Metaphyseal Reverse Total Shoulder Arthroplasty without a stem - Long-Term Results With 5 - 11 Years Follow-Up

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Disclosure

- Innovative Design Orthopaedics (IDO) - Designing surgeon - Stocks, Royalties
- Collplant - Advisory Board - Stocks
- Minivasive - Advisory Board - Stocks
- Estar Medical - Advisory Board - Royalties
- Ceramtec - Consultant
- Stryker sport medicine - Consultant
- Associate Editor - J of Shoulder and Elbow Arthroplasty
- Assistant Editor - J of Shoulder and Elbow surgery
Reverse TSA

Reverse shoulder prostheses continue to gain popularity

2018

- > 60% of TSA are rTSA in USA, UK, Germany, Italy, Israel
- 73% in Australian NJR
- > 80% in France

Figure S11 Proportion of Primary Total Shoulder Replacement by Class

Revisions with longer and longer stems...
Less and less bone stock...

Only the tip of the Iceberg!

What next?

significant re-operation rate
22% reoperation for CTA

Zumstein JSES 2011

20% - 60% reoperation for RA and Revisions

Bolleau JSES 2005

Rates of revision rTSA are increasing

T. Bradley Edwards, ASES Closed meeting 2014

Courtesy of Prof. Frank Gohlke, Paris Course 2013
The patient’s (shoulder) life journey

Plan the patient’s life journey

Preserve all options for future revisions
Reverse shoulder arthroplasty with a cementless short metaphyseal humeral implant without a stem: clinical and radiologic outcomes in prospective 2- to 7-year follow-up study

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Verso Triple-finned stemless metaphyseal reverse prosthesis

2005 - 2019 >13 years of experience

Design principles

• Minimal bone resection - Bone preserving prosthesis

• Stemless metaphyseal fixation - cancellous bone only (No diaphyseal stem)

• Cementless fixation - Bone impaction technique
Between 2005 to December 2011 (5y - 11y FU) 172 consecutive shoulders that underwent rTSA with Verso rTSA were available to long term FU. 149 stemless metaphyseal implant and 23 with stemmed implant.

Mean FU 89 months (6.25 years) (range 60 - 138 Months)
41 M /131 F Mean age 74.3y (38-93y)
13 patients (26) - bilateral (staged) rTSA
50 of these were operated as revision arthroplasty:
  - 21 from stemmed implants to stemmed Verso rTSA
  - 29 to stemless rTSA
  - 3 of them from stemmed to stemless implant

Assessment:
Constant Score, SSV, Satisfaction, Radiological assessment & Video Clips

Results:
Mean Active range of movement improved from 53° to 130° elevation, 10° to 51° AER and 24° to 67° AIR reaching to the waist with the hand behind the back.
Change in Average Constant Score

Figures for period: 01/01/2005 to 31/12/2011

Operation Type: All, Prosthesis Type: Verso - Primary
Age Group of Patients: All Ages, Diagnosis: All, Diagnosis Sub Gp: None
Surgeon: All Surgeons

Change in Average Constant Score

<table>
<thead>
<tr>
<th>Time Period</th>
<th>Constant Score</th>
<th>Adj Constant Score</th>
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<tbody>
<tr>
<td>PreOp</td>
<td>15</td>
<td>22</td>
</tr>
<tr>
<td>Imm</td>
<td>44</td>
<td>60</td>
</tr>
<tr>
<td>PostOp</td>
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<td>54</td>
</tr>
<tr>
<td>3 Wks PostOp</td>
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<td>57</td>
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<td>6 Wks PostOp</td>
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<tr>
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<tr>
<td>6 Mths PostOp</td>
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<tr>
<td>3 Yrs PostOp</td>
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<tr>
<td>&gt; 5 years PostOp</td>
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( Full CS scores available for: 147 of 158 Operations done )

Change in Average Pain and ROM Score

<table>
<thead>
<tr>
<th>Time Period</th>
<th>Avg Pain score (A2)</th>
<th>Painless ROM (B4)</th>
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<tbody>
<tr>
<td>PreOp</td>
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<td>1 Yrs PostOp</td>
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<tr>
<td>2 Yrs PostOp</td>
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<tr>
<td>3 Yrs PostOp</td>
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<tr>
<td>&gt; 5 years PostOp</td>
<td>9</td>
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</tr>
</tbody>
</table>

