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>Time to wound healing</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>
</tr>
<tr>
<td>Standard deviation</td>
<td>±2</td>
<td>±2</td>
<td>±2</td>
<td>±1</td>
</tr>
<tr>
<td>Time to union</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<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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<tr>
<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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<tr>
<td>----------------------------------</td>
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<td>---------</td>
<td>-----------</td>
<td>-----------</td>
</tr>
<tr>
<td>Pain (4w)</td>
<td>22</td>
<td>6</td>
<td>&lt;.001**</td>
<td>.002*</td>
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<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>
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<tr>
<td>Infection - deep</td>
<td>12</td>
<td>4</td>
<td>&lt;.001**</td>
<td>.003*</td>
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<tr>
<td>Mal union</td>
<td>2</td>
<td>1</td>
<td>0.242</td>
<td>0.321</td>
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<tr>
<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>
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</table>
Pain (4w)
Bleeding (oozing) (4w)
Swelling (4w)
Infection - superficial
Infection - deep
Malunion
Delayed union
Nonunion
Neuroimpairment
Comp. syndrome

Number of patients

Treatment cohort vs Control cohort
<table>
<thead>
<tr>
<th>Secondary outcomes II</th>
<th>CHS</th>
<th>Control</th>
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</thead>
<tbody>
<tr>
<td>Satisfactory RoM (4w)</td>
<td>96</td>
<td>103</td>
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<tr>
<td>Mobility at last R/V</td>
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<td></td>
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<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?