

Soft Tissue Sarcoma of Male Genitourinary Tract

Santosh Kumar^{1*} and Aditya Prakash Sharma¹

¹Department of Urology, Nehru Hospital, India

***Corresponding author:** Santosh Kumar, Department of Urology, PGIMER, Chandigarh, Nehru Hospital, PGIMER, Chandigarh-160012, India, Tel: +91-9417374067; Email: santosh-sp1967jaimatadi@yahoo.co.in

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Soft tissue sarcomas of genitourinary tract are rare tumors in adults accounting for about 2.1% of sarcomas and 1% to 2% of malignant GU tumors [1,2]. However they are common in children and comprise about 8-10% of malignancies in children less than 15 years of age [3]. Due to the rarity of this disease there are no large clinical trials available. The largest series published till date in by Dotan et al from MSKCC who published a 25 years experience of managing 131 such patients [4]. The earlier published largest series was from the same centre comprising only 43 patients [5]. Another multicentre study published from Italy reported 22 patients of genitourinary sarcoma [6].

EPIDEMIOLOGY

Soft tissue sarcomas have been claimed to be common in males as compared to females [4-6]. In the largest series from Memorial Sloan Kettering Cancer Centre (**MSKCC**) 87% patients were males [4]. It is probable that this data is showing falsely high value as it has not taken into account the soft tissue sarcomas of female genital tract (e.g. leiomyosarcomas of uterus). In adult men maximum (44%) sarcomas were of paratesticular region followed by kidney (20%), prostate (16%) and bladder (15%) [4].

In a multicentric study published by Mondiani et al included 22 patients (18 males and 4 females) [6]. The mean age at diagnosis was 61 ± 21.5 years (range: 15.3–89.1). The most common site was paratesticular (40.9%), followed by kidney (36.4%), prostate (13.6%) and penis and

bladder (4.6%). The most common histological type in their study was leiomyosarcoma (36.7%), followed by liposarcoma (27.3%), rhabdomyosarcoma (13.6%) and other histological types (22.7%). At the last followup (mean: 3.66 ± 3.25 years), 50% patients were still alive. There were no significant differences in survival according to sex, age or histological type. They also found a significant difference in survival based on size and grade of the tumor ($p = 0.0006$ and $p = 0.01$).

Histologically most common soft tissue sarcoma in GU tract as already mentioned is leiomyosarcoma (29%) followed by liposarcomas (26%) [4]. these tumors are high grade tumors and are larger in size. The relatively poor prognosis of GU sarcomas can also be explained by high grade tumors, larger tumor size, and the proportion of patients who present with advance presentations. Tumor grade is a well established adverse prognostic factor in STS and it was incorporated into the American Joint Committee on Cancer staging system for soft tissue sarcoma (Table 1) [7]. High grade tumors were noted in 78% of the series from MSKCC, which is much higher than the 59% incidence of high grade sarcomas at other anatomical sites.

Table 1: TNM Classification for Soft Tissue Sarcoma (AJCC 7).

Primary tumor (T)				
TX	Primary tumor cannot be assessed			
T0	No evidence of primary tumor			
T1	Tumor ≤ 5 cm in greatest dimension*			
T1a	Superficial tumor			
T1b	Deep tumor			
T2	Tumor > 5 cm in greatest dimension*			
T2a	Superficial tumor			
T2b	Deep tumor			
*The superficial tumor is located exclusively above the superficial fascia without invasion of the fascia; the deep tumor is located in any of the following: exclusively beneath the superficial fascia, superficial to the fascia, with invasion of or through the fascia, or both superficial to and beneath the fascia.				
Regional lymph nodes (N)				
NX	Regional lymph nodes cannot be assessed			
N0	No regional lymph node metastasis			
N1	Regional lymph node metastasis†			
† The presence of positive nodes (N1) in M0 tumors is considered stage III.				
Histologic grade (G)				
GX	Grade cannot be assessed			
G1	Grade 1			
G2	Grade 2			
G3	Grade 3			
Stage	T	N	M	Histologic grade
Stage IA	T1a	N0	M0	G1, GX
	T1b	N0	M0	G1, GX

Stage IB	T2a	N0	M0	G1, GX
	T2b	N0	M0	G1, GX
Stage IIA	T1a	N0	M0	G2, G3
	T1b	N0	M0	G2, G3
Stage IIB	T2a	N0	M0	G2
	T2b	N0	M0	G2
Stage III	T2a, T2b	N0	M0	G3
	Any T	N1	M0	Any G
Stage IV	Any T	Any N	M1	Any G

STAGING

All the genitourinary tract tumors are located beneath the deep fascia and are intrabdominal (except Penile and paratesticular sarcomas) and are thus by definition advanced. Majority of them are larger than 5 cm and are found to have higher grade than extremity sarcomas. Thus, these features portend a poor prognosis for the GU sarcomas.

The use of the TNM classification in the staging of sarcomas does not sufficiently predict the prognosis. Therefore, the histological grade is determined based upon the scoring system of the French Federation of Cancer Centers Sarcoma Group (Table 2) [8,9].

Table 2: Grading system based upon the French Federation of Cancer Centers Sarcoma Group.

Tumor differentiation	Mitotic count	Tumor necrosis	Histological grade
Score 1, good	Score 1, 0-9 mitoses per 10 HPF	Score 0, no necrosis	Grade 1, total score 2,3
Score 2, intermediate	Score 2, 10-19 mitoses per 10 HPF	Score 1, <50% tumor necrosis	Grade 2, total score 4,5
Score 3, poor	Score 3, ≥20 mitoses per 10 HPF	Score 2, ≥50% tumor necrosis	Grade 3, total score 6,7,8

IMAGING

The most useful modalities for genitourinary tumors including sarcomas remain CT scan and MRI [10]. MRI has distinct advantage over CT scan in extremity tumors as it provides better delineation between the tumor and the soft tissue such as muscle and blood vessels [11]. In pelvis the MRI is said to score over the CT scan due to its multi planar imaging. However, in retroperitoneum and abdomen no distinct advantage is offered by MRI. MRI also scores over CT scan in case of delineating vascular invasion.

