

CASE REPORT

Extensive lymph node involvement in classic renal angiomyolipoma: A case report and literature review

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ABSTRACT

Background: Renal angiomyolipoma (AML) is a benign mesenchymal neoplasm driven by biallelic inactivation of TSC genes. Regional lymph node involvement is rare in classic AML and may raise concern for malignancy or metastatic disease.

Case report: We present a case of a 43-year-old woman with a large, complex renal mass measuring 23 cm and extending across the midline, radiologically concerning for either AML or liposarcoma. The patient had no clinical or genetic evidence of tuberous sclerosis. Due to the risk of hemorrhage, arterial embolization was attempted but was unsuccessful, necessitating right radical nephrectomy. At surgery, several retroperitoneal lymph nodes were noticeably enlarged. An intraoperative frozen section revealed only classical AML component without any epithelioid elements, providing reassurance to minimize the extent of lymph node dissection. Histopathologic examination confirmed classic AML with involvement of nineteen regional lymph nodes. No evidence of epithelioid morphology or malignancy was identified. The patient recovered uneventfully and remains disease-free on follow-up.

Conclusions: Lymph node involvement in AML should not be misinterpreted as metastasis. According to current WHO consensus recommendations, such findings are best interpreted as multicentric tumor spread rather than metastasis. Awareness of this phenomenon is critical for surgical decision making, to avoid overtreatment and misclassification as renal cell carcinoma (RCC) metastasis.

Key Words: Renal, Angiomyolioma, Lymph node involvement

1. INTRODUCTION

Renal angiomyolipoma (AML) is a benign mesenchymal neoplasm composed of variable amounts of adipose tissue, spindled smooth muscle cells, and dysmorphic thick-walled blood vessels. Although most AMLs arise sporadically, they are also a common manifestation of tuberous sclerosis complex (TSC; OMIM 191100). AMLs are associated with biallelic loss of *TSC1* (9q34; encoding hamartin) or

TSC2 (16p13.3; encoding tuberin) genes.^[1] Relative to sporadic AMLs, TSC-associated tumors present at a younger age and are more often multifocal, bilateral, and larger in size. In most cases, classic AMLs have an indolent clinical course; however, selected tumors may cause clinically significant morbidity, especially when associated with spontaneous subcapsular hemorrhage (Wunderlich syndrome) into the retroperitoneum. Accordingly, treatment is guided by

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clinical context and may include surveillance, embolization, surgery, or mTOR inhibitor therapy.^[2,3]

Aggressive behavior in AML is most often linked to epithelioid angiomyolipoma (eAML), a rare malignant variant.^[1] Lymph node involvement in classic AML is exceedingly rare and, despite its worrisome appearance, has not generally been associated with adverse clinical outcomes.^[4,5] The biologic basis of this phenomenon remains uncertain, with prior authors proposing multifocality or benign dissemination rather than true metastasis. We report a sporadic classic renal AML with extensive regional lymph node involvement. Although the tumor also showed renal sinus and venous branch involvement, these findings should be interpreted cautiously and, in isolation, do not establish malignant behavior. The patient remains alive and disease-free 30 months after nephrectomy. This case broadens awareness of an uncommon manifestation of classic AML and emphasizes the need to avoid overdiagnosis and overtreatment.

2. CASE REPORT

A 43-year-old woman with a medical history of hypertension presented with early satiety, poor appetite, and fifteen-pound weight loss over the last several months. Computed tomography and magnetic resonance imaging demonstrated a 23 cm fat-containing mass involving the lower pole of the right kidney, crossing the midline, and exerting mass effect on surrounding structures (see Figure 1). She had previously undergone right renal artery embolization with plans for staged embolization procedures.^[1,2] Due to persistent fever and malaise, she was referred for surgical resection. The imaging appearance favored angiomyolipoma, although the size and extent of the lesion also raised consideration of eAML and retroperitoneal liposarcoma. Biopsy of the mass was deferred pre-operatively due to the risk of bleeding.

