# High rate of benign histology in radiologically suspect renal lesions

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# ABSTRACT

**INTRODUCTION:** The objective of this study was to determine the incidence of benign renal lesions for clinically localised renal masses and the need for new diagnostic procedures to assess these lesions.

**MATERIAL AND METHODS:** This retrospective study included patients who underwent partial or radical nephrectomy between November 2010 and July 2013. All patients underwent a multiphase helical computed tomography (CT), which revealed suspected renal malignancy. The exclusion criteria were cystic tumours, biopsy before surgery, and disseminated and locally advanced disease. Lesions were defined as follows: small  $\leq$  4 cm, intermediate > 4 and  $\leq$  7 cm, and large > 7 cm.

**RESULTS:** A total of 226 patients underwent radical or partial nephrectomy; of these 75 patients were excluded. In all, 151 had masses suspected of being malignant tumours on CT. The mean age was 62.9 years. The male: female ratio was 3:1. The distribution of small, intermediate and large lesions were 75 (49.7%), 47 (31.1%) and 29 (19.2%), respectively. Among the three types of lesions, 15 (20%), 5 (10.6%) and 3 (10.3%) were benign, respectively (p = 0.27). Partial nephrectomy was performed in 69.3% of patients with small tumours versus 23.4% of patients with intermediate tumours, p < 0.001.

**CONCLUSION:** Benign lesions were observed in 20% of small renal masses ≤ 4 cm even though CT revealed a suspect renal lesion. The need for new diagnostic approaches for clinically localised renal lesions is evident. **FUNDING:** not relevant.

TRIAL REGISTRATION: not relevant.

The number of diagnoses of renal cell carcinoma has increased over the past two decades because of the incidental detection of small renal tumours resulting from an increased use of computed tomography (CT) [1-3]. Multiphase helical CT is the standard imagining modality used to detect renal masses, but it is associated with some limitations and its sensitivity varies [4]. Other imaging modalities are available, but they are also associated with limitations. Ultrasound allows us to distinguish solid tumours from cystic changes, but it is less adequate for the determination of type of solid tumour [5]. Contrast-enhanced ultrasound has improved our ability to differentiate tumours, but does not eliminate the influence of bowel gas, obesity or tumour location, and it requires sufficient experience [6]. Magnetic resonance imaging (MRI) has a tendency to upgrade complex cystic changes [7] and positron emission tomography (PET) has a low sensitivity for diagnosis of renal masses due to a lack of flourodeoxyglucose uptake in some tumours [8].

Core needle biopsy may clarify the histology of the tumour. The sensitivity of biopsy for small masses ( $\leq 3$  cm) is lower than for large masses. Non-diagnostic biopsy is not necessarily benign, as repeated biopsy reveals malignancy in the majority of cases [9-11].

The purpose of this study was to investigate the incidence of benign lesions for clinically localised renal masses on final histology when CT revealed suspect lesions.

## MATERIAL AND METHODS

This retrospective study included patients who underwent radical nephrectomy (RN) or partial nephrectomy (PN) between November 2010 and July 2013 at the Department of Urology, Roskilde Hospital, Denmark. Data were extracted from a well-maintained database within the Department of Urology, Roskilde Hospital. All patients underwent CT with three phases: the plain, the cortical nephrographic and the tubular nephrographic phase. All CTs had been evaluated by a radiologist and re-evaluated by a multidisciplinary team consisting of an uro-radiologist, an oncologist and a urologist, all with a subspecialty in renal disease, and CT revealed a renal lesion suspected for malignancy.

The exclusion criteria were cystic lesions, biopsy before surgery, locally advanced disease and metastatic disease. Tumours were divided into three cohorts: small lesions (SL) were defined as lesions  $\leq 4$  cm, intermediate lesions (IL) as lesions > 4 cm and  $\leq 7$  cm and large lesions (LL) as lesions that were > 7 cm. Tumour size was measured in three dimensions on CT, and the largest diameter was considered to be the size of the lesion.

Fuhrman grade I and II were considered to be potential tumours with low malignancy potential, and Fuhrman grade III and IV were considered to be tumours with a high malignancy potential.

## Statistics

Statistical analysis was performed using SPSS statistics

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Perioperative distributions of renal lesions.