Newer modalities to distinguish malignant from benign lesion have been under investigation. MR spectroscopy using P31 isotope has been advocated to distinguish both on basis of inorganic / organic phosphorus levels in the tissue [12]. Another potential application of this modality remained to determine the in vivo response to chemotherapy of the sarcoma.

PET scan has a definitive role in sarcoma management in cases of recurrent tumors and in case of monitoring response to chemotherapy [13,14]. Another modality is radionuclide scintigraphy using isotopes such as Ga 67 and Thallium 201. Ga 67 has been the commonly used in identifying undetectable clinical metastasis earlier. However, with advent of PET scan this modality is now obsolete [15].

KIDNEY

Sarcomas of kidney are rare and account for 1% to 2% of all malignant renal tumors in adults. The peak incidence is in the fifth decade of life [16,17]. Leiomyosarcoma followed by rhabdomyosarcoma remain the commonest tumor pathologies. Renal sarcoma although less common is more lethal than sarcoma of other genitourinary site, including the prostate, bladder, paratesticular and spermatic cord [18]. Differentiation of renal sarcoma from sarcomatoid RCC is of importance but is often difficult on the basis of clinical presentation, radiographic findings, and even on pathological analysis. Identification of any of the subtypes of RCC in histopathology excludes the diagnosis of primary renal sarcoma.

Carcinosarcoma of renal pelvis has also been described in less than 20 cases (Figure 1) [19]. Carcinosarcomas are composed of both epithelial and sarcomatous components, while sarcomatoid carcinomas are malignant spindle cell neoplasms composed of epithelial components containing changes of sarcomatoid morphology [20]. Microscopically, the carcinomatous component is mostly transitional cell carcinoma and the sarcomatous component is largely composed of spindle or pleomorphic tumor giant-cells (Figure 2). Carcinosarcomas and sarcomatoid carcinomas are similar on hematoxylin eosin staining, so immunohistochemical study is mandatory for diagnosis. Immunohistochemistry becomes important as it reveals epithelial component expressing cytokeratins while sarcomatous component express vimentin and S-100 (Figure 3).

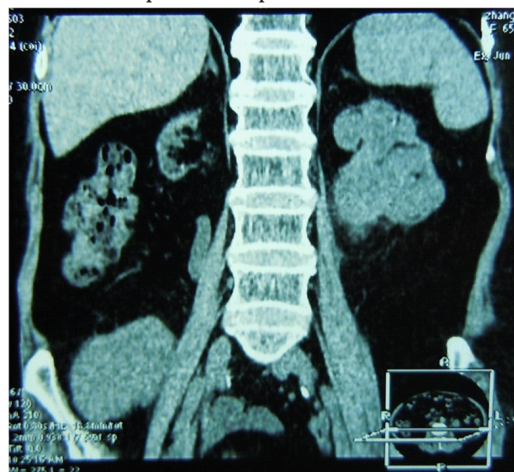


Figure 1: Computed tomography (CT) scan revealed a 5 cm × 4 cm lesion in the left pelvic region which turned out to be carcinosarcoma. Reprinted with permission from: Wu et al. World Journal of Surgical Oncology. 2014; 12: 407.

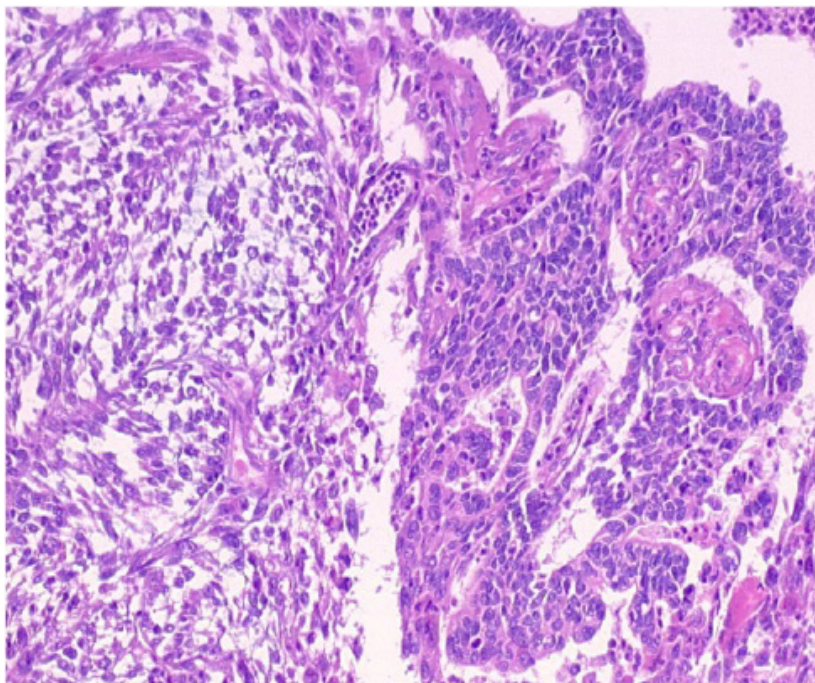


Figure 2: Pathological examination of the lesion. Reprinted with permission from: Wu et al. World Journal of Surgical Oncology. 2014; 12: 407.

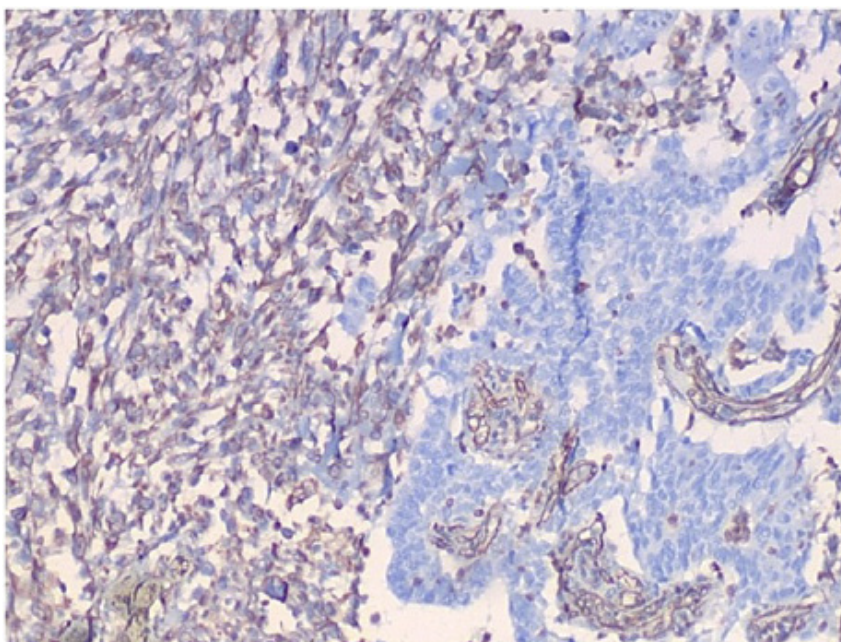


Figure 3: Immunohistochemical examination of the vimentin. Reprinted with permission from: Wu et al. World Journal of Surgical Oncology. 2014; 12: 407.