At surgery, several retroperitoneal lymph nodes were noticeably enlarged and were concerning for disease involvement. A frozen section diagnosis of an enlarged lymph node was requested, with the planning for extensive retroperitoneal lymph node dissection if there was any concern for eAML or malignancy. An intraoperative frozen section revealed only classical AML component without any epithelioid elements, providing reassurance to minimize the extent of dissection to only paracaval and interaortocaval lymph nodes, rather than proceeding with a more extensive retroperitoneal lymphadenectomy.

Gross examination showed a 20 cm × 18 cm × 7.8 cm exophytic, ill-defined mass arising from the renal hilum and extending beyond the renal parenchyma. The tumor involved the hilar and perinephric adipose tissue and abutted Gerota's fascia. The cut surface was golden yellow with hemorrhagic foci (see Figure 1). All surgical margins were negative.

Microscopic examination confirmed a classic AML composed of haphazardly arranged spindled smooth muscle cells, adipose tissue, and dysmorphic vessels (see Figure 2). Prior embolization material was present. Immunohistochemical stains were performed, and the tumor cells demonstrated positive expression of HMB45, Melan-A, smooth muscle actin (SMA), and cathepsin K, with negative inhibin expression. The Ki-67 proliferative index was low (1%-5%). AML involved the renal sinus and extended into the branches of the renal vein (see Figure 2). In addition, all 19 sampled interaortocaval and paracaval lymph nodes were involved by AML (see Figure 3). Germline testing for *TSC1* and *TSC2* did not reveal any pathogenic alterations, and no clinical stigmata of tuberous sclerosis complex were identified. The postoperative course was uneventful. After 30 months of follow-up, the patient remains alive and without evidence of recurrence.

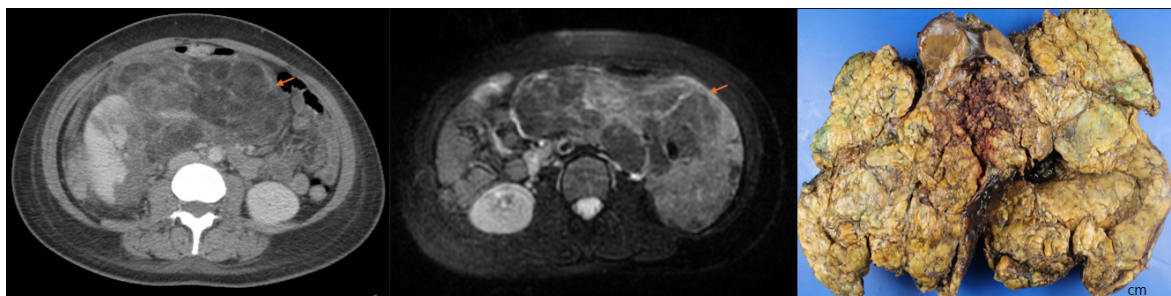


Figure 1. Representative preoperative CT scan (left) and T2- weighted MRI (middle) of the abdomen and the macroscopic images of the nephrectomy specimen (right)

The radiologic images show a large fat-containing right renal/retroperitoneal mass with intratumoral vascularity, favoring angiomyolipoma (orange arrows). Grossly, the right kidney is involved by a large friable tan ill-defined mass with hemorrhagic foci. The mass involves the renal sinus and perinephric adipose tissue. No definite main renal vein thrombus is identified.

