Open tibial Fractures 6 hour rule

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Introduction

• Tibia common site
• Open fractures ~ 11.5/100,000 people annually (Giannoudis 2006)
• Gustilo classification
Open fractures

- Goal is prevention of infection, restoration of function and bone union
- Injury type (Gustillo) and treatment affect outcome
- 6 hours to theatre – “to be, or not to be”? 
It’s the law!

- Timing of surgery is paramount (Gustilo 1990)
- Debridement within 6 hours is necessary to keep the rate of infection low (Patel 2009)
- The patient should be transferred to the operating theatre as soon as possible and certainly within 6 hours (Johnson 2008, Court Brown 1997)
Evidence?

• Much of what we do in orthopaedics is not proven clinically.
• <6 hrs better outcome proven in guinea pigs! (Tripuraneni 2008)
• 6 hour rule is not required?! “Methodologically rigorous studies that adjust for confounding factors … and account for all patients at follow-up are needed to confirm these results” (Sungaran 2007)
Argument...

• The recent evidence suggests that there is no significance between <6hrs and >6hrs. confounding factors e.g. surgeon grade and experience, theatre staff, patient physiology.
Bacterium growth

- size / length growth,
- new cell wall grows through the centre forming two daughter cells
- Same genetics
- may divide (correct environment) into four in 20 minutes
- Exponential growth! (http://www.cellsalive.com/ecoli.htm)
Importance of 6 hours to theatre?

- IV ABX
- Irrigation and removal of contamination
- Correct surgical team at appropriate time
- Thorough debridement, washout and fixation as soon as possible.
- Earlier the better!
Why 6 hours?

• Debridement well established
• Friedrich - improved results if before 6h
  – Guinea Pigs
• Kindsfater ¹ significant increase in infection

• J Orthop Trauma 1995;9:121-7
1993/7 BAO/BAPS guidelines

• ‘the first orthopaedic procedure [should be] undertaken within 6 hours of injury’
<table>
<thead>
<tr>
<th>Study</th>
<th>Patients</th>
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<tbody>
<tr>
<td>Merritt 1988</td>
<td>70 patients</td>
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<tr>
<td>Patzakis 1989</td>
<td>1100</td>
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<td>Bednar 1993</td>
<td>82</td>
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<td>Harley 2001</td>
<td>215</td>
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<td>Khatod 2003</td>
<td>191</td>
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<tr>
<td>Ashford 2004</td>
<td>48</td>
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<td>Spencer 2004</td>
<td>142</td>
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<td>Pollak 2010</td>
<td>315</td>
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</tbody>
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Children

- Kreder 1995  56
- Skaggs 2000  104
- Skaggs 2005  554
Earlier the better?

- NCEPOD 2003
- ‘the way we operate’
For/against

- Historical perspective
- 1 statistically significant human study (47 pax)
- 1 statistically significant guinea pig study
- 9 Level 2 studies over 30y >2500 patients
- no significant infection difference
So, what does matter?

- Gustilo grade
- Adequacy of debridement
- (Early) use of antibiotics
• Scheduled trauma list in normal hours

• ‘The 6 hour rule does not apply for solitary open fractures’