Effect of chronic heavy smoking on proximal humerus fractures

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Target group

• Osteomyelitis
• Delayed union
• Non-union

• Limited studies
• **Retrospective comparative study**
• Chronic heavy smoking
• Closed proximal humerus fracture
Study design

- 5-Year period, 1752 patients
- Chronic heavy smoking
- No hormonal disorders
- No medications affecting metabolism
- Given advice to stop smoking

118 met the inclusion criteria

- Comparative arm: age, sex, Neer, Rx requirements, closed fractures, non-smokers
Outcome factors

• **Primary**
  - Time to fracture union
  - Time to wound healing

• **Secondary**
  - Postoperative complications (pain, bleeding, swelling, infection, non-union, mal union, delayed union, compartment syndrome and neurovascular impairment)
  - Satisfactory RoM at 4 weeks
  - Mobility at last R/V (same before injury, worse)
Results

• CHS group
  - 31 males
  - 87 females
  - 57 years
  - 14 had ORIF

• Control group
  - 45 males
  - 73 females
  - 46 years
  - 10 had ORIF

One-part, two-part, three-part or four-part fracture and their displacements >1cm or >45°
<table>
<thead>
<tr>
<th>Primary outcomes</th>
<th>CHS</th>
<th>CHS</th>
<th>CHS</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Conservative</td>
<td>Surgical</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Time to wound healing</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Mean (weeks)</td>
<td>6</td>
<td>6</td>
<td>7</td>
<td>2</td>
</tr>
<tr>
<td>Minimum-Maximum</td>
<td>3-8</td>
<td>3-7</td>
<td>3-8</td>
<td>1-2</td>
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<tr>
<td>Standard deviation</td>
<td>±2</td>
<td>±2</td>
<td>±2</td>
<td>±1</td>
</tr>
<tr>
<td><strong>Time to union</strong></td>
<td></td>
<td></td>
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<tr>
<td>Mean (weeks)</td>
<td>12</td>
<td>11</td>
<td>14</td>
<td>9</td>
</tr>
<tr>
<td>Minimum-Maximum</td>
<td>10-19</td>
<td>10-15</td>
<td>12-19</td>
<td>7-10</td>
</tr>
<tr>
<td>Standard deviation</td>
<td>±2</td>
<td>±1</td>
<td>±2</td>
<td>±1</td>
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<td>Secondary outcomes</td>
<td>CHS group</td>
<td>Control</td>
<td>CHS vs. C</td>
<td>CHS vs. C</td>
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<td>-----------------------------</td>
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</tr>
<tr>
<td></td>
<td>n=118</td>
<td>n=118</td>
<td>Pearson</td>
<td>Fisher</td>
</tr>
<tr>
<td>Pain (4w)</td>
<td>22</td>
<td>6</td>
<td>&lt;.001**</td>
<td>.002*</td>
</tr>
<tr>
<td>Bleeding (oozing) (4w)</td>
<td>2</td>
<td>0</td>
<td>-</td>
<td>-</td>
</tr>
<tr>
<td>Swelling (4w)</td>
<td>14</td>
<td>4</td>
<td>&lt;.001**</td>
<td>.002*</td>
</tr>
<tr>
<td>Infection- superficial</td>
<td>6</td>
<td>3</td>
<td>.002*</td>
<td>.003*</td>
</tr>
<tr>
<td>Infection - deep</td>
<td>12</td>
<td>4</td>
<td>&lt;.001**</td>
<td>.003*</td>
</tr>
<tr>
<td>Mal union</td>
<td>2</td>
<td>1</td>
<td>0.242</td>
<td>0.321</td>
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<td>Delayed union</td>
<td>24</td>
<td>5</td>
<td>&lt;.001**</td>
<td>.002*</td>
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<tr>
<td>Non union</td>
<td>5</td>
<td>1</td>
<td>.002*</td>
<td>.005*</td>
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<tr>
<td>Neuro impairment</td>
<td>2</td>
<td>0</td>
<td>-</td>
<td>-</td>
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<tr>
<td>Comp. syndrome</td>
<td>0</td>
<td>0</td>
<td>-</td>
<td>-</td>
</tr>
</tbody>
</table>
Pain (4w)  |  Bleeding (oozing) (4w)  |  Swelling (4w)  |  Infection - superficial  |  Infection - deep  |  Mal union  |  Delayed union  |  Non union  |  Neuro impairment  |  Comp. syndrome

Number of patients:
- Pain (4w): 25
- Bleeding (oozing) (4w): 5
- Swelling (4w): 10
- Infection - superficial: 5
- Infection - deep: 15
- Mal union: 5
- Delayed union: 20
- Non union: 10
- Neuro impairment: 2
- Comp. syndrome: 0

Legend:
- Treatment cohort
- Control cohort
<table>
<thead>
<tr>
<th>Secondary outcomes II</th>
<th>CHS</th>
<th>Control</th>
</tr>
</thead>
<tbody>
<tr>
<td>Satisfactory RoM (4w)</td>
<td>96</td>
<td>103</td>
</tr>
<tr>
<td>Mobility at last R/V</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Same to before injury</td>
<td>92</td>
<td>109</td>
</tr>
<tr>
<td>Dependent – worse</td>
<td>14</td>
<td>6</td>
</tr>
</tbody>
</table>
Effect of smoking

• Blood vessels lining
• Lipids level in the blood

• Many pathologies
• Atheroma formation

• Long-term excessive smoking
• Blood supply (reduced oxygenation)
  • Delayed union
  • Poor wound healing
  • Other complications
Conclusion

• Chronic heavy smokers
• Delayed fracture union
• **Surgical fixation**: poor wound healing, postoperative pain and deep surgical infection.

• Smoking cessation programmes
Thank you

Questions?