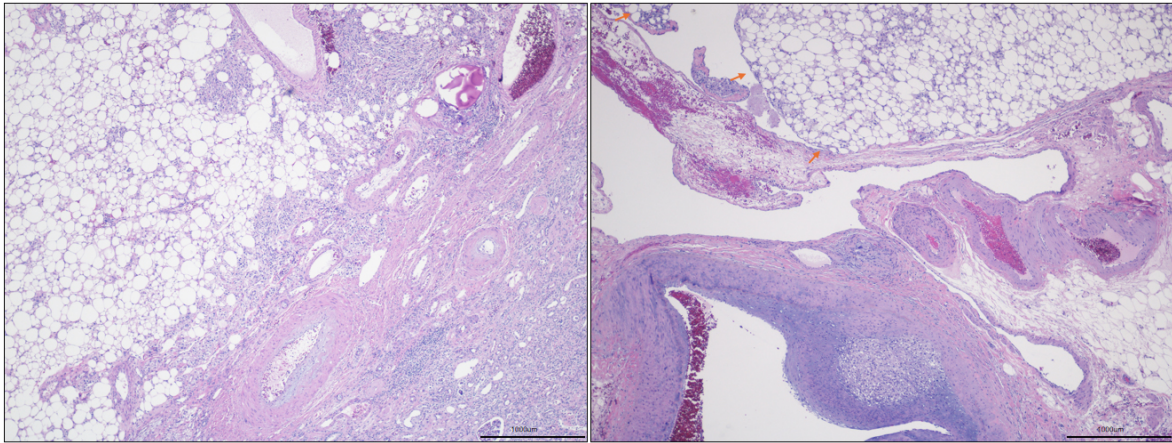


Figure 2. Representative hematoxylin and eosin-stained microscopic images of the renal mass showing classic angiomyolipoma

Low magnification image showing haphazardly arranged spindled smooth muscle cells, adipose tissue, and dysmorphic thick-walled blood vessels. Right panel demonstrates involvement of the renal sinus with extension into a venous branch (orange arrows).

