Human Pathology (2016) **58**, 1–6

ELSEVIER

Human PATHOLOGY

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Original contribution

Renal oncocytoma with vascular invasion: a series of 22 cases☆

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Received 2 June 2016; revised 11 July 2016; accepted 20 July 2016

Keywords:
Kidney;
Oncocytoma;
Benign renal mass;
Vascular invasion;
Lymphovascular invasion

Summary Renal oncocytomas are benign neoplasms that are often excised, as clinically they cannot be distinguished with certainty from renal cell carcinoma. One of the least common findings in oncocytomas is vascular invasion, and their behavior is not well characterized with only reports of isolated examples and smaller case series. Whether vascular invasion is acceptable for the diagnosis of oncocytoma still remains controversial, even amongst genitourinary pathologists with expertise in renal tumor pathology. Of 1474 cases of renal oncocytoma identified at 3 large medical centers, 22 (1.5%) had vascular invasion. Patients included 12 men and 10 women with an average age at diagnosis of 67.5 years (range, 48-91 years). Thirteen cases showed large vessel invasion, and the remainder involved medium or small vessels. Tumor was grossly visible in the renal vein in 2 cases. Clinical data were available on 16 of the 22 cases with an average follow-up time of 29.9 months (range, 7.5-94.5 months). Of the cases with clinical follow-up, all but one individual was alive. All living individuals were free of recurrence or metastatic disease at the time of last follow-up. Our cohort showed no metastasis or recurrence and overall survival of 94.7% at 2.5 years following diagnosis, supporting the finding that vascular invasion does not alter the favorable prognosis of oncocytoma. The presence of vascular invasion should not lead to any uncertainty about the diagnosis in an otherwise typical oncocytoma.

1. Introduction

Renal oncocytoma was definitively characterized as a benign entity separate from renal cell carcinoma in 1976 [1]. Oncocytomas are rarely symptomatic and often discovered as an incidental mass on cross-sectional imaging for other complaints. One of the least common findings in oncocytoma is vascular invasion with a reported incidence of 2% to 5.4% [2-5]. In most renal epithelial neoplasms, renal vein involvement is typically considered a feature of malignancy and is included in the staging of renal cell carcinomas. However, the behavior of oncocytomas with vascular invasion is not well characterized with only reports of isolated examples and smaller case series. In this study, we present 22 cases of renal oncocytoma

☆ Disclosures: The authors declare no conflicts of interest and have no funding disclosures.

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http://dx.doi.org/10.1016/j.humpath.2016.07.020
0046-8177/

with vascular invasion with clinical follow-up of 16 of those cases.

2. Materials and methods

A language search of the surgical pathology files for "oncocytoma AND kidney" from the senior author's consult service was performed covering 2000 through 2015. The study was carried out with an IRB approval from the Johns Hopkins Medical Institutions. Six hundred ninety-nine specimens of oncocytoma were identified from the Johns Hopkins urologic pathology consult service during that time, and the pathology reports were then searched for a description of vascular invasion, angiolymphatic invasion or lymph-vascular invasion. By these criteria, vascular invasion was identified in 10 cases by examination of the report. All cases had slides available for review and confirmation of vascular invasion.

Additionally, language searches of the surgical pathology files for "oncocytoma AND kidney" from inside resection cases at the Cleveland Clinic and MD Anderson Cancer Center were performed covering 2000 through 2015. Five hundred seven specimens of oncocytoma were identified at Cleveland Clinic during that time. By these criteria, vascular invasion was identified in 7 cases by examination of the report. Two hundred sixty-eight specimens of oncocytoma were identified from consecutive MD Anderson cases during that time. By these criteria, vascular invasion was identified in 5 cases by examination of the report. All cases had slides available for review.

Slides were reviewed by the authors, and diagnostic consensus was reached in all cases. The pathologic variables included were procedure type, size, laterality, type of vessel involved, gross versus microscopic vascular invasion, architectural pattern of the main tumor, perinephric fat involvement, presence of atypia, and margin status. The clinical history was obtained by means of telephone calls and faxes to the urologists, as well as review of the electronic medical record. We requested vital status, date and cause of death, history of genitourinary or other malignancy, and presence of recurrent disease for each patient with available clinical follow-up. Additional information regarding vital status was obtained by searching the Social Security Death Index (SSDI).

3. Results

3.1. Clinical features

Of 1474 cases of renal oncocytoma diagnosed at three large medical centers (JHMI n = 699, CCF n = 507, MDA n = 268), 22 (1.5%) had vascular invasion. The Table contains the patient and tumor characteristics for each of the 22 cases. Patients included 12 men and 10 women with an average age of diagnosis of 67.5 years (range, 48–91 years). Diagnostic specimens included 1 biopsy, 5 partial nephrectomies and 16 radical nephrectomies. Tumor size ranged from 1.0–12.0 cm (mean, 5.2 cm). Twelve of the tumors occurred on the left, with the remaining 10 located on the right side. Seven cases had coexisting neoplasms in the diagnostic specimen: 3 clear cell renal cell carcinomas, 2 angiomyolipomas and 2 with multiple oncocytomas.

3.2. Histology

All specimens, with the exception of one predominantly tubulocystic type (Fig. 1A), showed at least some component of classic nested architecture (Fig. 1C) with areas of fibromyxoid stroma (Fig. 1E and F). The tubulocystic tumor also showed osseous and myeloid metaplasia. Focal or pronounced degenerative atypia was present in 11 cases (Fig. 2A and B); however, mitotic rate was low in all cases. Involvement of perinephric fat was identified in 7 cases (Fig. 2C). A positive margin was found in one case, a wedge biopsy. Thirteen cases showed large vessel invasion (Figs. 1B and D, 2A and D), eight involved medium intrarenal vessels (Fig. 2E and F) and one involved a small intrarenal vessel. Tumor was grossly visible in the renal vein in 2 cases, but did not extend to the renal vein margin (Fig. 2D). Vascular invasion with re-endothelization of the vessels was noted with endothelial cells lining the tumor thrombus (Fig. 2E), which is a well-recognized phenomenon.

3.3. Treatment and follow-up

Clinical follow-up data were available on 16 of 22 cases with an average follow-up time of 29.9 months (range, 7.5-94.5 months). Of the cases with clinical follow-up, all but one individual was alive (93.7%). Records were not available as to the cause of death for this patient. All living individuals were free of recurrence or metastatic disease at the time of last follow-up. Of the 22 cases, 21 did not have a death reported in the SSDI, for an overall survival rate of 95.4%.

4. Discussion

The genesis of renal oncocytoma as a diagnostic entity arose in the 1970s with an initial discovery of 4 cases of oncocytoma, which prompted a re-review of other cases of carcinoma for potential unrecognized oncocytomas. Ultimately, Klein et al [1] reported 13 oncocytic neoplasms comprised of only "eosinophilic epithelial cells arranged in tubular and alveolar patterns." Lieber et al [6] described 90 cases of oncocytoma and argued that if the diagnosis was restricted to the criteria of "closely similar, regular cells possessing rounded smooth nuclei and abundant eosinophilic granular cytoplasm," they could be considered benign entities with no metastatic potential.

Renal oncocytomas are now uniformly defined histologically as relatively well-circumscribed, cytologically bland neoplasms comprised of large cells with abundant, granular eosinophilic cytoplasm and a central, round nucleus, which often contains a