diagnosis and surgical planning but there are no patognomonic CT or MR features for the differentiation of a mass. As for other paratesticular masses, the definitive diagnosis is made postoperatively; there is virtually no role for preoperative therapy for these tumors (56). Radical surgery (*i.e.* radical orchiectomy using an inguinal approach) represents the therapy of choice since simple excision could lead to microscopic residual disease (57, 58).

Similarly to liposarcoma, leiomyosarcoma is one of the most frequent histological types in older patients. It has been postulated that they may arise from muscular tissue of any of the components of the IC; some researchers found β-chorionic gonadotropin production to be related to the lesion (59). Like other high-grade tumors, it is generally positive for desmin staining and radical surgery is obviously the recommended treatment.

Malignant fibrous histiocytoma (MFH) is rare and has been reported to represent only 11% of adult SC sarcomas (60). It can be divided into four subtypes: storiform-pleomorphic (more frequent), giant cell, myxoid (extremely rare) and inflammatory. It shares the same clinical presentation with others soft tissue sarcomas of the SC and the current treatment strategy is complete local resection; nonetheless this tumor has a higher recurrence rate [21% as reported in a recent paper of Li *et al.* (61)] and adjuvant radiotherapy may be considered in order to reduce this risk.

In adult paratesticular sarcomas, risk factors for local relapse are dimensions, inguinal location, positive margins, previous intralesional surgery (62) and high-grade sarcoma (60); hence, a wide *en bloc* excision is recommended in an attempt to minimize local recurrence.

Nodal recurrence has been reported up to 29%. However, the role of regional and retroperitoneal lymph node dissection (RPLND) is uncertain. There is a general agreement in considering that most common sarcomas (liposarcomas, leiomyosarcomas) rarely involve locoregional lymph nodes (54) so that RPLND is an option for high risk patients (*i.e.* MFH, fibrosarcoma) and is recommended in patients with preoperative evidence of retroperitoneal lymph node metastasis and in case of locally advanced or metastatic rhabdomyosarcomas, taking into account their higher propensity for lymphatic and hematogenous spread.

Few data are available regarding the radiation dosage required for adjuvant radiotherapy for paratesticular sarcomas (40) but more recent, albeit a small series suggest that a combined treatment represent a viable option in order to improve local control of the disease (57, 58, 62).

Except for rhabdomyosarcoma in children, there is no evidence in the current literature that justifies the use of adjuvant chemotherapy in the treatment of sarcomas of the inguinal region (54).

Mesothelioma. Malignant neoplasms, as well as the presence of metastasis of the epididymis and SC, are extremely rare. Mesotheliomas are tumors that involve the *tunica vaginalis*, usually diagnosed in young adult patients. The clinical presentation is, generally, unilateral, persistent inguinal swelling (1). Most patients are initially treated conservatively for a suspected benign entity and the diagnosis of malignancy is often made postoperatively (63). Well-differentiated papillary mesotheliomas are benign, not associated with exposure to asbestos but are less common than their malignant counterparts. The differential diagnosis with metastatic malignant mesothelioma can be very difficult. Clinical history is helpful: in fact malignant mesothelioma most often involves the pleural or peritoneal cavity and exposure to asbestos is a well-known risk factor for its development (64). The diagnosis is generally made postoperatively at immunohistochemical assay: calretinin staining is positive in malignant mesothelioma. The treatment of choice is surgical excision. Approximately one third of patients develop recurrence after hydrocelectomy and 12% develop

recurrence after scrotal or inguinal orchiectomy (63) so that the patients should be targeted toward a careful clinical-radiological follow-up.

Lymphoma. Lymphoma of the testis is a rare tumour, accounting for fewer than 1% of all malignant lymphomas (65); testicular lymphomas can involve the epididymis in 60% of cases and the SC in 40% (12). Primary lymphomas of the epididymis and SC are extremely rare and, typically, of B-cell lineage (66); much more frequently, the paratesticular region is the site of recurrent disease. At clinical examination, they present as hard masses involving the IC; histologically, these tumors are classified as intermediate or high grade with a diffuse growth pattern (1). The prognosis is poor: radical orchiectomy is imperative but, considering the high probability of relapse, a role for adjuvant radio- and chemotherapy (1) has been also proposed.