Distribution of lesions according to their histological results. The values are n (%)

|                  | Small<br>lesions | Intermediate<br>lesions | Large<br>lesions |
|------------------|------------------|-------------------------|------------------|
| Oncocytoma       | 7 (9)            | 3 (6)                   | 2 (7)            |
| Angiomyolipoma   | 6 (8)            | 1 (2)                   | 0 (0)            |
| Other benign     | 2 (3)            | 1 (2)                   | 1 (3)            |
| Clear cell       | 35 (47)          | 31 (66)                 | 18 (62)          |
| Papillary type 1 | 8 (11)           | 0 (0)                   | 0 (0)            |
| Papillary type 2 | 4 (5)            | 4 (9)                   | 3 (10)           |
| Papillary type?  | 2 (3)            | 0 (0)                   | 1 (3)            |
| Chromophobe      | 7 (9)            | 5 (11)                  | 3 (10)           |
| Other malignant  | 4 (5)            | 2 (2)                   | 1 (3)            |
| Total            | 75 (100)         | 47 (100)                | 29 (100)         |
|                  |                  |                         |                  |

Distribution of lesions according to the pathological T-staging. The values are n.

for Mac, version 19.0.0 (SPSS Inc., Chicago, IL, USA). A chi<sup>2</sup>-test was used to compare distributions among groups. p-values below 0.05 were considered statistically significant.

Trial registration: not relevant.

# RESULTS

A total of 226 patients underwent PN or RN, and 75 patients were excluded from the study: 25 patients with cystic lesions, 16 patients who had undergone kidney biopsy prior to surgery, 14 patients who had locally advanced lesions and 20 patients with metastatic disease. A total of 151 patients were included in the study. In these patients, CT revealed suspected renal lesions and patients underwent RN or PN. The distribution of lesions is shown in Figure 1. The mean age was 62.9 years (range: 37-86 years) with a male:female ratio of 3:1. The median tumour size was 4.2 cm (range: 1.1-22 cm). The median SL size was 2.5 cm (range: 1.1-4.0 cm), median IL size was 5.5 cm (range: 4.2-7.0 cm) and the median LL size was 11.0 (range: 7.5-22 cm). PN was performed in 69.3% of SL patients versus 23.4% of IL patients (p < 0.001). All LL patients underwent RN. The distribution of benign lesions was not significant in all cohorts (p = 0.27).

The distribution of lesion subtypes according to their histological results is shown in Table 1. The incidence of clear cell renal cell carcinoma (ccRCC) was 35 (58%) in SL, 31 (74%) in IL and 18 (69%) in LL (p = 0.25). Fuhrman grade was specified in 91.4% of the histology reports. Low malignant tumours were recognised in 40 (76.9%) SL patients, 18 (43.9%) IL patients and 10 (41.7%) LL patients, (p < 0.001).

|      | Small<br>lesions | Intermediate<br>lesions | Large<br>lesions |
|------|------------------|-------------------------|------------------|
| pT1a | 58               | 4                       | 0                |
| pT1b | 0                | 33                      | 3                |
| pT2  | 0                | 1                       | 16               |
| pT3a | 2                | 4                       | 6                |
| pT3b | 0                | 0                       | 1                |
|      |                  |                         |                  |

The distribution of pathological T-staging is shown in Table 2.

# DISCUSSION

The number of benign lesions in SL (20%) was comparable to that reported in other international studies [12-15]. In our cohort, about two-thirds of this group underwent PN and had the opportunity to preserve their renal function. It is mandatory to perform a partial nephrectomy on small renal tumours when possible, regardless of the renal function of the contralateral kidney.

Fuhrman grade III or higher, which are considered more aggressive tumours [16], were less frequent in SL. These results may offer the opportunity to give our patients more accurate information about their disease, and an active surveillance strategy may become an important option for these patients, especially those with a high co-morbidity. This matter needs further investigation.

Due to the high incidence of benign lesions in small renal masses, numerous studies have been performed to clarify the value of core needle biopsy. The procedure is becoming increasingly safe with a low rate of severe complications; however, Herts [9] reported a low sensitivity of renal biopsy for small masses, and non-diagnostic biopsy is not necessarily a benign lesion [10]. Wood et al [17] reported 6-21% false negative preoperative renal biopsies. Distinguishing between oncocytoma and chromophobic renal cell carcinoma, sampling error and hybrid tumours is a big challenge in renal biopsies [10]. Renal biopsy prior to operation is an important option for the patients with SL if an active surveillance strategy is the treatment of choice or the results of a biopsy will change the treatment option. The consequences of a biopsy need to be discussed carefully with the patients before the final decision is made. Benign lesion in IL and LL are relatively low (10%) and renal biopsy may be an option if surgical treatment can be avoided. Benign lesions in IL and LL were comparable, and this may be because of the small sample size in each cohort.

The limitations of this study are that it is retrospective and that the number of patients included in the study is relatively small. More studies are needed to identify benign lesions and to distinguish between the aggressive types of malignant lesions.

## CONCLUSION

Benign lesions were observed in 20% of small renal masses ≤ 4 cm, even though CT revealed a suspected renal lesion. Aggressive malignant subtypes are less frequent in small renal masses. The need for new diagnostic approaches to distinguish between clinically localised renal lesions is evident and solutions are needed.

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