Avascular necrosis of carpal bones

- Traumalix
- Gorgonium
Avascular necrosis of carpal bones

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Genève
Avascular necrosis of carpal bones

- Kienböck’s disease
- Preiser’s disease
- Avascular necrosis of the capitate
Kienböck’s disease

Historical perspective
Epidemiology
Anatomy

Michaël Papaloïzos
# Short history

<table>
<thead>
<tr>
<th>Year</th>
<th>Name</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1843</td>
<td><strong>Peste</strong></td>
<td>Collapsed lunate during cadaver dissections</td>
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<tr>
<td>1910</td>
<td><strong>Kienböck</strong></td>
<td>First description of lunatomalacia</td>
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<tr>
<td>1928</td>
<td><strong>Hulten</strong></td>
<td>Association with negative ulnar variance</td>
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<tr>
<td>1947</td>
<td><strong>Ståhl</strong></td>
<td>First staging of the disease</td>
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<td>1953</td>
<td><strong>Decoulx</strong></td>
<td>First classification</td>
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<tr>
<td>1966</td>
<td><strong>Antuña-Zapico</strong></td>
<td>Relationship between the shape of the lunate and ulnar length (thesis)</td>
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<tr>
<td>1977</td>
<td><strong>Lichtman</strong></td>
<td>Treatment oriented classification</td>
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<tr>
<td>2006</td>
<td><strong>Bain &amp; Begg</strong></td>
<td>Arthroscopy assisted classification</td>
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Epidemiology

- more frequent in Caucasians (?)
- 2-3 men : 1 women
- children can be affected (rare, better prognosis)
- peak : 20 - 40 years
- bilateral lesions are rare, < 2%
- higher incidence in manual workers
- role of repetitive microtraumatisms unclear
Relevant anatomy

Ulnar variance
In biomechanical cadaveric studies, approximately 20% of the load transmitted through the wrist passed through the ulna.

- Pronation + ulnar deviation: force transmitted up to 150%
- Ulnar variance affects axial load transmission
- 2.5 mm shortening ➞ ulnar load decreased to 4%
- 2.5 mm lengthening ➞ load increased to 42%

Antuña-Zapico

- Types 2 and 3 more frequent with zero and ulnar positive variance
- Type 1 associated with ulnar negative variance
- More sensitive to fatigue and stress load
Relevant anatomy

Vascularity

Palmar intercarpal arch

Dorsal radiocarpal arch

palmar
dorsal

Interosseous posterior artery
**Relevant anatomy**

**Vascular variance**

Y, I and X patterns

I (single vessel pattern) more at risk

Gelberman et al. 1980
Relevant anatomy

Vascular variance

- Palmar and dorsal blood supply present in 74% to 100% of bones.

- Single vascular blood supply in approximately 7% of lunates.

- Injection studies have demonstrated a consistent palmar blood supply but frequently an inconsistent dorsal blood supply.

- 20% of lunates have only a palmar arterial supply.

- Displaced volar fragments left untreated may place predisposed lunates at risk.

  These fractures may be reduced and fixed.
The normal ratio is $0.54 \pm 0.03$. 

Carpal height ratio

divide
the carpal height (L2)
by the length of the third metacarpal (L1)