

Renal Cell Carcinoma

Renal cell cancer (RCC) is the most malignant urological tumor.

Epidemiology

Renal cell cancer presents 2–3% of all tumors. Incidence grows every year (2%), only in Sweden and Denmark is getting lower. The highest incidence of RCC is in the Czech Republic: 27/100 000 per year with mortality 11/100 000 per year.^[1]

Risk Factors^[1]

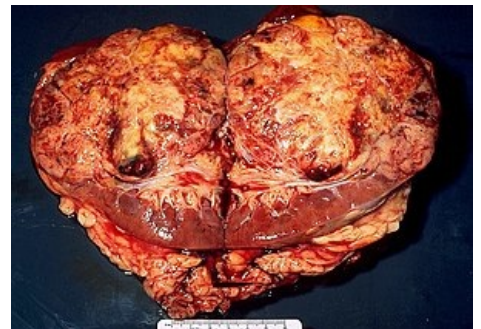
- cigarette smoking
- obesity
- man sex
- age over 60 years
- arterial hypertension
- asbestos
- aluminium
- end stage kidney, chronic renal failure
- positive family history!

Pathology

RCC is deviated from proximal tubules cells. RCC is well circumscribed, encapsulated, macroscopic color of the tumor is yellow. Can contain necrosis or bleeding in the tumor. Advanced large tumors can infiltrate renal pelvis, renal capsule and fat, can create tumor thrombus.^[2]

Types

- **Clear cell carcinoma** – the most often type (80–90%), can be sporadic or familial (Von Hippel Lindau), cells contain a lot of glycogen and lipids in cytoplasm, that makes them "clear cell".
- **Papilar renal carcinoma** (10–15%), is very often multifocal and in both kidneys, often in dialyzed patients
- **Chromophobe carcinoma** (4–5%)
- **Collecting ducts RCC** (1%)
- **Medullary renal carcinoma** (< 1%)
- **Mucinous tubular and spindle cell carcinoma** (< 1%)



RCC - macroscopy.

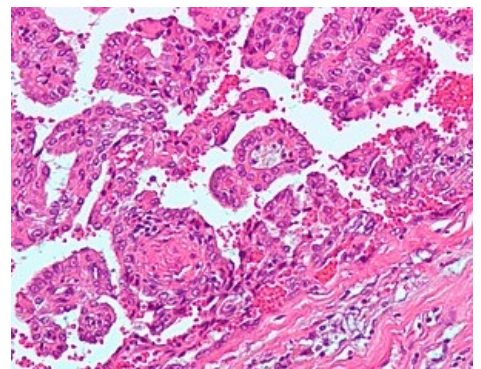
Metastases

Hematogenous metastases^[1]:

- **lungs** – very often (60%),
- **bones** – reason of pathological fractures, hypercalcemia, elevated ALP, (30–40%)
- **liver** (30–40%),
- **brain** (5%).

Lymphatogenous metastases – regional lymph nodes (less often – 15%).

Local invasion in renal pelvis, renal capsule and fat and in renal vein as tumor thrombus (can progress to inferior caval vein).



Papillary RCC, microscopy.

Clinical Features

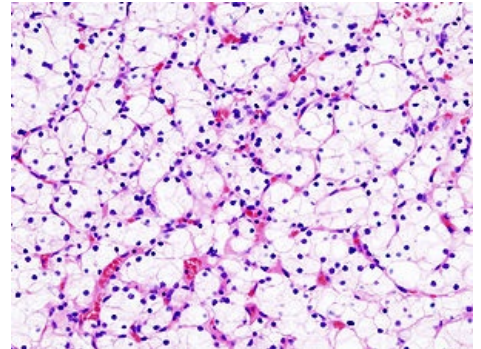
The danger of RCC is, that early stages have **no symptoms** (60% of all tumors, are found as incidentaloma by USG)^[1]. Advanced stages are presented with:

- low back pain
- macrohematuria
- palpable tumor
- varicocele
- bone pain, pathological fractures

- paraneoplastic symptoms:
 - hypertension, kachexia, febrilia, elevated liver enzymes,
 - polycythemia, trombocytosis, hypercalcemia.

