Sporadic multiple renal angiomyolipoma with lymph node involvement: a case report and literature review

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Abstract
Angiomyolipoma (AML) is a benign tumor that mainly occurs in the kidneys. Simultaneous involvement of the kidney and local regional lymph nodes is very rare and might be misdiagnosed as a metastasizing malignant cancer. In the present study, a 50-year-old woman was referred to our hospital after a routine health screening ultrasound. Sporadic multiple renal AML with lymph node involvement was suspected based on the clinical manifestations and radiologic features. Partial nephrectomy was performed and a para-inferior vena cava lymph node was removed. The pathologic results confirmed multiple AML with lymph node invasion. We also reviewed the English-language literature regarding renal AML with lymph node involvement. We found that middle-aged women were likely to develop this disease and that loin pain was the main presenting feature. Most patients had no history of tuberous sclerosis complex. Radical nephrectomy was the predominant treatment. No local recurrence or distant metastasis occurred in any patients after radical nephrectomy or partial nephrectomy. In conclusion, renal AML with lymph node involvement is rare but can occur in both patients with tuberous sclerosis complex and those with multiple sporadic AML. Partial nephrectomy should be the first-line treatment, after which further treatment is not necessary.
Keywords
Angiomyolipoma, renal angiomyolipoma, lymph node involvement, partial nephrectomy, literature review, case report

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Introduction
Angiomyolipoma (AML) is a benign tumor that primarily occurs in the kidneys and is composed of blood vessels, smooth muscle, and adipose tissue.\(^1\) Renal AML, also termed hamartoma, is the second most common benign tumor in the kidney and accounts for 3% of renal tumors.\(^2\) Classic renal AML is easily diagnosed based on computed tomography (CT) or magnetic resonance imaging, and in almost all sporadic cases, renal AML presents as only one lesion.\(^3\) However, few cases of renal AML accompanied by regional lymph node involvement have been described. We herein present a case of multiple renal AML co-occurring with para-inferior vena cava (para-IVC) lymph node involvement and a comprehensive review of the literature. Written informed consent was obtained from the patient for publication of this article and accompanying images. The present study protocol was approved by the local ethics committee of The First Hospital of Jilin University.

Case presentation
A 50-year-old woman presented with multiple right renal masses that had been incidentally detected on a health screening ultrasound. The patient was asymptomatic and had no hematuria or weight loss. Her medical history was unremarkable, and she had no signs of tuberous sclerosis complex (TSC). Physical examination revealed no significant abnormalities. The results of routine laboratory tests, including kidney function and blood tests, were normal with the exception of microscopic hematuria. Unenhanced and enhanced CT scans revealed typical multiple renal AML in the middle pole of the right kidney measuring 4 cm in its greatest dimension. Enlargement of the para-IVC lymph node was also present (Figure 1). Open partial nephrectomy (PN) was performed, and the para-IVC lymph node (2 cm in its greatest dimension) was removed. The pathological diagnosis of the renal specimen was AML (Figure 2(a)), and the lymph node showed AML invasion (Figure 2(b)). The patient was followed up with a CT scan every 6 months, and the tumor had not recurred 12 months postoperatively.

Discussion
Renal AML occurs sporadically or accompanies TSC. Typically, renal AML shows a slow benign growth pattern and no signs of distant metastasis.\(^2\) However, renal AML with regional lymph node involvement might suggest potential metastatic characteristics of AML.

We searched English-language articles in the Medline database using the key words “kidney” or “renal,” “angiomyolipoma” or “hamartoma” and “lymph node.” Twenty-two papers were found. Based on the full text of the articles rather than only the abstracts, 16 papers and 25 cases were found to be relevant\(^4\)–\(^19\) (Table 1). Busch et al.\(^4\) reported the first two cases of
benign renal AML with regional lymph node involvement in 1976. The mean age of the patients in the 25 reported cases was 40 years and ranged from 9 to 73 years. Women were predominantly affected (female: male ratio of 20:5). Loin pain was the main presenting feature (56%). Most patients had no history of TSC; however,
Table 1. Previously reported cases of renal angiomyolipoma with lymph node involvement.