Malignant epididymal tumors. Primary epididymal neoplasms are mostly benign. Malignancies arising from the epididymis include extratesticular germinative tumors, malignant mesothelioma, adenocarcinoma, serous papillary carcinoma and squamocellular carcinoma (67). Adenocarcinoma of the epididymis is an extremely rare tumor with about 30 cases reported in the literature (68).

Considering the rare occurrence of epididymal malignant tumors, prognostic factors for their progression have not been defined. Radical surgery is imperative, with an RPLND recommended both for node-positive and node-negative patients at preoperative imaging (69).

Metastases. Metastatic spread to the SC is unusual. Some mechanisms involved in this process have been proposed but the main routes are the lymphatic one and the hematogenous one.

There are several origins of the tumor that metastatizes to the IC. Metastases have been reported from tumors of the prostate (70), kidney (71) and gastrointestinal tract (72); moreover, metastatic adenocarcinoma of the pancreas can involve the IC in the setting of peritoneal carcinomatosis. The clinical history provides vital clues to the etiology of these forms.

Discussion

The vast majority of paratesticular lesions are represented by hernias, benign cystic lesions of the epididymis (cysts, spermatoceles) and scrotal fluid collections (hydroceles, pyoceles). However, the anatomical constituents of the IC may be the primary site of onset of neoplasms.

The typical presentation is a slow-growing, painless inguinal mass. Features suggestive of malignancy include rapid growth, large size and symptomatic presentation. More than 70% of tumors are found in the SC, and the most common SC tumor is lipoma, frequently found during hernia repair.

Adenomatoid tumors are the most common tumors of the epididymis. Other benign tumors include leiomyoma, fibroma, hemangioma, neurofibroma, and papillary cystadenoma.

Because the SC is almost completely derived from the mesoderm, most malignant tumors are represented by sarcomas, uncommon tumors that arise from the embryonic mesoderm.

Well-differentiated liposarcoma is the most frequent subtype in adults, followed by leiomyosarcormas; MFH and fibrosarcomas are rare. These tumors usually manifest as a firm palpable mass of the IC or scrotum; generally, they are treated with surgical excision, and have a high propensity for recurrence (57). Less frequently, malignant lesions are represented by mesotheliomas of the *tunica vaginalis*, lymphomas and, extremely rare, metastases from other primary sites.

US can be used quickly and accurately evaluate inguinal masses. Varicoceles, epididymal cysts and spermatoceles are the most frequently encountered paratesticular lesions (6) with specific US characteristics. Internal echoes made by sediment, hemorrhage, turbid contents or calcification of the wall can lead to diagnostic challenge and any image that has a solid appearance should be further evaluated.

Some sonographic features have been identified for lipomas (characteristic high reflectivity), highly vascular scrotal haemangiomas and epididymal papillary cystadenomas (6); conversely, undefined, solid mass with invasion of adjacent structures and unclear planes of cleavage are features associated with malignant growth.

Most solid extratesticular masses lack sonographic specific features so that CT and MR imaging aid in characterization of the morphology and staging. The wide field of view, high-contrast spatial resolution, and multiplanar imaging capability of MR imaging allow precise demonstration and localization of a mass, including its anatomical relationship to the surrounding structures.

Table I summarizes radiological and histological/immunohistochemical features of the major PT.

However, due to the limitations related to the lack of a definitive diagnosis with radiological techniques, almost all patients undergo surgery. Current treatment recommendations include radical orchiectomy with wide local resection of surrounding soft tissues due to high potential risk of local recurrence especially for high-grade lesions: a wide local excision is advisable in order to avoid positive surgical margins, taking into account that sarcomas and other malignant condition tend to infiltrate surrounding tissues making correct resection extremely challenging.

