The arthritic wrist
Tricks and pitfalls

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Criterions

- **Patient**
  - Pain, strength, mobility
  - Functional demand
  - Results of medical treatment

- **Watson grade**
  - SLAC, SNAC, or SCAC wrist

- **Surgeon experience**
Arthritic wrist

Surgical procedures

- Styloidectomy and other ectomy
- Partial implant of scaphoid
- Distal scaphoid resection
- Proximal row carpectomy
- Partial wrist fusions
- Total wrist fusion
- Denervation
- Wrist arthroplasty
Styloidectomy

- Remove the impingement and synovitis
- Grade I +/- II
- Not efficient in SLAC
- Better in
  - very old SNAC I or II
  - Scaphoid malunion
- Arthroscopic procedure
- No literature
Partial implant of scaphoid

- Pyrocarbon (APSI Bioprofile)
- Péquignot JP *Chir Main* 2000 276-85
- SNAC II
- Styloidectomy associated
Distal scaphoid resection

- Malerich *J Hand Surg Am* 1999 1196-1205
- SNAC II
- Better on stiff wrist
- Palmar approach
Proximal row carpectomy

- SLAC - SNAC II
- Postop. posture splints
- Long time of strength collapse
- Radiocapitate change at long term

10 yrs
Partial arthrodesis: indications

- SNAC - SLAC III +++

- SNAC - SLAC II
  Alternative option with
  - PRC
  - Distal scaphoid resection
    - Malerich 1999
  - Pyrocarbone implant
    - Péquignot 2000
Options for partial wrist fusion

<table>
<thead>
<tr>
<th>+ scaphoidectomy</th>
<th>Scaphoid conservation</th>
</tr>
</thead>
<tbody>
<tr>
<td>SNAC, SLAC III</td>
<td>SLAC I</td>
</tr>
<tr>
<td>• 4 bones fusion (LCTH)</td>
<td>• Scaphocapitate</td>
</tr>
<tr>
<td>• 3 bones fusion (LCH)</td>
<td>• Scapholunocapitate</td>
</tr>
<tr>
<td>• 2 bones fusion (LC)</td>
<td>• Scapholunate</td>
</tr>
<tr>
<td></td>
<td>• STT</td>
</tr>
<tr>
<td></td>
<td>RSL joint destruction</td>
</tr>
<tr>
<td></td>
<td>• radioscapholunate</td>
</tr>
</tbody>
</table>
Partial arthrodesis with scaphoid excision: rationale

- To remove the radioscaphoid impingement

- To stabilize the midcarpal joint
  - with possible correction of
    - DISI deformation
    - ulnar translation

- To preserve
  - carpal height
  - the safe radiolunate joint
Partial arthrodesis

• Common points
  – Scaphoidectomy
  – Central column arthrodesis

• Different procedures
  – Capitolunate fusion
  – 4 bones fusion
  – Capitolunate fusion with triquetrum resection
Capitolunate fusion Watson (early 80’s)

Technique
- Dorsal or lateral (Kadji) approach
- Carpal realignment
- Preservation of the carpal height
- Fixation: wires, screws, plate, staples
# Capitolunate fusion: results

<table>
<thead>
<tr>
<th></th>
<th>F/E range of motion</th>
<th>Strength % of controlateral</th>
<th>Nonunion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Krakauer 1994</td>
<td>50°</td>
<td>80%</td>
<td>50%</td>
</tr>
<tr>
<td>Kirschenbaum 1993</td>
<td>60°</td>
<td>(25 kg)</td>
<td>30%</td>
</tr>
<tr>
<td>Ashmead 1994</td>
<td>72°</td>
<td>80%</td>
<td>30%</td>
</tr>
<tr>
<td>Chaise 1996</td>
<td>59°</td>
<td>65%</td>
<td>0%</td>
</tr>
<tr>
<td>Kadji 2002</td>
<td>60°</td>
<td>80%</td>
<td>18%</td>
</tr>
<tr>
<td>Kitzinger 2003</td>
<td>62°</td>
<td>80%</td>
<td>30%</td>
</tr>
</tbody>
</table>

9 yrs
4 bone fusion (Watson 1984)

