Interposition arthroplasty with the Amandys® pyrocarbon implant in rheumatoid wrist

Dr Victor LESTIENNE
Dr Philippe Bellemère, Dr Etienne Gaisne, Dr Yves Kerjean, Dr Thierry Loubersac
Institut de la main Nantes Atlantique

Conflict of interest : Philippe Bellemère – Implant Designer
Amandys® is an alternative to TWF and TWA in pancarpal arthritis.
INTRODUCTION

MATERIALS AND METHODS

RESULTS

DISCUSSION

CONCLUSION

PYROCARBON IMPLANT AMANDYS®

- Free interposition arthroplasty:
  - Mobile spacer, not fixed to the bone
  - Avoids load peaks at the radius or the carpus
  - The bony surfaces in contact with the implant can slide and roll

- Biomechanical properties:
  - Low coefficient of friction
  - Modulus of elasticity close to the cortical bone
  - High wear resistance
  - Excellent biocompatibility

No studies on its outcomes in the management of rheumatoid pancarpal arthritis
MONOCENTRIQUE, CONTINUOUS AND RETROSPECTIVE STUDY

*From November 2009 to June 2017*

*Clinique Jeanne d’Arc – Institut de la main Nantes Atlantique*

Amandys® in RA - Indication Criteria:

- Well controlled disease
- Well or acceptable wrist alignment:
  Simmen’s type 1 or 2

<table>
<thead>
<tr>
<th>Table 1</th>
<th>Simmen classification of the rheumatoid wrist involvement.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ranking</td>
<td>Operation</td>
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<tr>
<td>Type 1</td>
<td>Spontaneous tendency for ankylosis</td>
</tr>
<tr>
<td>Type 2</td>
<td>Osteoarthritic destruction pattern relatively stable over time</td>
</tr>
<tr>
<td>Type 3</td>
<td>Disintegration with progressive destruction and loss of alignment</td>
</tr>
<tr>
<td>3A</td>
<td>Ligamentous destabilization</td>
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<tr>
<td>3B</td>
<td>Bony destabilization</td>
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Type 1 - contraindication
POPULATION

28 cases in 23 patients
18 women and 5 men
Mean age : 55.7 y

9 wrists (32%) previously operated:
- 2 wrists Synovectomy
- 5 PWF
- 1 TWF
- 1 Darrach procedure

Indications

- Rheumatoid Arthritis : 24
- Ankylosis Arthritis : 2
- Psoriatic Arthritis : 1
- Idiopathic Arthritis : 1

Simen’s Type:
- Type 1 : 20
- Type 2 : 5
- Type 3 : 3
METHODS - EVALUATION

CLINICAL

- Mobilities
- Grip strength
- Functionnal scores: QuickDASH and PRWE
- Pain

X-RAYS

- Sagittal subluxation
- Radial deviation (angle of Shapiro)
- Ulnar carpal translation (index of Youm)
- Carpal height (index of MacMurtry and Youm)
Mean follow-up: 45 months
Follow up > 5y: 15 wrists

14 (50%) Associated procedures in the same time:

**DRUJ**: 7 cases (25%)
- 4 Sauvé-Kapandji
- 2 Darrach
- 1 DRUJ arthroplasty: Eclypse®

**OTHERS**: 7 cases (25%)
- 2 extensor tendons repairs
- 2 STT pyrocarbon arthroplasty
- 1 ECRL transfert
- 1 radius osteotomy
- 1 thumb MP joint fusion
### CLINICAL RESULTS

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X-RAYS RESULTS

PREOPERATIVE
- Carpal collapse
- Well alignment wrist population

POSTOPERATIVE
- No significant subsidence
- No carpal translation
COMPLICATIONS

- **3 implants** early instability (11%) treated with new bones preparation, implant repositioning and capsule reinforcement.

- **1 distal radius fracture** treated by splint

- **1 EPL tendon rupture** after 18 months

- **1 bilateral** implant late instability well tolerated
MOBILITY

Results: All mean mobilities were included in the functional ranges described by Palmer (1985). Results comparable to other series studying the Amandys

Total wrist arthroplasty:
Out of 22 arthroplasty series studied by Cavaliere and Chung (2008) and Berber (2018), only 4 had average scores in the functional mobility sector for all values.

Amandys’ s mobilities higher than those of TWA

Palmer 1985: Functional wrist motion: a biomechanical study

Cavaliere, Chung 2008: A systematic review of total wrist arthroplasty compared with total wrist arthrodesis for rheumatoid arthritis

Berber, 2018: Systematic Review of Total Wrist Arthroplasty and Arthrodesis in Wrist Arthritis
**Grip Force**

**Results**: Average postoperative grip force of 16.6kg (77.7% on the contralateral side)

6.2kg

**Literature**: Berber (2018)

The gripping force in relation to the contralateral side varies from:
- 50 to 79% in TWF
- 58 to 72% in TWA

Results comparable to those of TWF

**Pain**

**Results**: Postoperative average VAS of 2.5/10 (-4.1 points)

**Literature**: Berber (2018)

Lower pain scores in TWF (0.8 to 1.9/10 out of 10) compared to TWA (0.4 to 5.4 out of 10)

Our results are between those of TWF and TWA

**Berber, 2018**: Systematic Review of Total Wrist Arthroplasty and Arthrodesis in Wrist Arthritis
**Results:**

DASH postop 33 points: - 28.1 points.
PRWE postop 27.1 points: - 34.3 points.

**TWF:** Fonction rarely improved

- 1 study / 17 *Berber 2018*

**TWA:** Frequent improvement in functionnal scores, to a lesser extent than the study results

*Functional scores higher than the TWA*

*Berber, 2018*: Systematic Review of Total Wrist Arthroplasty and Arthrodesis in Wrist Arthritis
Results:
3 early instabilities (11 %)
Survival rate: 100% at 45 months.

Literature: Complication rate
• Cavaliere and Chung (2008) : TWA 30% vs 17% TWF (p<0,05)
• Berber (2018) : TWA 31% vs 28% TWF (p>0,05)
TWA 4th génération 13% vs 2-3th génération 47% (p<0,05)

Amandys’ s complication rate lower than those of TWA and TWF
But close to the 4th generation of TWA
Insufficient follow up to compare the survival rate

Cavaliere, Chung 2008 : A systematic review of total wrist arthroplasty compared with total wrist arthrodesis for rheumatoid arthritis
Berber, 2018 : Systematic Review of Total Wrist Arthroplasty and Arthrodesis in Wrist Arthritis
CONCLUSION

**Pyrocarbon** : Ideal implant material for interposition arthroplasty

**Results** :

- Good clinical and radiological tolerance of the implant
- Pain Relief
- Average range of motion preserved and superior to the useful range of motion
- Grip Force comparable to that of TWF
- Functionnal results superior to thoses of TWA
- No implants removed, moderate complication rate

- Complications attributed to technical errors : learning curve
- Require long term evaluation and bigger series

**Amandys®** = Reliable alternative TWA or TWF in rheumatoid arthritis with a well aligned wrist