5-10 YEAR EXPERIENCE WITH STEMLESS ARTHROPLASTY

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Disclosures

- Consultant for Arthrex Inc.
- Royalties Arthrex Inc.

INDICATIONS FOR STEMLESS TSA

1. POSTTRAUMATIC OSTEOARTHRITIS
2. IDIOPATHIC OSTEOARTHRITIS
3. DISLOCATION ARTHROPATHY
4. AVASCULAR OSTEONECROSIS
5. RHEUMATOID ARTHRITIS
   (CENTERED FORM)
CONTRA - INDICATIONS FOR STEMLES TSA

1. OSTEOPOROSIS (T SCORE < -2.5 SD)

CONTRA - INDICATIONS FOR STEMLES TSA

1. OSTEOPOROSIS (T SCORE < -2.5 SD)
2. BONE CYST FORMATION (RA)
3. EPILEPSY

HUMERAL HEAD GEOMETRY & BIOMECHANICS OF STEMLESS HEAD REPLACEMENT

Design principle:
Primary stability by shifting & fixation of the trunion to the center of rotation
DESIGN RATIONAL OF STEMLESS IMPLANTS

2004: TESS (Biomet)  2005: Eclipse (Arthrex)  2010: Simpliciti (Tornier)

EPHYSEAL & METAPHYSEAL FIXATION TO PREVENT MIGRATION

FINITE ELEMENT ANALYSIS ECLIPSE

CRANIAL LOADING: Reduction of migration to 0.2mm with cortical support of the trunion

MIDTERM RESULTS OF STEMLESS SHOULDER ARTHROPLASTY

Evaluation of clinical and radiological results with 5 - 8 years after stemless humeral head replacement

Midterm results of stemless shoulder arthroplasty: a prospective study

Peter Habermeyer, MD, PhD, Sven Lichtenberg, MD, Mark Tauber, MD, PhD, Petra Regsch, MD
AIM OF THE STUDY

Evaluation of clinical and radiological results with 9 & 10 years after stemless humeral head replacement

OWN RESULTS WITH A FUP OF 9 & 10 YEAR

- N = 49 (27f / 22m)
- Ø FU: 9 years (90-127 Mo)
- Ø Age 56 years (21-81y)
- 32 HSA (65%) / 17 TSA (35%)
- Lost of FUP n=6, FUP rate: 88%
- Follow-up:
  - 6 Wo, 3 Mo, 6 Mo, 12 Mo, annually
  - Constant Score
  - X-ray in 3 planes

INDICATIONS

No of patients

<table>
<thead>
<tr>
<th>Indication</th>
<th>No of Patients</th>
</tr>
</thead>
<tbody>
<tr>
<td>primary OA</td>
<td>7</td>
</tr>
<tr>
<td>Posttraumatic</td>
<td>24</td>
</tr>
<tr>
<td>Postinfectious</td>
<td>7</td>
</tr>
<tr>
<td>Arthritis</td>
<td>2</td>
</tr>
<tr>
<td>Revision arthroplasty</td>
<td>1</td>
</tr>
<tr>
<td>Total</td>
<td>25</td>
</tr>
</tbody>
</table>
**CONSTANT-SCORE**

**pre-OP / post-OP TOTAL**

FU 9 years, age 56y, n=43

![Graph showing significant improvement of overall Constant Score, pain, ADL & ROM](image)

⇒ Significant improvement of overall Constant Score, pain, ADL & ROM

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**CONSTANT-SCORE POST-OP**

**HSA vs TSA**

P > 0.05

![Graph showing no difference in Constant score and its subcategories](image)

⇒ No difference in Constant score and its subcategories

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**ROM POST-OP**

**HSA vs TSA**

P > 0.05

![Graph showing no difference in active ROM](image)

⇒ No difference in active ROM
RESULTS
POSTTRAUMATIC AVN

- N=24 (14f/10m)
- Ø age 57 years (37-81y)
- Ø Follow-up 108 Mo (90-127 Mo)
- chron. fracture Boilieu I
- 15 HSA
- 5 TSA

CONSTANT-SCORE
POSTTRAUMATIC pre- / post-OP

FU 109 Mo, age 57y, n=24

Significant improvement of overall Constant Score, pain, ADL & ROM

ROM
POSTTRAUMATIC pre- / post-OP

FU 109 Mo, age 57y, n=24

Significant improvement of flexion, abduction, ext. rotation
ASSESSMENT OF RLL & STRESS SHIELDING

ASSESSMENT OF HUMERAL HEAD MIGRATION

RC-DEFICIENCY = Migration & loss of shoulder function

RADIOLOGICAL RESULTS HUMERUS

- Incomplete RLL ≤ 1mm 2.9%
- Loosening 0%
- Resorption of greater tub. 1 case
- Stress shielding zone A 29.4% ap
- Humeral head migration 14.7%
RADIOPHICAL RESULTS
GLENOID SIDE