Finally, it is important to mention that infertility could be the potential result of any surgical procedure performed on the testis or epididymis. It is advisable to investigate normal function of contralateral testis and epididymis so that sperm banking can be performed to ensure future fertility.

Table I. *Summary of the major paratesticular tumor types with frequency, imaging features, gross examination and histological/immunohistochemical profiles (6, 7, 8, 10, 42, 51, 52, 54, 63, 73, 74).*

	Frequency	Imaging	Gross examination	Histological and immunohistochemical profile
Adenomatoid tumor of the epididymis	Common – 30% of paratesticular tumors	US: Non specific, isoechoic to adjacent epididymis	Yellow-white solid and elastic tumor	Calretinin +; irregular spaces coated by a layer of epithelial or epithelioid cells
Lipoma	Common – 45% of paratesticular tumors	Hyperechoic at US, variable with foci of fibrous or vascular tissue; CT: low attenuation; bright signal intensity at T1-weighted MR imaging	Yellow fatty mass	Adipocytes with variable amount of fibrous and vascular tissue
Leiomyoma of the epididymis	Rare – 1-5% of paratesticular tumors	US: Variable, solid or cystic mass	Well-circumscribed; fibrous capsule may be present	Muscle spindle cells with fibrous hyalinised connective tissue; calcifications.
Sarcomas	Common			
Liposarcoma	37% of paratesticular sarcomas	Usually hyperechoic and heterogeneous at US; CT and MR reveal fatty tissue pattern	Bulky yellow mass with variable areas of sclerosis	Well-differentiated: MDM2-CDK4+, protein S-100 +, vimentin +; de-differentiated: pleomorphic spindle cell sarcoma with abundant mitotic figures, desmin +; myxoid: lipoblast at varying stages in hyaluronic acid matrix
Leiomyosarcoma	24% of paratesticular sarcomas	US: Variable echogenicity	Well-circumscribed mass with areas of hemorrhage and necrosis, typically located in the scrotal part of the spermatic cord	Spindle cells with elongated eosinophilic cytoplasm and pleomorphic, hyperchromatic nuclei; actin +, desmin +, HHF-35 +
MFH	10% of paratesticular sarcomas	US: Variable echogenicity; intense flow with hypervascularity at color Doppler US	Grayish-white, firm lesion; local infiltration	Vimentin +
Lymphoma	Rare – 1% of paratesticular tumors	US: Diffuse infiltration of the region, hypoechoic feature	Poorly demarcated grayish nodule, with or without necrosis and hemorrhage	CD20 +; lymphoid large cells with clear or slightly eosinophilic cytoplasm with large, strongly atypical, polymorphic nuclei and a great number of mitoses
Mesothelioma	Rare – 1-5% of paratesticular tumors	US: Lesion closely related to tunica vaginalis	Solid coat around the tunica vaginalis with variable features	Calretinin +; epithelioid features with papillary growth, tubulo-papillary, solid growth in invasive foci

US: Ultrasonography; CT: computed tomography; MR: magnetic resonance; MDM-2: proto-oncogene proteins c-MDM2; CDK4: cyclin-dependent kinase 4; HHF-35: muscle actin antibody HHF-35; CD20: B-lymphocyte antigen CD20.

Conclusion

A large variety of benign and malignant lesions can be found in the IC, generally presenting as slow-growing, asymptomatic masses. Although most of them are benign, we have to consider that in some cases they can be life-threatening lesions.

Radiological investigations are useful tools in order to characterize these paratesticular masses but there are no certain pathognomonic features that may render the differential diagnosis easier, consequently patients generally undergo surgery to allow for definitive diagnosis. The best management is wide excision, with or without adjuvant treatment, although data have only been obtained from small, single institution series and there is still a lack regarding the optimal surgical and adjunctive treatment strategies.

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