Solitary fibrous tumor

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Abstract

Solitary fibrous tumor (SFT) is a rare mesenchymal neoplasm which may be found everywhere in the body. It is now distinguished into two forms, pleural and extrapleural, which morphologically resemble each other. Abdominal localizations are quite rare, with 10 cases only reported in bladder; rarely they can be source of paraneoplastic syndromes (i.e., hypoglycemia secondary to insulin-like growth factor). In April 2006 a 74-year-old white male presented with chills, diaphoresis and acute abdominal pain with hematuria. At admission in emergency he underwent an abdominal X-ray (no pathological findings) and an ultrasound examination of the kidneys and urinary tract, which revealed a pelvic hyperechogenic neoformation measuring approximately 10×8×7 cm, compressing the bladder. Blood chemistry at admission revealed only a mild neutrophilic leucocytosis (WBC 16600, N 80%, L 11%), elevated fibrinogen and ESR, and hypoglycemia (38 mg/dL). Macroscopic hematuria was evident, while urinocolture was negative. Contrast enhanced CT scan of the abdomen and pelvic region revealed a large round neoformation dislocating the bladder, with an evident contrast-enhanced periphery and a central necrotic area. Continuous infusion of glucose 5% solution was necessary in order to maintain blood glucose levels above 50 mg/dL. The patient underwent complete surgical resection of an ovoidal mass coated by adipose tissue, with well delimited margins; histological findings were consistent with *solitary fibrous tumor* (SFT). Hypoglycemia resolved completely with removal of the growth. In this case report we describe a SFT growing in the bladder, a quite rare localization, which presented a unique hypoglycemia. In contrast to the majority of cases reported in the literature, the behavior of this SFT was not aggressive, and, since the patient is still alive, surgical resection was considered conclusive.

Introduction

Solitary fibrous tumor (SFT) is a rare mesenchymal neoplasm: it was first described in 1931 by Klemperer and Rabin as a *distinct mesothelial tumor arising from the pleura*.[1] Despite this first description, SFTs have been reported in numerous other extraserosal sites, thus supporting the tumor's mesenchymal rather than mesothelial origin.[2] For this reason, it is now distinguished into two entities, pleural and extrapleural, which morphologically resembling each.

Extrapleural SFTs are observed in middle aged adults (between 20 and 70 years, median 50 years), and affect both sexes equally. Occasional cases can occur in adolescents. They can be found in any location: to the best of our knowledge, nearly 40% are found in subcutaneous tissues, while others are found in deep soft tissues of the extremities, in the head and neck region (including larynx, hypopharynx, parapharyngeal space, tongue, orbit, paranasal sinuses and nasal cavity), meninges, orbit, thoracic wall, mediastinum, pericardium, peritoneum, pelvis, adrenal glands, liver and urogenital system.

Abdominal localizations are quite rare: of the 160 cases appearing in the literature, 28 have been reported in the liver, 25 in the prostate, 20 in the kidneys, 12 in the retroperitoneum, and only 10 in bladder; other localizations are anecdotal.

Clinically, it is a slow-growing, painless, well-delineated exophytic mass; large tumors can be due to compression symptoms, while rarely they are the source of paraneoplastic syndromes (i.e., hypoglycemia secondary to insulin-like growth factor). The dimensions of a SFT can vary from 1 to 25 cm in diameter.

Case Report

In April 2006 a 74-year-old white male presented with chills, diaphoresis and acute abdominal pain with hematuria. He was not diabetic, was a smoker (about 30 cigarettes/day) and in 2005 had undergone a complete surgical resection of a vesical leiomyoma. On admission to our emergency department he underwent an abdominal X-ray (which showed no pathological findings) and an ultrasound examination of the kidneys and urinary tract, which revealed a pelvic hyperechogenic neoformation that measured approximately 10×8×7 cm and that compressed bladder. Blood chemistry at admission revealed only a mild neutrophilic leukocytosis (WBC 16600, N 80%, L 11%), elevated fibrinogen and ESR, and hypoglycemia (38 mg/dL). Macroscopic hematuria was evident, while urinocolture was negative. Contrast enhanced CT scan of the abdomen and pelvic region revealed a large round neoformation dislocating the bladder, with an evident contrast-enhanced periphery and a central necrotic area (Figure 1). Continuous infusion of glucose 5% solution was necessary in order to maintain blood glucose levels above 50 mg/dL. The patient underwent complete surgical resection of an ovoidal mass coated by adipose tissue and with well delimited margins (Figure 2). Histological findings were consistent with SFT. The patient underwent radical excision of the neoplasm and has since not been treated with any further therapies. He is still alive without any clinical-radiological evidence of recurrence. Hypoglycemia resolved completely with removal of the neoplasm.

Discussion

The histological appearance of SFT may resemble and overlap with other benign and malignant diagnostic entities, such as hemangiopericytoma, leiomyoma, nodular fasciitis, inflammatory myofibroblastic tumor, fibromatosis, and benign peripheral nerve sheet tumor.[3] It must be noted that tumors with similar features have been described in literature with different names, thereby creating some confusion among pathologists and clinicians.

The unifying morphological criterion of all these lesions is represented by a well-circumscribed, tan-colored, rubbery mass, which is often tethered by a pedicle and partially encap-

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sulated. Microscopically it is described as a *patternless* proliferation of bland-looking spindly to oval epithelioid cells that form short fascicles and/or clusters, admixed with thick or thin collagen bands, and a prominent branching vasculature. Mature adipocytes and giant multinucleated stromal cells may be present.[3,4] Mitoses are generally scarce, rarely exceeding 3 mitoses per 10 hp fields.