Diagnostic Methods

- **USG** – over 60% of RCC are found as incidentaloma by common USG examination in asymptomatic patient,
- **CT with contrast** – can tell more about tumor size, localization, invasion (renal veins, renal pelvis, lymphatic nodes), tumor thrombus, liver metastases
- **X-ray of heart and lungs** or CT of lungs – necessary for staging
- **CT/MRI of brain** (possible metastases)
- **bone scintigraphy** – just only in symptomatic patient (bone pain, pathological fractures) or in patient with elevated ALP
- **fine needle biopsy**
- **cavography** – angiography of inferior caval vein, focused on imaging of tumor thrombus, today replaced by MRI



Clear cell carcinoma, microscopy.

Staging and Grading

TNM Staging^{[1][3]}

Size of the tumor, invasion:

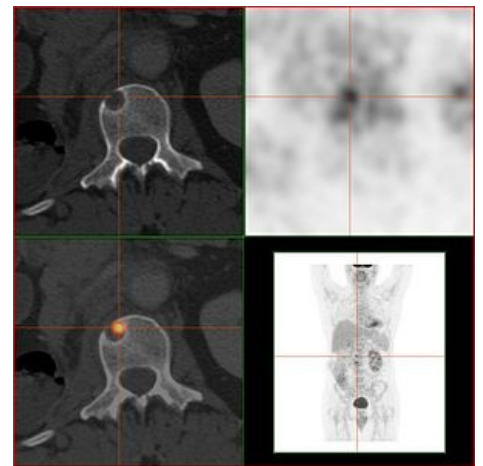
- T1 = ≤ 7 cm, no extraparenchymal invasion
- T1a = ≤ 4 cm
- T1b = more than 4 cm and most 6 cm
- T2 = more than 7 cm no extraparenchymal invasion
- T3 = invasion to veins or extraparenchymal tissue (renal pelvis, fat) but not beyond Gerota's fascia
- T3a = adrenal invasion or perirenal tissue invasion
- T3b = invasion in to renal veins or inferior caval vein (under level of the diaphragm)
- T3c = inferior caval vein invasion (over level of the diaphragm)
- T4 = tumor infiltrates beyond Gerota's fascia

Regional lymph nodes (necessary examination of 8 lymph nodes):

- N0 = no LN metastases
- N1 = 1 LN metastase
- N2 = more LN metastases

Distant metastases:

- M0 = no distant metastases
- M1 = distant metastases



Scinti: RCC's metastasis in vertebral body

Grading

Fuhrman grade^[1]:

- Grade 1 – nuclear size 10 mm, round and uniform nuclear outline, absent or inconspicuous nucleoli.
- Grade 2 – nuclear size 15 mm, irregular outline, small nucleoli
- Grade 3 – nuclear size 20 mm, irregular outline, prominent nucleoli
- Grade 4 – nuclear size > 20 mm, irregular or bizarre outline, prominent nucleoli with heavy chromatin clumps

Therapy

Therapy of RCC is based on surgical procedures.

Surgery

- **Nephron-sparing surgery** – is indicated in tumors ≤ 4 cm, or in tumors in both kidneys, hereditary form of RCC of solitary kidney, can be performed by laparoscopy or lumbotomy.
- **Radical nephrectomia** – is resection of:
 - kidney with fat case and Gerota's fascia,
 - adrenal gland.^[1]
- Radical nephrectomia can be preformed by laparoscopy (tumors < 8 cm with no extra renal invasion or tumor thrombus) or laparotomy.
- **Tumor thrombus** treatment is based on its localization:
 - just only in renal vein \rightarrow radical nephrectomy,

- in inferior caval vein but only under level of diaphragm → cavotomy,
- in inferior caval vein over level of the diaphragm → in cooperation with heart surgeon, extracorporeal circulation.

Imunochemotherapy

Imunochemotherapy is performed in metastatical RCC's (metastases in lungs!) by INF α or IL-2. Partial remission is found in 10–15% of patient. Immunotherapy can be combined with bevacizumab.

Chemotherapy and hormonal therapy has no effect.

Biological Treatment

Biological treatment is focused on angiogenesis. It can slow down progression and prolong survival time. E.g. bevacizumab, sunitinib, everolimus and others.

Links

Related Articles

- Kidney Tumors

References

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2. POVÝŠIL, Ctibor, et al. *Speciální patologie*. 1. edition. Prague : Galen, 2007. pp. 225-226. ISBN 978-80-7262-494-2.
3. WikiSkripta. *Karcinom ledviny* [online]. ©2012. The last revision 2012-04-04, [cit. 2012-05-12]. <http://www.wikiskripta.eu/index.php/Karcinom_ledviny>.