HSA:
glenoid wear after HSA:
⇒ 1 (2.3%) Revision to TSA

TSA:
incomplete RLL < 1mm 27.3%
No loosening

2006 2016

COMPLICATIONS
HUMERERAL SIDE

• 1 (2.3%) Late infection ⇒ Explantation 7 mo post-op
• 6 (14%) RC deficiency
  ⇒ 1x Pect. major transfer 6 weeks post-OP
  ⇒ 1x Reverse shoulder arthroplasty 74 mo post-OP
• 1 (2.3%) greater tuberosity resorption without revision
• 1 (2.3%) proximal humeral fracture at the surgical neck
  by a fall 7 weeks post-OP
  ⇒ conservative treatment

9.3% revisions on humeral side

POSTTRAUMATIC AVN

79 years, female

8 years after injury

Abduction 70°
Flexion 50°
ER -10°
Severe pain
POSTTRAUMATIC AVN

- Abduction 90°
- Flexion 100°
- IR L1
- ER 30°
- Pain 14/15

1 year post-OP

CHRONIC LOCKED POSTERIOR FRACTURE DISLOCATION & AVN

M.M., 81y

CHRONIC LOCKED POSTERIOR FRACTURE DISLOCATION & AVN

- 6 Mo post-OP
- ROM: Flexion 110°
- ERO 30°
- Constant Score 42 points (65.6%)
DISCUSSION: CONVERTIBLE VS REVERSIBLE

PERIPROSTHETIC FRACTURE

CONCLUSION

- Good functional results after 9-10 years
- Excellent results in posttraumatic cases
- No revision due to loosening
- Stress Shielding
  - within the area of physiologic lower bone substance
- Good reversibility
- Easy revision in periprosthetic fracture
THANK YOU FOR YOUR KIND ATTENTION!

WHAT IS BETTER?  
HABERMeyer et al. 2016

<table>
<thead>
<tr>
<th>TYPE</th>
<th>Stemless TSA</th>
<th>Uncemented Stem – Prosthesis TSA</th>
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<tbody>
<tr>
<td>Indication</td>
<td>Primary OA</td>
<td>Primary OA</td>
</tr>
<tr>
<td>N</td>
<td>20 (10f/10m)</td>
<td>20 (13f/7m)</td>
</tr>
<tr>
<td>Follow-up Rate</td>
<td>70%</td>
<td>85%</td>
</tr>
<tr>
<td>Ø FU</td>
<td>55</td>
<td>69</td>
</tr>
<tr>
<td>Hours</td>
<td>(min 60)</td>
<td>(months)</td>
</tr>
<tr>
<td>Age</td>
<td>65</td>
<td>69</td>
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</table>

Prospective randomized study: Shaft vs Stemless

ADVANTAGES STEMLESS HHR
Length of time of Surgery

Matched pair analysis
Significant reduction of length of surgery (20 Min) using the stemless implant > 17%

Habermeyer P et al. DVSE 2009
**STEMMED vs STEMLESS TSA**

**FUNCTIONAL RESULTS**

<table>
<thead>
<tr>
<th>Constant Score (P)</th>
<th>Pain</th>
<th>ADL</th>
<th>ROM</th>
<th>Strength</th>
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<tbody>
<tr>
<td>Stemmed</td>
<td>70</td>
<td>12</td>
<td>16</td>
<td>16</td>
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<tr>
<td>Stemless</td>
<td>73</td>
<td>13</td>
<td>16</td>
<td>16</td>
</tr>
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</table>

P > 0.05

**Assessment of RLL**

Habermeyer P 2010

**Radiological Results**

<table>
<thead>
<tr>
<th>Stress shielding</th>
<th>Stemless TSA</th>
<th>Stemmed TSA</th>
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<tbody>
<tr>
<td>Stress shielding</td>
<td>26.7%</td>
<td>47.1%</td>
</tr>
<tr>
<td>RLL humeral Component</td>
<td>0</td>
<td>0</td>
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<tr>
<td>No implant – related Complications</td>
<td></td>
<td></td>
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### DISCUSSION:
**COMPLICATIONS STANDARD STEM vs ECLIPSE**

<table>
<thead>
<tr>
<th>COMPLICATIONS</th>
<th>Stemmed Implants (Denard PJ JSES 2013, Young AA JBJS Am 2012, Raiss P JBJS Am 2014)</th>
<th>Eclipse</th>
</tr>
</thead>
<tbody>
<tr>
<td>RC-defects</td>
<td>up to 16.8%</td>
<td>14%</td>
</tr>
<tr>
<td>Loosening of the humeral component</td>
<td>0% - 2%</td>
<td>0%</td>
</tr>
<tr>
<td>Complication rate (without glenoid &amp; without RCT)</td>
<td>8%</td>
<td>7%</td>
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### CASE PRESENTATIONS

**POSTTRAUMTIC AVN**

F. A., 50 y

- 3 years after ORIF
- 1 year post-OP
- 5 years post-OP
- 7 years post-OP
POSTTRAUMATIC ARTHRITIS / AVN & RC at Risk

G.S., 46 y

POSTTRAUMATIC ARTHRITIS / AVN & RC at Risk

Eclipse & convertible glenoid

G.S., 46 y

Revision to RSA

REVISION TO RSA

• Failed Hemiarthroplasty by RC Defect