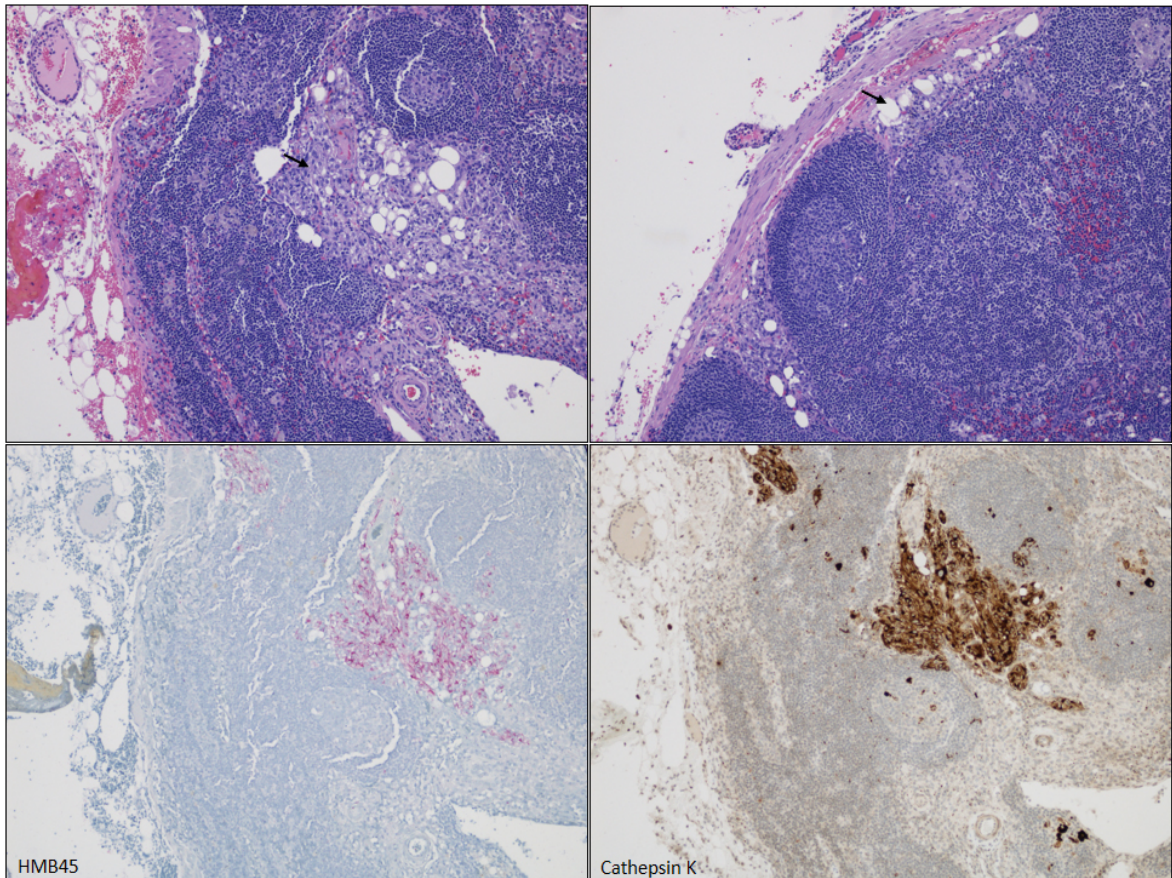


Figure 3. Representative microscopic images of the angiomyolipoma involving the regional lymph nodes

Low magnification image showing classic angiomyolipoma within the interaortocaval and paracaval retroperitoneal lymph nodes (arrows). Tumor cells are immunohistochemically positive for HMB45 and Cathepsin-K.

Table 1. Summary of reported cases of renal angiomyolipoma with lymph node involvement in the English-language literature

Author (report year)	Age (years)	Gender	Laterality	Size (cm)	Nephrectomy	TSC	Follow-Up (years)
Wilson and Lo (1964)	42	F	Bilateral	Unknown	None	Yes	Unknown
Allen and Risk (1965)	52	F	Left	Unknown	Radical	No	2
Campbell et al. (1974)	28	F	Bilateral	10, 2.5, 1.5	Unknown	Yes	Unknown
Snowdon (1974)	24	M	Bilateral	Unknown	None	Yes	Unknown
Scott et al. (1975)	12	M	Right	Unknown	Radical	Yes	1
Busch et al. (1976)	21	M	Right	11	Radical	No	Unknown
	49	F	Right	Unknown	Radical	No	Unknown
Bloom et al. (1982)	19	F	Right	Unknown	Radical	Yes	3
	11	M	Left	Unknown	Radical	Yes	3
	24	M	Bilateral	Unknown	Radical	Yes	11
Chawla et al. (1983)	28	F	Right	12	Partial	Yes	Unknown
Dao et al. (1984)	24	M	Left	Unknown	Radical	No	1
Manabe et al. (1984)	42	F	Left	20	Radical	No	3
Brecher et al. (1986)	63	F	Right	6.5	Radical	No	15
Sant et al. (1986)	49	F	Left	4	Radical	No	3
	61	F	Left	17	Radical	Yes	9
Manabe et al. (1987)	32	F	Left	9	Radical	No	Unknown
Taylor et al. (1988)	9	F	Right	10,3	Partial	Yes	1.7
	15	M	Bilateral	Unknown	Radical	Yes	2
	25	F	Right	Unknown	Radical	Yes	8
Ro et al. (1990)	49	M	Left	Unknown	Radical	No	1
	53	M	Right	Unknown	Radical	No	1
	58	F	Left	Unknown	Radical	No	18
Ansari et al. (1991)	46	F	Left	12	Radical	No	0.17
Ackerman et al. (1993)	25	F	Left	Unknown	Radical	No	2
Maffezzini et al. (1995)	42	M	Right	Unknown	Radical	Yes	Unknown
	26	F	Right	15	Radical	No	4
	63	F	Right	15	Radical	No	2
	52	M	Right	2	Radical	No	2
Csanaky et al. (1995)	38	F	Left	10	Radical	Yes	2
	39	F	Left	6	Radical	Yes	0.5
	73	F	Left	4, 2, 2	Radical	Yes	0.5
Frohlich et al. (1999)	31	F	Left	7	Radical	No	Unknown
Turker et al. (2000)	40	F	Right	18	Radical	No	8
Gogus et al. (2001)	17	F	Left	8	Radical	No	0.5
Shiga et al. (2003)	28	M	Left	10	Radical	No	0.3
Lin et al. (2003)	37	F	Left	7	Radical	No	Unknown
Cui et al. (2011)	47	M	Left	28	Radical	No	2
Liu et al. (2015)	59	F	Left	3.5	Partial	No	2
Kon-Nanjo et al. (2017)	62	F	Left	15	Radical	No	10
Tan et al. (2017)	52 (mean)	11F;	Unknown	Unknown	11 Radical;	Unknown	6.67 (mean)
(mean of 12 patients)		1M			1 Partial		
Ding et al. (2021)	50	F	Right	4	Radical	No	1
Present Case (2026)	43	F	Right	20	Radical	No	2.5 ongoing

