Classification of Urolithiasis in Denmark 2002—2004

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Background:
No exact data exists on the distribution and prevalence of various causes of stone diseases in Denmark.

Purpose:
To describe the prevalence of different stone diseases in Denmark, using a classification system based on the guidelines of the Scandinavian Cooperative Group for Urinary Stones (1).

Methods and material:
All urological departments in Denmark were invited to join a central registration of all patients (> 15 years) with upper urinary tract stones during a 2-year period.
(1/12002 – 31/3 2004).

Both hospitalized and out-patients were included. Patients could only be registered once.

Patients were evaluated and classified according to the guidelines (fig. 1 and table 1-2).

MIAF urolithiasis: conditions with a definitive Metabolic, Infectious, Anatomical or Functional cause of stone formation.

Seventeen departments representing 11 of 14 counties participated, covering approximately 85—90% of the population.

Number of patients/department: median 81 (range: 19 - 429).

2294 patients were registered.

57.4% were new stone formers.

Median age: 53 years (range 16 – 96 years).

The female: male ratio was 1:2.

Table 1. Classification

<table>
<thead>
<tr>
<th>Simple idiopathic calcium urolithiasis</th>
</tr>
</thead>
<tbody>
<tr>
<td>Complicated idiopathic calcium urolithiasis:</td>
</tr>
<tr>
<td>With hypercalciuria</td>
</tr>
<tr>
<td>Without hypercalciuria</td>
</tr>
<tr>
<td>With both hypercalciuria and hypocitraturia</td>
</tr>
<tr>
<td>With neither hypercalciuria nor hypocitraturia</td>
</tr>
<tr>
<td>With unknown urine calcium and urine citrate</td>
</tr>
</tbody>
</table>

MIAF urolithiasis:
Metabolic:
- Urinary acid related disorders
- Urinary acid stones with hyperuricosuria
- Urinary alkaline stones without hyperuricosuria
- 2.8 hydroxyapatite
- Xanthine
- Hyperuricosuric states
- Primary hyperoxaluria
- Idiopathic hyperoxaluria
- Other hyperoxaluric conditions
- Renal tubular acidosis
- Chronic diarrhoea states
- Cystinuria
- Other rare causes not mentioned above (ex. Indinavir)

Infection stones:
Anatomical or functional abnormalities

Classification not possible (incomplete diagnostics)

Fig. 1. Flowchart for evaluation and management.

Evaluation chart

| Medical history & Imaging |
| Urine culture and pH |
| B-creatine, 24-hr-urine calcium, 2-hr-urine citrate, & other urinalysis (if necessary) |

| Simple idiopathic calcium urolithiasis |
| MIAF urolithiasis |
| Complex MIAF urolithiasis |

Diagnosis of simple and complicated stone disease: 2022

Simple stone disease:
- Single stone formed with spontaneous passage of stone.
- Unilateral typical radiopaque stone that is easily fragmented and cleared from the renal tract following ESWL, and/or endoscopic surgery.
- Insignificant recurrence of typical radiopaque stone.

Complicated stone disease:
- Operation or severe stone disease.
- Significant recurrence.
- High stone burden.
- Early stone debut (<30 years).

Table 2. Definition of simple and complicated stone disease.
Results:
2294 patients were registered.

Overall results (number of patients and distribution) (N=2294):

<table>
<thead>
<tr>
<th>Classification</th>
<th>Number</th>
<th>%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Simple idiopathic calcium urolithiasis</td>
<td>1190</td>
<td>51.9</td>
</tr>
<tr>
<td>Complicated idiopathic calcium urolithiasis</td>
<td>534</td>
<td>23.3</td>
</tr>
<tr>
<td>MIAF (n=38)</td>
<td>19</td>
<td>8.3</td>
</tr>
<tr>
<td>Metabolic (n=181)</td>
<td>181</td>
<td>7.9</td>
</tr>
<tr>
<td>Not classified (n=181)</td>
<td>181</td>
<td>7.9</td>
</tr>
<tr>
<td>Total</td>
<td>2294</td>
<td>100</td>
</tr>
</tbody>
</table>

389 patients (17%) had MIAF-urolithiasis, 1724 patients (75%) had idiopathic calcium urolithiasis, and 181 patients (8%) were not classified (fig. 2).

1190 patients (52%) had simple idiopathic calcium urolithiasis, 534 patients (23%) had complicated idiopathic calcium urolithiasis, 214 patients (9%) had a metabolic cause, 63 patients (3%) had infection stones, and 112 patients (5%) had an anatomical/functional cause (fig. 3).

Among 534 patients with complicated idiopathic calcium urolithiasis 48 (9%) had hypercalcemia, 155 (29%) had hypocitruria, 19 (4%) both hypercalcemia and hypocitruria and 117 (22%) had neither hypercalcemia nor hypocitruria. In 195 patients (36%) 24H U-calcium and U-citrate was not available (fig. 4).

214 patients had a metabolic cause (specified in fig. 5). The were no cases of 2,6 dihydroxyadenosine or xanthinuria.

Conclusion
The classification system was found to be applicable and of clinical value. Since the distribution pattern of the different stone diseases was fairly identical from department to department, the results are supposed to be representative for the whole nation of Denmark.