The Internal Diameter of the Radius and Ulna in Korean Children
- in regarding intramedullary fixation of forearm bone fractures

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Introduction

- Flexible intramedullary nailing is the prevailing method in these days.
- But sometimes the ready-made nail might not be passable due to the diameter of the bone, with the risk of making fracture gap or comminution by jamming, resulting in poor results.
- We studied the inner diameter of the radius and ulna of children along with their age in relation to the width of the nail.

Materials and Methods

- 208 cases of normal forearm bone x-ray, on the narrowest inner diameter, on the AP view with 5 times magnification, by 3 examiners respectively
- M : F = 156 : 52
- Age : 11.1 (6 – 19) years

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- Including: all the patient visiting the institute for getting examined on their forearms with x-ray
- * in cases of fx, contralateral x-ray was used.
- Exceptions: any disease affecting on their bone diameter, such as congenital anomaly or metabolic disease

Results

- Demography of the patients

<table>
<thead>
<tr>
<th>Age Group</th>
<th>Male</th>
<th>Female</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>6-9 years</td>
<td>54</td>
<td>24</td>
<td>78</td>
</tr>
<tr>
<td>10-14 years</td>
<td>73</td>
<td>18</td>
<td>91</td>
</tr>
<tr>
<td>15-19 years</td>
<td>29</td>
<td>10</td>
<td>39</td>
</tr>
<tr>
<td>Total</td>
<td>156</td>
<td>52</td>
<td>208</td>
</tr>
</tbody>
</table>

- Minimum inner diameter passable for 2.0mm ready-made nail with 30° curved tip: 3.5mm (provided by the manufacturer)

- Average internal diameters of forearm bones:
  - The inner diameter of bones get larger with growth. And especially the radius of young children has significantly narrower internal diameter than that of the old.

- In boys(A), the 67% (1SD) of the population would grow to the passable diameter in the radius by the age of 12.6 years. In girls(B), the age comes to 15.1 years.

Conclusions

1. Occasionally the ready-made flexible nail would be thicker than passable diameter of both forearm bones, and have limitation in their use.
2. Surgeon should think of the appropriate thickness of the nail in careful preoperative planning.