Ewing's sarcoma or primitive neuroectodermal tumor is another rare variant of sarcoma. The diagnosis of primary renal Ewing's sarcoma is usually made postoperatively and requires histological examination, with a combination of immunohistochemical and molecular techniques [21,22]. Ewing's sarcoma belongs to the blue small round tumors due to its cellular morphology on histopathology (Figure 4). Immuno histochemistry shows CD99 positivity (Figure 5). Molecular techniques include FISH analysis (Figure 6) revealing EWS gene rearrangements, including the t (11;22)(q24;q12) translocation resulting in the EWS-FLI-1 fusion gene. Mukkunda et al [23] have reviewed ewing's sarcoma of kidney and found aggressive treatment with radical nephrectomy and adjuvant combination chemotherapy is recommended, in line with the management of Ewing's family tumors at other sites, but in spite of multimodality treatment the outlook remains poor.

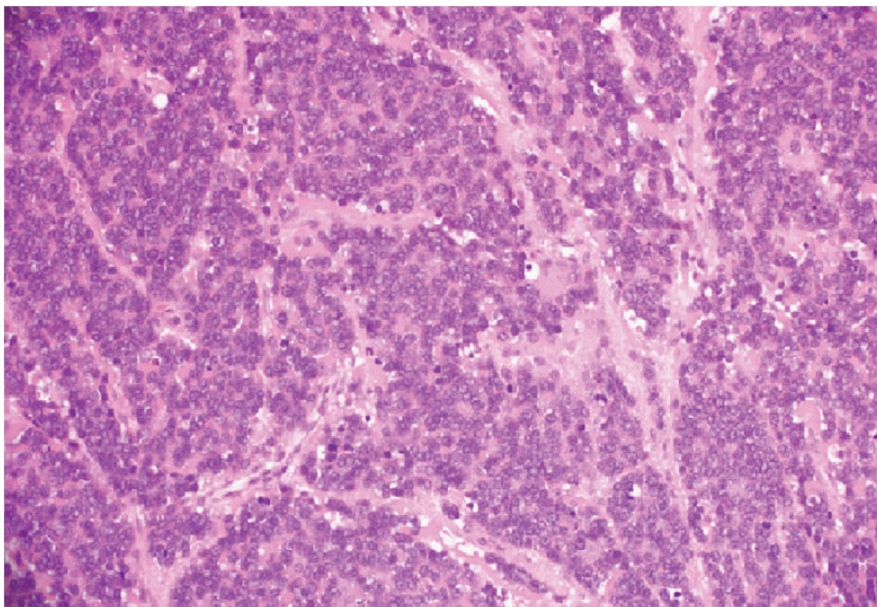


Figure 4: Histopathology of a nephrectomy specimen Ewing's sarcoma. haematoxylin and eosin stain, showing tumor composed of sheets of small round cells with uniform round nuclei and scanty cytoplasm ($\times 200$). Reprinted with permission.Mukkunda et al. Hindawi Publishing Corporation.Sarcoma. 2009;, Article ID 504654.

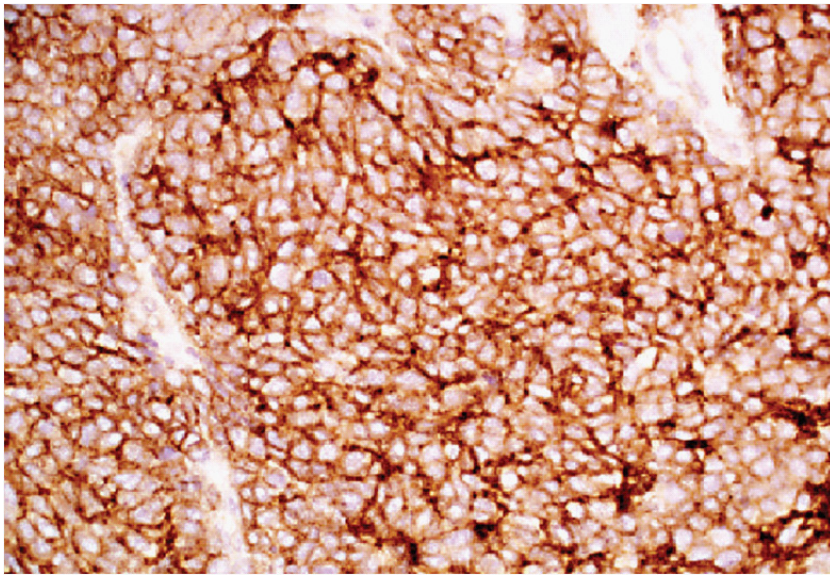


Figure 5: Immunohistochemistry showing diffuse membranous positivity of cells for CD99 (×400). Reprinted with permission.Mukkunda et al. Hindawi Publishing Corporation.Sarcoma. 2009; Article ID 504654.

