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CLINICAL STUDY

Growth rates are similar in potentially benign and malignant small renal masses detected incidentally

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Abstract: *Objective:* Generally small renal masses grow at slow rate; some of them do not exhibit any growth. Does it mean that they are less aggressive? The aim of our study was to compare the growth of enhancing, non-enhancing solid renal masses, angiomyolipomas and complex renal cystic masses ≤ 4 cm in diameter.
Materials and methods: 12 patients with solid enhancing, 20 with solid non-enhancing, 8 with angiomyolipomas and 25 with Bosniak II/IIF/III and IV masses were enrolled and prospectively studied during the surveillance period. The mean diameter of the lesion at presentation was 3.5; 3.1; 3.2 and 3.9 cm, the mean period of observation was 47; 48; 35 and 48 for each group respectively. All masses were detected incidentally. Progression rates (the largest diameter was calculated) were compared among the groups.
Results: The range and mean growth rates among all groups after one year of observation were (0.0–0.3; 0.2 cm); (0.0–0.3; 0.2 cm); (0.0–0.4; 0.3 cm); (0.0–0.3; 0.1 cm); (0.0–0.2; 0.1 cm); (0.0–0.0; 0.0 cm) and (-0.6–0.0; -0.2 cm) for 7 groups respectively. Overall 55.4 % of masses did not exhibit any growth. We did not monitor any pathological lymph node enlargement, distant metastases in any group of patients. Overall, 85 % of masses that exhibited growth during the first year did so at the end of follow up.
Conclusions: The vast majority of small solid and complex cystic renal masses exhibit similar slow growth rates. According to these results, urologists can not predict the biological potential of the mass based on radiographic criteria and growth rates only *(Tab. 2, Ref. 12).* Full Text in free PDF *www.bmj.sk.*
Key words: renal cell carcinoma, observation, enhancing solid renal masses, complex renal cysts.

Generally, small renal masses grow at slow rate; some of them do not exhibit any growth. Does it mean that they are less aggressive? The aim of our study was to compare the growth of enhancing, non-enhancing solid renal masses, radiographically confirmed angiomyolipomas and complex renal cystic masses up to 4 cm in greatest diameter during the observation using helical CT (computed tomography) or MR (magnetic resonance) imaging.

Material and methods

All solid enhancing renal masses had high-attenuation [>20 HU (Hounsfield units)] obtained on nephrographic phase images, non-enhancing masses had attenuation less than 15HU, complex renal cystic masses were defined according to the Bosniak classification (1) by two radiologists and one urologist in consensus. All lesions were at least 2 cm in diameter (median 3.5; 3.1; 3.2 and 3.9 cm for each group respectively). Non-enhancing masses were diagnosed as angiomyolipomas, where the negative densities on nephrographic phase images were obtained, or suspected oncocytomas, low fat angiomyolipomas or other benign or potentially malignant lesions when no negative densities were present as the typical diagnostic criterion for angiomyolipoma. In our study, we have included 8 patients with typical angiomyolipoma based on US (ultrasound) and CT. Overall 12 patients with solid enhacing, 20 with solid non-enhacing, 8 with angiomyolipomas ans 25 with Bosniak II/IIF/III and IV masses were enrolled and prospectively studied during the surveillance period.

26 patients were excluded from the study (patients that underwent surgery or were lost during the follow up). None of the observed patients underwent a biopsy of the renal mass. Patients were followed by a serial CT or MRI in 6 monthly intervals. The size of the lesion was measured as the largest cross-sectional diameter. Tumor growth rate was defined as a change in diameter after one year. CT examinations were performed by using the 5 mm section thickness. All patients received 150ml of intravenous contrast material, contrast enhanced scan was obtained after a scanning delay of 90 seconds. All MRI patients underwent transverse breath-hold T1 weighted image and a two-dimensional grading-echo sequence and transverse or coronal breath-hold T2 weighted imaging. As the iv. contrast agent, 20ml of gabapentetate dimeglumine was injected. Each patient with enhancing renal mass and Bosniak III and IV lesion was medically unfit for surgery, at high perioperative risk or unwilling to undergo surgical procedure. These patients, apart from regular imaging, underwent a chest X-ray once a year.

Results

According to the type of the renal mass defined on CT or MRI, the mean size of the mass was (3.5; 3.1; 3.2, 3.9 cm) and

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Tab. 1. Materials and methods, patients characteristics.

Type of the renal mass	Mean size of the mass	Mean patient's age	Number of incidentally detected masses (%)
Solid enhancing	3,5	73	100
Solid non-enhancing	3,1	54	100
Angiomyolipomas	3,2	56	100
Complex cystic	3,9	59	100

Tab. 2. Growths rates of renal masses defined according to the radiographic criteria.