Malignant counterparts are usually hypercellular lesions, showing variable cytologic (focally moderate to marked) atypia, tumor necrosis, infiltrative margins and higher frequency of mitoses.[5] Immunohistochemical staining for vimentin, Bcl2, CD 99 and CD34 immunoreactivity isperformed in order to discriminate SFT from other neoplasms; it is usually completely negative for S-100 protein, cytocheratin AE1/AE3 and neurofilaments. In some cases immunohistochemical negativity has been reported for c-kit, CAM 5.2, factor XIIIa, HMB-45, AE-1, SMA, CD31, and Fli-1.[6,7]

One classification distinguishes SFT into two subcategories: fibroblastic and myofibroblastic. The latter strongly express alfa smooth-muscle actin and desmin, while the former do not.[8] Solitary fibrous tumors are karyotipically variable, and currently available data do not evince any anomalies that are common to or characteristic of these lesions. Cytogenetic data are very limited and suggest predominantly structural abnormalities and numerical imbalances.[9]

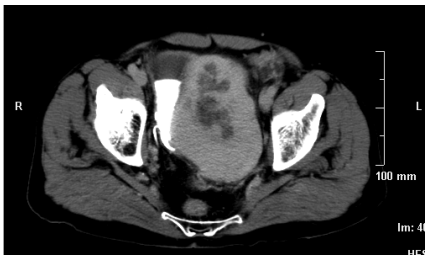

Figure 1. Computed tomography scan of the abdomen with the mass.

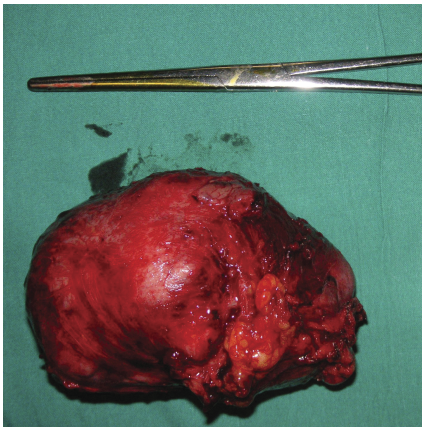

Figure 2. The mass after surgery.

The tumour is difficult to detect because it has no typical radiologic features: on X-ray it appears as a moderately radio-opaque mass; on ultrasonography as a nodule with generally well-defined borders and a homogeneous echostructure. In addition to these means, second-level imaging techniques, such as contrast-enhanced CT scan and MRI, are usually performed: the former reveals a well-defined capsule surrounding a nearly homogeneous mass with progressive enhancement from the arterial to the venous phase and occasionally multiple small non-enhancing portions.[10]

Despite their unpredictable behavior, 10-15% of SFTs are aggressive. Local recurrence or onset of metastasis depends mainly on the following prognostic parameters: histological features (nuclear atypia, increased cellularity, necrosis, and more than 4 mitoses per 10 HPF), localization (approximately 10 to 15% of SFTs located outside the thoracic cavity are recurrent or metastatic), dimensions (>10 cm) and resectability (the most important).

Although most SFTs are characterized by a non-aggressive clinical course, malignant transformation and a large size have been associated with a poor outcome, thus making long-term follow-up in all cases strongly advisable. Lesions located in the mediastinum, abdomen, pelvis or retroperitoneum tend to behave more aggressively than those in the limbs. Metastases are most often reported in the lungs, bone and liver.

Non islet-cell hypoglycemia (Doege Potter syndrome) due to the production of high molecular weight insulin-like growth factors[11] is the most frequent associated paraneoplastic syndrome: it is described in only 40 of all cases of SFT reported in the literature,[11] but in nearly 70% of these it has a malignant behavior or a poor survival from diagnosis (30% have a benign behavior or no reported deaths during follow-up). Bladder localizations with associated hypoglycemia are very rare.

Because of the unpredictable behavior that SFTs display and the lack of consistent data in literature, surgery is considered the treatment of choice whenever possible. The use of chemotherapy is reserved to metastatic or symptomatic non-resectable SFTs, but there are no standard chemotherapeutic indications or regimens. Even though SFTs are considered relatively chemoresistant, the most effective drugs seem to be anthracyclines and ifosfamide, followed by gemcitabine and dacarbazine, which are commonly used in soft tissue sarcomas.[12,13]

Radiation therapy is of some benefit, when applicable, also in combination with chemotherapy.[14] The novel targeted drug imatinib mesilate seems to exert some activity on SFT expressing the wild type platelet-derived growth factor receptor-β: its *in vitro*[15] and *in vivo*[16] inhibitory activity in chemo- and radioresistant malignant SFT has recently been reported.

Conclusions

In this case report we describe a SFT growing in the bladder, a quite infrequent localization, which presented a unique associated hypoglycemia.

In contrast with the majority of cases reported in the literature, the behavior of this SFT was not aggressive. Surgical resection was considered conclusive, given that the patient is still alive, despite the initial presentation with paraneoplastic syndrome.

In view of the recent introduction of *targeted therapies*" in cancer treatment and the rarity of this neoplasm, further efforts are needed in order to collect a critical mass of biopsy specimens and to perform more exhaustive anatomopathological and molecular examinations.

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