How to manage the failed osteosynthesis in proximal humerus fracture?

L Obert, E Beaudouin, A Khellafi, P Clappaz, S Rochet, A Adam, R Cermeno, T Lascar

Orthopedic, Traumatology, Plastic and Hand surgery Unit & CIC IT 808
University Hospital of Besancon - Besançon F25033
Medical & Pharmaceutic Faculty, University of Franche Comté
lobert@chu-besancon.fr
Conflict of Interest

FX Solution, Zimmer & Biomet, Medartis, Wright Evolutis
Introduction

Failed internal fixation …
produces many challenges with limited surgical options

Non union / Mal union …

F Duparc OTSR 2013
Screw penetration of the articular surface

Courtesy from T Lascar
Progressive fracture displacement / Loss of reduction
Avascular necrosis
What is the problem? What is the solution?
What is the problem?

ORIF: 24%  2/3 ... screw penetration  
Egol KA & al J Orthop Trauma. 2008

ORIF: 40%  ... 19% second surgery  

ORIF: 31%  Nail: 4% screw penetration  

ORIF: 37%  
Silverstein MP & al Bull Hosp Jt Dis 2013
Retrospective multi center study

\[ N = 232 \ « 4 part » \ fractures \]

<table>
<thead>
<tr>
<th></th>
<th>orthoP TT</th>
<th>Nail</th>
<th>Plate</th>
<th>Hemi</th>
<th>RTSA</th>
</tr>
</thead>
<tbody>
<tr>
<td>Follow up (months)</td>
<td>38</td>
<td>45</td>
<td>44</td>
<td>39</td>
<td>39</td>
</tr>
<tr>
<td>SSV (%)</td>
<td>75</td>
<td>75</td>
<td>75</td>
<td>66</td>
<td>75</td>
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<tr>
<td>EAA (°)</td>
<td>139°</td>
<td>132°</td>
<td>135°</td>
<td>112°</td>
<td>130°</td>
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<tr>
<td>Cst. pond. (%)</td>
<td>90</td>
<td>77</td>
<td>83</td>
<td>73</td>
<td>83</td>
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<tr>
<td>Cst. pond. &lt; 70%</td>
<td>24%</td>
<td>42%</td>
<td>27%</td>
<td>44%</td>
<td>21%</td>
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<tr>
<td>Necrosis (%)</td>
<td>20%</td>
<td>30%</td>
<td>29%</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Reop (%)</td>
<td>0%</td>
<td>13%</td>
<td>25% (15%)</td>
<td>3%</td>
<td>0%</td>
</tr>
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</table>
**Prospective multicenter study**  
**N = 152 « 4 part » fractures**

<table>
<thead>
<tr>
<th>orthoP TT</th>
<th>Nail</th>
<th>Plate</th>
<th>Hemi-arthro</th>
<th>Reversed</th>
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<tr>
<th>Follow up (months)</th>
<th>SSV (%)</th>
<th>EAA (°)</th>
<th>Cst pond. (%)</th>
<th>Cst pond. &lt; 70%</th>
<th>Reop (%)</th>
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<tr>
<td>11</td>
<td>72</td>
<td>133°</td>
<td>86</td>
<td>27%</td>
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<td>73</td>
<td>108°</td>
<td>69</td>
<td>57%</td>
<td>8%</td>
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<tr>
<td>10</td>
<td>71</td>
<td>122°</td>
<td>79</td>
<td>23%</td>
<td>22% (15%)</td>
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<tr>
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<td>94°</td>
<td>64</td>
<td>46%</td>
<td>0%</td>
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<tr>
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<td>69</td>
<td>111°</td>
<td>75</td>
<td>30%</td>
<td>6%</td>
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</tbody>
</table>

(dislocation)
How to Avoid

Selection of … Fracture & tools / patient & surgeon
How to avoid … ?
How to avoid: Fracture & bone?
How to Predict

Failed fixation associated with …

Number of fracture parts
Loss of medial cortex support
Older age, Osteoporosis
Bad reduction during the operation
Initial varus malreduction
Inadequate control of the length of screw
Improper rehabilitation

Jung SW & al J Orthop Trauma. 2015
Solution S

Hemi or RTSA ... ?
Tuberosities ? Cuff ? ... Age
Hemi

10 failed ORIF
HEMI / Uncemented locked stem
Good results

Ikram A & al  Open Orthop J. 2015
RTSA

53 failed ORIF

RTSA

44 reviewed / 2y of minimum FU

Constant score: 32% to 67%

RTSA

11 malunion or non union & 13 failed ORIF

RTSA

SPADI, ASES, UCLA, and Constant scores achieved significance

But …

Do control bone defect & height
Caution with cement … and hole
How frequent is the infection in case of REOP?
Uncemented … ?
Conclusion

Screw penetration
Secondary displacement
Necrosis
Choosing your type of treatment is …
Choosing the type of complications