Type of the renal mass	Number of Masses	Mean follow up	Growth rates at 1 year (range)	Growth rates at 1 year (mean)	Growth rates at the last check up (range)	Growth rates at the last check up (mean)
Solid enhancing	12	47	0.0–0.3	0.2	0.0–0.4	0.2
Solid non-enhancing	20	48	0.0–0.3	0.2	0.0–0.3	0.2
Radiographically comfirmed angiomyolipomas	8	35	0.0–0.4	0.3	0.0–0.4	0.2
Bosniak II	15	63	0.0–0.3	0.1	0.0–0.3	0.2
Bosniak IIF	6	56	0.0–0.2	0.1	0.0–0.2	0.1
Bosniak III	2	42	0.0	0.0	0.0	0.0
Bosniak IV	3	38	-0.6–0.0	-0.2	-0.16–0.1	-0.6

patient's age (73, 54, 56 and 59 years) for enhancing, non-enhancing, typical angiomyolipomas and complex cystic renal masses patients, respectively. The mean period of observation was 47; 48; 35 and 48 for each group, respectively. All patients were asymptomatic, without microscopic haematuria or other symptoms that could be related to the presence of renal mass (Tab. 1). The range and mean growth rates among all groups after one year (0.0–0.3; 0.2 cm); (0.0–0.3; 0.2 cm); (0.0–0.4; 0.3 cm); (0.0–0.3; 0.1 cm); (0.0–0.2; 0.1 cm); (0.0–0.0; 0.0 cm) and (-0.6–0.0; -0.2 cm) and at the last follow up were (0.0–0.4; 0.2 cm); (0.0–0.3; 0.2 cm); (0.0–0.4; 0.2 cm); (0.0–0.3; 0.2 cm); (0.0–0.2; 0.1 cm); (0.0–0.0; 0.0 cm) and (-0.16–0.1; -0.6 cm) for 7 subsets of patients respectively (Tab. 2). Overall 55.4 % of masses (33 pts / 5 enhancing; 13 nonenhancing; 6 pts with typical angiomyolipoma; 7 Bosniak II; 3 Bosniak II and 2 Bosniak III) of masses did not exhibit any growth at the last follow up. Those masses that exhibited growth during the first year. 85% of them did so at the end of last follow up.

In one case we have observed a spontaneous partial regression of complex renal cyst Bosniak IV during the observation period after 30 months. According to the initial CT. complex renal cystic lesion Bosniak class III with thickened wall was detected. The thickened part of the cystic wall had attenuation numbers on pre-contrast CT-scan 45HU and on nephrographic phase images 95 HU. The lesion measured 40 mm on the largest diameter. After 6 months. the patient underwent MRI scan and because of solid component the patient was upgraded do Bosniak IV category. And after 30 months from the time of diagnosis. patient underwent another MRI. where a spontaneous partial regression of the cystic mass of the left kidney was observed. Patient's history was uneventful. no trauma. surgical intervention or any outer factor was excluded.

We did not monitor any pathological lymph node enlargement, distant metastases in any group of patients.

Discussion

The natural history of small localized renal tumors is defined according to the surveillance studies. Which are still controversial and yet can not be established as a part of a guideline recommendation – treatment with delayed intervention. There are still many unanswered questions and previous attempts to identify biologically aggressive small renal tumors according to the clinical status and radiographic criteria failed. Growing and non-growing tumors harbor the same prognostic potential and there is no difference in the incidence of malignancy between both groups (2). There is no correlation of growth rates and lesion size at presentation (3) and other potential predictors of future growth including gender.

Patient's age and tumor radiographic features did not gain it's importance and significance as well (4, 5, 6). The fact that the tumor growth does not predict worse prognosis. should urologist rely on growths rates of the mass? What are the criteria or when we should indicate the surgical intervention? Our study was to evaluate if the benign renal masses have the similar growth rates to potentially malignant masses.

The goal is to select those masses that will need treatment within short period of time from those that will stay indolent. According to the study results even the cystic nature of the mass did not predict the future mass growth. which is potentially a feature of better prognosis. These results are comparable with

other studies (4, 5). moreover we have included benign complex cystic renal masses Bosniak II and IIF category and radiographically confirmed angiomyolipomas. As a result they exhibited the same growth potential when compared with solid enhancing/non-enhancing renal masses.

Weibl et al compared the growth rates of solid enhancing and non-enhancing masses in their study. They showed that there was only a minor difference between these two groups of patients (7). In their further analysis the faster growing lesions which were extirpated. Confirmed renal cell carcinoma variants with favourable histological parameters (8). Which means that faster growing masses do not necessarily harbor adverse prognosis. In general. according to our results. the progression rates are similar to potentially benign masses previously documented (8, 9, 10).

The spontaneous partial regression of the Bosniak IV renal cystic mass as a rare phenomenon during observation (11) was seen in one of our patients.

The limitations of our study are following: data were collected from one institution. Inter-observer variability was not proceeded among the masses. The growth was calculated from the largest diameter measured by the radiologist. there was no inter and intra-observer variability of the measurements performed. Because the tumor diameter on CT has an error of about ± 0.3 cm. The determination of the growth during active surveillance can be misleading (12). There was no statistical analysis made because of the small subset of patients in each category characterized by the radiographic criteria.

Conclusions

The vast majority of small solid and complex cystic renal masses exhibit similar slow growth rates. According to these results, based on radiographic criteria and growth rates only, urologists cannot predict the biological potential of the mass. In patients elected for surveillance management, observation is addressing the question if all renal masses that are potentially malignant and <4 cm in diameter should be initially managed by expectant management. Future perspectives like biopsy of renal mass with the subsequent analysis of molecular markers could be more beneficial than an active surveillance only.

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