Renal Cancer: Symptoms, diagnosis, pathology & prognosis

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Plan for today:

- How renal tumours present
- What investigations are needed and why
- What types of tumours are found
- How stage & grade can help predict outcome
UK Incidence 2007

2.7% of new cases
= 8,228 cases
UK Mortality 2008

3,848 cases

Lung
Colorectal
Breast
Prostate
Bladder
Kidney

Men
Women
Renal cancer

- The incidence continues to rise
- Peak in ages 60 - 70
- Male:Female: 1.6 to 1
Patients present in various ways:

• No symptoms

• Symptoms from the primary tumour
  – ‘paraneoplastic syndromes’

• Symptoms from metastatic tumours
‘incidental’ tumours

• Before CT & US around 7% of tumours were detected incidentally

• In modern series up to 80% are incidental finding on US / CT (& increasingly MRI)

• Metastatic as well as primary tumours may be detected incidentally
Paraneoplastic syndromes:

• In up to 20% of cases
  – High ESR
  – Polycythaemia
  – Hypercalcaemia
  – Hypertension
  – Pyrexia
  – Cachexia
  – Stauffer’s syndrome
Stauffer’s syndrome:

- 3-20% incidence
- Elevated alkaline phosphatase
- Prolonged PT time
- Hypoalbuminaemia
- Elevated bilirubin & transaminases

- Normalises in 70% post nephrectomy – persistence is a poor prognostic sign (indicates viable tumour)
Symptoms from the primary:

- Virchow's Triad – the ‘too late triad’:
  - Haematuria
  - Flank pain
  - Abdominal mass

- Now a far less common presentation of RCC
  - 9% in 1970
  - 3% in 1995
Presenting symptoms in 1990s*:

<table>
<thead>
<tr>
<th>Symptom</th>
<th>Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td>Haematuria</td>
<td>26%</td>
</tr>
<tr>
<td>Flank pain</td>
<td>35%</td>
</tr>
<tr>
<td>Abdominal mass</td>
<td>7%</td>
</tr>
<tr>
<td>Weight loss</td>
<td>12%</td>
</tr>
<tr>
<td>High ESR</td>
<td>20%</td>
</tr>
<tr>
<td>Anaemia</td>
<td>16%</td>
</tr>
<tr>
<td>Varicocele</td>
<td>1%</td>
</tr>
</tbody>
</table>

*Sunela et al BJUI Intl Sept 2010*
Metastatic disease
Metastatic disease:

• 20% of patients have metastatic disease at presentation

• Metastatic disease is often asymptomatic at presentation

• Can spread to almost any organ
## Common sites of spread:

<table>
<thead>
<tr>
<th>Organ</th>
<th>Cleveland, USA</th>
<th>France</th>
<th>New York, USA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lung (%)</td>
<td>73</td>
<td>74</td>
<td>72</td>
</tr>
<tr>
<td>Bone (%)</td>
<td>32</td>
<td>32</td>
<td>26</td>
</tr>
<tr>
<td>Retroperitoneal Lymph nodes (%)</td>
<td>27</td>
<td>26</td>
<td>20</td>
</tr>
<tr>
<td>Brain (%)</td>
<td>4</td>
<td>2</td>
<td>Not given</td>
</tr>
<tr>
<td>Mediastinum (%)</td>
<td>Not given</td>
<td>Not given</td>
<td>23</td>
</tr>
</tbody>
</table>
Diagnosis:

• Tumour markers for kidney cancer are currently unavailable

• No blood test will make the diagnosis
Useful blood tests:

• FBC
  – Anaemia
  – Erythrocytosis
• Bone biochemistry
  – Hypercalcaemia
• Liver Function Tests
• ESR
• Creatinine
Diagnosis by imaging:

- Incidental tumours are commonly found on ultrasound (US) performed for other reasons.

- Suspicious lesions must be further evaluated with a correctly performed CT scan (or MRI).
Renal Mass Protocol CT

• A renal protocol multidetector CT scan is recommended for further diagnostic imaging, unless the patient cannot tolerate iodinated contrast agents

• Sections through the abdomen and chest

• It should not be routine to image the pelvis
Three sets of images (phases):

1. Non-contrast phase
2. Injection of IV contrast
3. Corticomedullary (arterial) phase at 40 seconds
4. Nephrographic phases at 100 seconds
   - 3-D reconstruction of the corticomedullary phase shows the vasculature, which can be useful for surgical planning
   - It is usually combined with a non contrast CT of chest
Renal mass protocol CT:

- CT image prior to intravenous contrast admin (A) demonstrates a 3.5 cm mass (arrow) in the left kidney. This measures 39 Hounsfield units corresponding to soft-tissue density. After administration of intravenous contrast (B), the mass (arrow) demonstrates enhancement increasing to 68 Hounsfield units.
The Hounsfield scale, named after Sir Godfrey Hounsfield is a quantitative scale for describing radiodensity on CT scans

