Orthopaedic trauma in children – are they just small adults?

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There are differences from adults

- Big head
- Special bones
- Growth plates
- Remodeling of deformity
- Progressive deformity
- Fixation is different
- Rapid healing
- Non-accidental trauma
- Need to go back to school
- Children are dependant
Proportions vary by age

IDEAL PROPORTION AT VARIOUS AGES

Adult = 8 heads tall, with a head size of 9 inches
15 year old = 7 1/2 heads tall with a head size of 9 inches
10 year old = 7 heads tall with a head size of 7 1/2 inches
5 years old = 6 heads tall with a head size of 7 inches
3 years old = 5 heads tall with a head size of 6 1/2 inches
1 year old = 4 heads tall with a head size of 6 inches

Another way to look at it:

- In adults and children, the ratio of the trunk to the total height is about 3/8.
- However, at birth the head is about a quarter of the total height, whereas in the usual adult, the head is an eighth of the total height.
- In kids the legs are short

http://www.dace.co.uk/proportion_child
Big head causes supine neck flexion
Kids bones are special

Bendable bones
Growth plates
Remodeling of deformity
Progressive deformity
Small size
Internal fixation is different
Rapid healing

http://www.spoilheap.co.uk/pics/infant.jpg
Bendable bones

http://www.worldoforthopedics.com/tag/bent-bone/

Growth plates

http://www.eurogrow.net/eug/Project+Information/Objectives
Normal Growth

http://www.growtaller.net/index.html#device
Bone growth

Bones start out small

They grow in length and width

Bones stop growing in adulthood

Remodeling of deformity

Injury

Healing

Remodeled
Fractures of growth plates

http://www.vetsurgerycentral.com/growth_plate.htm
Progressive deformity

Leg-length discrepancy

http://www.theuniversityhospital.com/limblength/tech.htm
Injury
Distal femur is “smashed”

CT Scan:
The medial growth plate is damaged

Post op:
The fracture is put back together
Small Size


http://www.keggioorthosurgery.com/images/image2.jpg
Pins and wires

For children, less is more

http://www.e-radiography.net/articles/Fractures
Nails?

http://www.pedsortho.net/images/broken-bones-femur-older-than-8.jpg

http://www.aaos.org/news/aaosnow/aug09/clinical14-1.gif
## Rapid healing

<table>
<thead>
<tr>
<th>Bone Location</th>
<th>Adult</th>
<th>Teen</th>
<th>Juvenile</th>
<th>Infant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Femur</td>
<td>12</td>
<td>6</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Forearm</td>
<td>6-8</td>
<td>5</td>
<td>4</td>
<td>2</td>
</tr>
<tr>
<td>Humerus</td>
<td>6</td>
<td>4</td>
<td>3</td>
<td>1-2</td>
</tr>
</tbody>
</table>

Casts for Kids?
Non-accidental trauma


http://www.radiologyassistant.nl

http://looneytunes09.wordpress.com/2011/03/31/child-abuse-should-be-prevented-every-month/

http://www.radiologyassistant.nl
• Fractures of long bones in infants
• Skull fractures in infants
• Multiple fractures in various stages of healing
• Associated bruises, cigarette burns or filth
• Stories that change or don’t add-up
Kids need to go back to school

Kids are dependant

- They can’t take care of themselves
- They usually don’t give their own history
- They don’t follow direction
- They can’t limit their level of activity

All are unemployed and none vote


http://opinion-forum.com/index/2011/04/too-bad-kids-can%E2%80%99t-vote/
The Message

• Kids are different from adults

http://news-liteimgs.s3.amazonaws.com/100114_tallshort.jpg