Avascular Necrosis after Supracondylar Fractures of the Humerus in Children: Report of 5 cases

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【Introduction】
Supracondylar fractures of the humerus are the most common fractures in children.

Avascular necrosis (AVN) after supracondylar fracture of the humerus is a rare but important complication. We report 5 cases with suspicion of AVN after supracondylar fracture of the humerus.

<table>
<thead>
<tr>
<th>Major complication</th>
<th>Neurovascular damage</th>
<th>Varus elbow deformity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Minor complication</td>
<td>Avascular necrosis of the humerus</td>
<td></td>
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</tbody>
</table>

【Case presentation】

◆ Case 1
3y.o girl, Gartland type III
She was treated with closed reduction and pinning. The radiolucent area of the medial condyle of the humerus appeared at the X ray check-up a year after the surgery. MRI showed AVN of the trochlea. The range of motion of her elbow, but slight motion pain was remaining.

◆ Case 2
7y.o boy, Gartland type III
He was treated with open reduction and pinning. 6 months after the surgery, the radiolucent area of the medial condyle of the humerus appeared. He had full range of motion and no pain.

◆ Case 3
7y.o girl, Gartland type III
She was a apparatus gymnastics player. She was treated with closed reduction and pinning. The radiolucent area of the medial condyle of the humerus appeared 6 months after the surgery. Avascular necrosis was suspected at the CT and MRI but she now have full range of motion and participates in gymnastics without pain.

【Discussion】
Complications after supracondylar fractures of the humerus

◇ Vascular injury (1.0% : type III 10-20%)
◇ Volkmann contracture (<0.5%)
◇ Nerve injury (10-20%)
◇ Cubitus Varus
◇ Osteonecrosis

【Conclusion】
Our cases had no clinical symptoms, but AVN of the trochlea is a rare complication and should be considered in late presentation of pain or loss of motion after treatments of supracondylar fractures of the humerus.

Long-term follow-up would be necessary in the treatments of supracondylar fractures of the humerus in children.

Table: Gartland classification, Treatment, Follow-up

<table>
<thead>
<tr>
<th>Gartland classification</th>
<th>Treatment</th>
<th>Follow-up</th>
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<tbody>
<tr>
<td>1</td>
<td>3y.o girl</td>
<td>pinning</td>
</tr>
<tr>
<td>2</td>
<td>7y.o boy</td>
<td>open reduction &amp; pinning</td>
</tr>
<tr>
<td>3</td>
<td>7y.o girl</td>
<td>pinning</td>
</tr>
<tr>
<td>4</td>
<td>5y.o boy</td>
<td>casting</td>
</tr>
<tr>
<td>5</td>
<td>5y.o boy</td>
<td>casting</td>
</tr>
</tbody>
</table>

Retrospective data were collected for the patients with supracondylar fractures of the humerus treated at our hospital and our affiliated hospitals from 2001 to 2015.

【Avascular Necrosis of Trochlea after Supracondylar Humerus Fractures in Children】

Etiel et al. reported this complication are caused by the loss of blood supply of the trochlea and seen in displaced fractures but also in nondisplaced fractures.

In displaced fractures, the medial and/or lateral vessels are injured, leading to Gartland type A or type B deformity.

In nondisplaced fractures, the lateral vessels are affected. The lateral vessels may be interrupted by tamponade caused by encased fracture hematoma.

Rockwood and Wilkins' Fractures in Children