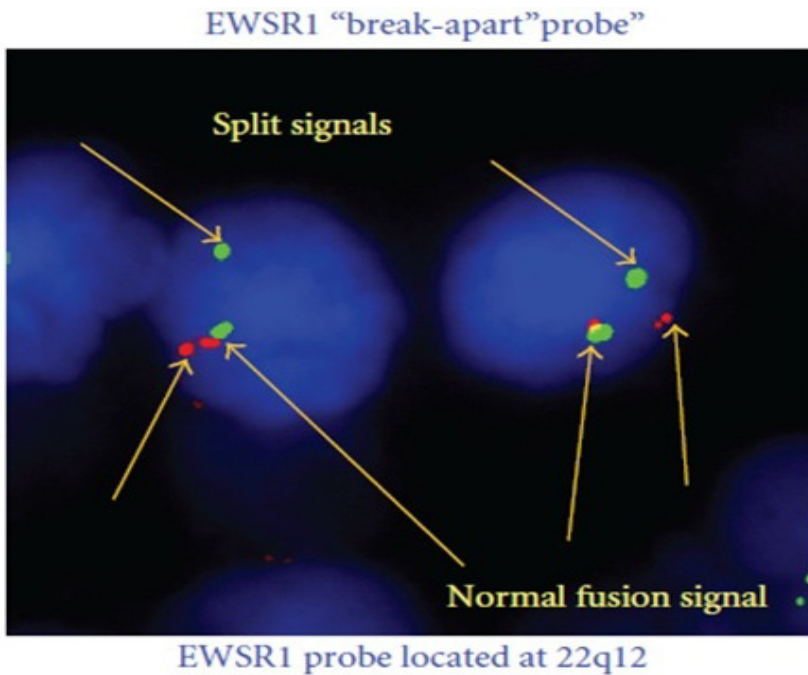


Figure 6: FISH analysis using Vysis LSI EWSR1 Dual Color Break Apart Rearrangement Probe for 22q12, showing EWS gene rearrangement EWSR1 "break-apart" probe EWSR1 probe located at 22q12 split signalsnormal fusion signal. Reprinted with permission.Mukkunda et al. Hindawi Publishing Corporation.Sarcoma. 2009; Article ID 504654.

The common presentation of renal sarcoma in adults include abdominal or flank pain, palpable mass and hematuria. These are similar to those seen with large, rapidly growing RCCs [24]. CT typically shows a large soft tissue mass derived from the kidney similar to sarcomatoid variant of RCC's [18,25]. It is characterized by apparent origin from the capsule or perisinuous region, absence of lymphadenopathy, presence of fat or bone suggestive of liposarcoma or osteosarcoma, and most importantly hypovascular pattern on CT angiography are suggestive of renal sarcoma. One notable exception which is hypervascular is the hemangiopericytoma[25].

They tumors are surrounded by a pseudocapsule that is readily identifiable but that cannot be relied on for surgical dissection [26]. It is often infiltrated with cancer cells, which can extend for some distance into the surrounding tissues leading to R1 resections at best. In many cases this cannot be recognized macroscopically, although it is often manifested in the form of local recurrences, which are common after surgical extirpation, even when a wide excision has been, performed [27]. High-grade sarcomas often metastasize, with primary site being the lungs, and portending a poor prognosis. Progression to death is in a matter of months. Low-grade sarcomas take a more indolent course, although local recurrences often require repeat resection to prolong survival and minimize morbidity. The most important prognostic factors for sarcomas remain margin status and tumor grade.

The initial resection is the key event because, for many patients, and R0 resection offers the best chance for a long-term cure. For renal sarcomas this is done by performing a radical nephrectomy along with en bloc excision of adjacent organs i.e colon, spleen or pancreas (for left sided tumors) and liver resection(for right sided tumors).[28]

Chemotherapeutic agents that have demonstrated activity against metastatic sarcomas include doxorubicin and ifosfamide, but even in the best of circumstances response rates are disappointing [28]. The combination of radiation therapy and chemotherapy, which has proved effective in an adjuvant setting for the management of sarcomas of the extremity, has not provided much benefit for renal or retroperitoneal sarcomas [18]. At present, the role of such adjuvant approaches for the management of renal sarcomas is not well defined, although a multimodal approach is warranted.

URETER

Primary leiomyosarcomas of ureter are very rare tumors and less than 25 cases reported in world literature so far [29]. Because of the rare nature of these tumors they are typically treated by excision with adjuvant therapy that is based on the experience with tumors of similar histology occurring elsewhere in the body.

An important aspect of the management of leiomyosarcoma is to differentiate the lesion from rhabdomyosarcoma and other spindle-cell neoplasms. This is especially difficult with poorly differentiated high-grade lesions [30]. On immunohistochemistry, leiomyosarcoma is negative for epithelial markers (cytokeratins and epithelial membrane antigens).

Wide local excision (Figure 7, Figure 8) is considered the treatment of choice with radiation and chemotherapy being offered to patients with positive margins or nodes, or those with bulky disease [31,32]. Radiotherapy can be considered for larger tumours and/or positive margins, if anatomically feasible. Adjuvant chemotherapy has not been proven to be effective and remains investigational [31,32]. Radiotherapy can be considered for larger tumours and/or positive margins, if anatomically feasible. Treatment for metastatic disease is palliative. Active agents include doxorubicin, ifosfamide, gemcitabine and docetaxel.



Figure 7: Large leiomyosarcoma of ureter.

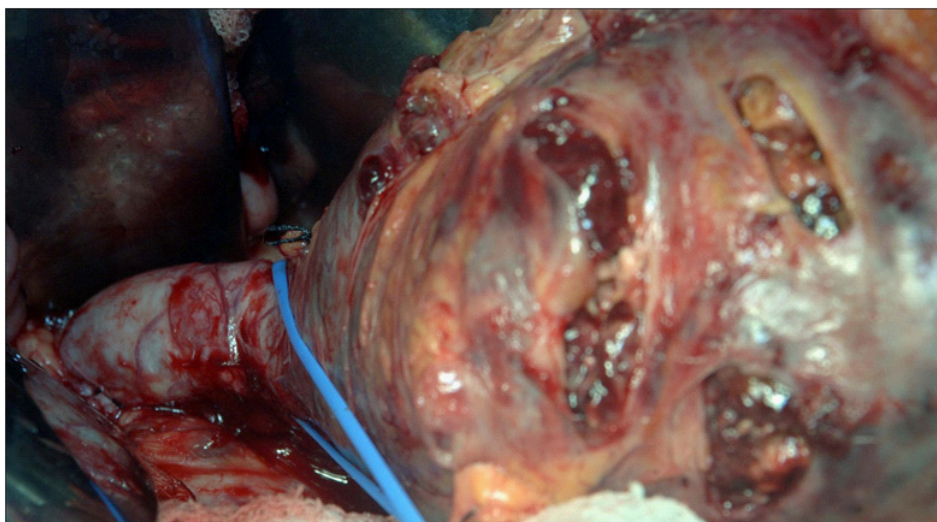


Figure 8: Intraoperative photograph of ureteric leiomyosarcoma.