Note. Table 1 summarizes English-language reports identified through a targeted literature review using the terms “renal angiomyolipoma,” “lymph node,” “nodal involvement,” and related synonyms. We included reports of classic renal AML with regional lymph node involvement and excluded epithelioid AML when it was clearly identified as such. Because some publications reported pooled series, overlap of individual patients across reports cannot be fully excluded; therefore, totals should be interpreted as descriptive estimates.

3. DISCUSSION

Classic renal AML is a benign PEComa that occurs sporadically or in association with TSC. Most lesions are discovered incidentally, although large tumors may present with pain, hemorrhage, or other mass-effect symptoms. Contemporary management is risk-stratified rather than based on size alone. Active surveillance is appropriate for many asymptomatic lesions, whereas selective arterial embolization, nephron-sparing surgery, thermal ablation in selected cases, and mTOR inhibition (particularly in TSC-associated disease) may be considered for symptomatic tumors or those with features associated with bleeding risk.^[6,7] Surgical intervention is preferred in sporadic cases, owing to a lower rate of recurrence and secondary procedures.

The epithelioid variant of AML is associated with aggressive disease and metastasis. True metastasis has not been recognized in classic AML, but regional lymph node involvement has been described. A targeted review of the English-language literature identified approximately 53 previously reported patients with classic renal AML involving regional lymph nodes (see Table 1). In 1964, Wilson and Lo reported the first case of triphasic AML with lymph node involvement in an autopsy.^[8] Collectively, 53 other patients, including the present case, have been reported in 27 other manuscripts although overlap across pooled series cannot be completely excluded.^[4,9–34] Reported patients are predominantly female (male-to-female ratio is 7:20) and span a wide age range (mean 40.9 years; range 9–73 years). Only 16 patients had a known history of TSC (38%, excluding patients whose TSC history was unknown). The tumors in a non-TSC setting are reported to be solitary, except for one case.^[24] In the available follow-up data, no convincing distant metastases and no clear disease-related mortality have been documented for classic AML with nodal involvement after resection. These observations support the concept that nodal involvement in classic AML does not necessarily imply malignant behavior.

The biologic basis of nodal involvement in classic AML remains unsettled. Proposed explanations include multifocal tumor development and benign dissemination from the renal lesion. Using microsatellite marker analysis on 12 patients, Tan et al. showed that lineage relationships between tumors in the kidney and corresponding lymph nodes though unlikely could not be definitively excluded, as one patient had a clonal relationship suggesting that the lymph node lesion could have originated from the tumor in the kidney.^[19] However, similar relationships could not be found in the other patients. Similar observations have been reported in lymphangiomyomatosis.^[35] Furthermore, other benign tumors such as pleomorphic adenoma and leiomyoma can also involve regional lymph nodes.^[36,37] Importantly, long-term

follow-up in previously reported cases has favored an indolent process rather than behavior analogous to malignant renal neoplasia. In the present case, renal sinus and venous branch involvement is a noteworthy morphologic finding, but we have deliberately avoided using it as proof of malignant metastatic biology. Instead, we interpret the overall clinicopathologic picture as most consistent with a benign tumor showing regional nodal involvement. This is in keeping with the current WHO consensus, which recommends reporting such cases as multifocal tumors rather than true metastatic deposits.