- The scale is defined in Hounsfield units (symbol HU), running from air at $-1000$ HU, through water at $0$ HU, and up to bone at $+400$ HU and more

- Significant enhancement in renal tumours is defined as an increase of $15$ Hounsfield units or more
# Bosniak Classification

<table>
<thead>
<tr>
<th>Category</th>
<th>Definition</th>
<th>Malignant histology (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Simple benign cyst – thin walled no septa or calcification or solid elements. Water density. No enhancement</td>
<td>&lt;1</td>
</tr>
<tr>
<td>2</td>
<td>Benign cyst with a few thin septa fine calcification. No enhancement</td>
<td>5</td>
</tr>
<tr>
<td>2F</td>
<td>Cysts with more hairline thin septa. Minimal thickening of septa or wall. Some focal thick or nodular calcification. No enhancement</td>
<td>? Up to 18%</td>
</tr>
<tr>
<td>3</td>
<td>Indeterminate cystic masses with thickened irregular walls or septa in which enhancement can be seen</td>
<td>50</td>
</tr>
<tr>
<td>4</td>
<td>Clearly malignant with cystic lesions that contain enhancing soft tissue components</td>
<td>93</td>
</tr>
</tbody>
</table>
Additional imaging:

- Isotope bone scan: If alkaline phosphatase is elevated or c/o bone pain

- USS/MRI: if there is a concern about caval extension

- Cavography is rarely used to assess IVC
• Isotope renogram if renal dysfunction is present or contralateral kidney looks small and/or scarred

• CT Head for unexplained CNS symptoms

• Echocardiography may help in cases where atrial extension is suspected
Pathology:
## Pathology: Histologic subtypes

<table>
<thead>
<tr>
<th>Renal Cancer</th>
<th>Frequency (%)</th>
<th>Origin</th>
<th>Prognosis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Clear Cell</td>
<td>70-80</td>
<td>Proximal renal tubule</td>
<td>Hypervascular More aggressive than papillary or chromophobe Assd with VHL</td>
</tr>
<tr>
<td>Papillary (chromophilic)</td>
<td>10-15</td>
<td>Proximal renal tubule</td>
<td>Multifocal Variable prognosis</td>
</tr>
<tr>
<td>Chromophobe</td>
<td>5-10</td>
<td>Intercalated cells</td>
<td>Better prognosis</td>
</tr>
<tr>
<td>Collecting duct (Bellini duct)</td>
<td>1-2</td>
<td>Collecting duct</td>
<td>Infiltrative Poor prognosis</td>
</tr>
<tr>
<td>Neuroendocrine</td>
<td>&lt;1</td>
<td>variable</td>
<td></td>
</tr>
<tr>
<td>Not classified</td>
<td>1-3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
TNM Classification 2002 (6th Ed)

- **T1** 7cm or less limited to kidney
  - **T1a** 4cm or less
  - **T1b** more than 4cm but not more than 7cm
- **T2** more than 7cm limited to kidney
- **T3**
  - **T3a** Invades adrenal or peri-nephric tissue but not beyond Gerota
  - **T3b** into renal veins or vena cava below diaphragm
  - **T3c** Into vena cava above the diaphragm
- **T4** Tumour directly invades Gerota’s fascia
## Robson stage

<table>
<thead>
<tr>
<th>Stage</th>
<th>T classification</th>
<th>N classification</th>
<th>Description</th>
<th>5 yr survival (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Stage I</td>
<td>T1-T2</td>
<td>N0</td>
<td>Tumour within capsule</td>
<td>70 – 90</td>
</tr>
<tr>
<td>Stage II</td>
<td>T3a</td>
<td>N0</td>
<td>Invading fat (confined to Gerotas)</td>
<td>60 – 80</td>
</tr>
<tr>
<td>Stage III</td>
<td>T3b</td>
<td>N1</td>
<td>Lymph nodes and/or vena cava</td>
<td>0 – 20</td>
</tr>
<tr>
<td></td>
<td>T3c</td>
<td>N2</td>
<td></td>
<td>40 – 60</td>
</tr>
<tr>
<td>Stage IV</td>
<td>T4</td>
<td>M1</td>
<td>Adjacent organs or distant mets</td>
<td>1 - 10</td>
</tr>
</tbody>
</table>
Leibovich (Mayo) Score

- Pathological T stage 0-4
- Nodal status 0-2
- Tumour size
  - <10cm 0
  - >10cm 1
- Nuclear Grade 0-3
- Histological tumour necrosis 0-1

Scores from 0 – 11 Low=0-2, Intermediate=3-5 & High=6 or more

Leibovich et al; Cancer 2003
Leibovich score & outcome:

![Graph showing metastases-free survival over years to metastases or last follow-up with different Leibovich scores ranging from 0-1 to ≥8.](image-url)
Survival by risk group:

Low risk = 0-2  Intermediate risk = 3-5 and high risk = 6 or higher
Thank You