Cigarette Smoking Increases Complication Rate in Forefoot Surgery

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Background

- Negative effects cigarettes are known
  - Carbon monoxide reduces oxygen available to tissues
  - Cyanide interferes with cellular metabolism
  - Negatively impacts immune response
  - Microclotting and decreased microcirculation

- Cigarette smoking increases perioperative complications
  - 40% vs 8% pseudoarthrosis rate lumbar fusion (Brown et al)
  - 18.6% vs 7.1% nonunion in hindfoot fusions (Ishikawa et al.)

- No data on effect in forefoot surgery
Methods

- Retrospective review 2008–2010

- 633 patients underwent forefoot surgery
  - Smoking status determined in 602 (95%)
  - Grouped according to smoking status

- Outcome measures
  - Nonunion
  - Infection
  - Delayed wound healing
  - Delayed union
  - Persistent pain

- Statistics
  - Complication Rate
  - Power analysis
  - Chi-Square/Fisher’s Exact
## Comorbidities

<table>
<thead>
<tr>
<th>% Comorbidities</th>
<th>Group</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>I - Never</td>
<td>II - Stopped</td>
</tr>
<tr>
<td>DM</td>
<td>8.3</td>
<td>16.5</td>
</tr>
<tr>
<td>Neuropathy</td>
<td>1.3</td>
<td>10.1</td>
</tr>
<tr>
<td>RA</td>
<td>8.5</td>
<td>11.4</td>
</tr>
<tr>
<td>Steroids</td>
<td>2.0</td>
<td>3.8</td>
</tr>
</tbody>
</table>
Results

Total Complication Rate Due to Cigarette Smoking

<table>
<thead>
<tr>
<th>Group</th>
<th>Complication Rate (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>I - Never</td>
<td>8.53</td>
</tr>
<tr>
<td>II - Stopped</td>
<td>16.46</td>
</tr>
<tr>
<td>III - Continued</td>
<td>36.36</td>
</tr>
</tbody>
</table>
## Complications

<table>
<thead>
<tr>
<th>% Comlications</th>
<th>Group</th>
<th>P-value</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>I - Never</td>
<td>II - Stopped</td>
</tr>
<tr>
<td>Delayed union</td>
<td>0.4</td>
<td>2.5</td>
</tr>
<tr>
<td>Nonunion</td>
<td>0.2</td>
<td>2.5</td>
</tr>
<tr>
<td>Infection</td>
<td>2.0</td>
<td>1.3</td>
</tr>
<tr>
<td>Delayed wound healing</td>
<td>1.1</td>
<td>1.3</td>
</tr>
<tr>
<td>Persistent Pain</td>
<td>3.94</td>
<td>5.06</td>
</tr>
</tbody>
</table>
Results

Cigarette Smoking Increases Complication Rate in Forefoot Surgery

Percent (%)

Group

I - Never
II - Stopped
III - Continued

Persistent Pain
Delayed Wound Healing
Infection
Nonunion
Delayed Union

Campbell Clinic
ORTHOPAEDICS
Results

<table>
<thead>
<tr>
<th>% Complications</th>
<th>Relative Risk to Group I</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Group II</td>
</tr>
<tr>
<td>Delayed union</td>
<td>5.8</td>
</tr>
<tr>
<td>Nonunion</td>
<td>11.6</td>
</tr>
<tr>
<td>Infection</td>
<td>0.6</td>
</tr>
<tr>
<td>Delayed wound healing</td>
<td>1.2</td>
</tr>
<tr>
<td>Persistent Pain</td>
<td>1.3</td>
</tr>
<tr>
<td>Total</td>
<td>1.9</td>
</tr>
</tbody>
</table>
Discussion

- Persistent pain largest complication
  - Independent complication
  - Possible elevated proinflammatory mediators in smokers may amplify pain (O’Loughlin et al.)
  - Increased prevalence chronic back pain in smokers (Shiri et al.)
Discussion

- 11% smoking population vs 20% CDC statistics
  - Underestimate vs overestimate effect

- Group II duration cessation
  - Median 17 years
  - No correlation to complication rate

- Group III quantity of cigarettes used
  - Without complication 0.69 ppd
  - With complication 0.88 ppd

CDC smoking rates in adults per state
Conclusion

- Cigarette smoking increases risk of complications

- Educate patients pre-operatively, document
  - CPT 99406 – smoking and cessation counseling 3–10min
  - CPT 99407 – >10 min
  - ICD-9 305.1 – Tobacco use disorder
  - Document resources provided

- Counsel on smoking cessation, coordinate with PCP

![smokefree.gov banner](image)
Thank You
References

- Brown CW, Orme TJ, Richardson HD. The rate of pseudoarthrosis (surgical nonunion) in patients who are smokers and patients who are nonsmokers: a comparison study. Spine. 1995; 11:942–943

- Ishikawa SN, Murphy GA, Richardson EG. The effect of cigarette smoking on hindfoot fusions. Foot Ankle Int. 2002;23:996–998