From a practical standpoint, recognition of this phenomenon has implications for intraoperative and postoperative management. When frozen section and permanent histology confirm classic AML without epithelioid or sarcomatoid features, the presence of suspicious regional nodes should not be taken as evidence of aggressive malignancy. Rather, pathologic confirmation may help limit the extent of nodal dissection and avoid unnecessary overtreatment. Our patient remains disease-free at 30 months; however, this follow-up interval is still relatively short, and longer surveillance will be useful to further document long-term behavior.

4. CONCLUSIONS

Classic renal AML can rarely involve regional lymph nodes in both sporadic and TSC-associated settings. Based on the available literature and the present case, this finding does not by itself indicate aggressive metastatic behavior. Knowledge of this phenomenon can help prevent overtreatment in these patients.

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AUTHORS CONTRIBUTIONS

NR collected data, performed literature review, and drafted the manuscript. IT, DS, and UN contributed to the clinical and pathologic interpretation. PK conceived the study, supervised the project, and critically revised the manuscript. All authors approved the final manuscript.

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The authors declare no conflicts of interest.

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No additional data are available.

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REFERENCES

- [1] Kapur P, Brugarolas J, Trpkov K. Recent Advances in Renal Tumors with TSC/mTOR Pathway Abnormalities in Patients with Tuberous Sclerosis Complex and in the Sporadic Setting. *Cancers (Basel)*. 2023; 15(16): 4043. PMID:37627070. <https://doi.org/10.3390/cancers15164043>
- [2] Fernández-Pello S, Hora M, Kuusk T, et al. Management of Sporadic Renal Angiomyolipomas: A Systematic Review of Available Evidence to Guide Recommendations from the European Association of Urology Renal Cell Carcinoma Guidelines Panel. *Eur Urol Oncol*. 2020; 3(1): 57-72. PMID:31171501. <https://doi.org/10.1016/j.euo.2019.04.005>
- [3] Choi HS, Kim CS, Ma SK, et al. Wunderlich syndrome and regression of angiomyolipoma. *Korean J Intern Med*. 2020; 35(6): 1528-1529. PMID:32229794. <https://doi.org/10.3904/kjim.2020.053>
- [4] Ding X, Cui M, Wang T, et al. Sporadic multiple renal angiomyolipoma with lymph node involvement: a case report and literature review. *J Int Med Res*. 2021; 49(3): 3000605211001710. PMID:33788657. <https://doi.org/10.1177/03000605211001710>
- [5] Tallarigo C, Baldassarre R, Bianchi G, et al. Diagnostic and therapeutic problems in multicentric renal angiomyolipoma. *J Urol*. 1992; 148(6): 1880-4. PMID:1433628. [https://doi.org/10.1016/S0022-5347\(17\)37057-X](https://doi.org/10.1016/S0022-5347(17)37057-X)
- [6] Simmons JL, Hussain SA, Riley P, et al. Management of renal angiomyolipoma in patients with tuberous sclerosis complex. *Oncology reports*. 2003; 10(1): 237-241. PMID:12469175. <https://doi.org/10.3892/or.10.1.237>
