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Urologic Oncology: Seminars and Original Investigations ▮ (2017) ▮▮▮–▮▮▮

UROLOGIC ONCOLOGY

Original article

Pathological heterogeneity in sporadic synchronous renal tumors: Is the histological concordance predictable?

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Received 21 April 2017; received in revised form 31 July 2017; accepted 5 September 2017

Abstract

Objective: To evaluate the pathological concordance rate of multiple synchronous renal masses (MSRM) presumed to be sporadic and to analyze predictive factors of concordance.

Material and methods: We identified from our institutional database patients with sporadic MSRM treated at our center between January 2000 and December 2015. All tumors were reviewed by a dedicated uropathologist. Pathological concordance rate was analyzed regarding clinical characteristics and preoperative imaging.

Results: We included 112 patients: 50 had unilateral synchronous renal masses and 62 bilateral synchronous renal masses. A total of 291 tumors were analyzed, with an average of 2.6 tumors per patient. Overall, the malignant concordance rate was 91.6%, the pathological concordance rate was 67.3% and the grade concordance rate was 62.5%. In univariate analysis, predictive factors of histological concordance were bilateral synchronous renal masses (odds ratio [OR] = 3.39; 95% CI: 1.06–10.8; $P = 0.04$), age < 60 years (OR = 3.04; 95% CI: 1.2–7.7; $P = 0.02$) and ≥3 lesions (OR = 2.41; 95% CI: 1.03–5.68; $P = 0.04$). In multivariate analysis, age < 60 remained significantly associated with histological concordance (OR = 3.84; 95% CI: 1.24–11.9; $P = 0.02$).

Conclusions: The histological concordance rate of MSRM is low. Age at diagnosis <60 years, bilateral lesions and ≥3 tumors are predictive factors of histological concordance, but the pathological diagnosis remains difficult to predict. This heterogeneity is important to take into account, particularly when choosing the treatment upon the renal biopsy results from a single lesion.

Keywords: (MeSH): renal cell carcinoma; Multifocal tumors; Synchronous; Pathological concordance

1. Introduction

Renal cell carcinoma (RCC) represents 2%–3% of all cancers [1]. Most of the cases diagnosed each year are solitary renal tumors. However, unilateral or bilateral synchronous tumors can occur in a small subset of patients, raising diagnostic and therapeutic issues. Multiple synchronous renal masses (MSRM) can be associated with underlying risk factors, like constitutional genetic predisposition to RCC (hereditary familial RCC syndrome) or acquired risk factors, like chronic kidney disease (CKD), which is often associated with the development of bilateral papillary RCC [2]. Although the pathology of renal tumors associated with hereditary syndromes or CKD is well characterized [3,4], this is not the case for sporadic MSRM: they represent a distinct subpopulation and may have a different presentation from hereditary bilateral RCC.

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http://dx.doi.org/10.1016/j.urolonc.2017.09.002
1078-1439/

Few studies have investigated the pathological findings in these tumors, and histologic subtypes of synchronous tumors are not always concordant in the same patient. Understanding the concordance rate in patients harboring MSRM is crucial in the treatment decision process, especially since percutaneous biopsy is becoming more and more common. The primary objective of this study was to evaluate the pathological concordance rate of MSRM presumed to be sporadic. The secondary objective was to analyze if preoperative clinical or radiological factors were associated with the histologic concordance of these tumors.

2. Material and methods

2.1. Population of the study

An institutional board-approved, retrospective review of the institutional database was performed to identify patients with MSRM treated at our center between January 2000 and December 2015. MSRM were defined by the presence, in the same patient, of at least 2 different renal tumors, with a pathological diagnosis from either the surgical specimen or a renal biopsy. The tumors could be unilateral or bilateral. They were considered synchronous when they were identified on the same radiological examination or when the delay between 2 surgical procedures was inferior to 6 months. Patients with a predisposition to RCC were excluded: patients with a known hereditary familial RCC syndrome, even when the genetic testing was made after the initial diagnosis; patients with end-stage CKD (patients requiring dialysis, kidney transplantation, or CKD stage 5 [glomerular filtration rate <30 ml/min]). Tumor recurrences, multiple asynchronous tumors and metastatic tumors were also excluded.

2.2. Pathological analysis

All tumors were reviewed by a dedicated uropathologist and classified according to the 2012 International Society of Urological Pathology (ISUP) classification [5]. Malignant concordance was defined as pathologically confirmed RCC in all lesions from the same patient. Histological concordance was defined as the same histological subtype in all tumors from the same patient. Grade concordance was defined for clear cell RCC and papillary RCC as the same Fuhrman grade in all tumors from the same patient. The concordance rate was the ratio between the number of patients with concordant tumors divided by the total number of patients. To identify correlations between the variables, we used chi-squared test for qualitative variables and Mann-Whitney test for quantitative variables. Predictive factors of concordance were tested in univariate and multivariate analysis through a logistic regression model, with $P < 0.05$ considered to be significant. All analyses were performed using XLSTAT v18.06 (Addinsoft, France).

2.3. Radiological analysis

Preoperative imaging was reviewed by a radiologist specialized in renal tumors, with the goal to identify criteria associated with pathological concordance. All computed tomography (CT)-scans available were reviewed blindly from the pathological diagnosis. For each patient, the 2 biggest lesions were compared using the following criteria: spontaneous density (before contrast) and enhancement after contrast (enhancement = maximum density after contrast − spontaneous density). The radiologist also gave his subjective impression about the histological concordance. Quantitative variables were analyzed with Mann-Whitney test. Using these variables as a diagnostic test, receiver operating characteristics curves were generated and the accuracy was measured with the area under the curve. The subjective impression of the radiologist was described using sensitivity and specificity.

3. Results

3.1. Patients characteristics

From January 2000 to December 2015, we identified 216 patients treated at our center for MSRM. Among them, 65 patients had hereditary familial RCC syndrome known at the time of diagnosis (60 von Hippel Lindau syndrome, 4 tuberous sclerosis complex, and 1 Birt-Hogg-Dubé syndrome), 36 patients had end-stage CKD, 2 patients had a family history of RCC in a first-degree relative with a high suspicion of hereditary syndrome (multiple tumors at a young age) and were excluded. Overall, we included 112 patients with MSRM considered to be sporadic. Among these patients, 50 had unilateral synchronous renal masses (USRM) vs. 62 with bilateral synchronous renal masses (BSRM) (Fig.). The patients' characteristics are presented in Table 1.

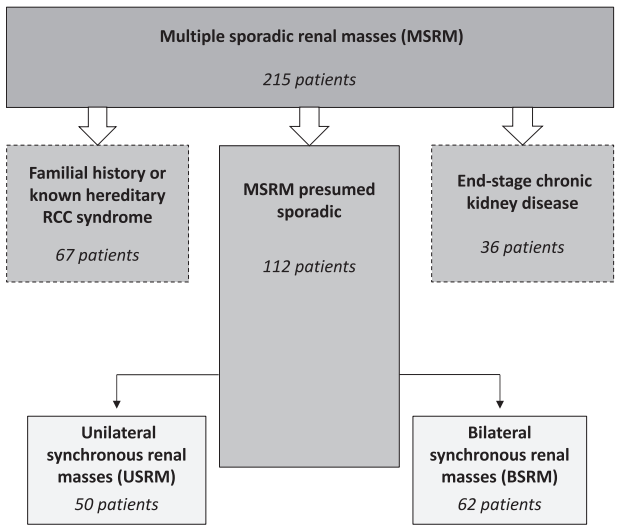

Fig. Flow-chart of the study.