Pain Score
0 = No pain
1 = Mild pain
2 = Mild pain
3 = Mild pain
4 = Mild pain
5 = Mild pain
6 = Moderate pain
7 = Moderate pain
8 = Moderate pain
9 = Moderate pain
10 = Moderate pain
11 = Severe pain
12 = Severe pain
13 = Severe pain
14 = Severe pain
15 = Unbearable pain

ROM Score
10 = Above Head
8 = Ear
6 = Neck
4 = Chest
2 = Waist
Complications:

Intra-operative: 2 undisplaced fracture of the humeral metaphysis, 1 glenoid fracture during preparation
- All healed @ 3m conservative Rx; No lucencies or loosening @ FU
No infection or other intra-operative complications

Early post-operative: 3 dislocations due: 1 pushed himself out of chair - 1 week po; 2 - due to an inferior osteophyte
1 Glenosphere disengaged from the baseplate - due to soft tissue interposition
- All re-operated: Osteophyte removed & liners realigned; Interposition removed & Glenosphere reinserted - All made good recovery

Late post-operative: 2 acromion# 2m po - full recovery with conservative Rx
6 Traumatic # scapular spine after a fall (2m, 2y, 2.5y, 6y, 7y and 8y po) - 3 operated with plating, 3 conservative Rx
- Made moderate recovery -no pain but limited function
4 Traumatic glenoid periprosthetic # after a fall (with well fixed glenoid): 1 refused further surgery, 1 conservative Rx, 2 revised with good outcome
8 Late traumatic humeral periprosthetic # after a fall: 6 treated conservatively - all healed with good function
2 displaced meta-diaphyseal periprosthetic # - revision to a stemmed rTSA

Complications:
Radiographic Results of the 172 rTSA:
No lucencies seen around the implants
No glenoid notching in 132 shoulders
Glenoid notching observed in 40 (23.2%) shoulders - appeared >1-2 years PO
- 34 (19.8%) of these were grade 1 or 2 (Nerot-Sirveaux) non progressive
- Only 6 cases of grade 3 glenoid notching (3.5%)

Verso metaphyseal rTSA without a stem
*with over 13 years of experience*

- No stress shielding
- No Humeral Subsidence
- No Loosening
- No Lysis of tuberosities

Stress shielding in Stemmed prostheses
Radiological signs of **stress shielding**
- 5.9% cemented
- 47% uncemented
Partial or complete resorption of the greater & lesser tuberosities
- GT 69% cemented
- LT 45% cemented
- 100% uncemented
- 76% uncemented


Long term FU of stemmed reverse TSA:
- 8.8% Humeral Subsidence
- 26% Stress Shielding
- 85% Lysis of tuberosities

Luc Favard ICL 12th ICSES, Japan 2013

Ascend Flex short stem
A high % radiolucency around the short-stem humeral components at short-term (<2y) follow-up

Radiographic evaluation of short-stem press-fit total shoulder arthroplasty: short-term follow-up

Cancellous fixation only
Return to work and sport activities

Most patients returned to their activities / work and sport and leisure activities

Preop 5y po revision to Verso
8 Patients sustaining late traumatic humeral peri-prosthetic fractures:
Which one would you prefer to treat?

- **6** treated conservatively - all healed with good function
- **2** displaced meta-diaphyseal periprosthetic fracture - revision to a stemmed rTSA
Limitations to use stemless (metaphyseal) prosthesis

- Acute proximal humeral fractures
- Nonunions
- Severe bone loss
- Revisions after stemmed prosthesis (?)

**Cementless Stemmed Verso rTSA**
for acute fractures and # dislocations, nonunions
Revision of stemmed prostheses

Low profile proximal prosthesis with places for attachment of the tuberosities
Conclusions

Stemless reverse TSA

• **Excellent long term (>13 years) clinical and radiologic results**
  
  • Bone preserving
  
  • Outstanding ROM (including AER & AIR)
  
  • Long survivorship
  
  • No loosening or subsidence
  
  • Better revise-ability