- [7] Wang C, Li X, Peng L, et al. An update on recent developments in rupture of renal angiomyolipoma. *Medicine (Baltimore)*. 2018; 97(16): e0497. PMID:29668633. <https://doi.org/10.1097/MD.00000000000010497>
- [8] Wilson GC, Lo D. Tuberous Sclerosis: A Case with Pulmonary and Lymph Node Involvement. *Med J Aust*. 1964; 2: 795-796. PMID:14218668. <https://doi.org/10.5694/j.1326-5377.1964.tb109705.x>
- [9] Allen TD, Risk W. Renal angiomyolipoma. *J Urol*. 1965; 94(3): 203-207. PMID:5828309. [https://doi.org/10.1016/S0022-5347\(17\)63600-0](https://doi.org/10.1016/S0022-5347(17)63600-0)
- [10] Campbell EW, Brantley R, Harrold M, et al. Angiomyolipoma presenting as fever of unknown origin. *Am J Med*. 1974; 57(5): 843-846. PMID:4440705. [https://doi.org/10.1016/0002-9343\(74\)90860-2](https://doi.org/10.1016/0002-9343(74)90860-2)
- [11] Snowdon JA. Cerebral aneurysm, renal cysts and hamartomas in a case of tuberous sclerosis. *Br J Urol*. 1974; 46(5): 583. PMID:4418219. <https://doi.org/10.1111/j.1464-410X.1974.tb03860.x>
- [12] Scott MB, Halpern M, Cosgrove MD. Renal angiomyolipoma: two varieties. *Urology*. 1975; 6(6): 768-773. PMID:1202732. [https://doi.org/10.1016/0090-4295\(75\)90818-3](https://doi.org/10.1016/0090-4295(75)90818-3)
- [13] Bloom DA, Scardino PT, Ehrlich RM, et al. The significance of lymph nodal involvement in renal angiomyolipoma. *J Urol*. 1982; 128(6): 1292-1295. PMID:7154190. [https://doi.org/10.1016/S0022-5347\(17\)53468-0](https://doi.org/10.1016/S0022-5347(17)53468-0)
- [14] Chawla K, Silber L, Alexander LL. Renal angiomyolipoma with retroperitoneal adenopathy. *J Natl Med Assoc*. 1983; 75(4): 431-434.
- [15] Dao AH, Pinto AC, Kirchner FK, et al. Massive nodal involvement in a case of renal angiomyolipoma. *Arch Pathol Lab Med*. 1984; 108(8): 612-613.
- [16] Frohlich T, Brands A, Thon WF, et al. Angiomyolipoma of the kidney and lymph nodes. *World J Urol*. 1999; 17(2): 123-125. PMID:10367372. <https://doi.org/10.1007/s003450050117>
- [17] Turker Koksall I, Tunc M, Kilicaslan I, et al. Lymph nodal involvement by renal angiomyolipoma. *Int J Urol*. 2000; 7(10): 386-389. PMID:11144508. <https://doi.org/10.1046/j.1442-2042.2000.00213.x>
- [18] Cui L, Hu XY, Gong SC, et al. A massive renal epithelioid angiomyolipoma with multiple metastatic lymph nodes. *Clin Imaging*. 2011; 35(4): 320-323. PMID:21724128. <https://doi.org/10.1016/j.clinimag.2010.08.017>
- [19] Tan P, Xu H, Jiang Y, et al. Microsatellite analysis for differentiating the origin of renal angiomyolipoma and involved regional lymph node. *Sci Rep*. 2017; 7(1): 362. PMID:28336972. <https://doi.org/10.1038/s41598-017-00460-w>
- [20] Ansari SJ, Stephenson RA, Mackay B. Angiomyolipoma of the kidney with lymph node involvement. *Ultrastruct Pathol*. 1991; 15(4-5): 531-538. PMID:1755110. <https://doi.org/10.3109/01913129109016260>
- [21] Brecher ME, Gill WB, Straus FH, 2nd. Angiomyolipoma with regional lymph node involvement and long-term follow-up study. *Hum Pathol*. 1986; 17(9): 962-963. PMID:3759077. [https://doi.org/10.1016/S0046-8177\(86\)80647-5](https://doi.org/10.1016/S0046-8177(86)80647-5)