BLADDER

Sarcomas are the most common mesenchymal tumor comprising less than 1% of all bladder cancers [4,33]. Leiomyosarcoma is the most common histologic subtype similar to other GU sarcomas, followed by rhabdomyosarcoma and then, rarely, angiosarcoma, osteosarcoma, and carcinosarcoma [33].

It is more common in males and is the disease of elderly mostly seen in 6th decade of life. There is an association with pelvic radiation and systemic chemotherapy for other malignancies to the bladder sarcomas [34]. They are unrelated to smoking. Majority of sarcomas are high-grade, and more than three fourth of tumors will be confined to bladder muscle [4].

The most common presenting symptom is gross painless hematuria, followed by irritative LUTS. An abdominal and chest imaging is necessary for diagnosis and staging. Transurethral resection which reveals a normal overlying urothelium is necessary for proving the diagnosis. The grade of the sarcoma is the primary prognostic factor and incorporated into the overall sarcoma staging system [4]. Treatment for localized disease includes radical cystectomy with a R0 resection because the local recurrence rate is 2.4 times higher in patients with a positive surgical margin [4]. The overall 5-year disease-free survival rate for leiomyosarcoma of the bladder is reported between 52% to 62% [35]. Angiolymphatic invasion and metastatic disease at the time of presentation portend poor prognosis for these patients.

Chemotherapeutic regimens used for bladder sarcomas comprise of doxorubicin, ifosfamide, and cisplatin [4,34]. The most common site for metastatic disease is lung, followed by bone, liver, and, rarely, soft tissue organs. Rhabdomyosarcomas may occur at any age, but in young children, they produce polyploid lesions at the base of the bladder, described as botryoides tumors. Multimodality therapy combining chemotherapy with surgical resection and radiation are used in the treatment of pediatric rhabdomyosarcomas [36].

PARATESTICULAR AND SPERMATIC CORD SARCOMAS

Paratesticular and spermatic cord soft tissue sarcomas although rare are the commonest adult soft tissue sarcomas of GU tract [4,6]. Mostly the presentation will be a painless inguinal, scrotal or inguinoscrotal mass. Most common histopathology in children is rhabdomyosarcoma while in adults liposarcomas are the commonest histopathological diagnosis. While all the other sarcomas viz. leiomyosarcomas, fibrosarcomas, malignant fibrous histiocytoma and rhabdomyosarcoma occur in almost equal distribution in adults [4,6].

Dotan et al reported 57 patients of paratesticular and spermatic cord sarcomas [4]. Moindiani et al reported nine patients (6 right/3 left) presented with scrotal or groin mass, in one case associated to hydrocele [6]. The mean diameter of the tumour was 5 cm (3.5; range 1.5–18.5). The most common histological type was liposarcoma (n = 5, 55.6%), followed by leiomyosarcoma (n = 2, 22.3%), and rhabdomyosarcoma and malignant fibrous histiocytoma with 1 case for each histological type (11.1%). Four cases (44.4%) were classified on lower level according to FFCC–

Broders classification. All patients underwent surgical resection of the tumour with radical orchiectomy, while doxorubicin-based chemotherapy was applied in two cases (rhabdomyosarcoma and fibrous histiocytoma). None of the patient underwent retroperitoneal lymph node dissection. Three out of 9 cases (33.3%) died during the follow-up with one recurrence treated by surgery alone.

Another rare sarcoma is myxofibrosarcoma of the spermatic cord is a very rare condition with only ten cases reported so far (Figure 9, Figure 10) [37]. Myxofibrosarcoma is a group of fibrolastic lesions with variability in the the amount of myxoid stroma and representing a distinct clinicopathological entity. It is one of the subtypes of malignant fibrous histiocytoma (Figure 11).

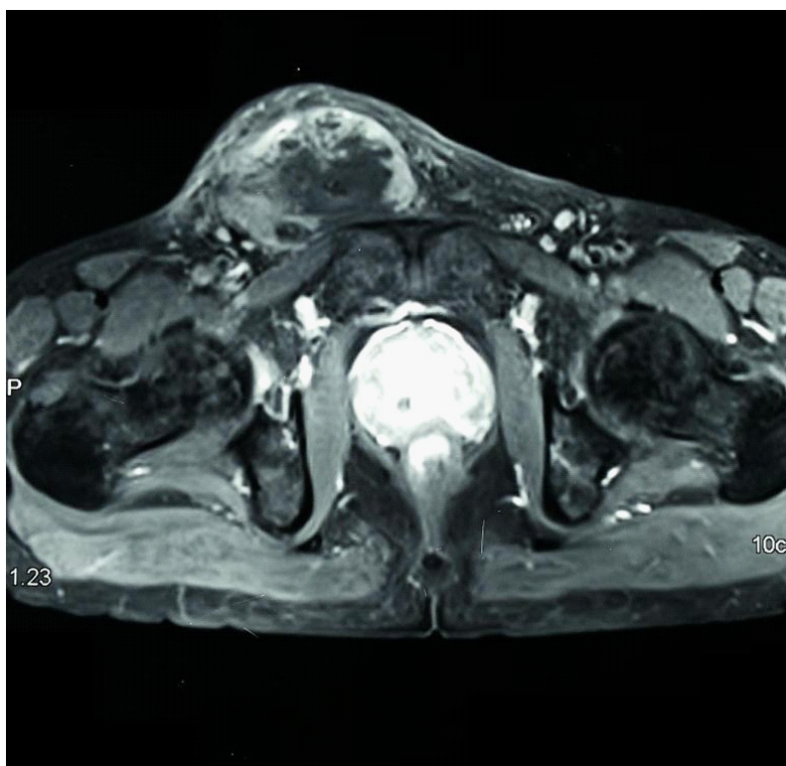


Figure 9: MRI image of Paratesticular malignant fibrous histiocytoma.