- **technique**
  - Dorsal approach
  - PIN denervation
  - Scaphoid removing
  - Dorsal osteophytis removing
    - Radius, lunate, capitate, triquetrum
4 bone fusion: carpal realignment

YES

NO
4 bone fusion: carpal realignment

- Antero-posterior tilt
- Extension
- Axial compression
- Lateral translation
- Transcient K-wires fixation
- Fluoroscopy checking

“joy stick”
4 bone fusion: midcarpal joint decortication
4 bone fusion: midcarpal joint grafting

Cancellous bone
- Scaphoid
- Distal radius
- Olecranon
- Iliac crest
- allograft + bone substitute (Tomaino 2001)

Packed grafting

Manual axial compression
4 bone fusion: **fixation**

- K-wires
- Cortical graft (Garcia-Lopez 2001)
- Screws
- Plates
- Shape memory staples
4 bone fusion: quadripodal staple fixation (*QUA Memometal*)
4 bone fusion: post-operative care

- Anterior splint 4 wks

- Early mobilisation before 3 wks post op?
## 4 bone fusion: results

<table>
<thead>
<tr>
<th>SLAC &amp; SNAC</th>
<th>Range of motion flex-ext</th>
<th>Strength % of controlateral</th>
<th>Nonunion</th>
</tr>
</thead>
<tbody>
<tr>
<td>Watson 1984</td>
<td>108°</td>
<td>82%</td>
<td>5 %</td>
</tr>
<tr>
<td>Voche 1993</td>
<td>44.5°</td>
<td></td>
<td>0 %</td>
</tr>
<tr>
<td>Tomaino 2001</td>
<td>72°</td>
<td>58%</td>
<td>0 %</td>
</tr>
<tr>
<td>Krakauer 1994</td>
<td>54°</td>
<td>80%</td>
<td>9 %</td>
</tr>
<tr>
<td>Wyrick 1995</td>
<td>67°</td>
<td>74%</td>
<td>17 %</td>
</tr>
<tr>
<td>Dagrégorio 1998</td>
<td>54°</td>
<td>79%</td>
<td>0 %</td>
</tr>
<tr>
<td>Sauerbier 2000</td>
<td>54°</td>
<td>65%</td>
<td>2.9 %</td>
</tr>
<tr>
<td>Bertrand 2002</td>
<td>70°</td>
<td>59%</td>
<td>5.8 %</td>
</tr>
</tbody>
</table>

**Our series**

| 60 cases > 1yr    | 52° (- 30°)               | 69% (+13%)                 | 0%       |
4 bone fusion: pronostic factors

- Delay
- SLAC
- Luxation
- Carpal realignment
  - Dagrégorio 1998
  - Bertrand 2002
Capitolunate fusion with resection of the triquetrum

- Delattre 1997
  - Shortening fusion
  - 3 bones fusion

- Calandruccio 2000
  = 4 BF

- Alnot 2002
  - Shortening fusion
    > 4 BF
    = PRC
Partial arthodesis

With conservation of scaphoid (SLAC wrist)

• Radio scapholunate fusion
• Scapho-capitate fusion
• STT fusion
• Scapho-lunate fusion
Radio-scapho-lunate fusion

- Remove the distal scaphoid
- Useful range of motion
Scapho-capitate fusion

- Avoid radio-scaphoid impingement

7 yrs
STT fusion

- Avoid radio-scaphoid impingment
- Semi-flexion position of scaphoid
Scapho-lunate fusion

- Try to fusion it
- Avoid radio-scaphoid impingment
Partial arthrodesis: conclusion

• All procedures are
  – Salvage procedure
  – Very efficient on pain
  – Preserve some motion
  – Preserve some strength
Partial arthrodesis: What procedure?

- Depends on
  - Stiffness
  - Duration of the SNAC or SLAC
  - Ulnar translation
  - DISI deformation
  - Shape of the lunate
  - Patient demand and age

4 bone fusion has a great value
Total wrist fusion

- Try an other procedure if possible
Wrist denervation

- A waiting procedure
Wrist prosthesis

• FORGET IT!
• Or make sure you have a good insurance