- [22] Busch FM, Bark CJ, Clydine HR. Benign renal angiomyolipoma with regional lymph node involvement. *J Urol*. 1976; 116(6): 715-717. PMID:1003638. [https://doi.org/10.1016/S0022-5347\(17\)58985-5](https://doi.org/10.1016/S0022-5347(17)58985-5)
- [23] Csanaky G, Szereday Z, Magyarlaki T, et al. Renal angiomyolipoma: report of three cases with regional lymph node involvement and/or with renal cell carcinoma. *Tumori*. 1995; 81(6): 469-474. PMID:8804480. <https://doi.org/10.1177/030089169508100619>
- [24] Gogus C, Safak M, Ereku S, et al. Angiomyolipoma of the kidney with lymph node involvement in a 17-year old female mimicking renal cell carcinoma: a case report. *Int Urol Nephrol*. 2001; 33(4): 617-618. PMID:12452610. <https://doi.org/10.1023/A:1020518315280>
- [25] Kon-Nanjo K, Baba Y, Yoshio Y, et al. Renal angiomyolipoma with para-aortic lymph node involvement. *Pathol Int*. 2017; 67(5): 273-275. PMID:28271585. <https://doi.org/10.1111/pin.12522>
- [26] Lin WY, Chuang CK, Ng KF, et al. Renal angiomyolipoma with lymph node involvement: a case report and literature review. *Chang Gung Med J*. 2003; 26(8): 607-610.
- [27] Liu G, Yao D, Zhang S, et al. Minimal fat renal angiomyolipoma with lymph node involvement: A case report and literature review. *Can Urol Assoc J*. 2015; 9(7-8): E568-571. PMID:26609336. <https://doi.org/10.5489/cuaj.2749>
- [28] Maffezzini M, Vlassopoulos G, Simonato A, et al. Renal angiomyolipoma with extrarenal involvement—in vascular, lymph-node and perirenal tissue. Reports of four cases. *Scand J Urol Nephrol*. 1995; 29(3): 327-329. PMID:8578277. <https://doi.org/10.3109/00365599509180584>
- [29] Manabe T, Moriya T, Kimoto M. Benign renal angiomyolipoma with regional lymph node involvement. Report of a case showing enlargement five years after nephrectomy. *Acta Pathol Jpn*. 1987; 37(11): 1853-1858. PMID:3439460. <https://doi.org/10.1111/j.1440-1827.1987.tb02878.x>
- [30] Manabe T, Tasaka Y, Amano M, et al. Regional lymph node involvement in benign renal angiomyolipoma. *Acta Pathol Jpn*. 1984; 34(4): 889-893. PMID:6485803. <https://doi.org/10.1111/j.1440-1827.1984.tb07619.x>
- [31] Ro JY, Ayala AG, el-Naggar A, et al. Angiomyolipoma of kidney with lymph node involvement. DNA flow cytometric analysis. *Arch Pathol Lab Med*. 1990; 114(1): 65-67.
- [32] Sant GR, Ucci AA, Jr., Meares EM, Jr. Multicentric angiomyolipoma: renal and lymph node involvement. *Urology*. 1986; 28(2): 111-113. PMID:3739112. [https://doi.org/10.1016/0090-4295\(86\)90098-1](https://doi.org/10.1016/0090-4295(86)90098-1)
- [33] Shiga Y, Tsutsumi M, Suzuki K, et al. Angiomyolipoma with regional lymph node involvement: a case report and literature review. *Hinyokika Kyo*. 2003; 49(2): 81-86.
- [34] Taylor RS, Joseph DB, Kohaut EC, et al. Renal angiomyolipoma associated with lymph node involvement and renal cell carcinoma in patients with tuberous sclerosis. *J Urol*. 1989; 141(4): 930-932. PMID:2926893. [https://doi.org/10.1016/S0022-5347\(17\)41057-3](https://doi.org/10.1016/S0022-5347(17)41057-3)
- [35] Henske EP. Metastasis of benign tumor cells in tuberous sclerosis complex. *Genes Chromosomes Cancer*. 2003; 38(4): 376-381. PMID:14566858. <https://doi.org/10.1002/gcc.10252>
- [36] Marioni G, Marino F, Stramare R, et al. Benign metastasizing pleomorphic adenoma of the parotid gland: a clinicopathologic puzzle. *Head Neck*. 2003; 25(12): 1071-1076. PMID:14648866. <https://doi.org/10.1002/hed.10319>
- [37] Seong G, Ahluwalia S, Talabong DJA, et al. A Rare Case of Benign Metastasizing Leiomyoma Causing T11 Spinal Cord Compression: A Report and Literature Review. *Cureus*. 2023; 15(7): e41875. <https://doi.org/10.7759/cureus.41875>