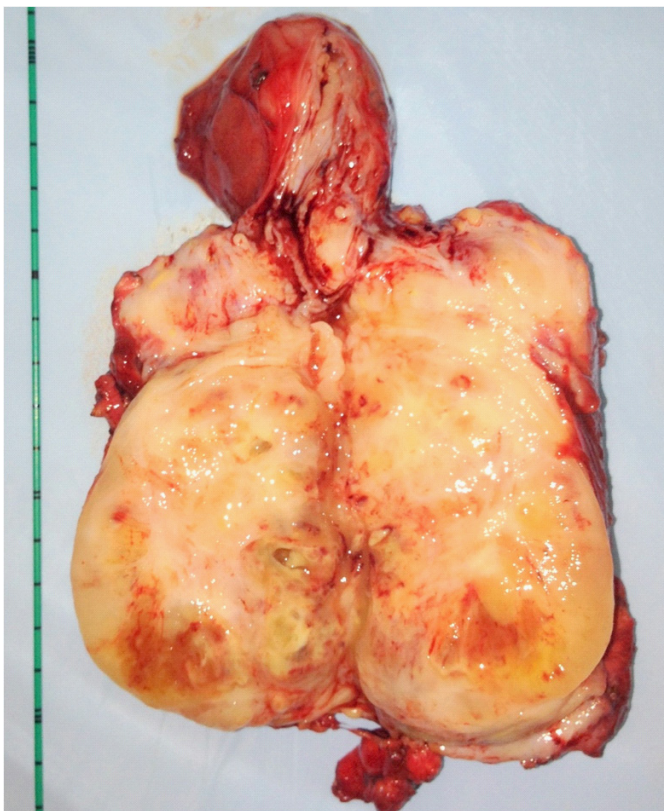


Figure 10: Operative specimen cut section of paratesticular soft tissue sarcoma.

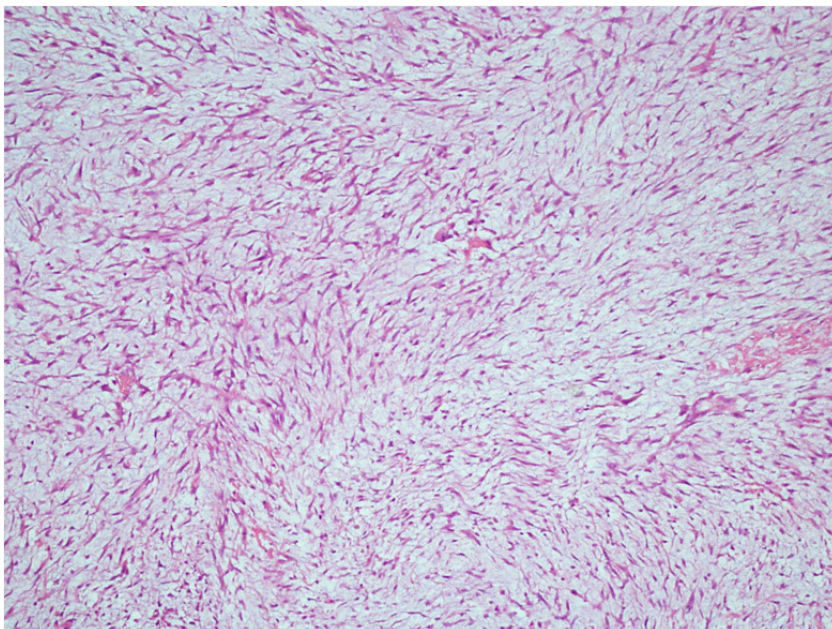


Figure 11: Histopathology showing spindle cell morphology of myxofibrosarcoma.

The treatment of choice for paratesticular sarcomas is radical or high inguinal orchiectomy. There is role of retroperitoneal lymph node dissection in paratesticular rhabdomyosarcoma as the incidence of lymph node metastasis in this variant is almost 40% [38]. Rest all variants have predominantly hematological spread. In case of paratesticular rhabdomyosarcoma a significant false negative rate of detection of lymph nodal metastasis has been found. Thus, a unilateral template dissection is recommended in clinically negative lymph node [39,40]. However, in case of positive lymphadenopathy on CT scan a formal retroperitoneal lymph node dissection is recommended. Patients with positive RP lymph nodes receive systemic chemotherapy. Most commonly used therapy is VCD regimen (Vincristine, Cyclophosphamide and Dactinomycin). Adriamycin is added to the regimen in case of upfront metastatic patient. The reported 5-year survival approach almost 60% for paratesticular tumors [4]. Survival rates are markedly improved compared to the prechemotherapy era. There are higher recurrence rates after scrotal orchiectomy thereby favoring the dictum that a solid tumor in paratesticular and spermatic cord area should be considered malignant unless proved otherwise.

SEMINAL VESICLE

Seminal vesicle malignancies are very rare and primary sarcomas are rarer. These are difficult to diagnose, because patients are typically asymptomatic until late in the course of the disease [41]. Serum PSA and tissue biopsies can help differentiate primary malignancies from extension/metastasis of lymphoma, prostate, bladder, or rectal cancer. Seminal vesicle is said to have low proliferative activity which leads to a lower incidence of seminal vesicle malignancy [42]. Sarcomas of the seminal vesicle, including leiomyosarcoma, rhabdomyosarcoma, angiosarcoma, and müllerian adenosarcoma-like tumor, behave very aggressively, and radical extirpation has varying outcomes. Patients may present with perineal discomfort and lower urinary tract symptoms predominantly obstructive. Masses are almost always palpable on digital rectal examination. A biopsy is usually done before the surgical enterprise. The optimal management protocol is still debated because of rarity of the tumor. Large radical pelvic surgery: cystoprostatectomy with pelvic lymphadenectomy or pelvic exenteration have been done for these tumors [42].

PROSTATE

Sarcomas of the prostate account for 0.1% to 0.2% of all malignant prostatic tumors [43]. In the MSKCC series 16 % of STS were prostatic sarcomas [4]. Histopathologically, rhabdomyosarcoma of prostate are common in children while leiomyosarcomas are the most common sarcomas involving the prostate in adults [44]. Most common presenting symptoms include hematuria, bladder outlet obstruction, perineal discomfort and constipation.