| Case No. | Authors (year) | Age (years) | Sex | Side | Diameter | Symptoms | Treatment | TSC | Evidence of malignancy | Distant metastasis | Follow-up |
|----------|----------------|-------------|-----|------|----------|----------|-----------|-----|-----------------------|-------------------|-----------|
| 1        | Busch et al. (1976) | 21          | Male | Right | 11 cm    | Pain     | RN        | No  | No                    | No                | Unknown   |
| 2        | Chawla et al. (1983) | 28          | Female | Right | 12 cm    | Pain     | PN        | Yes | Unknown               | Unknown           | Unknown   |
| 3        | Manabe et al. (1984) | 42          | Female | Left  | 20 cm    | Pain     | RN        | No  | No                    | No                | 3 years   |
| 4        | Sant et al. (1986)  | 61          | Female | Left  | 17 cm    | Pain     | RN        | Yes | No                    | No                | 9 years   |
| 5        | Brecher et al. (1986) | 49          | Female | Right | 4 cm     | Fatigue  | RN        | No  | No                    | No                | 3 years   |
| 6        | Taylor et al. (1989) | 9           | Female | Left  | 10 cm, 3 cm | Pain    | PN        | Yes | No                    | No                | 20 months |
| 7        | Ansari et al. (1991) | 46          | Female | Left  | 12 cm    | Pain     | RN        | No  | No                    | No                | 2 months  |
| 8        | Ackerman et al. (1994) | 25          | Female | Unknown | Unknown | Asymptomatic | Unknown | Unknown | Unknown               | Unknown           | Unknown   |
| 9        | Maffezzini et al. (1995) | 42          | Male   | Right | 15 cm    | Pain     | RN        | No  | No                    | No                | 4 years   |
| 10       | Csanaky et al. (1995) | 38          | Female | Left  | 10 cm    | Pain     | RN        | No  | No                    | No                | 2 years   |
| 11       | Türkler Köksal et al. (2000) | 40          | Female | Right | 18 cm    | Pain     | RN        | No  | No                    | No                | 8 years   |
| 12       | Göğüş et al. (2001) | 17          | Female | Left  | 8 cm     | Pain     | RN        | No  | No                    | No                | 6 months  |
| 13       | Lin et al. (2003) | 37          | Female | Left  | 7 cm     | Pain     | RN        | No  | No                    | Unknown           | Unknown   |
| 14       | Cui et al. (2011) | 47          | Male   | Left  | 28 cm    | Pain     | RN        | No  | Yes                   | No                | 2 years   |
| 15       | Kon-Nanjo et al. (2017) | 62          | Female | Left  | 15 cm    | Asymptomatic | RN        | No  | No                    | No                | 10 years  |

TSC, tuberous sclerosis complex; PN, partial nephrectomy; RN, radical nephrectomy.
eight (32%) cases were associated with TSC. All 25 cases were benign AML rather than malignant epithelioid AML. No distant metastasis occurred in any patients. Radical nephrectomy (RN) was the main treatment, and PN was performed in only four (16%) patients.

Clinically, most cases of AML are sporadic, and 10% to 20% of cases present in association with TSC. Among the 25 published cases of AML with node involvement, 8 (32%) had a history of TSC. Most cases of sporadic AML are asymptomatic, whereas TSC-associated AML is often symptomatic. However, among the 17 published cases of AML with node involvement without TSC, only 2 (12%) were asymptomatic. Moreover, all 17 cases of AML with node involvement without TSC were solitary. Our report describes the first case of sporadic multiple renal AML with lymph node involvement.

Based on the benign nature of AML and the absence of local recurrence and distant metastasis in the present case, the involvement of a local regional lymph node was thought to be simply a multicentric growth instead of metastasis. Tan et al. analyzed the genomic instability of renal AML with regional lymph node involvement in 12 patients and found a potential lineage relationship between renal AML and involved local lymph nodes.

The biological assessment of renal AML is controversial. However, considering that epithelioid renal AML may present with malignant behavior, all patients described in previously published reports were followed up from 2 months to 15 years postoperatively, and no local recurrence or distant metastasis occurred although no further treatment was performed. However, only 16% of the patients in these published studies underwent PN; the others underwent RN. No patients developed local recurrence or distant metastasis, indicating that RN should be avoided when PN is feasible by any approach. Some atypical renal AMLs may be misdiagnosed as renal cancers; thus, biopsy of renal tumors is needed, particularly when small tumor-like lesions are incidentally detected. This may help to avoid unnecessary nephrectomy. Additionally, we may be able to hypothesize that PN is the standard treatment for small renal masses without preoperative renal mass biopsy, even with lymph node metastasis. Considering the benign behavior of renal AML with lymph node involvement, an unenhanced CT scan can be performed every 6 to 12 months.

Conclusion
Renal AML with lymph node involvement is rare and can occur in both patients with TSC and those with multiple sporadic AML. PN should be the first-line treatment, after which further treatment is not necessary.

Declaration of conflicting interest
The authors declare that there is no conflict of interest.

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