Prostatic stromal tumors, arising from the specialized prostatic stroma, are rare and distinct tumours with diverse histologic pattern. These tumors have been reported under a variety of terms including atypical stromal hyperplasia, phyllodes type of atypical stromal hyperplasia, and cystic epithelial-stromal tumors [45]. Now these lesions have been classified as lesions of

Uncertain Malignant Potential (**STUMP**) and stromal sarcoma (low grade and high grade) [46] (Figure 12-14). Their diagnosis is rarely suspected clinically because of their rarity and the nonspecific nature of clinical symptoms.

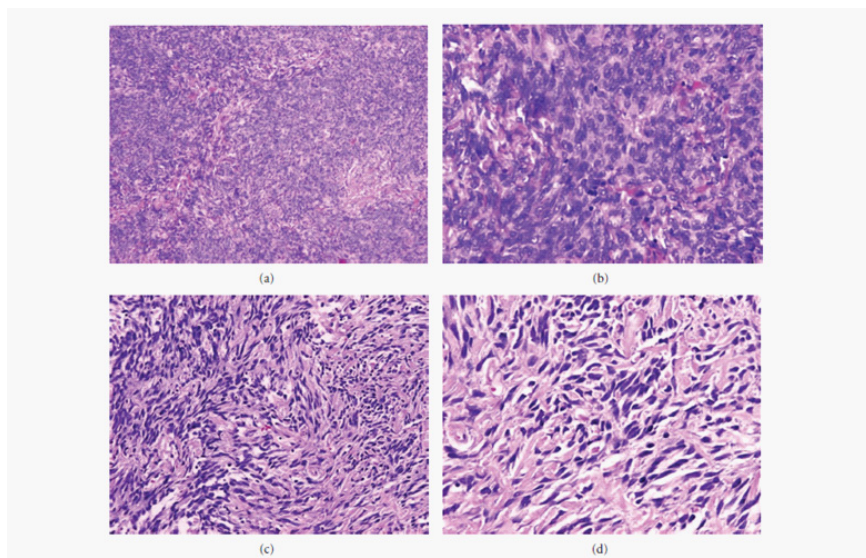


Figure 12: Histological features of low-grade prostatic sarcoma. Diffuse proliferation of epithelioid cells ((a) (10 XHPF) and (b) (40 XHPF)) and spindle cells, with a storiform and infiltrative growth pattern ((c) (20 XHPF) and (d) (40 XHPF)). From: Zamparese et al. Hindawi Publishing Corporation Case Reports in Pathology. Volume 2011; Article ID 252805.

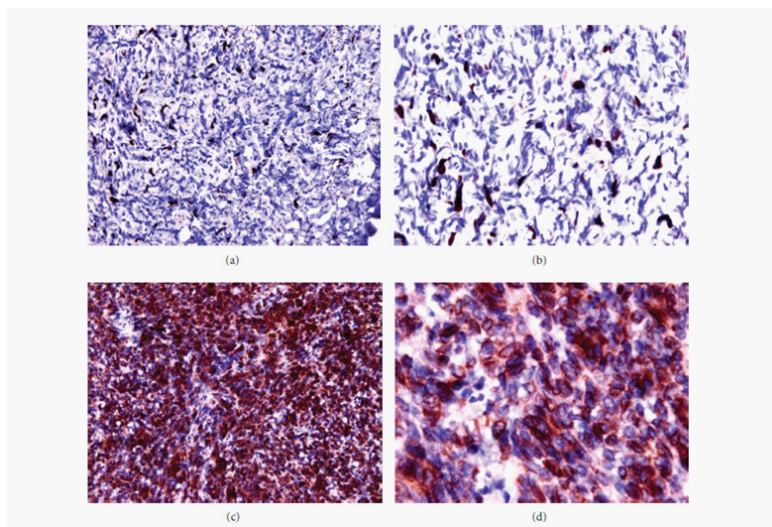


Figure 13: Immunohistochemical expression of CD34 and Ki67. Ki-67 showed a very low expression ((a) (20 XHPF) and (b) (40 XHPF)). The neoplastic cells express diffusely CD34 immunoreactivity ((c) (20 XHPF) and (d) (40 XHPF)). From: Zamparese et al. Hindawi Publishing Corporation Case Reports in Pathology. Volume 2011; Article ID 252805.

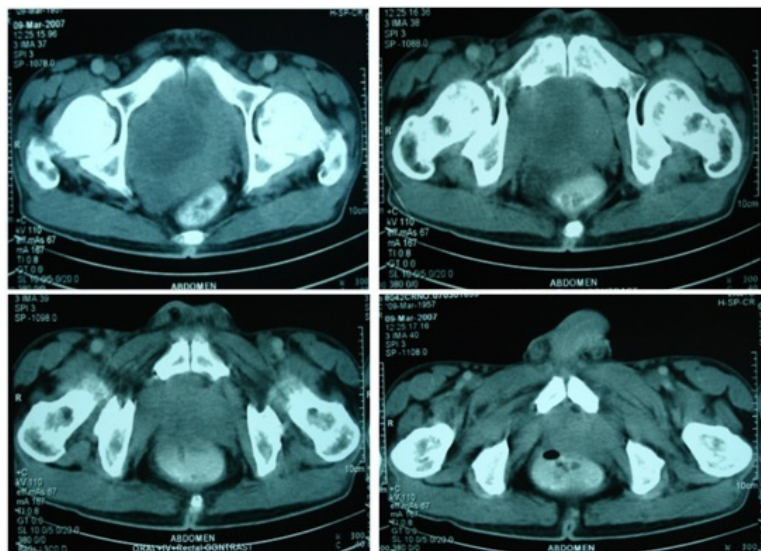


Figure 14: CT Scan showing large prostatic sarcoma which was leiomyosarcoma on histopathology.

Histologically the diagnosis of High grade prostatic sarcoma is based on observation of a neoplasm with a proliferation of epithelioid and spindle cells that showed different growth patterns (solid, storiform, epithelioid, short fascicles, spindled, rhabdoid, and malignant phyllode-like). The neoplastic cells showed marked nuclear atypia, mitosis, and necrosis [47]. Low grade prostatic sarcoma on the other hand showed no nuclear atypia and low mitotic rates, can locally invade, despite having relatively bland cytology at times. HG-PS has the potential to be metastasized.

In contrast to stromal sarcoma, the neoplastic nature of STUMPs is controversial. STUMPs may be considered neoplastic based on the observation that they may diffusely infiltrate the prostate gland and extend into adjacent tissues [47,48]. Mostly STUMP is not of an aggressive nature however occasional cases have been reported with an extension into adjacent tissues or recurrence [49]. The predominant histology of STUMP consists of normo cellular or mildly hypercellular stroma with cytologically degenerative atypical cells. Gaudin et al proposed the currently used classification of STUMP [50]. Four patterns of stroma were described: cellular stromal pattern , degenerative atypia , phyllodes pattern, and stromal predominant/ myxoid pattern. In STUMP, the degenerative atypia subtype was the most common pattern seen. Although STUMP can be histologically misdiagnosed as benign prostatic hyperplasia, it is important to recognize that these are neoplasms with unique local morbidity and malignant potential. In contrast to BPH, STUMP has potential for frequent recurrence and Is found in younger men.

There are also mesenchymal tumors of the prostate arising from the unique prostatic specialized stroma. These lesions range from prostatic stromal tumors of uncertain malignant potential to prostatic sarcomas. Primary Gastrointestinal Stromal Tumor (**GIST**) of prostate has also been reported. Rectal GISTs can secondarily involve the prostate gland and this phenomenon

should be excluded before considering a primary prostatic GIST [51]. Patients with localized disease are rare and may be offered radical prostatectomy. Most patients present with locally advanced tumor and need a radical cystoprostatectomy or total pelvic exenteration with diversion.

PENIS

Primary mesenchymal tumors of the penis are rare tumors with approximately 100 cases reported so far [4]. The presenting signs and symptoms of subcutaneous mass, penile pain and enlargement, priapism, and urinary obstruction were the same for both benign and malignant lesions. It has been reported to masquerade as a Peyronie plaque [52]. Malignant lesions were found more frequently on the proximal shaft tumors are more likely to be malignant as compared to the distally located tumors. The most common malignant lesions were those of vascular origin, followed in frequency by those of neural, myogenic, and fibrous origin [53]. Case reports of rarer sarcomatous lesions have been published, for example, malignant fibrous histiocytoma, angiosarcoma, leiomyosarcoma, epithelioid sarcoma and hemangioendothelioma.

Kaposi sarcoma of penis has risen following AIDS. It presents most commonly in HIV affected patients as bluish, poorly circumscribed sub centimetric nodules. It portends a very poor prognosis and has a fatal clinical course [54].

Sarcomas have been classified as superficial as per AJCC staging system when they arise from the integumentary supporting structures and as deep when they develop from the corporeal body supporting structures [55]. Wide, local surface excision and partial penile amputation for the superficial tumors have been suggested and used successfully in isolated case reports [56]. Total penectomy has been reserved for tumors of deep corporeal origin. However, local recurrences are characteristic of sarcomas [57]. Deep lesions at the base of the penis [58]. Radiation therapy has also been tried for treating the penile sarcomas.

URETHRAL SARCOMA

Anecdotal case reports of urethral sarcomas have been described. They have been located in the posterior urethra and presented with hematuria. They were treated with radical cystoprostatectomies and overall prognosis was found to be dismal [59,60].

ADJUVANT THERAPY

The adjuvant therapy use has been extrapolated from its use in extremity sarcoma due to rarity of GU sarcomas. The indications which have been described in literature are high grade tumors, large tumors with R1 or R2 resections or unfavorable anatomic sites such as prostate and kidney [4,6].

Multimodality treatment using chemoradiation or preemptive radiation prior to surgery has been recommended in select cases as used in a series published by Mayo clinic in a subset of 7 patients of bladder sarcoma. However, Surgery with R0 resection remains the gold standard even in present era pending improvement in the available chemotherapeutic drugs and radiation modalities [10].

PROGNOSIS AND PROGNOSTIC FACTORS

Extent of surgical excision and the stage of the tumor are the most important predictors of prognosis for genitourinary sarcomas similar to the other sarcomas. Ozturk reviewed other prognostic features for renal sarcoma which are summarized below in (Table 3) [61].

Table 3: Prognostic features of renal sarcomas.

Good prognostic features	Poor prognostic features
Complete surgical excision	Incomplete surgical excision
Solitary tumor	Multiple tumors
Diameter < 5 cm	Diameter > 5cm
Negative Lymph nodes	Positive lymph nodes
Sensitivity to Chemo/Radiotherapy	Presence of metastasis
	Recurrent tumor
Asymptomatic	Symptomatic patients
Pathological low grade	Pathological high grade
Good diifferentiation	Poor differentiation
Mitotic count < 9 mitosis/10 HPF	>20 /10HPF
Tumor necrosis <50%	Tumor necrosis > 50%
Low Ki – 67 proliferation index	High
	Rhabdomyosarcoma, vascular sarcomas, clear cell sarcoma, epitheloid sarcoma, Ewing's sarcoma or
	undifferentiated sarcoma
17q duplications	Overexpression of p16 and p53
1p33-p32.3 duplications	MED12 gene mutation
PRUNE2 expression	4q31 and 18q22 deletions
	Fumarate hydratase mutation
	c-Myc expression

Oztruk concluded that prognosis of renal sarcomas is difficult to predict due to rarity of these tumors. The most important positive prognostic feature for these tumors remains complete surgical resection. Due to the presence of multiple histological subtypes of sarcomas, the specified prognostic features have not been evenly randomized. The sarcomas exhibit a haphazard genetic and molecular structure. Previous studies, which have analyzed the overexpression of p16 and p53 genes, MED12 gene mutations, c-Myc expression, 4q31 and 18q22 deletions and FH mutations suggest that sarcomas possess a more complex molecular and genetic basis than is currently known or understood.

CONCLUSION

Soft tissue sarcomas of genitourinary tract are rare tumors accounting for about 2% of all STSs and 1% to 2% of all urological cancers. Prolonged disease specific survival is closely associated

with tumor histology, size and grade, the ability to achieve R0 resection and a lack of metastasis at presentation. Adjuvant therapy is almost always needed in high grade tumors or tumors with incomplete resection.

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